Innovating for improved healthcare

Policy and practice for a thriving NHS

Annexes

Sonja Marjanovic, Marlene Altenhofer, Lucy Hocking, Molly Morgan Jones, Sarah Parks, Ioana Ghiga, Carla Cox, Katerina Galai & Tom Ling
## Table of contents

List of figures ........................................................................................................................................ v
List of tables ........................................................................................................................................... viii
List of boxes .......................................................................................................................................... ix

**Annex A. Prioritisation survey insights** ........................................................................................................... 1  
A.1. Summary ............................................................................................................................................... 1  
A.2. Introduction ........................................................................................................................................... 3  
A.3. Methodology ........................................................................................................................................... 3  
A.4. Results ................................................................................................................................................... 5  
A.5. Appendix to Annex A: stakeholder figures ....................................................................................... 46  

**Annex B. Stakeholder interview insights** ..................................................................................................... 105  
B.1. Summary ............................................................................................................................................ 105  
B.2. Introduction ......................................................................................................................................... 107  
B.3. Methodology ....................................................................................................................................... 108  
B.4. Stakeholder distribution ....................................................................................................................... 109  
B.5. Knowledge of health innovation and related policies ......................................................................... 111  
B.6. Supporting health innovation to be more meaningful – insights across the system and innovation drivers .............................................................................................................. 123  
B.7. Insights gained from discussion of specific Accelerated Access Review recommendations and associated policy initiatives ........................................................................................................... 144  
B.8. Appendix to Annex B: interview protocols ........................................................................................ 171  

**Annex C. Case vignettes** ............................................................................................................................ 185  
C.1. Summary ............................................................................................................................................ 185  
C.2. Introduction ......................................................................................................................................... 187  
C.3. High-Sensitivity Troponin Assays ....................................................................................................... 189  
C.4. Remote cardiac monitoring devices ..................................................................................................... 193  
C.5. One-step nucleic acid amplification (OSNA) for sentinel lymph node intra-operative molecular analysis in breast cancer ...................................................................................................... 200  
C.6. Prostatic urethral lift for treating benign prostatic hyperplasia (UroLift®) ........................................ 210  
C.7. Drug-eluting stents ............................................................................................................................ 215  
C.8. Kooth ................................................................................................................................................. 221  
C.9. Sleepio .............................................................................................................................................. 229  
C.10. MoodGYM .................................................................................................................................... 238  
C.11. NHS Blood Donor Chair ..................................................................................................................... 244  
C.12. Cascade model for genetic testing of Familial Hypercholesterolemia .................................................. 249  
C.13. ENDOCUFF VISION™ ..................................................................................................................... 255  
C.15. SecurAcath ...................................................................................................................................... 269  
C.16. HeartFlow FFR\textsubscript{CT} Analysis .............................................................................................. 277  
C.17. Appendix to Annex C: case vignette interview protocols ................................................................. 286
List of figures

Figure A.1: Breakdown of stakeholder types for all survey respondents ........................................ 6
Figure A.2: Breakdown of healthcare professionals and providers ................................................... 7
Figure A.3: Breakdown of innovation and improvement networks ................................................... 7
Figure A.4: Respondents’ declared genders .................................................................................... 8
Figure A.5: Breakdown of stakeholder types for respondents who answered questions on skills, capabilities and leadership ................................................................. 9
Figure A.6: The percentage of respondents to the skills, capabilities and leadership impact question that chose each initiative ........................................................................................................ 11
Figure A.7: The average sustainability and scalability rating of each initiative ................................ 12
Figure A.8: Breakdown of stakeholder types for respondents who answered questions on motivations and accountabilities ........................................................................................................ 13
Figure A.9: The percentage of respondents to the motivations and accountabilities impact question that chose each initiative ........................................................................................................ 13
Figure A.10: The average sustainability and scalability rating of each initiative ................................ 15
Figure A.11: Breakdown of stakeholder types for respondents who answered questions on the information and evidence environment ........................................................................ 16
Figure A.12: The percentage of respondents to the information and evidence environment impact question that chose each initiative ........................................................................................................ 17
Figure A.13: The average sustainability and scalability rating of each initiative ................................ 19
Figure A.14: Where respondents go for information on innovation needs, opportunities and evidence on impact .................................................................................................................... 20
Figure A.15: Breakdown of stakeholder types for respondents who answered questions on relationships and networks .................................................................................................................... 22
Figure A.16: The percentage of respondents to the relationships and networks impact question that chose each initiative .................................................................................................................... 27
Figure A.17: The average sustainability and scalability rating of each initiative ................................ 29
Figure A.18: Breakdown of stakeholder types for respondents who answered questions on patient and public involvement and engagement ........................................................................ 30
Figure A.19: The percentage of respondents to the PPIE impact question that chose each initiative .................................................................................................................... 32
Figure A.20: The average sustainability and scalability rating of each initiative ................................ 34
Figure A.21: Where respondents think members of the public and patients go to access information on innovation-related needs, developments and opportunities ........................................................................ 36
Figure A.22: Breakdown of stakeholder types for respondents who answered questions on funding and commissioning .................................................................................................................... 39
Figure A.23: The percentage of respondents to the funding and commissioning impact question that chose each initiative .................................................................................................................... 41
Figure A.24: The average sustainability and scalability rating of each initiative ................................ 42
Figure A.25: Percentage of respondents who associate particular funding sources with innovation funding ........................................................................................................................................ 43
Figure A.26: The percentage of respondents from different stakeholder types that chose each action targeting skills, capabilities and leadership: a) innovation and improvement networks;
b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.27: The percentage of respondents from different stakeholder types that chose each action targeting motivations and accountabilities: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.28: The percentage of respondents from different stakeholder types that chose each action targeting the information and evidence environment: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.29: The percentage of respondents from different stakeholder types that chose each action targeting relationships and networks: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.30: The percentage of respondents from different stakeholder types that chose each action targeting patient and public involvement and engagement: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.31: The percentage of respondents from different stakeholder types that chose each action targeting funding and commissioning: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.32: Where respondents go for information on innovation needs, opportunities and evidence on impact: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.33: Where respondents say patients go for information on innovation: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure A.34: Percentage of respondents from each stakeholder group who associate particular funding sources with innovation funding: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Figure C.1: Illustration of the functionality of a remote cardiac monitoring device

Figure C.2: OSNA

Figure C.3: UroLift® system treatment steps

Figure C.4: Drug-eluting stent

Figure C.5: Interface of Kooth’s mobile phone version

Figure C.6: Sleepio programme on a smartphone

Figure C.7: Interface of MoodGYM

Figure C.8: Renfrew Group Blood Donor Chair

Figure C.9: Diagram showing how a family pedigree would be developed by an FH nurse and who would be tested

Figure C.10: ENDOCUFF VISION™
Figure C.11: Interface of CHC2DST .................................................................................................. 261
Figure C.12: Insertion of SecurAcath .................................................................................................. 271
Figure C.13: Inserted SecurAcath device ............................................................................................. 271
Figure C.14: 3D model of HeartFlow FFR_{CT} Analysis........................................................................ 279
Figure G.1: Trends in the levels of uptake of grouped medicines ....................................................... 368
Figure G.2: Average marginal effects with 95% confidence intervals (quarter 8) ............................ 371
Figure G.3: Average marginal effects with 95% confidence intervals (any period) ....................... 371
Figure H.1: Overview of work streams and methods used in Phase 1 and Phase 2 of this study........ 385
List of tables

Table A.1: Examples of where respondents go for information on innovation needs, opportunities and evidence on impact ........................................................................................................... 23
Table A.2: Examples of where respondents think patients go to access information on innovation-related needs, developments and opportunities ................................................................. 37
Table B.1: Breakdown of stakeholder groups for thematic interviews ........................................... 109
Table C.1: National data on side effects associated with blood donation ........................................ 247
Table D.1: Overview of the stakeholder-specific workshops .............................................................. 295
Table F.1: Types of impact and associated metrics for system readiness and capability for innovation ...................................................................................................................... 352
Table G.1: NHS England CCG Assurance Framework categorisation .............................................. 359
Table G.2: Uptake of individual medicines – summary statistics ................................................... 362
Table G.3: CCG and population characteristics – summary statistics (n=209 CCGs) .................... 364
Table G.4: Uptake of groups of medicines – summary statistics (n=209 CCGs) ................................ 365
Table G.5: Means and standard deviation of grouped medicines across quarters (DDD per 100,000 resident population) ........................................................................................................ 367
Table G.6: Relationship between CCG and population characteristics, and the decision to partake in innovative prescribing .................................................................................................. 369
Table G.7: Relationship between CCG and population characteristics, and the level of uptake .... 372
Table G.8: Relationship between CCG and population characteristics, and growth in uptake ........ 374
Table G.9: Relationship between CCG and population characteristics, and relative growth in uptake in grouped medicines ........................................................................................................ 376
Table G.10: Relationship between CCG and population characteristics, and absolute growth in uptake in grouped medicines .................................................................................................... 378
Table G.11: Relationship between CCG and population characteristics, and uptake in grouped medicines ...................................................................................................................................... 380
Table G.12: Relationship between CCG and population characteristics, and logarithmic value of uptake in grouped medicines .................................................................................................. 382
Table H.1: Breakdown of contributions by stakeholder group (Phase 1 and Phase 2) ....................... 386
Table H.2: Breakdown of stakeholder groups for all survey respondents ........................................ 391
Table H.3: Breakdown of stakeholder groups for thematic interviews ........................................... 393
Table H.4: Breakdown of interviews per stakeholder group for the case vignettes ......................... 396
Table H.5: Overview of the stakeholder-specific workshops .............................................................. 398
<table>
<thead>
<tr>
<th>Box</th>
<th>Key messages</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.1</td>
<td>Key messages – High-Sensitivity Troponin Assays</td>
<td>189</td>
</tr>
<tr>
<td>C.2</td>
<td>Key messages – Remote cardiac monitoring devices</td>
<td>193</td>
</tr>
<tr>
<td>C.3</td>
<td>Key messages – One-step nucleic acid amplification (OSNA)</td>
<td>200</td>
</tr>
<tr>
<td>C.4</td>
<td>Key messages – Prostatic urethral lift for treating benign prostatic hyperplasia (UroLift)</td>
<td>210</td>
</tr>
<tr>
<td>C.5</td>
<td>Key messages – Drug-eluting stents</td>
<td>215</td>
</tr>
<tr>
<td>C.6</td>
<td>Key messages – Kooth</td>
<td>221</td>
</tr>
<tr>
<td>C.7</td>
<td>Key messages – Sleepio</td>
<td>229</td>
</tr>
<tr>
<td>C.8</td>
<td>Key messages – MoodGYM</td>
<td>238</td>
</tr>
<tr>
<td>C.9</td>
<td>Key messages – NHS Blood Donor Chair</td>
<td>244</td>
</tr>
<tr>
<td>C.10</td>
<td>Key messages – Cascade model for genetic testing of Familial Hypercholesterolemia</td>
<td>249</td>
</tr>
<tr>
<td>C.11</td>
<td>Key messages – ENDOCUFF VISION™</td>
<td>255</td>
</tr>
<tr>
<td>C.12</td>
<td>Key messages – Continuing Healthcare Checklist and the Decision Support Toolkit (CHC2DST)</td>
<td>260</td>
</tr>
<tr>
<td>C.13</td>
<td>Key messages – SecurAcath</td>
<td>269</td>
</tr>
<tr>
<td>C.14</td>
<td>Key messages – HeartFlow FFR&lt;sub&gt;CT&lt;/sub&gt; Analysis</td>
<td>277</td>
</tr>
<tr>
<td>D.1</td>
<td>Considerations for a PPIE strategy</td>
<td>320</td>
</tr>
</tbody>
</table>
Annex A. Prioritisation survey insights

A.1. Summary

**Aims**

- A prioritisation survey was conducted to help identify what stakeholders in the health system consider to be the priority interventions for supporting an innovative health system (be they existing support mechanisms or to support capacity-building).
- Stakeholders were consulted on the potential impact, sustainability and scalability of initiatives and interventions seeking to enable the development and uptake of innovation in the health system. The focus was on different interventions intended to support key drivers of innovation.1

**Design and implementation**

- The survey, which was open for 7.5 weeks (13 June 2017 to 4 August 2017), examined six drivers of innovation in the health system identified by Marjanovic, Sim et al. (2017a, 2017b): skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning.
- For each driver/theme, respondents were asked to choose (from a longlist) three innovation-related initiatives, interventions or support mechanisms taking place or identified as needed in the health system, that they felt would be most important and likely to lead to impact on the overall system. Respondents were given the opportunity to provide examples of initiatives they thought worked particularly well or not as well as intended.
- 256 people responded to the survey overall (representatives of innovation and improvement networks, healthcare professionals and providers, commissioning, the private sector, higher education institutions and research institutes, charity and public and patient voice, and policymakers).2

**Key findings**

The most frequently selected initiatives (percentage of respondents given in brackets) and overarching findings for each theme are described below.

**Skills, capabilities and leadership:**

- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (59.0 per cent).
- Professional networking opportunities and establishing ‘communities of practice’ (52.6 per cent).
- Initiatives to facilitate cross-sector learning (51.4 per cent).

The selected initiatives are all related to knowledge-sharing and communication activities; initiatives specifically related to training were selected fewer times overall, although training through coaching and mentoring seems to be particularly valued by healthcare professional and provider representatives (and more so than formal curriculum-based training).

---

1 The interventions were identified in Phase 1 of this study, but stakeholders were also given the opportunity to flag additional needs.

2 A respondent is anyone who filled in at least one of the sections of the survey (excluding the introductory section). The survey was split into six sections, and distributed in two orders. Each section had between 135 and 177 respondents.
Motivations and accountabilities:
- Organisational leadership that recognises and values innovation and visibly promotes innovation-related activities (64.8 per cent).
- Healthcare provider schemes to ‘free up’ health professional time to engage with innovation-related activities (43.0 per cent).
- Seed funding to help incubate ideas (39.4 per cent).

A need to address the management of risk and risk cultures was also explicitly mentioned by some respondents.

The information and evidence environment:
- Innovation or health improvement networks that enable the spread of information (66.7 per cent).
- A more explicit national strategy and guidance on how information and evidence flows (49.7 per cent).
- A supportive data infrastructure that allows for interoperability of data platforms (49.0 per cent).

When asked where the respondents themselves go to access information on innovation needs, opportunities and evidence of impact, the most commonly selected response was personal networks (75.5 per cent).

Relationships and networks:
- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (63.8 per cent).
- Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (54.2 per cent).
- Supporting existing innovation-related institutions and networks (53.1 per cent).

Patient and public involvement and engagement:
- Creating mechanisms for patient-driven innovations (48.9 per cent).
- Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions (46.1 per cent).
- A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (38.3 per cent).

We also asked respondents where members of the public and patients go to access information on innovation-related needs, developments and opportunities: social media platforms were most commonly selected (69.4 per cent), followed by peer support groups and websites, charities and NHS websites. Peer support groups and websites were the most frequently selected by representatives of the charity and patient voice group.

Funding and commissioning:
- Ensuring stable and sustainable national funding programmes for innovation (55.6 per cent).
- Supporting outcome-based commissioning models to help create a viable route to market (46.7 per cent).
- Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the ‘valley of death’ and can be supported across the whole healthcare innovation pathway – from design to adoption (36.3 per cent).

Overarching findings
- As would be expected, stakeholders tended to select options reflecting their roles in the system.
- Respondents were also asked to rate the scalability and sustainability of each initiative they chose on a scale of one 1 to 6.3 Interestingly, respondents rated each to have relatively similar and high levels of scalability and sustainability on average (largely between 4 and 5 on the scale of 1 to 6).

---

3 The following definitions of scalability and sustainability were provided: scalability refers to the feasibility of wider-
A.2. Introduction

Through a three-year study commissioned by the National Institute for Health Research (NIHR) Policy Research Programme, RAND Europe and the University of Manchester have worked with regional health economies and national stakeholders to help develop specific and actionable recommendations for the NHS on how to better innovate (in service models, products and technologies) to respond to demands for high-quality, efficient and effective care.

As part of this study, we conducted a consultation survey to help identify what are likely to be the highest impact and priority interventions to support the development and uptake of innovation in the health system. The survey focused on a series of systemic drivers of innovation: skills and capabilities for innovation development and uptake; information and evidence; relationships and networks; incentives and accountabilities; public and patient engagement; and funding and commissioning. For each of these drivers/themes, we presented a series of activities and initiatives identified during the Phase 1 of the study (through 221 contributions in workshops and interviews) across stakeholder groups (see Marjanovic, Sim et al. 2017a, 2017b). These included initiatives and interventions already taking place in the health system (nationally and in the regions we have engaged with) or that were identified as areas for future capacity-building to support receptive and connected places for innovation development and uptake. Respondents were asked to choose (from a longlist) three of these innovation-related initiatives, interventions or support mechanisms.

This Annex presents the survey and analysis methodology used, along with the associated caveats, as well as the results by theme and a discussion across the drivers.

A.3. Methodology

A.3.1. Survey methodology

The survey, which was implemented using the online survey tool SurveyMonkey, was sent by email to 955 individuals spanning healthcare professionals and providers, members of innovation and improvement networks, commissioners, academics, the private sector and policymakers. The initial email list was made up of contacts from prior rounds of this study (see Marjanovic, Sim et al. 2017a, 2017b). We also contacted members of key innovation, quality improvement and health research networks (such as Academic Health Science Networks (AHSNs), Vanguards, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs), Test Beds, Innovation Hubs), using email addresses from scale implantation and use of the initiatives within regions, between regions and nationally; sustainability refers to the potential for sustained use of the initiative by the health system over time.

4 East of England, Greater Manchester and the North West Coast, South West of England and University College London Partners (UCLP).
5 https://www.surveymonkey.com/
6 While the survey was sent to these individuals, they were allowed to forward it to other people of interest. In addition, the survey was sent to an individual who agreed to distribute it to people involved in Vanguards.
publicly available sources. The list of contacted people was also supplemented with contacts suggested by our project working group.

The survey was launched on 13 June 2017 and kept open until 4 August 2017, with reminders at regular intervals. It examined six drivers of innovation in the health system (and their associated initiatives and interventions) identified in Phase 1 of our research (Marjanovic, Sim et al. 2017a, 2017b): skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning. Each survey respondent was asked to answer questions on three drivers, with the option of completing answers for the remaining three.\(^7\)

Within each theme participants were asked to select three initiatives from a list (of seven to ten initiatives) that they felt are most likely to have an impact. For the three selected, they were then asked to rate the sustainability and scalability of that initiative.\(^8\) The survey also included some open-ended questions relevant to the particular theme and seeking to provide additional insight and nuance to the findings.

When piloted, the full survey covering all six themes took approximately 30 minutes to complete. In order to increase the response rate to the survey we therefore made two separate surveys, which each asked questions for three of the six themes (and took approximately 10 to 15 minutes to complete), and then gave an option to answer the other three themes if desired. The two surveys asked the two sets of questions in the opposite order. Because of this, each section has a different number of responses, and potentially a different breakdown of stakeholders. To minimise the effects of this – with one exception, charity and patient and public involvement and engagement (PPIE) representatives – we split each stakeholder type randomly into two groups when sending out the survey, so roughly half from each stakeholder type received the first version of the survey, and roughly half received the second version. Those involved in patient and public involvement and engagement all received the version of the survey that had the section on their field in it.

The survey was analysed quantitatively and qualitatively. Quantitative analysis of the survey data was conducted in R.\(^9\) For the qualitative analysis, broad analytical categories were developed for each question and responses were mapped into these categories.

A.3.2. Limitations and caveats

The methods and scope of this work leads to some limitations with regard to how the results should be analysed and interpreted:

\(^7\) One version of the survey had questions on strengths, capabilities and leadership, the information and evidence environment and patient and public involvement and engagement first, and then gave an option to answer questions on the other drivers. The other version had questions on relationships and networks, motivations and accountabilities and funding and commissioning first, and then gave an option to answer questions on the other drivers.

\(^8\) The following definitions were provided: ‘scalability’ refers to the feasibility of wider-scale implantation and use of the initiatives within regions, between regions and nationally; ‘sustainability’ refers to the potential for sustained use by the health system over time.

\(^9\) R is a statistical programming language (see https://cran.r-project.org/ for more information).
The survey was sent to a list of individuals and organisations known to be involved in some way (either directly or with a stake) in innovation activities in the NHS. We also allowed the survey to be distributed by recipients to other individuals who may be interested. However, the respondent list is not necessarily representative of all types of individual involved in health innovation activities. Individuals were asked to identify their primary stakeholder group; this grouping is used throughout the analysis. It should be noted that respondents may have been influenced by their individual role or that of their organisation. Moreover, as some of the groups are very small (private sector representatives (n=25), academics and researchers (n=24), charity and public and patient voice representatives (n=23), and policymakers (n=15)), caution should be taken when interpreting the results. This survey is meant to serve as a complement to other work streams of the study, rather than as a standalone study.

For each driver, we gave individuals the opportunity to identify initiatives they thought had gone particularly well or not. While respondents were also asked for reasons for any examples they mentioned, the majority of respondents only identified the initiative and did not provide an explanation.

For each driver, respondents were asked to select three out of a number of options that they think have the greatest potential for impact. If it is assumed that each option has equal potential for impact (and therefore each respondent chooses from the options randomly), then each answer would be expected to be chosen by a certain percentage of respondents. For example, if there were seven options, and each person selected three initiatives randomly, then each answer would be selected 43 per cent of the time. For this reason we comment particularly on options that have been selected more or less frequently than if they had been selected randomly.

A.4. Results

A.4.1. Respondent information

Overall, 256 people responded to the survey, over half of whom were healthcare professionals or providers (25.8 per cent) or came from innovation and improvement networks (27 per cent) (Figure A.1). Just over 10 per cent came from commissioning bodies (12.5 per cent), and slightly under 10 per cent were from each of the private sector (9.8 per cent), higher education or research institutes (9.4 per cent), or represented charity and public and patient voice (9.0 per cent). Within the healthcare professionals or providers group, over 50 per cent were from hospital care (secondary or tertiary) (54.8 per cent) (see Figure A.2); within the innovation and improvement networks, 65.2 per cent came from AHSNs (see Figure A.3). 21.1 per cent of the respondents reported at a national level, with the rest representing different local regions. 56.7 per cent of the respondents reported that they were male, and 40.9 per cent

---

10 Each section listed between seven and ten options based on wider research conducted for this study in the previous year.

11 A respondent is anyone who filled in at least one of the sections of the survey (excluding the introductory section). The overall response rate to the survey cannot be identified as the number of potential respondents is not definable.
responded that they were female (Figure A.4). Under 1 per cent stated they affiliated to another category.12

As noted in the methodology section above, it should be kept in mind that the survey was distributed in two orders. This means that each section was not necessarily completed by all respondents. In fact, each section was filled in by between 135 and 177 respondents. The balance of stakeholder types answering each question remained similar for all themes (see stakeholder breakdown graphs in each section below).

Figure A.1: Breakdown of stakeholder types for all survey respondents

---

12 The ‘other’ category represents individuals who said they matched all available categories, or those that did not give a response that was mappable to our categories (for example, specifying a region).
Figure A.2: Breakdown of healthcare professionals and providers

Please specify what type of healthcare provider you work for? (n=62)

- Hospital care (secondary or tertiary): 54.8%
- Other (please specify): 19.4%
- Primary care: 17.7%
- Mental Health: 6.5%
- Community care: 1.6%

Figure A.3: Breakdown of innovation and improvement networks

Please specify what type of innovation and improvement network you belong to? (n=69)

- Academic Health Science Network (AHSN): 65.2%
- Innovation Hub: 10.1%
- Test Bed: 7.2%
- Other (please specify): 7.2%
- Collaborations in Leadership for Applied Health Research and Care (CLAHRC): 7.2%
- Vanguard: 1.4%
- Accelerator or catalyst: 1.4%
Figure A.4: Respondents’ declared genders

- Male: 56.7%
- Female: 40.9%
- Prefer not to say: 2.0%
- Other: 0.4%

Please indicate your gender (n=254)
A.4.2. Skills, capabilities and leadership

Overall, 173 respondents answered questions on skills, capabilities and leadership (see Figure A.5). The stakeholder breakdown is similar to the overall stakeholder breakdown (Figure A.1).

**Figure A.5: Breakdown of stakeholder types for respondents who answered questions on skills, capabilities and leadership**

![Bar chart showing the percentage of respondents for each stakeholder type.](image)

Respondents were asked to select three of seven given initiatives that they think have the greatest potential for impact. Three options were selected more than would have been expected if responses were selected randomly (Figure A.6):¹³

- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others) (selected by 59 per cent of respondents).
- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events) (selected by 52.6 per cent of respondents).

---

¹³ If each option was selected randomly then each option would have been selected approximately 43 per cent of the time.
• Initiatives to facilitate cross-sector learning (i.e. private, NHS, other public and third sector) to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others) (selected by 51.4 per cent of respondents).

These three selected options are all related to knowledge-sharing and communication activities. The initiatives specifically related to training were all selected fewer times overall, although training through coaching and mentoring seems to be particularly valued by healthcare professional and provider representatives (and more so than formal curriculum-based training). Breakdowns by stakeholder group are presented in Figure A.26 in the Appendix of this Annex (Section A.5).

Looking across stakeholder groups, ‘organisations designed to share knowledge, information and learning’ was the most selected option by those from innovation and improvement networks and commissioning and the second most selected by representatives of higher education and research institutes. It rated fourth for healthcare professionals and providers, the majority of whom selected professional networking opportunities, coaching and mentoring, and initiatives to facilitate cross-sector learning (see Figure A.26 in the Appendix of this Annex (Section A.5)).

These less formal learning approaches seemed to be more in demand than formal training on innovation-related skills in medical curricula, according to healthcare professionals. Formal inclusion of innovation training in medical curricula was selected the least by those from innovation and improvement networks, healthcare professionals and providers and those from commissioning. However, it was the most selected option by individuals from higher education and research institutes (55 per cent) (see Figure A.26 in the Appendix of this Annex (Section A.5)).
Respondents were asked to rate their top three initiatives in terms of scalability and sustainability (from 1 to 6, where 6 was the highest). Figure A.7 shows the average sustainability and scalability rating for each of the initiatives. In general, respondents felt that the initiatives they selected were relatively scalable and sustainable: all initiatives have average scalability ratings between 4.4 and 5.0, and average sustainability ratings between 4.4 and 4.8; this result is reflected across the stakeholder types. There are a number of possible reasons for the similarity in ratings between initiatives. Although tentative, respondents may have correlated potential for impact with scalability and sustainability and therefore only selected options that they felt are relatively scalable and sustainable.
Respondents were also asked if they would like to highlight any examples of initiatives targeting skills, capabilities and leadership for innovation that they thought worked particularly well or particularly poorly, including reasons. Twenty-one different initiatives were mentioned as working particularly well, with no initiatives standing out in terms of number of mentions. These span a wide range of topics including national programmes such as the NHS Innovation Accelerator, nationally funded programmes running at regional levels, such as CLAHRCs and AHSNs, and more local initiatives such as the DigitalHealth.London Accelerator programme. They also span specific courses and fellowships for innovation and leadership skills, and methodologies (such as action learning sets). For the majority of examples given, reasons for providing them were not explained.

This information needs to be interpreted carefully: it is interesting to observe many of the same initiatives that were identified as working well by some individuals were seen as working poorly by others, highlighting both a diversity of perceptions and potential variety in performance between initiatives in different localities. The initiatives thought to be working poorly span large national training programmes, and very specific locally organised programmes. The concerns raised related to entrepreneurship training programmes being delivered by individuals who have not had experience of being entrepreneurs themselves; the emphasis on entrepreneurship training over training about skills to adopt and implement innovations; variable performance across AHSNs and insufficient support of their work by commissioners in some cases; and challenges to sharing knowledge and learning about experiences, beyond the confines of a specific programme.
A.4.3. Motivations and accountabilities

Overall, 142 people answered questions on motivations and accountabilities. Again the stakeholder breakdown (Figure A.8) is similar to the overall stakeholder breakdown (Figure A.1), with 31 per cent of respondents from innovation and improvement networks and 28.9 per cent who are healthcare professionals and providers.

![Figure A.8: Breakdown of stakeholder types for respondents who answered questions on motivations and accountabilities](image)

Respondents were asked to select three of ten given initiatives that they think have the greatest potential for impact. Four options were selected more than would have been expected if responses were selected randomly (Figure A.9):

- Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities (selected by 64.8 per cent of respondents).
- Healthcare provider schemes to ‘free up’ health professional time to engage with innovation-related activities (e.g. ‘buying out’ programmed activities/sessions for healthcare professionals) (selected by 43 per cent of respondents).

---

14 If each option was selected randomly then each option would have been selected approximately 30 per cent of the time.
• Seed funding to help incubate ideas (e.g. pump-priming or proof of concept funding) (selected by 39.4 per cent of respondents).
• Enhanced focus on incentives for uptake specifically of proven high value innovations as well as for associated decommissioning (selected by 38.7 per cent of respondents).

The top selected option, ‘organisational leadership which recognises and values innovation and visibly promotes innovation-related activities’, was selected by nearly two thirds of the respondents, and comes top for all but the private sector and charity and public and patient voice group (see Figure A.27 in the Appendix of this Annex (Section A.5)). In general, ‘healthcare provider schemes that “free up” health professional time’ or providing small amounts of funding for innovation activities were chosen more than options relating to professional development or career development opportunities.
Figure A.9: The percentage of respondents to the motivations and accountabilities impact question that chose each initiative
Respondents were asked to rate their top three initiatives in terms of scalability and sustainability (from 1 to 6, where 6 was the highest). Figure A.10 shows the average sustainability and scalability rating for each of the initiatives. All seven have very similar scalability and sustainability ratings (ranging from 4.40 to 5.38 and from 4.30 to 5.00 respectively). This result is reflected across the stakeholder types.

**Figure A.10: The average sustainability and scalability rating of each initiative**

Examples of initiatives targeting motivations and accountabilities for innovation that respondents thought worked particularly well include tariffs and funding schemes (e.g. the Quality and Outcomes Framework (QOF) and the Innovation and Technology Tariff (ITT)), and training schemes and programmes that provide time, space and permission to engage with innovation (e.g. the NHS Innovation Accelerator, the Clinical Entrepreneur Training Programme and others). Four survey respondents also voiced that some initiatives can work poorly, for example in cases where national programmes are not operationalised without sufficiently clear interventions or defined outcomes. Two respondents commented that organisational leadership in the NHS is currently fire-fighting rather than future focused, and that there are few incentives for Trusts to value innovators or to adopt proven innovations.

In general comments at the end of the survey a number of barriers related to motivations and accountabilities were mentioned. Lack of incentives for NHS staff to innovate due to innovation being seen as high risk was most commonly mentioned (by four respondents). It was also noted that competition within the NHS leads to a lack of sharing of good practice and knowledge. Possible solutions mentioned included: incentives for commissioners to promote innovation, clarity on NHS goals of quality and productivity, initiatives to recognise organisations/individuals that have excelled in innovation, and drive for continuous improvement. These comments are illustrative of the views of respondents who wished to provide additional examples, and should not be seen as reflective of the population as a whole.
A.4.4. The information and evidence environment

Overall, 147 people answered questions on the information and evidence environment. The stakeholder breakdown of these respondents (see Figure A.11) is similar to the overall stakeholder breakdown for the whole survey (Figure A.1).

**Figure A.11: Breakdown of stakeholder types for respondents who answered questions on the information and evidence environment**

Respondents were asked to select three of seven given initiatives (drawing from Phase 1 of the research and the wider knowledge base) that they think have the greatest potential for impact. This spans existing initiatives and future capacity-building needs. Three options were selected more than would have been expected if responses were selected randomly (Figure A.12):[^15]

- Innovation or health improvement networks that enable the spread of information (e.g. Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)) (selected by 66.7 per cent of respondents).

[^15]: If each option was selected randomly then each option would have been selected approximately 43 per cent of the time.
A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally (selected by 49.7 per cent of respondents).

A supportive data infrastructure which allows for interoperability of data platforms (selected by 49.0 per cent of respondents).

‘Innovation or health improvement networks that enable the spread of information’, selected by two thirds of the respondents, is the most selected action from any of the questions asking about impact in the survey. The examples of networks given in this initiative already exist. The other two actions selected more than would be expected, however, are aspects of the system that are in need of further capacity strengthening.

Looking across stakeholder types, ‘innovation or health improvement networks that enable the spread of information’ was the most selected by those from innovation and improvement networks and healthcare professionals and providers, and came in the top three for all stakeholder types (see Figure A.28 in the Appendix of this Annex (Section A.5)). Perhaps unsurprisingly, it was selected by over 85.0 per cent of those from innovation and improvement networks.

‘A supportive data infrastructure which allows for interoperability of data platforms’, was only fifth most selected by those from innovation and improvement networks and fourth most selected by healthcare professionals and providers, but was the most selected option among those from commissioning and higher education and research institutions. This may be reflective of their perceived roles and information needs in the health system – i.e. interests in different types of data and different sources of information.
Respondents were asked to rate their top three initiatives in terms of scalability and sustainability (from 1 to 6, where 6 was the highest). Figure A.13 shows the average sustainability and scalability rating for each of the initiatives. Again, in general, respondents felt that the initiatives they selected were relatively scalable and sustainable: all initiatives have similar scalability and sustainability ratings (ranging from 4.53 to 5.14 and from 4.42 to 4.97 respectively). This result is reflected across the stakeholder types.
Figure A.13: The average sustainability and scalability rating of each initiative

Some initiatives were listed as working particularly well for targeting the information and evidence environment, indicating diversity in what individuals find important and relevant. Examples given include websites and information sources such the National Institute for Health and Care Excellence (NICE), networking initiatives (for example through or with AHSNs, or the National Cancer Intelligence Network (NCIN)), the Academy of Fabulous Stuff, and specific projects such as the Enhanced Recovery Partnership Programme or work between Greater Manchester AHSN’s DataWell and the NorthWest EHealth FARSITE to establish mechanisms to use real-time data for research. A number of principles or guidelines, such as the Narrative for Person Centred Coordinated Care\textsuperscript{16} or the Crisis Care Concordat,\textsuperscript{17} which sets out how services should be organised, were also mentioned.

Four of the examples of initiatives that work well involved AHSNs, but AHSNs were also one of the initiatives listed as targeting the information and evidence environment relatively poorly – again indicating possible diversity in performance on this front and diversity in perceptions. Comparative analysis of individual AHSNs was outside the scope of this study. In the main, respondents did not comment on specific initiatives that have worked poorly, but instead commented on issues they felt stopped the information and evidence environment from working well. This included: a need for commissioners to be more supportive of local actions targeting information and evidence (two respondents); lack of continued funding for projects as a barrier to creating an effective information and evidence environment (one respondent); a need for enhanced national leadership on data and evidence

\textsuperscript{16} See https://www.england.nhs.uk/2012/12/narrative-integrated-care/

\textsuperscript{17} See http://www.crisiscareconcordat.org.uk/
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

Landscapes, noting an example of a programme that developed guidance on interoperability and sought to establish networks to develop consensus, but was not built upon once it was finished and so the respondent felt it did not reach its full potential (one respondent). Additionally two respondents noted that they thought the way that information on websites or in journals is presented is not necessarily most useful for knowledge exchange as it is not always put in context. Finally, respondents noted difficulty obtaining information on evidence generation or for assessing impact of innovations, either at a national level or from clinical commissioning groups (CCGs).

We asked respondents where they themselves go for information on innovation needs, opportunities and evidence on impact (Figure A.14). The most commonly selected response (75.5 per cent) was that information on innovation was obtained through personal networks, with 28 examples given including clinical networks, health libraries networks, networks of Innovation Leads, Vanguards, the NHS Innovation Accelerator programme and online forums (see Table A.1). Other institutional websites (e.g. AHSNs, Innovation Hubs, Knowledge Transfer Networks), direct communication with health professionals, participation in various boards and committees, conferences and trade shows, and NICE guidelines were all reported as sources of information on innovations by more than 50 per cent of respondents. It is interesting to note that four of the five most selected answers rely on personal connections and face-to-face interactions, over the use of websites.

Table A.1 includes further details provided about the types of places respondents go for information on innovations. Within each category a large diversity of examples was provided. However, some examples were mentioned much more often than others. For example, within other institutional websites, AHSN websites were mentioned 30 times; within conferences and trade shows, the NHS Health and Social Care Innovation Expo was mentioned 11 times, and the NHS Confederation Conference six times; and within other internet search engines, examples such as Google were mentioned 16 times.

Looking across stakeholder types, personal networks seem to be of particular importance to respondents from innovation and improvement networks (91.5 per cent), health practitioners and professionals (86.5 per cent), the charity and patient and public involvement sector (76.9 per cent), and the private sector (75 per cent). For all of these groups it was the most common response (see Figure A.32 in the Appendix of this Annex (Section A.5)). For policymakers and respondents from commissioning the most common response was ‘other institutional websites’ (with 75 per cent and 77.8 per cent or respondents selecting it respectively); for these two groups ‘information via personal networks’ came third and ninth respectively (with 62.5 per cent and 50 per cent or respondents selecting it respectively). For those from higher education and research institutes the most common response was ‘information gained via participating in various boards and committees’ (68.8 per cent).
Figure A.14: Where respondents go for information on innovation needs, opportunities and evidence on impact

- Information via personal networks: 75.5%
- Other institutional websites (e.g., Academic Health Science Networks, Innovation Hubs, Knowledge Transfer Networks): 69.8%
- Direct communication with health professionals: 60.4%
- Information gained via participating in various boards and committees: 59.0%
- Conferences and trade shows: 56.8%
- NICE guidelines: 50.4%
- Other internet search engines: 39.6%
- Other journal publications (excluding Cochrane reviews): 36.7%
- Other NHS England portals: 28.8%
- Cochrane reviews: 26.6%
- Academy of Fabulous Stuff: 24.5%
- NHS Choices website: 22.3%
- CQC reports: 21.6%
- Other: 16.5%
- Don't know: 1.4%
Table A.1: Examples of where respondents go for information on innovation needs, opportunities and evidence on impact

<table>
<thead>
<tr>
<th>Example given</th>
<th>Number of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Websites/online forums: commissioner and provider websites; stakeholder and partner websites; voluntary, community and social enterprise (VCSE) sector websites; googling events; Google; BBC News website; NHS England website and other publications; Department of Health and Social Care innovation sites; Health Databases Advanced Search; Innovation Unit; NHS Digital; NHS Innovation portal (innovation exchange); NHS Intranet; NHS Jobs; NHS commissioners online information; industry websites such as Cambridge Wireless; AHSN websites.</td>
<td>66</td>
</tr>
<tr>
<td>Personal and professional networks: colleagues; clinical networks; network across East of England; networks addressing locally agreed priorities; network of Innovation Lead; friends; key clinical professionals; nurses; local authority meetings; meetings with the Care Quality Commission and Healthwatch; working with the Department of Health and Social Care; working with the Office for Life Sciences; NHS providers; voluntary sector networks; Knowledge Hub contacts; commissioners; various innovator curators.</td>
<td>29</td>
</tr>
<tr>
<td>Conferences/events: local events; NHS Health and Care Innovation Expo; NHS Confederation Conference; Clinical Pharmacy Congress; Health+Care Show; Health Libraries Group/Clinical Librarians Conference; subject conferences; Royal Pharmaceutical Society Conference; Royal College of General Practitioners annual primary care conference and events; Massachusetts Interscholastic Athletic Association conferences; Medtech Innovation Briefings.</td>
<td>29</td>
</tr>
</tbody>
</table>

18 ‘Number of times mentioned’ indicates how often initiatives of a particular type (e.g. ‘Websites/online forums’) were mentioned by respondents.
19 The national health and social care information centre providing information, data and IT systems.
20 A web portal allowing people to share their ideas and meet other people with similar interests and expertise.
21 An international community for technology organisations.
22 Those specifically mentioned include AHSN Atlas, AHSN Innovation Exchange, AHSN Knowledge Transfer Networks, Eastern AHSN, Health Innovation Network South London, Innovation Agency (formerly the North West Coast AHSN), Oxford AHSN and South West AHSN.
23 The independent regulator of health and adult social care in England.
24 A network aiming to ensure that health and social care services and the government put people at the heart of care.
25 The UK government’s office focused on life science research and innovation to transform health and care service.
26 Contacts using the digital community of colleagues and experts sharing knowledge, insight and best practice.
27 An annual event focused on innovation, enterprise and collaboration.
28 An annual conference focused on the essential components of developing health and care services for the future.
29 An annual conference for the clinical pharmacy profession.
30 An annual conference focused on sharing best practice and discovering solutions to health and care challenges.
31 A network of people working in health and social care information and an annual conference for clinical librarians.
32 An annual conference run by the body responsible for leading and supporting the pharmacy profession.
33 Conferences and events run by the professional membership body for family doctors in the UK and overseas.
34 NICE advice briefings on new medical devices and other medical or diagnostic technologies.
### Example given

<table>
<thead>
<tr>
<th>Formal UK government/NHS outputs and activities: NHS strategy papers; NHS RightCare; NHS Innovation Accelerator; NHS Improvement resources; Vanguards (including Urgent and Emergency Care Vanguards); Medicines Optimisation; Innovation Hubs; NHS Research and Development community; National Research and Development forum; Commissioning Support Unit transformation portal.</th>
<th>Number of times mentioned&lt;sup&gt;18&lt;/sup&gt;</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Royal Colleges and academic societies: International Society for Professional Innovation Management; Institute of Physics and Engineering in Medicine; Hospital Consultants and Specialists Association; Healthcare Information and Management Systems Society; Health Services Research UK; Royal Pharmaceutical Society networks; Royal College of Physicians work group on systems; Royal Academy of Engineering; Royal College of General Practitioners; Northern Health Science Alliance; regional trade organisations such as One Nucleus.&lt;sup&gt;54&lt;/sup&gt;</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

---

<sup>35</sup> Supports the NHS to provide the best and most cost effective care.

<sup>36</sup> An NHS England initiative aiming to facilitate and speed up access to new health innovations.

<sup>37</sup> An NHS initiative providing tools, resources and programmes to help NHS England to provide safe, high-quality and compassionate care.

<sup>38</sup> NHS organisations leading the development of new care models.

<sup>39</sup> An NHS England initiative looking at the value of medicines and ensuring that they are clinically and cost effective.

<sup>40</sup> Regional NHS organisations providing legal and commercial support to staff who have developed a pre-market product.

<sup>41</sup> A community of professionals facilitating best practice in health research management and research strategy development.

<sup>42</sup> An NHS forum facilitating best practice in health research management and research strategy development.

<sup>43</sup> A network of libraries providing free access to books, journals and online resources to all NHS staff and students.

<sup>44</sup> An association of members from research, industry and the public sector focusing on innovation management.

<sup>45</sup> The UK’s professional body and learned society for physicists, engineers and technologists within the field of medicine.

<sup>46</sup> A professional association and trade union representing and advising hospital consultants, staff and associate specialist doctors and specialist registrars in the UK (both in the NHS and private sectors).

<sup>47</sup> A global network of health IT professionals.

<sup>48</sup> A membership organisation of mostly research units and NHS organisations, but also professionals groups and private sector associates, informing and evaluating innovations in health services and policy.

<sup>49</sup> Networks of the body responsible for leading and supporting the pharmacy profession within England.

<sup>50</sup> Systems work group dedicated to improving medical practice, chiefly through accreditation of physicians.

<sup>51</sup> The UK’s national academy of engineering.

<sup>52</sup> The professional membership organisation for family doctors in the UK and overseas.

<sup>53</sup> A membership organisation of representatives from the North of England’s top research universities, research-intensive teaching hospitals and AHSNs.
<table>
<thead>
<tr>
<th>Example given</th>
<th>Number of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHSNs and their activities: Small Business Research Initiative (SBRI) scheme; University College London Partners. An international membership organisation for companies working within the life science and healthcare sector.</td>
<td>12</td>
</tr>
<tr>
<td>Other organisations: Health Enterprise East; Innovate UK; Healthwatch; DigitalHealth.London; Healthcare +; Institute for Healthcare Improvement; small and medium-sized enterprises (SMEs); Hub Wales; Coordinated Approach To Child Health. Funded by the UK’s innovation agency.</td>
<td>11</td>
</tr>
<tr>
<td>Formal networks: Cambridge Health Network; NIHR Clinical Research Network; Practice Management Network; South West Innovation Network; Clinical Research Network Eastern; Consortia for Improving Medicine with Innovation and Technology; Innovation Agency.</td>
<td>10</td>
</tr>
<tr>
<td>Social media: LinkedIn; Twitter.</td>
<td>7</td>
</tr>
<tr>
<td>NHS Trusts and hospitals: Papworth Hospital; Cambridge University Hospital Foundation Trust; Cambridgeshire and Peterborough NHS Foundation Trust. Funded by a school-based health programme designed to promote physical activity and healthy food choices as well as to prevent tobacco use in the US and abroad.</td>
<td>6</td>
</tr>
<tr>
<td>Other sources: VCSE sector; newsletters and guidance; eHealth; Kahootz.</td>
<td>6</td>
</tr>
<tr>
<td>Not-for-profit organisations/charities: Digital Health and Care Alliance; The Health Foundation; GS1. An international organisation promoting digital health and care systems in the UK and Europe.</td>
<td>4</td>
</tr>
</tbody>
</table>

---

54 An international membership organisation for companies working within the life science and healthcare sector.
55 An academic health science partnership bringing people and organisations together to change the health and wellbeing of the population.
56 An organisation offering technology advisory services and innovation management to the NHS and industry.
57 The UK’s innovation agency.
58 Healthwatch Halton was specifically mentioned.
59 An independent not-for-profit organisation based in Cambridge, Massachusetts, focused on health and healthcare improvement. The training programme supports individuals’ ability to drive improvement initiatives.
60 A school-based health programme designed to promote physical activity and healthy food choices as well as to prevent tobacco use in the US and abroad.
61 A network for leading players in health.
62 The NIHR Clinical Research Network coordinates clinical research within the NHS.
63 A body for primary care practice managers to act as a platform to share discussions and experience.
64 The network coordinating clinical research within the NHS in the East of England.
65 A network of academic and medical institutions partnering with industry and government focused on improving collaboration and speeding up the development and implementation of health innovations.
66 The NHS body running Addenbrooke’s Hospital and the Rosie Hospital.
67 The NHS body delivering many of the NHS services that are provided outside of hospital and in the community such as physical, mental health and specialist services.
68 An education multimedia construction toolset.
69 An independent charity focused on improved health and healthcare for people in the UK.
70 A not-for-profit organisation focused on developing and maintaining global standards for business communication.
### Example given

| Patient representatives and patient groups: National Association for Patient Participation\(^{72}\); Patient Safety Collaboratives.\(^{73}\) | 4 |
| Research collaborations: CLAHRCs\(^{74}\); Cambridge University Health Partners.\(^{75}\) | 3 |
| Boards and committees: CCG boards\(^{76}\); Vanguard local committees\(^{77}\); council of a university. | 3 |
| Specialist groups. | 3 |
| Incubators: university incubators.\(^{78}\) | 2 |

---

\(^{72}\) An association promoting and supporting patient participation in primary care.

\(^{73}\) Groups empowering patients and healthcare staff to work together to identify safety priorities and issues as well as to develop solutions.

\(^{74}\) Research collaborations between local providers of NHS services and NHS commissioners, universities and the relevant AHSN.

\(^{75}\) A collaboration uniting a world-leading university and three high-performing NHS Foundation Trusts centred on the Cambridge Biomedical Campus.

\(^{76}\) Board members for CCGs, the clinically led statutory NHS bodies responsible for commissioning of healthcare services for their local area.

\(^{77}\) Local committees leading the development of new care models.

\(^{78}\) University-based groups designed to accelerate the growth and success of academic entrepreneurship.
A.4.5. Relationships and networks

Overall, 177 people answered questions on relationships and networks. The stakeholder breakdown is again similar to the overall stakeholder breakdown (Figure A.1); however, for this question the percentage of respondents who are healthcare professionals and providers (28.8 per cent) is slightly higher than the percentage of respondents from innovation and improvement networks (27.7 per cent). The percentage of respondents from the private sector (10.7 per cent) is also higher than those from commissioning (9.0 per cent) (see Figure A.15).

Figure A.15: Breakdown of stakeholder types for respondents who answered questions on relationships and networks

Respondents were asked to select three of seven given initiatives that they think have the greatest potential for impact. Three options were selected more than would have been expected if responses were selected randomly (Figure A.16):79

- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet) (selected by 63.8 per cent of respondents).

---

79 If each option was selected randomly then each option would have been selected approximately 43 per cent of the time.
• Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution) (selected by 54.2 per cent of respondents).

• Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise (selected by 53.1 per cent of respondents).

Looking across stakeholder types, ‘enhancing the capacity of the NHS to articulate needs to innovators’ was selected by more than 50 per cent of the four largest stakeholder groups (healthcare professionals and providers, innovation and improvement networks, the private sector and commissioning), with more than 70 per cent of both those from innovation and improvement networks and those from the private sector selecting it (see Figure A.29 in the Appendix of this Annex (Section A.5)). ‘Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system’ was selected most by those in from commissioning, was second most selected by those from innovation and improvement networks and fourth most selected by those from the private sector and healthcare professionals and providers.
Respondents were asked to rate their top three initiatives in terms of scalability and sustainability (from 1 to 6, where 6 was the highest). Figure A.17 shows the average sustainability and scalability rating for each of the initiatives. All seven have very similar scalability and sustainability ratings (ranging from 4.07 to 4.98 and from 4.39 to 4.80 respectively). This result is reflected across the stakeholder types.
AHSNs and AHSN-related schemes (e.g. Innovation Scouts organised by the Innovation Agency, and Greater Manchester AHSN’s Innovation Nexus) and SBRI efforts were given as examples of what seems to have worked well (albeit not all AHSNs were seen to work equally well and stakeholder views reflect a diversity of experiences – more specific information was not provided). One respondent commented that AHSN activities that bring people together for discussion to support better understanding of the relevant issues – such as innovation surgeries, market insight briefings, events where system leaders can articulate challenges in detail, as well as the SBRI – have effectively supported the spread and adoption of innovation locally. The Vanguard programme was also mentioned, described as providing ring-fenced time and resources and focused aims and objectives with freedom to act (although often not seen as an innovation programme specifically, highlighting blurred boundaries between improvement and innovation efforts). CLAHRCs were also mentioned as working well as they had been given resources and continuity, but further information allowing us to objectively identify or compare specific CLAHRCs is not available and was outside the scope of this study.

Some respondents also commented on activities they have experienced that they found effective, including:

- Efforts of some NHS organisations to engage with suppliers/manufacturers and explain the public sector landscape for innovation and what evidence the suppliers/manufacturers need to provide to the NHS. This was felt to improve the engagement of innovators and to assure them of a continued commitment to innovation from the NHS (one respondent).
- A paired learning programme, linking up administrative and clinical managers, which was felt to provide participants with a much wider perspective of the NHS and encourage future collaboration between administration and managers to deliver outcomes (one respondent).
Respondents also identified aspects of initiatives that could lead to poor performance. Concerns were raised that national networking agencies are not yet working as effectively as possible in developing sustainable relationships or delivering outcomes. Again, while some respondents highlighted AHSN-specific initiatives as having worked well, others thought they have not worked as well as they could have. One respondent also noted that many national initiatives had failed to provide context or sufficient detail about needs-assessments and hence to facilitate responses that are sensitive to areas of demand. Three respondents commented on the need to look broader, for example by looking at the role of the voluntary, community and social enterprise (VCSE) sector and ability of stakeholders to engage with it, and also by looking more nationally instead of locally to identify good practices and transferrable lessons for organisational and inventive work that could be applied to supporting effective relationships and networks in the innovation space.
A.4.6. Patient and public involvement and engagement

Overall, 141 people answered questions on the patient and public involvement and engagement environment (see Figure A.18 for further details).

![Figure A.18: Breakdown of stakeholder types for respondents who answered questions on patient and public involvement and engagement](image)

Respondents were asked to select three of nine given initiatives that they think have the greatest potential for impact. Three options were selected more than would have been expected if responses were selected randomly (Figure A.19):80

- Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees) (selected by 48.9 per cent of respondents).
- Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities (selected by 46.1 per cent of respondents).

---

80 If each option was selected randomly then each option would have been selected approximately 33 per cent of the time.
A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach) (selected by 38.3 per cent of respondents).

'Patient engagement roles' was selected by more than 30 per cent of people in each stakeholder type other than private sector respondents, and was in the top four selected actions for those from innovation and improvement networks, healthcare professionals and providers those from commissioning and those from higher education and research institutions (see Figure A.30 in the Appendix of this Annex (Section A.5)).81 ‘Creating mechanisms for patient-driven innovations’ was also in the top four selected actions for these four largest stakeholder groups.

Interestingly, charity and patient and public voice representatives found ‘learning from the research and charity sector experience with patient and public involvement’ to have the greatest potential for impact (selected by 57.1 per cent of respondents of this stakeholder group), which was only fifth across all stakeholder groups. ‘Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed’, which was the fourth most often selected initiative by all respondents, was least frequently selected by charity and patient and public voice representatives (see Figure A.30 in the Appendix of this Annex (Section A.5)).82

---

81 Note that there were only eight private sector respondents to this question.

82 Note that there were only 14 charity and patient and public voice respondents to this question.
Respondents were asked to rate their top three initiatives in terms of scalability and sustainability (from 1 to 6, where 6 was the highest). Figure A.20 shows the average sustainability and scalability rating for each of the initiatives. All seven initiatives have very similar scalability and sustainability ratings (ranging from 4.51 to 4.97 and from 4.32 to 5.04 respectively). This result is reflected across the stakeholder types.
Initiatives respondents thought worked particularly well in terms of targeting patient and public involvement and engagement include a number of specific patient involvement efforts, such as some patient engagement groups (for example within Trusts), patient involvement in Innovation Exchanges, and events that bring and explain innovations to patients. The responses given also include more general examples of actions, such as consultants explaining to patients that complex innovation-related work needs to be concentrated at a few locations, and patient and public involvement-led priority setting. It is striking that no single initiative was mentioned particularly frequently and that some national initiatives that are frequently associated with PPIE issues were not highlighted as examples (this might merit further examination and/or be linked to the nature of respondents and their localised knowledge).

A number of specific initiatives aimed at targeting the PPIE environment were felt to have worked poorly, and this was seen to relate to factors such as poor support by a CCG for PPIE activity in some local efforts, a national online patient programme (reason given was inappropriate constitution/membership) and a Clinical Research Network (reason given was too much top-down dictation by health professionals).

Respondents also gave some more general reflections. Three respondents highlighted challenges to ensuring representativeness of diverse groups in PPIE efforts. There were also some views expressed on the need for more patient-led care, additional public health initiatives, and generally more awareness-raising of innovation in the NHS for both patients and the wider public.

We also asked respondents where members of the public and patients go to access information on innovation-related needs, developments and opportunities (Figure A.21). The most commonly selected response (69.4 per cent of respondents) was that information on innovation was obtained by patients through social media platforms, with the most common examples given being Facebook and Twitter (see...
Table A.2). Peer support groups and websites, charities, NHS websites, particularly NHS Choices, and consultation with health professionals were all reported as sources of information on innovations for patients by more than 40 per cent of respondents. Figure A.21 shows the wide diversity of sources mentioned by respondents.

The most commonly selected choice (for where patients and the public go to for information) for all stakeholder groups was either:

- Social media platforms, which was the most selected choice by respondents from higher education and research institutions, commissioning, health practitioners and professionals, and policymakers.
- Peer support groups and websites, which was the most selected choice by respondents from charity and patient voice, innovation and improvement networks, and the private sector (see Figure A.33 in the Appendix of this Annex (Section A.5)).

Figure A.21: Where respondents think members of the public and patients go to access information on innovation-related needs, developments and opportunities

---

83 14 of the 93 respondents who said patients use social media to access information on innovation mentioned Twitter, and 15 mentioned Facebook.
84 Mentioned by 11 of the 65 respondents who said patients use NHS websites to access information on innovation.
Table A.2: Examples of where respondents think patients go to access information on innovation-related needs, developments and opportunities

<table>
<thead>
<tr>
<th>Example given</th>
<th>Number of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS websites: NHS Choices[^66]; general NHS website; clinical trial sites; NIHR Clinical Research Network; NICE[^67]; CLAHRCs; NHS Trust sites.</td>
<td>19</td>
</tr>
<tr>
<td>Peer support websites: Mumsnet[^86]; PatientsLikeMe[^89]; specialist websites; Health talk[^90]</td>
<td>7</td>
</tr>
<tr>
<td>Peer support groups: cancer support groups; Dementia Alliance International[^91]; local groups; long-term condition support groups; Metaconnectors exchange; renal support groups; self-help groups; voluntary sector groups.</td>
<td>9</td>
</tr>
<tr>
<td>Patient and public engagement groups: Involve[^92]; National Association for Patient Participation; NCRI Consumer Forum.</td>
<td>3</td>
</tr>
<tr>
<td>Social media: LinkedIn; Facebook; Twitter; Health Unlocked[^93]</td>
<td>38</td>
</tr>
<tr>
<td>Apps: health apps; WhatsApp groups.</td>
<td>3</td>
</tr>
<tr>
<td>Other websites: Wikipedia; Google+; Google; Clinical Trial gateway[^84]; Guardian clinical research zone[^92]; Patient Opinion [now Care Opinion][^96]; condition-specific blogs; university newsletters.</td>
<td>11</td>
</tr>
<tr>
<td>Consultation with health professionals: general practitioners; pharmacists; within work environment; clinics; engagement in research; attending briefings or consultation meetings; Shaping Our Future[^97]</td>
<td>11</td>
</tr>
</tbody>
</table>

[^65] ‘Number of times mentioned’ indicates how often initiatives of a particular type (e.g. ‘NHS websites’) were mentioned by respondents.


[^67] Institute producing evidence-based guidance, quality standards and performance metrics for health and social care practitioners and commissioners.

[^86] An online pool of knowledge, advice and support for new and expectant mothers.

[^89] An online patient network and real-time research platform.

[^90] A website offering information and support for a range of health issues through videos recorded by patients describing their real-life experiences.

[^91] A collaboration of individuals diagnosed with dementia advocating for autonomy for people with dementia.

[^92] A national advisory group aiming to support public involvement in NHS, public health and social care research.

[^93] A social network for people to find others with similar health backgrounds and concerns.

[^84] A website pulling together information about clinical trials and other research from several UK registers, helping patients to find trials that are relevant to them.

[^95] A section of the Guardian’s online news dedicated to clinical research.

[^96] An independent non-profit feedback platform for UK health services.

[^97] Cornwall and the Isles of Scilly health and social care partnership.
<table>
<thead>
<tr>
<th>Example given</th>
<th>Number of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charities: charities for various conditions; local charities; Arrhythmia Alliance; Cancer Research UK; all the Association of Medical Research Charities; Alzheimer’s Research UK; Alzheimer’s Society; Breast Cancer Now; Macmillan; national charities; Volunteer Cornwall; Young Minds; Jo’s Cervical Cancer Trust; Healthwatch.</td>
<td>22</td>
</tr>
</tbody>
</table>

98 A coalition of charities, patient groups, patients, carers, medical groups and allied professionals working together to promote timely and effective diagnosis and treatment of arrhythmias.

99 A national cancer research and awareness charity in the UK.

100 A UK dementia and Alzheimer’s disease research charity focused on causes, diagnosis, prevention, treatment and cure.

101 A UK dementia support and research charity for people with dementia and their carers.

102 The UK’s largest breast cancer charity, created by the merger of Breast Cancer Campaign and Breakthrough Breast Cancer.

103 One of the largest British charities, providing specialist healthcare, information, social support, emotional support and financial support to people affected by cancer.

104 A charity focused on developing active and engaged citizens through volunteering.

105 A UK charity dedicated to improving the wellbeing and mental health of children and young people.

106 The only UK charity focused on women affected by cervical cancer and cervical abnormalities.
A.4.7. Funding and commissioning

Overall, 135 people answered questions on funding and commissioning. Again, the stakeholder breakdown (Figure A.22) is similar to the overall stakeholder breakdown for the overall survey (Figure A.1).

Figure A.22: Breakdown of stakeholder types for respondents who answered questions on funding and commissioning

Respondents were asked to select three of ten given initiatives that they think have the greatest potential for impact. Four options were selected more than would have been expected if responses were selected randomly (Figure A.23):\textsuperscript{107}

- Ensuring stable and sustainable national funding programmes for innovation (e.g. from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and Academic Health Science Networks) (selected by 55.6 per cent of respondents).
- Supporting outcome-based commissioning models to help create a viable route to market (e.g. commissioning through evaluation schemes – which allow innovations to be commissioned at a

\textsuperscript{107} If each option was selected randomly then each option would have been selected approximately 30 per cent of the time.
small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely) (selected by 46.7 per cent of respondents).

- Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the ‘valley of death’ and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g. enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding) (selected by 36.3 per cent of respondents).

- Initiatives for greater pathway integration and new approaches to more join-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some new models of care or Vanguards initiatives) (selected by 35.6 per cent of respondents).

‘Ensuring stable and sustainable national funding programmes for innovation’ was the most selected option by those from innovation and improvement networks, healthcare professionals and providers, higher education and research institutions, and the private sector and came in the top three for all stakeholder types (see Figure A.31 in the Appendix of this Annex (Section A.5)). ‘Supporting outcome-based commissioning models to help create a viable route to market’ also came in the top three for all stakeholder types.
Figure A.23: The percentage of respondents to the funding and commissioning impact question that chose each initiative

Which 3 actions targeting funding and commissioning of innovations do you think have the greatest potential for impact? (n=135)

- Ensuring stable and sustainable national funding programmes for innovation (e.g. from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and Academic Health Science Networks) 55.6%
- Supporting outcome-based commissioning models to help create a viable route to market (e.g. commissioning through evaluation schemes – which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely) 46.7%
- Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the 'valley of death' and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g. enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding) 36.3%
- Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives) 35.6%
- Factoring innovation into procurement and commissioning contracts (e.g. schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes) 32.6%
- Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.) 27.4%
- Integrating monetary incentives for innovation (e.g. via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks) 23.7%
- Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g. fast-track approval, early access schemes) 20.0%
- More effort to diversify available funding sources (e.g. attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources) 12.6%
- Focusing on hybrid models of governance and management of innovation funding (e.g. strong regional roles coordinated with national oversight) 9.6%
Respondents were asked to rate their top three initiatives in terms of scalability and sustainability (from 1 to 6, where 6 was the highest). Figure A.24 shows the average sustainability and scalability rating for each of the initiatives. All seven have very similar scalability and sustainability ratings (ranging from 4.52 to 5.00 and from 4.15 to 5.00 respectively). This result is reflected across the stakeholder types.

**Figure A.24: The average sustainability and scalability rating of each initiative**

Examples of initiatives targeting funding and commissioning for innovations that respondents thought worked particularly well include a range of national funding schemes such as NIHR-commissioned calls, SBRI, NHS Innovation Accelerator and Catapults, and methods for paying for innovations such as the ITT and the Innovation and Technology Payment (ITP). Commissioning through evaluation was also mentioned by two respondents as working well, although one noted that they felt it only worked well at the beginning, but less so as it evolved.

A number of other initiatives were noted as not working as well as intended. For example, five respondents commented that they felt that the Commissioning for Quality and Innovation (CQUIN) payments framework tended to be used for performance management rather than innovation and improvement. A specific example given was of the High Impact Innovation incentive, noted as being funded through CQUIN, which was then abandoned, causing providers to drop the innovations entirely. One respondent also commented on other national funding initiatives, saying that they are too fragmented and not focused enough.

In general comments at the end of the survey, a number of barriers related to funding and commissioning were mentioned by respondents. Chief among these were concerns about a lack of funding, and in particular a need for more funding for AHSNs and Innovation Hubs (mentioned by four respondents,
one of whom was from an AHSN). There were also comments about more funding being needed for adoption and spread of innovation rather than research and development. One respondent commented that it might help if the number of funding opportunities was reduced but each itself had greater funding. Three respondents commented specifically on difficulties that small companies experience in selling to the NHS, and the need to be able to access the NHS as quickly as possible to stay in business. These comments are illustrative of the views of those respondents who wished to provide additional examples, and should not necessarily be seen as reflective of the population as a whole.

We also asked respondents which of a list of funding sources they associate with funding for innovation (Figure A.25). The most selected funding scheme was Innovate UK (75.4 per cent). All funding sources other than GrantFinder were selected by more than 50 per cent of the respondents (see Figure A.34 in the Appendix of this Annex (Section A.5)).

**Figure A.25: Percentage of respondents who associate particular funding sources with innovation funding**
A.4.8. Reflections across drivers

Overall, responses tend to reflect the type of role respondents have and their needs, but they also recognise the needs of wider actors with both overarching common priorities and some unique priorities across different groups.

For example:

- Looking across stakeholder types, ‘innovation or health improvement networks that enable the spread of information’ came in the top three for all stakeholder types. ‘A supportive data infrastructure which considers interoperability of data platforms’, however, was only fifth most selected by those from innovation and improvement networks and fourth most selected by healthcare professionals and providers, but was most selected by those from commissioning and higher education and research institutions. This may be reflective of interests and needs for different types of data and different sources of information. This could be explored further.

- Looking across stakeholder groups, ‘organisations designed to share knowledge, information and learning’ was most selected by those from innovation and improvement networks, commissioning, higher education and research institutions as a top three priority in terms of potential for overall impact on the system. However, healthcare professionals and providers prioritised professional networking opportunities, coaching and mentoring, and initiatives to facilitate cross-sector learning as key to strengthening skills and capabilities for innovating in healthcare.

- The most commonly selected choices for where patients and the public go to for information on innovation needs and opportunities for all stakeholder groups were:

  o Social media platforms, which was the most selected choice by respondents from higher education and research institutions, commissioning, health practitioners and professionals, and policymakers.

  o Peer support groups and websites, which was the most selected choice by respondents from charity and patient voice, innovation and improvement networks, and the private sector.

Respondents seemed to rate their priorities as having relatively high levels of sustainability and scalability, within current conditions. There are a number of possible reasons for the similarity in ratings between initiatives. Although tentative, respondents may have correlated potential for impact with scalability and sustainability and therefore only selected options that they felt are relatively scalable and sustainable.

Examples of initiatives that worked particularly well or poorly (despite only being mentioned by some respondents) provide useful information for policymakers to follow up on in considering actors who may engage in future policy implementation efforts. The additional open text comments provided by some respondents highlight and reinforce a large diversity of experiences, with no one-size-fits-all answer, but they do offer a clearer picture of the types of interventions that are perceived to be beneficial. They also provide practical examples of national efforts as well as local actions that some respondents felt were conducive to an effective system as well as further challenges to address and considerations to bear in mind in implementing policy and evolving programmes. These have to do with issues such as:
• Ensuring that those providing training and coaching have appropriate experiences to build their courses/mentorship on.
• A need to balance the focus on skills for entrepreneurship with skills for successful adoption.
• A need to consider how learning from specific programmes can be shared more widely, locally and nationally, for system-level benefit (including addressing cultural barriers to sharing, and not only structural issues).
• Support for learning programmes across professions and sectors to support delivery on outcomes.
• Wider-scale recognition of the value of information and evidence and of initiatives that invest in creating such infrastructure locally and nationally.
• A need for enhanced national leadership on data and evidence landscapes.
• A need to ensure that PPI efforts and national platforms have appropriate membership, for local CCG support of PPI activities, continued efforts to address innovative ways of tackling representativeness, and general awareness-raising of innovation in the NHS for both patients and the wider public. (Our wider research also found the need for communicating feedback on how patient engagement was used and what it led to).
• Continuing to support close dialogue between the NHS and the private sector, and specifically about the evidence the NHS needs to make well-informed purchasing decisions.
• A need to balance fire-fighting with future-focused strategy to support innovation and create better incentives for Trusts to value innovators or to adopt proven innovations.
• A need to move from a culture of risk avoidance to one of appropriate risk management, recognising the risks of not innovating through incentive-based mechanisms targeting organisational culture (e.g. reward and recognition for innovating, funding, professional development and career structures and performance-based incentives).

These points are illustrative of the views of those respondents who wished to provide additional examples, and should not necessarily be seen as reflective of the population as a whole. However, they strongly support and reinforce as well as add additional insights to our learning from Phase 1 of this research (see Marjanovic, Sim et al. (2017b)), extending and enabling a more rounded evidence base.
A.5. Appendix to Annex A: stakeholder figures

This Appendix presents the responses to the survey questions broken down by stakeholder group:

a) Innovation and improvement networks
b) Healthcare professionals and providers
c) Commissioning
d) Academics
e) Charity and public and patient voice
f) Private sector
g) Policymakers.

Figure A.26 to Figure A.31 present stakeholder-specific responses to initiatives associated with the six drivers of innovation in the health system (skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning). Figure A.32 shows stakeholder-specific results to the question on where respondents go for information on innovation needs, opportunities and evidence on impact, and Figure A.33 shows stakeholder-specific results to the question on where respondents think patients go for information on innovation. Finally, Figure A.34 illustrates how many of the respondents from each stakeholder group associate selected funding sources with innovation funding.
Figure A.26: The percentage of respondents from different stakeholder types that chose each action targeting skills, capabilities and leadership:

- **a)** innovation and improvement networks;
- **b)** healthcare professionals and providers;
- **c)** commissioning;
- **d)** academics;
- **e)** charity and public and patient voice;
- **f)** private sector;
- **g)** policymakers

**Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=51)**

- **Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others)**: 66.7%
- **Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others)**: 56.9%
- **Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, themed networks, meetings, professional associations, idea generation forums and problem-solving events)**: 41.2%
- **Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes)**: 39.2%
- **Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others)**: 39.2%
- **Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts)**: 35.3%
- **Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula**: 21.6%
**b) Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=36)**

- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events) - 63.2%
- Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts) - 55.3%
- Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others) - 52.6%
- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others) - 47.4%
- Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others) - 28.9%
- Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes) - 28.9%
- Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula - 23.7%
Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=25)

- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others)  - 60.0%
- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events)  - 56.0%
- Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others)  - 48.0%
- Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts)  - 48.0%
- Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others)  - 32.0%
- Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes)  - 28.0%
- Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula  - 28.0%
Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=20)

- Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula: 55.0%
- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others): 50.0%
- Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others): 45.0%
- Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts): 45.0%
- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events): 40.0%
- Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes): 35.0%
- Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others): 30.0%
Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=16)

- Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others) 75.0%
- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events) 62.5%
- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others) 56.2%
- Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula 31.2%
- Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts) 31.2%
- Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others) 25.0%
- Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes) 18.8%
Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=12)

- Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others) 75.0%
- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events) 58.3%
- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others) 58.3%
- Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula 41.7%
- Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes) 33.3%
- Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts) 25.0%
- Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others) 8.3%
Which 3 actions targeting skills, capabilities and leadership for innovation do you think have the greatest potential for impact? (n=9)

- Organisations designed to share knowledge, information and learning, raise awareness about innovation opportunities and help nurture relationships to match supply and demand (e.g. Academic Health Science Networks, Innovation Hubs, Accelerators, quality improvement networks and others) - 77.8%
- Initiatives to facilitate cross-sector (i.e. private, NHS, other public and third sector) learning to identify where innovation may offer new perspectives or solutions (e.g. on issues of risk management, public engagement and others) - 66.7%
- Professional networking opportunities and establishing ‘communities of practice’ (e.g. clinical leadership groups, strategic initiatives, thematic networks, meetings, professional associations, idea generation forums and problem-solving events) - 55.6%
- Training programmes in skills for health innovation uptake and diffusion in the health system (e.g. the NHS Innovation Accelerator programme, regional training programmes) - 33.3%
- Including training on innovation-related skills and the role of innovation in the health system, as part of medical education curricula - 33.3%
- Training programmes in skills for health innovation development and entrepreneurship (e.g. the nationally supported Clinical Entrepreneur Training Programme, regional training programmes in NHS Trusts, training delivered by Academic Health Science Networks and Innovation Hubs and others) - 22.2%
- Coaching and mentoring schemes focused on innovation skill sets within healthcare provider organisations (e.g. Innovation Scouts/Leads/Champions, and members of Innovation Panels in Trusts) - 11.1%
Figure A.27: The percentage of respondents from different stakeholder types that chose each action targeting motivations and accountabilities: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers.
b) Which 3 actions targeting motivations and accountabilities for innovation development and uptake do you think have the greatest potential for impact? (n=41)

- Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities: 61.0%
- Enhanced focus on incentives for uptake specifically of proven high value innovations, as well as for associated decommissioning (e.g. awards for uptake; better availability of evidence on innovation impact, accountability for innovation uptake as part of performance assessment): 46.3%
- Healthcare provider schemes to ‘free up’ health professional time to engage with innovation-related activities (e.g. ‘buying out’ programmed activities/sessions for healthcare professionals): 43.9%
- Seed funding to help incubate ideas (e.g. pump-priming or proof of concept funding): 41.5%
- Professional development opportunities in innovation-related activities (e.g. career pathway progression, skill development): 26.8%
- Reward and recognition schemes for innovation (e.g. awards for impact on patients, quality of care, cost-effectiveness of care through innovation development and/or uptake): 24.4%
- Financial rewards for entrepreneurs working in or with the NHS, and greater clarity about such incentives (e.g. royalties from intellectual property, clear NHS IP policies and benefit-sharing arrangements): 22.0%
- Organisational performance metrics-based incentives to help measure progress with innovation and to ensure accountability: 17.1%
- Formal job roles linked to innovation in healthcare provider organisations (e.g. Innovation Leads/Scouts/Champions, Directors of Improvement, Directors of Patient Experience, Innovation Panels): 14.6%
- Establishing standards and norms for promoting responsible and accountable risk management: 2.4%
Which 3 actions targeting motivations and accountabilities for innovation development and uptake do you think have the greatest potential for impact? (n=12)

- Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities: 66.7%
- Professional development opportunities in innovation-related activities (e.g. career pathway progression, skill development): 58.3%
- Seed funding to help incubate ideas (e.g. pump-priming or proof of concept funding): 50.0%
- Healthcare provider schemes to ‘free up’ health professional time to engage with innovation-related activities (e.g. ‘buying out’ programmed activities/sessions for healthcare professionals): 41.7%
- Enhanced focus on incentives for uptake specifically of proven high value innovations, as well as for associated decommissioning (e.g. awards for uptake; better availability of evidence on innovation impact; accountability for innovation uptake as part of performance assessment): 33.3%
- Reward and recognition schemes for innovation (e.g. awards for impact on patients, quality of care, cost-effectiveness of care through innovation development and/or uptake): 25.0%
- Organisational performance metrics-based incentives to help measure progress with innovation and to ensure accountability: 8.3%
- Formal job roles linked to innovation in healthcare provider organisations (e.g. Innovation Leads/Scouts/Champions, Directors of Improvement, Directors of Patient Experience, Innovation Panels): 8.3%
- Financial rewards for entrepreneurs working in or with the NHS, and greater clarity about such incentives (e.g. royalties from intellectual property, clear NHS IP policies and benefit-sharing arrangements): 8.3%
- Establishing standards and norms for promoting responsible and accountable risk management: 0.0%
Which 3 actions targeting motivations and accountabilities for innovation development and uptake do you think have the greatest potential for impact? (n=13)

- Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities: 69.2%
- Healthcare provider schemes to 'free up' health professional time to engage with innovation-related activities (e.g., 'buying out' programmed activities/sessions for healthcare professionals): 46.2%
- Enhanced focus on incentives for uptake specifically of proven high value innovations, as well as for associated decommissioning (e.g., awards for uptake, better availability of evidence on innovation impact, accountability for innovation uptake as part of performance assessment): 46.2%
- Seed funding to help incubate ideas (e.g., pump-priming or proof of concept funding): 38.5%
- Establishing standards and norms for promoting responsible and accountable risk management: 30.8%
- Professional development opportunities in innovation-related activities (e.g., career pathway progression, skill development): 23.1%
- Organisational performance metrics-based incentives to help measure progress with innovation and to ensure accountability: 23.1%
- Formal job roles linked to innovation in healthcare provider organisations (e.g., Innovation Leads/Scouts/Champions, Directors of Improvement, Directors of Patient Experience, Innovation Panels): 15.4%
- Reward and recognition schemes for innovation (e.g., awards for impact on patients, quality of care, cost-effectiveness of care through innovation development and/or uptake): 7.7%
- Financial rewards for entrepreneurs working in or with the NHS, and greater clarity about such incentives (e.g., royalties from intellectual property, clear NHS IP policies and benefit-sharing arrangements): 0.0%
Which 3 actions targeting motivations and accountabilities for innovation development and uptake do you think have the greatest potential for impact? (n=9)

- Healthcare provider schemes to ‘free up’ health professional time to engage with innovation-related activities (e.g. ‘buying out’ programmed activities/sessions for healthcare professionals) - 66.7%
- Seed funding to help incubate ideas (e.g. pump-priming or proof of concept funding) - 44.4%
- Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities - 44.4%
- Formal job roles linked to innovation in healthcare provider organisations (e.g. Innovation Leads/Scouts/Champions, Directors of Improvement, Directors of Patient Experience, Innovation Panels) - 44.4%
- Professional development opportunities in innovation-related activities (e.g. career pathway progression, skill development) - 33.3%
- Reward and recognition schemes for innovation (e.g. awards for impact on patients, quality of care, cost-effectiveness of care through innovation development and/or uptake) - 22.2%
- Establishing standards and norms for promoting responsible and accountable risk management - 22.2%
- Enhanced focus on incentives for uptake specifically of proven high value innovations, as well as for associated decommissioning (e.g. awards for uptake, better availability of evidence on innovation impact, accountability for innovation uptake as part of performance assessment) - 22.2%
- Organisational performance metrics-based incentives to help measure progress with innovation and to ensure accountability 0.0%
- Financial rewards for entrepreneurs working in or with the NHS, and greater clarity about such incentives (e.g. royalties from intellectual property, clear NHS IP policies and benefit-sharing arrangements) 0.0%
Which 3 actions targeting motivations and accountabilities for innovation development and uptake do you think have the greatest potential for impact? (n=14)

- Organisational performance metrics-based incentives to help measure progress with innovation and to ensure accountability: 57.1%
- Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities: 57.1%
- Seed funding to help incubate ideas (e.g. pump-priming or proof of concept funding): 35.7%
- Enhanced focus on incentives for uptake specifically of proven high value innovations, as well as for associated decommissioning (e.g. awards for uptake, better availability of evidence on innovation impact, accountability for innovation uptake as part of performance assessment): 35.7%
- Reward and recognition schemes for innovation (e.g. awards for impact on patients, quality of care, cost-effectiveness of care through innovation development and/or uptake): 28.6%
- Formal job roles linked to innovation in healthcare provider organisations (e.g. Innovation Leads/Scouts/Champions, Directors of Improvement, Directors of Patient Experience, Innovation Panels): 28.6%
- Healthcare provider schemes to ‘free up’ health professional time to engage with innovation-related activities (e.g. ‘buying out’ programmed activities/sessions for healthcare professionals): 21.4%
- Professional development opportunities in innovation-related activities (e.g. career pathway progression, skill development): 14.3%
- Establishing standards and norms for promoting responsible and accountable risk management: 14.3%
- Financial rewards for entrepreneurs working in or with the NHS, and greater clarity about such incentives (e.g. royalties from intellectual property, clear NHS IP policies and benefit-sharing arrangements): 7.1%
Which 3 actions targeting motivations and accountabilities for innovation development and uptake do you think have the greatest potential for impact? (n=8)

Organisational leadership which recognises and values innovation and visibly promotes innovation-related activities 87.5%

Seed funding to help incubate ideas (e.g. pump-priming or proof of concept funding) 37.5%

Healthcare provider schemes to ‘free up’ health professionals time to engage with innovation-related activities (e.g. ‘buying out’ programmed activities/sessions for healthcare professionals) 37.5%

Formal job roles linked to innovation in healthcare provider organisations (e.g. Innovation Leads/Scouts/Champions, Directors of Improvement, Directors of Patient Experience, Innovation Panels) 37.5%

Enhanced focus on incentives for uptake specifically of proven high value innovations, as well as for associated decommissioning (e.g. awards for uptake; better availability of evidence on innovation impact; accountability for innovation uptake as part of performance assessment) 37.5%

Organisational performance metrics-based incentives to help measure progress with innovation and to ensure accountability 25.0%

Financial rewards for entrepreneurs working in or with the NHS, and greater clarity about such incentives (e.g. royalties from intellectual property, clear NHS IP policies and benefit-sharing arrangements) 25.0%

Professional development opportunities in innovation-related activities (e.g. career pathway progression, skill development) 12.5%

Reward and recognition schemes for innovation (e.g. awards for impact on patients, quality of care, cost-effectiveness of care through innovation development and/or uptake) 0.0%

Establishing standards and norms for promoting responsible and accountable risk management 0.0%
Figure A.28: The percentage of respondents from different stakeholder types that chose each action targeting the information and evidence environment: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers.

Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=41)
Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=37)

- Innovation or health improvement networks that enable the spread of information (e.g. Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)) - 62.2%

- A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally - 48.6%

- Greater support and investment in developing virtual (nationally hosted or regionally hosted) platforms that would provide information on innovation opportunities, types of innovation support available and needs (e.g. internet platforms, websites) - 43.2%

- A supportive data infrastructure which allows for interoperability of data platforms - 43.2%

- More opportunities for face-to-face exchange of information, knowledge and evidence (e.g. through meetings, committees, events and other mechanisms) - 40.5%

- Individuals who act as brokers of information and evidence, including those belonging to multiple professional communities simultaneously (e.g. Directors of Innovation and Improvement, Innovation Scouts and Leads, members of trust innovation committees, academic clinicians) - 37.6%

- Establishing and adopting legal mechanisms to reduce blockages to collaboration and information sharing (e.g. Non-Disclosure Agreements and policies on benefit-sharing agreements) - 24.3%
Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=20)

- A supportive data infrastructure which allows for interoperability of data platforms: 65.0%
- Innovation or health improvement networks that enable the spread of information (e.g. Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)): 60.0%
- Greater support and investment in developing virtual (nationally hosted or regionally hosted) platforms that would provide information on innovation opportunities, types of innovation support available and needs (e.g. internet platforms, websites): 45.0%
- Establishing and adopting legal mechanisms to reduce blockages to collaboration and information sharing (e.g. Non-Disclosure Agreements and policies on benefit-sharing agreements): 45.0%
- A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally: 40.0%
- More opportunities for face-to-face exchange of information, knowledge and evidence (e.g. through meetings, committees, events and other mechanisms): 30.0%
- Individuals who act as brokers of information and evidence, including those belonging to multiple professional communities simultaneously (e.g. Directors of Innovation and Improvement, Innovation Scouts and Leads, members of trust innovation committees, academic clinicians): 15.0%
Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=16)

- A supportive data infrastructure which allows for interoperability of data platforms: 62.5%
- A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally: 62.5%
- Innovation or health improvement networks that enable the spread of information (e.g. Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)): 50.0%
- Individuals who act as brokers of information and evidence, including those belonging to multiple professional communities simultaneously (e.g. Directors of Innovation and Improvement, Innovation Scouts and Leads, members of trust innovation committees, academic clinicians): 50.0%
- Establishing and adopting legal mechanisms to reduce blockages to collaboration and information sharing (e.g. Non-Disclosure Agreements and policies on benefit-sharing agreements): 37.5%
- More opportunities for face-to-face exchange of information, knowledge and evidence (e.g. through meetings, committees, events and other mechanisms): 31.2%
- Greater support and investment in developing virtual (nationally hosted or regionally hosted) platforms that would provide information on innovation opportunities, types of innovation support available and needs (e.g. internet platforms, websites): 6.2%
Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=14)

- Innovation or health improvement networks that enable the spread of information (e.g. Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)).
  - 64.3%
- A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally.
  - 57.1%
- Greater support and investment in developing virtual (nationally hosted or regionally hosted) platforms that would provide information on innovation opportunities, types of innovation support available and needs (e.g. internet platforms, websites).
  - 50.0%
- More opportunities for face-to-face exchange of information, knowledge and evidence (e.g. through meetings, committees, events and other mechanisms).
  - 35.7%
- Individuals who act as brokers of information and evidence, including those belonging to multiple professional communities simultaneously (e.g. Directors of Innovation and Improvement, Innovation Scouts and Leads, members of trust innovation committees, academic clinicians).
  - 35.7%
- A supportive data infrastructure which allows for interoperability of data platforms.
  - 35.7%
- Establishing and adopting legal mechanisms to reduce blockages to collaboration and information sharing (e.g. Non-Disclosure Agreements and policies on benefit-sharing agreements).
  - 21.4%
Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=8)

- A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally: 75.0%
- A supportive data infrastructure which allows for interoperability of data platforms: 62.5%
- Innovation or health improvement networks that enable the spread of information (e.g., Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)): 50.0%
- Greater support and investment in developing virtual (nationally hosted or regionally hosted) platforms that would provide information on innovation opportunities, types of innovation support available and needs (e.g., internet platforms, websites): 50.0%
- More opportunities for face-to-face exchange of information, knowledge and evidence (e.g., through meetings, committees, events and other mechanisms): 37.5%
- Individuals who act as brokers of information and evidence, including those belonging to multiple professional communities simultaneously (e.g., Directors of Innovation and Improvement, Innovation Scouts and Leads, members of trust innovation committees, academic clinicians): 12.5%
- Establishing and adopting legal mechanisms to reduce blockages to collaboration and information sharing (e.g., Non-Disclosure Agreements and policies on benefit-sharing agreements): 12.5%
Which 3 actions targeting the information and evidence environment for innovation development and uptake do you think have the greatest potential for impact? (n=9)

- A supportive data infrastructure which allows for interoperability of data platforms: 77.8%
- A more explicit national strategy and guidance on how information and evidence flows pertaining to innovation in the health system will be managed and governed, at national levels and regionally: 66.7%
- Innovation or health improvement networks that enable the spread of information (e.g. Academic Health Science Networks, Innovation Hubs, Vanguards and Test Beds, regional health improvement networks, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)): 44.4%
- Establishing and adopting legal mechanisms to reduce blockages to collaboration and information sharing (e.g. Non-Disclosure Agreements and policies on benefit-sharing agreements): 44.4%
- Individuals who act as brokers of information and evidence, including those belonging to multiple professional communities simultaneously (e.g. Directors of Innovation and Improvement, Innovation Scouts and Leads, members of trust innovation committees, academic clinicians): 33.3%
- Greater support and investment in developing virtual (nationally hosted or regionally hosted) platforms that would provide information on innovation opportunities, types of innovation support available and needs (e.g. internet platforms, websites): 22.2%
- More opportunities for face-to-face exchange of information, knowledge and evidence (e.g. through meetings, committees, events and other mechanisms): 11.1%
Figure A.29: The percentage of respondents from different stakeholder types that chose each action targeting relationships and networks: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

Which 3 actions targeting relationships and networks for innovation development and uptake do you think have the greatest potential for impact? (n=49)

- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet): 79.6%
- Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise: 53.1%
- Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake; through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation): 46.9%
- Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution): 44.9%
- Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition: 40.8%
- Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strength collaboration across different networks (e.g. Academic Health Science Networks, Vanguards, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors: 20.4%
- Physical co-location of collaborating individuals and organisations (e.g. shared premises): 14.3%
### Which 3 actions targeting relationships and networks for innovation development and uptake do you think have the greatest potential for impact? (n=51)

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise</td>
<td>62.7%</td>
</tr>
<tr>
<td>Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution)</td>
<td>58.8%</td>
</tr>
<tr>
<td>Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet)</td>
<td>58.8%</td>
</tr>
<tr>
<td>Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition</td>
<td>45.1%</td>
</tr>
<tr>
<td>Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strengthen collaboration across different networks (e.g. Academic Health Science Networks, Vanguard, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors</td>
<td>29.4%</td>
</tr>
<tr>
<td>Physical co-location of collaborating individuals and organisations (e.g. shared premises)</td>
<td>23.5%</td>
</tr>
<tr>
<td>Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake; through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation)</td>
<td>21.6%</td>
</tr>
</tbody>
</table>
c) Which 3 actions targeting relationships and networks for innovation development and uptake do you think have the greatest potential for impact? (n=16)

- Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution) - 68.8%
- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet) - 50.0%
- Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strengthen collaboration across different networks (e.g. Academic Health Science Networks, Vanguards, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors - 43.8%
- Physical co-location of collaborating individuals and organisations (e.g. shared premises) - 37.5%
- Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake, through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation) - 37.5%
- Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition - 37.5%
- Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise - 25.0%
Which 3 actions targeting relationships and networks for innovation development and uptake do you think have the greatest potential for impact? (n=14)

- Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution) 78.6%
- Physical co-location of collaborating individuals and organisations (e.g. shared premises) 57.1%
- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet) 57.1%
- Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise 50.0%
- Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition 28.6%
- Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strengthen collaboration across different networks (e.g. Academic Health Science Networks, Vanguard, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors 14.3%
- Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake; through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation) 14.3%
Which 3 actions targeting relationships and networks for innovation development and uptake do you think have the greatest potential for impact? (n=14)

- Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution) 64.3%
- Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strengthen collaboration across different networks (e.g. Academic Health Science Networks, Vanguard, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors 64.3%
- Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition 64.3%
- Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise 35.7%
- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet) 35.7%
- Physical co-location of collaborating individuals and organisations (e.g. shared premises) 21.4%
- Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake, through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation) 14.3%
<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet)</td>
<td>73.7%</td>
</tr>
<tr>
<td>Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake; through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation)</td>
<td>57.9%</td>
</tr>
<tr>
<td>Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise</td>
<td>52.6%</td>
</tr>
<tr>
<td>Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution)</td>
<td>36.8%</td>
</tr>
<tr>
<td>Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strengthen collaboration across different networks (e.g. Academic Health Science Networks, Vanguards, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors</td>
<td>31.6%</td>
</tr>
<tr>
<td>Physical co-location of collaborating individuals and organisations (e.g. shared premises)</td>
<td>26.3%</td>
</tr>
<tr>
<td>Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition</td>
<td>21.1%</td>
</tr>
</tbody>
</table>
Which 3 actions targeting relationships and networks for innovation development and uptake do you think have the greatest potential for impact? (n=13)

- Supporting existing innovation-related institutions and networks to develop the capacity (either internally or in collaboration with others) to respond to NHS needs for implementation support, legal and intellectual property (IP) advice, and evaluation expertise
  - 69.2%

- Enhancing the capacity of the NHS to articulate needs to innovators and the route to market (e.g. greater clarity on what types of innovations are needed, what criteria they need to meet)
  - 61.5%

- Clarifying and making more visible the roles, remits, unique value added and complementarities of specific initiatives that already exist in the system, to reduce barriers to collaboration, duplication and exacerbated competition
  - 53.8%

- Supporting joint-working mechanisms between organisations involved with innovation and improvement efforts in the health system (e.g. secondments, individual affiliations with more than one institution)
  - 46.2%

- Enhancing the capacity of the private sector to make a compelling business case for the NHS (e.g. through a better understanding of what information the NHS needs to make decisions on uptake; through provision of evidence on impact to the NHS and information on the processes, support available and costs associated with implementation)
  - 30.8%

- Ensuring greater diversity in terms of who is represented on executive committees and boards of institutions with an innovation remit, to help strength collaboration across different networks (e.g. Academic Health Science Networks, Vanguards, Test Beds, Innovation Hubs and others), sectors (e.g. health, social care), between both clinical and managerial professions, and across primary, acute and community care, and public, private and third sectors
  - 23.1%

- Physical co-location of collaborating individuals and organisations (e.g. shared premises)
  - 15.4%
Figure A.30: The percentage of respondents from different stakeholder types that chose each action targeting patient and public involvement and engagement: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities</td>
<td>56.4%</td>
</tr>
<tr>
<td>Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees)</td>
<td>51.3%</td>
</tr>
<tr>
<td>A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach)</td>
<td>35.9%</td>
</tr>
<tr>
<td>Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector)</td>
<td>33.3%</td>
</tr>
<tr>
<td>Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed</td>
<td>30.8%</td>
</tr>
<tr>
<td>Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets)</td>
<td>30.8%</td>
</tr>
<tr>
<td>Training programmes for both the public, patients and health professions for effective engagement strategies and communication</td>
<td>23.1%</td>
</tr>
<tr>
<td>Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation)</td>
<td>20.5%</td>
</tr>
<tr>
<td>Learning from the research and charity sector experience with patient and public involvement</td>
<td>17.9%</td>
</tr>
</tbody>
</table>
Which 3 actions targeting patient and public engagement with innovation development and uptake do you think have the greatest potential for impact? (n=37)

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed</td>
<td>45.9%</td>
</tr>
<tr>
<td>Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities</td>
<td>45.9%</td>
</tr>
<tr>
<td>Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees)</td>
<td>43.2%</td>
</tr>
<tr>
<td>A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach)</td>
<td>37.8%</td>
</tr>
<tr>
<td>Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets)</td>
<td>35.1%</td>
</tr>
<tr>
<td>Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation)</td>
<td>32.4%</td>
</tr>
<tr>
<td>Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector)</td>
<td>21.6%</td>
</tr>
<tr>
<td>Learning from the research and charity sector experience with patient and public involvement</td>
<td>21.6%</td>
</tr>
<tr>
<td>Training programmes for both the public, patients and health professions for effective engagement strategies and communication</td>
<td>16.2%</td>
</tr>
</tbody>
</table>
Which 3 actions targeting patient and public engagement with innovation development and uptake do you think have the greatest potential for impact? (n=17)

- Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees) 64.7%
- Learning from the research and charity sector experience with patient and public involvement 47.1%
- Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets) 41.2%
- Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds, and other institutions, where patient representatives are encouraged to participate in innovation-related activities 35.3%
- Training programmes for both the public, patients and health professions for effective engagement strategies and communication 29.4%
- Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed 29.4%
- A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach) 23.5%
- Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation) 17.6%
- Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector) 11.8%
Which 3 actions targeting patient and public engagement with innovation development and uptake do you think have the greatest potential for impact? (n=16)

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach)</td>
<td>56.2%</td>
</tr>
<tr>
<td>Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities</td>
<td>50.0%</td>
</tr>
<tr>
<td>Learning from the research and charity sector experience with patient and public involvement</td>
<td>50.0%</td>
</tr>
<tr>
<td>Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees)</td>
<td>37.5%</td>
</tr>
<tr>
<td>Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed</td>
<td>31.2%</td>
</tr>
<tr>
<td>Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation)</td>
<td>25.0%</td>
</tr>
<tr>
<td>Training programmes for both the public, patients and health professions for effective engagement strategies and communication</td>
<td>18.8%</td>
</tr>
<tr>
<td>Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets)</td>
<td>18.8%</td>
</tr>
<tr>
<td>Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector)</td>
<td>12.5%</td>
</tr>
</tbody>
</table>
Which 3 actions targeting patient and public engagement with innovation development and uptake do you think have the greatest potential for impact? (n=14)

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning from the research and charity sector experience with patient and public involvement</td>
<td>57.1%</td>
</tr>
<tr>
<td>Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees)</td>
<td>57.1%</td>
</tr>
<tr>
<td>Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities</td>
<td>42.9%</td>
</tr>
<tr>
<td>A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach)</td>
<td>42.9%</td>
</tr>
<tr>
<td>Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets)</td>
<td>35.7%</td>
</tr>
<tr>
<td>Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation)</td>
<td>21.4%</td>
</tr>
<tr>
<td>Training programmes for both the public, patients and health professions for effective engagement strategies and communication</td>
<td>14.3%</td>
</tr>
<tr>
<td>Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector)</td>
<td>14.3%</td>
</tr>
<tr>
<td>Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed</td>
<td>14.3%</td>
</tr>
</tbody>
</table>
Which 3 actions targeting patient and public engagement with innovation development and uptake do you think have the greatest potential for impact? (n=8)

- Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector): 62.5%
- Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees): 62.5%
- Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation): 37.5%
- Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed: 37.5%
- Learning from the research and charity sector experience with patient and public involvement: 25.0%
- Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets): 25.0%
- A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach): 25.0%
- Training programmes for both the public, patients and health professions for effective engagement strategies and communication: 12.5%
- Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities: 12.5%
Which 3 actions targeting patient and public engagement with innovation development and uptake do you think have the greatest potential for impact? (n=8)

- Web-based platforms for patient and public engagement in innovation related activities (e.g. websites for soliciting ideas, providing feedback on ideas, enabling members of the public and patients to input into design thinking related to an innovation): 50.0%
- Learning from the research and charity sector experience with patient and public involvement: 50.0%
- Patient engagement roles as part of Trust and CCG structures, Academic Health Science Networks, Test Beds and other institutions, where patient representatives are encouraged to participate in innovation-related activities: 37.5%
- Exposing the public to health care innovations and engaging them as part of community events and activities of daily life (e.g. at football games, supermarkets): 37.5%
- Creating mechanisms for patient-driven innovations (e.g. targeted initiatives providing a platform and support for patient-initiated innovation ideas and projects, for example through web-based platforms for soliciting ideas, idea boxes in health service organisations for patients to provide written suggestions in, or through patient representative engagement with innovation committees): 37.5%
- A focus on better coordination of public and patient engagement efforts between innovation, quality improvement, and research activities in regions and nationally (rather than a fragmented approach): 37.5%
- Supporting greater collaboration with the private sector to establish new mechanisms of patient engagement with innovation in the health system (e.g. learning from consumer sentiment analysis approaches used in the private sector): 25.0%
- Sharing examples and evidence of positive experiences and successful outcomes to which patient and public engagement contributed: 25.0%
- Training programmes for both the public, patients and health professions for effective engagement strategies and communication: 0.0%
**Figure A.31:** The percentage of respondents from different stakeholder types that chose each action targeting funding and commissioning: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

<table>
<thead>
<tr>
<th>Action Description</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensuring stable and sustainable national funding programmes for innovation (e.g. from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and academic health science networks)</td>
<td>61.0%</td>
</tr>
<tr>
<td>Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives)</td>
<td>48.8%</td>
</tr>
<tr>
<td>Supporting outcome-based commissioning models to help create a viable route to market (e.g. commissioning through evaluation schemes – which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely)</td>
<td>48.3%</td>
</tr>
<tr>
<td>Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the ‘valley of death’ and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g. enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding)</td>
<td>43.9%</td>
</tr>
<tr>
<td>Factoring innovation into procurement and commissioning contracts (e.g. schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes)</td>
<td>41.5%</td>
</tr>
<tr>
<td>Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.)</td>
<td>17.1%</td>
</tr>
<tr>
<td>Integrating monetary incentives for innovation (e.g. via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks)</td>
<td>14.6%</td>
</tr>
<tr>
<td>Focusing on hybrid models of governance and management of innovation funding (for example strong regional roles coordinated with national oversight)</td>
<td>12.2%</td>
</tr>
<tr>
<td>Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g. fast-track approval, early access schemes)</td>
<td>9.8%</td>
</tr>
<tr>
<td>More effort to diversify available funding sources (e.g. attracting private sector support, ensuring European Union framework programme and national development funding to complement national funding sources)</td>
<td>4.9%</td>
</tr>
</tbody>
</table>
Ensuring stable and sustainable national funding programmes for innovation (e.g. from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and Academic Health Science Networks) - 51.3%

Supporting outcome-based commissioning models to help create a viable route to market (e.g. commissioning through evaluation schemes – which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely) - 48.7%

Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.) - 41.0%

Integrating monetary incentives for innovation (e.g. via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks) - 38.5%

Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g. fast-track approval, early access schemes) - 28.2%

Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives) - 28.2%

Factoring innovation into procurement and commissioning contracts (e.g. schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes) - 28.2%

Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the 'valley of death' and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g. enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding) - 25.6%

More effort to diversify available funding sources (e.g. attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources) - 5.1%

Focusing on hybrid models of governance and management of innovation funding (for example strong regional roles coordinated with national oversight) - 5.1%
Which 3 actions targeting funding and commissioning of innovations do you think have the greatest potential for impact? (n=12)

- Ensuring stable and sustainable national funding programmes for innovation (e.g., from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional min-commissions for seed funding in Trusts, CCGs and Academic Health Science Networks) 66.7%
- Supporting outcome-based commissioning models to help create a viable route to market (e.g., commissioning through evaluation schemes – which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely) 60.0%
- Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives) 60.0%
- Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g., fast-track approval, early access schemes) 33.3%
- Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.) 33.3%
- Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the ‘valley of death’ and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g., enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding) 25.0%
- Integrating monetary incentives for innovation (e.g., via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks) 16.7%
- More effort to diversify available funding sources (e.g., attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources) 8.3%
- Focusing on hybrid models of governance and management of innovation funding (for example strong regional roles coordinated with national oversight) 8.3%
- Factoring innovation into procurement and commissioning contracts (e.g., schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes) 8.3%
Which 3 actions targeting funding and commissioning of innovations do you think have the greatest potential for impact? (n=13)

- Ensuring stable and sustainable national funding programmes for innovation (e.g., from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional non-profits for seed funding in Trusts, CCGs, and Academic Health Science Networks) - 53.8%
- Supporting outcome-based commissioning models to help create a viable route to market (e.g., commissioning through evaluation schemes – which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely) - 46.2%
- Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives) - 38.6%
- Factoring innovation into procurement and commissioning contracts (e.g., schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes) - 38.5%
- Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.) - 38.6%
- More effort to diversify available funding sources (e.g., attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources) - 23.1%
- Integrating monetary incentives for innovation (e.g., via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks) - 23.1%
- Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the ‘valley of death’ and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g., enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding) - 23.1%
- Focusing on hybrid models of governance and management of innovation funding (for example strong regional roles coordinated with national oversight) - 15.4%
- Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g., fast-track approval, early access schemes) - 0.0%
### Which 3 actions targeting funding and commissioning of innovations do you think have the greatest potential for impact? (n=9)

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the 'valley of death' and can be supported across the whole healthcare innovation pathway – from design to adoption (e.g. enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding)</td>
<td>88.9%</td>
</tr>
<tr>
<td>Ensuring stable and sustainable national funding programmes for innovation (e.g. from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and Academic Health Science Networks)</td>
<td>66.7%</td>
</tr>
<tr>
<td>Supporting outcome-based commissioning models to help create a viable route to market (e.g. commissioning through evaluation schemes – which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely)</td>
<td>33.3%</td>
</tr>
<tr>
<td>Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g. fast-track approval, early access schemes)</td>
<td>33.3%</td>
</tr>
<tr>
<td>More effort to diversify available funding sources (e.g. attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources)</td>
<td>22.2%</td>
</tr>
<tr>
<td>Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives)</td>
<td>22.2%</td>
</tr>
<tr>
<td>Factoring innovation into procurement and commissioning contracts (e.g. schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes)</td>
<td>22.2%</td>
</tr>
<tr>
<td>Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.)</td>
<td>11.1%</td>
</tr>
<tr>
<td>Integrating monetary incentives for innovation (e.g. via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks)</td>
<td>0.0%</td>
</tr>
<tr>
<td>Focusing on hybrid models of governance and management of innovation funding (for example strong regional roles coordinated with national oversight)</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the 'valley of death' and can be supported across the whole healthcare innovation pathway — from design to adoption (e.g. enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding)

Ensuring stable and sustainable national funding programmes for innovation (e.g. from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and Academic Health Science Networks)

Supporting outcome-based commissioning models to help create a viable route to market (e.g. commissioning through evaluation schemes — which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely)

More effort to diversify available funding sources (e.g. attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources)

Factoring innovation into procurement and commissioning contracts (e.g. schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes)

Integrating monetary incentives for innovation (e.g. via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks)

Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.)

Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g. fast-track approval, early access schemes)

Initiatives for greater pathway integration and new approaches to more joined up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives)

Focusing on hybrid models of governance and management of innovation funding (e.g. example strong regional roles coordinated with national oversight)
Which 3 actions targeting funding and commissioning of innovations do you think have the greatest potential for impact? (n=8)

- Supporting outcome-based commissioning models to help create a viable route to market (e.g., commissioning through evaluation schemes—which allow innovations to be commissioned at a small scale, with data collected about their effectiveness, to evaluate their potential to be implemented more widely) – 62.5%
- Factoring innovation into procurement and commissioning contracts (e.g., schemes such as the Innovation and Technology Tariff, ring-fencing a proportion of commissioning budgets for commissioning by evaluation and outcome-based commissioning schemes) – 50.0%
- Ensuring stable and sustainable national funding programmes for innovation (e.g., from the Department of Health and Social Care, National Institute for Health Research, NHS England, Innovate UK, foundations and charities, local and regional mini-competitions for seed funding in Trusts, CCGs and Academic Health Science Networks) – 60.0%
- Supporting other schemes which accelerate progression of promising innovations through the pathway from development through to uptake by the system (e.g., fast-track approval, early access schemes) – 37.5%
- More effort to diversify available funding sources (e.g., attracting private sector support, ensuring European Union framework programme and regional development funding to complement national funding sources) – 37.5%
- Integrating monetary incentives for innovation (e.g., via the Commissioning for Quality and Innovation (CQUIN) or the Quality and Outcomes frameworks) – 25.0%
- Initiatives for greater pathway integration and new approaches to more joined-up commissioning between health and social care (such as those being developed for sustainability and transformation partnerships (STPs) and for some of the new models of care or Vanguard initiatives) – 25.0%
- Bespoke funding programmes tailored to different types of innovations which reflect the different timescales for the development and uptake of different types of innovations (drugs, devices, digital, service innovations, etc.) – 12.5%
- Focusing on hybrid models of governance and management of innovation funding (for example strong regional roles coordinated with national oversight) – 0.0%
- Adapting the way in which innovation funding in the health system is governed and managed so that promising innovations do not hit the “valley of death” and can be supported across the whole healthcare innovation pathway—from design to adoption (e.g., enhancing coordination between different funding sources, or greater collaboration between health and social care in governance and management of innovation funding) – 0.0%
**Figure A.32:** Where respondents go for information on innovation needs, opportunities and evidence on impact: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

<table>
<thead>
<tr>
<th>Information Source</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information via personal networks</td>
<td>91.9%</td>
</tr>
<tr>
<td>Other institutional websites (e.g. Academic Health Science Networks, Innovation Hubs, Knowledge Transfer Networks)</td>
<td>81.1%</td>
</tr>
<tr>
<td>Direct communication with health professionals</td>
<td>64.9%</td>
</tr>
<tr>
<td>Conferences and trade shows</td>
<td>59.5%</td>
</tr>
<tr>
<td>Information gained via participating in various boards and committees</td>
<td>56.6%</td>
</tr>
<tr>
<td>NICE guidelines</td>
<td>54.1%</td>
</tr>
<tr>
<td>Cochrane reviews</td>
<td>35.1%</td>
</tr>
<tr>
<td>Other journal publications (excluding Cochrane reviews)</td>
<td>32.4%</td>
</tr>
<tr>
<td>Other internet search engines</td>
<td>27.0%</td>
</tr>
<tr>
<td>Other</td>
<td>18.9%</td>
</tr>
<tr>
<td>Other NHS England portals</td>
<td>16.2%</td>
</tr>
<tr>
<td>NHS Choices website</td>
<td>16.2%</td>
</tr>
<tr>
<td>CQC reports</td>
<td>13.5%</td>
</tr>
<tr>
<td>Academy of Fabulous Stuff</td>
<td>10.8%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

**Innovation information sources (n=37)**
Innovation information sources (n=37)

- Information via personal networks: 86.5%
- Conferences and trade shows: 73.0%
- Other institutional websites (e.g., Academic Health Science Networks, Innovation Hubs, Knowledge Transfer Networks): 87.6%
- Direct communication with health professionals: 87.6%
- NICE guidelines: 54.1%
- Information gained via participating in various boards and committees: 51.4%
- Other internet search engines: 45.9%
- Academy of Fabulous Stuff: 45.9%
- Other journal publications (excluding Cochrane reviews): 35.1%
- CQC reports: 32.4%
- Cochrane reviews: 32.4%
- Other NHS England portals: 27.0%
- NHS Choices website: 21.6%
- Other: 8.1%
- Don't know: 0.0%
Innovation information sources (n=16)

- Information gained via participating in various boards and committees: 68.8%
- Other journal publications (excluding Cochrane reviews): 56.2%
- Other institutional websites (e.g., Academic Health Science Networks, Innovation Hubs, Knowledge Transfer Networks): 50.0%
- NICE guidelines: 50.0%
- Direct communication with health professionals: 50.0%
- Conferences and trade shows: 50.0%
- Information via personal networks: 43.8%
- Cochrane reviews: 37.5%
- Other internet search engines: 31.2%
- Other NHS England portals: 16.8%
- NHS Choices website: 16.8%
- CQC reports: 12.5%
- Other: 6.2%
- Don't know: 6.2%
- Academy of Fabulous Stuff: 6.2%
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

### Innovation Information Sources (n=8)

- Other institutional websites (e.g. Academic Health Science Networks, Innovation Hubs, Knowledge Transfer Networks): 75.0%
- Direct communication with health professionals: 75.0%
- Information via personal networks: 62.5%
- Other NHS England portals: 50.0%
- NICE guidelines: 50.0%
- Other journal publications (excluding Cochrane reviews): 37.5%
- Other internet search engines: 37.5%
- Other: 37.5%
- NHS Choices website: 37.5%
- Information gained via participating in various boards and committees: 37.5%
- Conferences and trade shows: 37.5%
- CQC reports: 25.0%
- Academy of Fabulous Stuff: 25.0%
- Cochrane reviews: 12.5%
- Don't know: 0.0%
Figure A.33: Where respondents say patients go for information on innovation: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

a) Patient information sources (n=38)
- Peer support groups and websites: 71.1%
- Social media platforms: 57.9%
- Charities: 50.0%
- NHS websites: 44.7%
- Consultation with health professionals: 44.7%
- Other websites: 26.3%
- Don’t know: 13.2%
- Other: 10.5%

b) Patient information sources (n=35)
- Social media platforms: 80.0%
- NHS websites: 62.9%
- Consultation with health professionals: 48.6%
- Peer support groups and websites: 45.7%
- Charities: 45.7%
- Other websites: 28.6%
- Don’t know: 8.6%
- Other: 5.7%
c) Patient information sources (n=16)

- Social media platforms: 81.2%
- Peer support groups and websites: 68.8%
- NHS websites: 56.2%
- Charities: 56.2%
- Consultation with health professionals: 43.8%
- Other websites: 25.0%
- Other: 18.8%
- Don't know: 12.5%

Percentage of respondents

---

d) Patient information sources (n=16)

- Social media platforms: 62.5%
- Charities: 56.2%
- Consultation with health professionals: 50.0%
- Peer support groups and websites: 37.5%
- Other websites: 37.5%
- NHS websites: 37.5%
- Other: 6.2%
- Don't know: 6.2%

Percentage of respondents
**Patient information sources (n=12)**

- Peer support groups and websites: 75.0%
- Social media platforms: 66.7%
- Charities: 66.7%
- Consultation with health professionals: 41.7%
- NHS websites: 33.3%
- Other websites: 25.0%
- Other: 25.0%
- Don't know: 8.3%

**Patient information sources (n=8)**

- Peer support groups and websites: 87.5%
- Social media platforms: 62.5%
- Charities: 50.0%
- Other websites: 25.0%
- NHS websites: 25.0%
- Consultation with health professionals: 25.0%
- Other: 0.0%
- Don't know: 0.0%
Figure A.34: Percentage of respondents from each stakeholder group who associate particular funding sources with innovation funding: a) innovation and improvement networks; b) healthcare professionals and providers; c) commissioning; d) academics; e) charity and public and patient voice; f) private sector; and g) policymakers

<table>
<thead>
<tr>
<th>Funding Sources (n=39)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBRI Healthcare</td>
</tr>
<tr>
<td>NHS England Innovation funding, including for the NIA and Clinical Entrepreneur Training Programme</td>
</tr>
<tr>
<td>NIHR Invention for Innovation (4i) programme</td>
</tr>
<tr>
<td>Philanthropic funding, e.g. through the Health Foundation and medical charities</td>
</tr>
<tr>
<td>European Union funding programmes, including framework programmes and European Regional Development Funds</td>
</tr>
<tr>
<td>Funding through Accelerators, Catalysts and Catapults</td>
</tr>
<tr>
<td>Private sector funding</td>
</tr>
<tr>
<td>GrantFinder: a web-based search system for finding small pockets of funding, including for R&amp;D although predominantly for research grants</td>
</tr>
<tr>
<td>Other (please specify)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Funding Sources (n=38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS England Innovation funding, including for the NIA and Clinical Entrepreneur Training Programme</td>
</tr>
<tr>
<td>Innovate UK funding (e.g. grants for health and life science enterprise)</td>
</tr>
<tr>
<td>NIHR Invention for Innovation (4i) programme</td>
</tr>
<tr>
<td>SBRI Healthcare</td>
</tr>
<tr>
<td>Philanthropic funding, e.g. through the Health Foundation and medical charities</td>
</tr>
<tr>
<td>Private sector funding</td>
</tr>
<tr>
<td>Funding through Accelerators, Catalysts and Catapults</td>
</tr>
<tr>
<td>European Union funding programmes, including framework programmes and European Regional Development Funds</td>
</tr>
<tr>
<td>Other (please specify)</td>
</tr>
<tr>
<td>GrantFinder: a web-based search system for finding small pockets of funding, including for R&amp;D although predominantly for research grants</td>
</tr>
</tbody>
</table>
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

c) Funding Sources (n=11)

- NHS England Innovation funding, including for the NIA and Clinical Entrepreneur Training Programme: 90.9%
- Philanthropic funding, e.g. through the Health Foundation and medical charities: 83.6%
- Innovate UK funding (e.g. grants for health and life science enterprise): 54.5%
- Funding through Accelerators, Catalysts and Catapults: 54.5%
- European Union funding programmes, including framework programmes and European Regional Development Funds: 54.5%
- Private sector funding: 45.5%
- NIHR Invention for Innovation (i4i) programme: 27.3%
- Other (please specify): 18.2%
- GrantFinder: a web-based search system for finding small pockets of funding, including for R&D, although predominantly for research grants: 18.2%
- SBRI Healthcare: 0.1%


d) Funding Sources (n=13)

- Innovate UK funding (e.g. grants for health and life science enterprise): 84.6%
- NIHR Invention for Innovation (i4i) programme: 60.2%
- Private sector funding: 61.5%
- SBRI Healthcare: 53.8%
- Philanthropic funding, e.g. through the Health Foundation and medical charities: 53.8%
- Funding through Accelerators, Catalysts and Catapults: 53.8%
- European Union funding programmes, including framework programmes and European Regional Development Funds: 53.8%
- NHS England Innovation funding, including for the NIA and Clinical Entrepreneur Training Programme: 38.5%
- Other (please specify): 7.7%
- GrantFinder: a web-based search system for finding small pockets of funding, including for R&D, although predominantly for research grants: 0.0%
RAND Europe

**f)**

**Funding Sources (n=12)**

- Private sector funding: 75.0%
- Innovate UK funding (e.g., grants for health and life science enterprise): 75.0%
- European Union funding programmes, including framework programmes and European Regional Development Funds: 50.0%
- Philanthropic funding, e.g., through the Health Foundation and medical charities: 41.7%
- NIHR Invention for Innovation (i4i) Programme: 41.7%
- NHS England Innovation funding, including for the NIA and Clinical Entrepreneur Training Programme: 41.7%
- SBRI Healthcare: 33.3%
- Funding through Accelerators, Catalysts and Catapults: 25.0%
- Other (please specify): 8.3%
- GrantFinder: a web-based search system for finding small pockets of funding, including for R&D, although predominantly for research grants: 8.3%
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

Funding Sources (n=8)

- Philanthropic funding, e.g. through the Health Foundation and medical charities: 75.0%
- SBRI Healthcare: 62.5%
- Private sector funding: 62.5%
- NIHR Invention for Innovation (i4i) programme: 62.5%
- NHS England Innovation funding, including for the NI and Clinical Entrepreneur Training Programme: 62.5%
- Innovate UK funding (e.g. grants for health and life science enterprises): 62.5%
- Funding through Accelerators, Catalysts and Catapults: 62.5%
- European Union funding programmes, including framework programmes and European Regional Development Funds: 62.5%
- GrantFinder: a web-based search system for finding small pockets of funding, including for R&G although predominantly for research grants: 12.5%
- Other (please specify): 0.0%
Annex B. Stakeholder interview insights

B.1. Summary

Aims

- Thematic in-depth interviews with different stakeholders in the health system were conducted to better understand how distinct stakeholder groups can engage with health innovation most effectively; to learn how the evolving policy landscape may be improved to more effectively contribute to an innovative health system; and to identify areas for policy intervention and associated practical actions.

Design and implementation

- Between September 2017 and March 2018 we conducted 77 interviews by telephone with representatives of innovation and improvement networks, healthcare providers and commissioners, charities and patient and public involvement organisations, the private sector, academics and policymakers.
- The interviews followed semi-structured protocols that contained a core set of questions that were asked in all interviews as well as more tailored questions related to the interviewees’ stakeholder affiliations.
- Interviews were audio recorded, transcribed and thematically analysed (Braun & Clarke 2006). The main analytic findings were organised around the six drivers of innovation in the health system identified by Marjanovic, Sim et al. (2017a, 2017b): skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning. Issues within these themes emerged from the data, and new themes also emerged inductively.

Key findings

Key issues and necessary actions related to skills, capabilities and leadership:

- Providing improved educational offers and training opportunities to increase the ability of individuals to understand, harness and engage with innovation.
- Establishing an innovative culture in the NHS by engaging and empowering frontline staff.
- Embedding effective leadership throughout organisations and the NHS system.
- Providing dedicated support for the implementation of policies and new innovations within the health system.

Key issues and necessary actions related to motivations and accountabilities:

- Creating the right incentives for research and innovation, providing the ‘golden thread’ between research, innovation and implementation.
- Understanding and embedding appropriate management structures and hierarchies, both organisationally and at a system level, regionally and nationally.

Key issues and necessary actions related to the information and evidence environment:

- Developing an open platform for sharing information on innovation.
- Establishing a more systematic and clearly defined approach to provide evidence for, and evaluation of, innovations that are adopted.
- Developing transparent mechanisms for research evidence to translate into policy, including for those areas that may not be at the top of the policy agenda.

Key issues and necessary actions related to relationships and networks:

- Supporting the development of innovations by introducing a range of mechanisms designed to recognise and actively bring together diverse actors both inside and outside the health system.
- Addressing fragmentation and misalignment in the health system.
Key issues and necessary actions related to engagement with patients and the public:

- Expending greater effort in involving patients in the innovation process across the innovation pathway.
- Improving patient and public involvement and engagement infrastructure at the local and national level in order to promote collaboration and opportunities to share learning and build capacity locally and nationally.

Key issues and necessary actions related to funding and commissioning:

- Providing a long-term and sustainable funding strategy to develop, introduce and study innovation.
- Funding innovation across the pathway, but focus regionally with national oversight and governance.

Overarching system considerations, key issues and necessary actions identified by interviewees:

- Developing an overarching health innovation strategy that supports the evolution of more integrated health and social care systems.
- Providing dedicated support for policy implementation at a local level.
- Improving the mechanisms for disseminating policies on innovation across the system.

Reflections on Accelerated Access Review recommendations and associated policy initiatives:

- In order to develop and implement an effective horizon-scanning mechanism in the NHS, interviewees found it important to develop a clear strategy and to manage NHS horizon scanning centrally, to learn from others and to have actors involved who have the right skills, and to ensure that the right needs are addressed.
- In order to ensure that the proposed strategic commercial unit within NHS England is effective, interviewees stressed the need to establish a well-defined strategy and to ensure efficient management of the unit, and to involve both external and internal actors to ensure that the right commercial skills are available, but also that NHS-specific knowledge is given.
- In order to improve the effectiveness of the Innovation and Technology Tariff (ITT) and Innovation and Technology Payment (ITP), interviewees found it important to take actions that give them large-scale impact, e.g. by selecting products supported by the schemes based on where the greatest local demand is, but which are also important across regions.
- In order to make the Accelerated Access Pathway successful, interviewees highlighted several key actions, including: having a clear strategy for the pathway; establishing key criteria on how to select innovations on the pathway; having sustainable funding and providing financial incentives; and clearly defining different actors’ roles in the pathway.
B.2. Introduction

As part of a three-year study commissioned by the National Institute for Health Research (NIHR) Policy Research Programme, RAND Europe and the University of Manchester have worked with regional health economies and national stakeholders to help develop specific and actionable recommendations for the NHS on how to better innovate (in service models, products and technologies) to respond to the demand for high-quality, efficient and effective care.

One of the work streams involved thematic in-depth interviews with different stakeholders in the health system (representatives of innovation and improvement networks, healthcare providers and commissioners, charities and patient and public involvement organisations, the private sector, academics and policymakers). This reflects our understanding that in different parts of the complex innovation landscape both problems and solutions might be understood differently and that a combination of insights is likely to be needed for any system-wide improvement.

The interviews had the following overarching aims:

- To better understand how distinct stakeholder groups can engage with health innovation (in relation to the entire pathway – from development to uptake and spread) most effectively, given their interests, roles and capacities in the health system, including in relation to current policy developments and initiatives related to health innovation.
- To learn how the evolving policy landscape may be improved to more effectively contribute to an innovative health system.
- To identify areas for policy intervention and associated practical actions.
- To explore how common or unique the perspectives and experiences of distinct stakeholder groups are.

This Annex presents the analysis of the thematic in-depth interviews, and is divided into the following sections:

- Section B.3 provides an overview of the interview and analysis methodology.
- Section B.4 outlines the distribution of the interviewed stakeholders.
- Section B.5 provides insights into interviewees’ knowledge of health innovation and related policies, including how different actors in the system should be involved in policy implementation.
- Section B.6 discusses findings related to the six drivers of innovation identified by Marjanovic, Sim et al. (2017b) (skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning) and overall system considerations.
- Section B.7 presents stakeholder insights on Accelerated Access Review (2016) recommendations and associated policy initiatives.
- Section B.8, the Appendix to this Annex, provides the interview protocols.
B.3. Methodology

The interviews followed semi-structured protocols that contained a core set of questions which were asked in all interviews and more tailored questions related to the stakeholder affiliation of the interviewees. Interviewees were identified through a combination of mechanisms, including: from Phase 1 insights, snowballing approaches, our own professional networks, leads from the literature and in discussion with our project working group.

Overall, we conducted 77 interviews by telephone between September 2017 and March 2018. The majority lasted between 40 and 60 minutes and each was conducted with one individual, except for one interview that involved two individuals. All interviews were audio recorded and transcribed to allow an in-depth analysis of the data obtained.

Each interviewee provided informed consent prior to the interviewee using an online consent form. In line with the Data Protection Act 1998\(^1\) as well as conformant with ISO 27001 to protect personal data, interviewees consented before their participation to audio recording and gave a preference regarding how their data are attributed in any publications resulting from this study (i.e. anonymity, full or partial attribution).

The interviews were thematically analysed (Braun & Clarke 2006). The study team developed an initial analysis template that followed the protocol questions as overarching analytical categories (within which subthemes emerged from the data), but also included space for other emerging themes. The analysis template was regularly refined during the process. In a first step, responses relating to each of the sections in the analysis template were analysed, followed by a higher-level analysis across sections during a study team workshop. Data were analysed for each stakeholder group to identify stakeholder-specific themes, and then cross-analysed.

Caveats

Considerable effort was made to ensure a balanced geographical spread of interviewees to reflect region-specific ideas, experiences, problems and approaches. However, this proved difficult in some cases (e.g. with healthcare providers). Although we were not looking for statistical representativeness, but rather for diversity of perspectives, we considered this limitation in the analysis of our data, particularly in light of the regional differences that may have an impact on the innovation landscape (described in more detail in Marjanovic, Sim et al. (2017b)).

Although we involved a wide range of different stakeholders, the views and experiences expressed in the interviews are not necessarily representative of all actors in the innovating health system in England. However, the diversity and number of stakeholders we have consulted provide a rich source of evidence and depth to the findings, especially in combination with the other work streams and methods.

\(^1\) All of the interviews conducted for this study were completed in April 2018 and thus before the EU General Data Protection Regulation (GDPR) 2018 was fully implemented in the UK. The interviews were analysed, and any recordings and transcripts were processed and stored in line with the GDPR 2018.
To identify interviewees, we relied on a combination of our own very extensive and diverse networks with the health and innovation landscape as well as recommendations from our project working group, which includes representatives from diverse national bodies (NHS England, the Office for Life Sciences and the Department of Health and Social Care). This was complemented by a snowballing approach. Our network contacts often helped us identify individuals in roles we were targeting (rather than suggesting individuals based only on their personal knowledge of them). To limit bias in conducting the interviews as well as in interpretation of the data, all interviewers followed a consistent protocol and data were analysed using a standardised coding template. At analysis stages, individuals discussed the way they coded and interpreted data (including at meetings and workshops) to add an additional layer of consistency.

B.4. Stakeholder distribution

The stakeholder groups and numbers of interviewees in each are presented in Table B.1.

Table B.1: Breakdown of stakeholder groups for thematic interviews

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Number of interviews</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation and improvement networks*</td>
<td>10</td>
<td>13.0%</td>
</tr>
<tr>
<td>Healthcare providers and commissioners</td>
<td>21</td>
<td>27.3%</td>
</tr>
<tr>
<td>Charities and patient and public involvement organisations</td>
<td>14</td>
<td>18.2%</td>
</tr>
<tr>
<td>Private sector</td>
<td>8</td>
<td>10.4%</td>
</tr>
<tr>
<td>Academics</td>
<td>13</td>
<td>16.9%</td>
</tr>
<tr>
<td>Policymakers</td>
<td>11</td>
<td>14.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Note:

* Examples in this stakeholder category include individuals from institutions such as Academic Health Science Networks (AHSNs), Vanguards, Innovation Hubs, Test Beds, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) and other regional network initiatives.

Innovation and improvement networks

Ten interviews were conducted with representatives from innovation and improvement networks. Eight of these were follow-up interviews with participants of the workshop involving innovation and improvement networks representatives conducted for this study, and two interviewees were suggestions from other interviewees.

Nine interviewees are affiliated with an Academic Health Science Network (AHSN), representing seven different AHSNs. The remaining interviewee is a representative of an Innovation Hub. The interviewees are geographically distributed across England, although we were unable to interview networks representatives from the North and North East. The majority of the interviewees of this stakeholder group are from the senior management level.
Healthcare providers and commissioners
Overall, 21 interviews were conducted with representatives of healthcare providers or clinical commissioning groups (CCGs), five of whom attended one of the two workshops for CCGs and providers (see Annex D). Three interviewees were from CCGs, seven from providers, and nine represented four different Medical Royal Colleges. The two remaining interviewees were from a health innovation support network and an Academic Health Science Centre (AHSC). Half of the interviewees were from London and a quarter from Cambridge, with the others representing a small number of different regions. Three-quarters of the interviewees have a senior management role, for example as a clinical or medical director, a CEO or a chief medical officer.

Charity and patient and public involvement organisations
In total 14 interviews were conducted with representatives from charities and patient and public involvement and engagement (PPIE) organisations. Eight of these were with individuals who attended a stakeholder workshop (see Annex D) and two were with individuals who wished to attend but were unable to do so. The remaining four were recommended by other interviewees. One interview was conducted with two interviewees.

It is difficult to completely split interviewees into either charity or PPIE representatives due to the overlap between these types of organisation, however a range of national organisations contributed, including Alzheimer’s Research UK, National Voices, Autistica and Genetic Alliance UK, in addition to one international not-for-profit organisation.

Private sector
We conducted eight interviews with individuals from private companies: six of these were follow-up interviews with participants from the private sector workshop (see Annex D) and one was with an individual who would have liked to attend the workshop but was unable to do so.

Three of the interviewees work in the medtech industry, one is a representative of a software/pharmaceutical company, two are from Local Enterprise Partnerships (LEPs), and two are representatives of interest groups/consultancies.2 The interviewees’ companies and organisations are geographically well distributed across England (considering there were only eight interviews), although none of them is based in the northern regions of England. All interviewees from this stakeholder group have a senior role in their company/organisation, e.g. chief executive, head of innovation, (managing) director or design development director.

Academics
Overall, 13 individuals from the academic and researcher community were interviewed. Twelve of these were participants from the academic workshop (see Annex D), and the remaining interviewee was recommended by another interviewee. Three of the interviewees are located in London and two in Cambridgeshire. The remaining nine interviewees are distributed across different regions in England.

2 We also invited representatives of pharmaceutical companies to an interview, but we did not receive responses to these interview requests (in one case an interviewee declined our request).
Ten interviewees are academics, of which six are professors and four are research fellows at junior or senior level. Two of the remaining interviewees have a managerial role at a university or research institution, and one individual leads a university’s medical school.

**Policymakers**

In total, 11 interviews were conducted with 12 policymakers (one interview included two interviewees). Three interviewees attended the policymaker workshop (see Annex D) and the other nine were recommended to us or were contacted directly. All interviewees were from senior management across government and NHS departments, as well as collaboration organisations such as the Innovation Unit.

**B.5. Knowledge of health innovation and related policies**

In general, policymakers, individuals from private companies, representatives of innovation and improvement networks and those from larger charity and PPIE organisations had a good understanding of the different health innovation policies of interest. Some individuals from charity and PPIE organisations had less awareness of policies, and almost all CCG representatives and healthcare providers were not very familiar with current health innovation policies.

Some policymakers, private sector interviewees and those from charity and PPIE organisations spoke about other policies they were aware of and/or were involved with. Policymakers mentioned, for instance: Getting It Right First Time (GIRFT) (see, e.g., Abercrombie 2017), NHS RightCare (see, e.g., NHS England n.d.-e) and Sustainability and Transformation Partnerships (STPs) (see, e.g., NHS England n.d.-d). The private sector representatives mentioned the Enhanced Recovery Partnership Programme, the Test Bed scheme and the Department of Business, Energy & Industrial Strategy’s (BEIS) development of science innovation audits. Interviewees from both of these stakeholder groups were aware of the *Life Sciences Industrial Strategy* (Bell 2017).

Interviewees were often familiar with these policies as it is part of their job role or they were involved in their development. Charity and PPIE interviewees were often aware of policies specifically related to the disease area they research and/or work with as well as internal policies they had developed. Individuals from the private sector were often familiar with innovation policies through membership of specific

---

3 Policymaker_INT1, Policymaker_INT4, Policymaker_INT7, Policymaker_INT8.
4 This programme aimed to help the NHS to understand and implement enhanced recovery in certain elective surgeries; see, e.g., Department of Health and Social Care (2011).
5 Private_INT1, Private_INT2, Private_INT3.
6 Policymaker_INT1, Policymaker_INT4, Policymaker_INT7, Policymaker_INT8, Private_INT7, Private_INT8.
7 Academics_INT5, Academics_INT8, Academics_INT12, Networks_INT4, Networks_INT8, Policymaker_INT1, Policymaker_INT2, Policymaker_INT3, Policymaker_INT4, Policymaker_INT6, Policymaker_INT7, Policymaker_INT8, Policymaker_INT9, Policymaker_INT10, Policymaker_INT11, Private_INT1, Private_INT5, Private_INT6, Private_INT7, ProviderCCG_INT6, ProviderCCG_INT7, ProviderCCG_INT8, ProviderCCG_INT13, ProviderCCG_INT14, ProviderCCG_INT17.
8 CharityPPIE_INT5, CharityPPIE_INT7, CharityPPIE_INT9, CharityPPIE_INT10, CharityPPIE_INT12, CharityPPIE_INT13.
groups, e.g. the Association of the British Pharmaceutical Industry (ABPI). They also learnt of policies through networking and via relationships with AHSNs. Although interviewees from CCGs or providers of healthcare were often not familiar with health innovation-related policies, those who were commented that they actively kept up to date through a desire to remain informed.

Some interviewees across stakeholder groups had no, or very little, familiarity with health innovation policy. CCG and healthcare provider representatives had the lowest awareness of innovation policy, with the majority having not heard of the policies. Some interviewees mentioned that their low awareness is due to a lack of communication about new policies, or the difficulty of keeping up with changes. Some interviewees from CCGs and healthcare providers commented that other demands on staff time mean that they have little capacity to actively engage with policy.

B.5.1. Involvement and engagement with health innovation and innovation policy

Involvement with policy development
Interviewees from across the stakeholder groups had been involved in development of innovation policies, though the level of their involvement varied tremendously. The *Accelerated Access Review* (2016) was the most frequently cited policy with which interviewees had been involved. Development of three other policies were mentioned by multiple stakeholders: The *Carter Review* (2016), the *Life Sciences Industrial Strategy* (2017) and the *(Next Steps on the NHS) Five Year Forward View* (2014a, 2017b).

Other policies were mentioned by specific stakeholder groups who were involved in their development. The development of the Innovation and Technology Tariff (ITT) and the Innovation and Technology Payment (ITP) involved some interviewees from innovation and improvement networks. Some interviewees from the private sector had been involved in development of the Enhanced Recovery Partnership Programme, the Test Bed scheme and BEIS’ development of science innovation audits. One policymaker had been involved in the creation of the Accelerated Access Collaborative.
Academic interviewees had a more general involvement in innovation policy development, rather than working on specific policies. This included studying the emergence and nature of AHSNs, general consultation for policies and discussions on how development and adoption of innovation could be speeded up.

**How were interviewees involved with policy development?**

Different stakeholders have different approaches to influencing policy and decision making, although meeting with policymakers and key figures in government, the NHS, AHSNs and other local organisations was mentioned by three stakeholders.

Individuals from the private sector and innovation and improvement networks are more likely to take advocacy-based approaches to influencing policy. For example, one private sector interviewee commented that they raise their views at conferences to ensure that the needs of the industry are reflected in policies. Campaigning for new policies and for particular innovations to be included in policies was also mentioned.

Individuals from charities commented on how larger charities have greater capacity and resources to influence policy development; for example, they often have dedicated policy departments actively keeping up to date with new and changing policies. The ability to keep up to date with the changing policy landscape decides a charities involvement in policy creation; those keeping up to date are more likely to be involved in development.

**Involvement with health innovations**

The majority of interviewees were able to provide examples of innovations they were involved with, familiar with or experience with at some point in the innovation pathway. Fewer interviewees described their role in relation to health innovation compared to their involvement with policy. However, those from innovation and improvement networks frequently commented on their role in the development and implementation of innovations.

The role of AHSNs often relates to engaging innovators, especially those from SMEs, and includes brokering relationships between innovators and other sectors, articulating the NHS’s needs to innovators and supporting implementation of a product. AHSNs can also be involved in aligning bodies other than

23 Academics_INT1.
24 Academics_INT11.
25 Academics_INT10, Academics_INT12.
26 CharityPPIE_INT2, Policymaker_INT6, Private_INT3, Private_INT6, Private_INT7.
27 Private_INT2.
28 Networks_INT1, Networks_INT2, Networks_INT10, Private_INT2.
29 CharityPPIE_INT2, CharityPPIE_INT4, CharityPPIE_INT5, CharityPPIE_INT7, CharityPPIE_INT9, CharityPPIE_INT10, CharityPPIE_INT12, CharityPPIE_INT13.
30 CharityPPIE_INT2, CharityPPIE_INT9.
31 Networks_INT1, Networks_INT2, Networks_INT5, Networks_INT6, Networks_INT7, Networks_INT8.
innovators at the national and local level. Another major AHSN role is to identify the specific needs of the NHS and provide funding and support to innovations that meet these needs. Interviewees from networks felt that a future role of AHSNs will be to coordinate and align AHSNs across England to support the spread of innovation and practices across AHSNs.

Some policymakers we interviewed commented on their role in disseminating best practice regarding innovation to support implementation and to disseminate policy information to a wider audience.

B.5.2. Motivations for involvement with health innovation and innovation policy

Different stakeholder groups generally had distinct motivations for their involvement in health innovation and policy development. However, the private sector and innovation and improvement networks often cited the same motivations. These included improving healthcare delivery and addressing healthcare needs, improving patient experiences and outcomes, and making the health system more efficient. A motivation specific to the private sector is to support businesses to get their product into the NHS.

Individuals from innovation and improvement networks also provided additional motivations for their involvement in policy and innovation, including advocating and supporting implementation of a particular innovation they believe is worthwhile, discussing and deciding the future role of AHSNs, and guiding how AHSN Innovation Exchanges should be designed and implemented.

Motivations for policymakers were often to support evidence-based innovation through effective research and development and to improve innovation and healthcare through effective policy.

Interviewees from charities and PPIE organisations are motivated to ensure there is meaningful engagement of patients in decisions about their care and with innovation, and that PPIE should not just...

---

32 Networks_INT3, Networks_INT5, Networks_INT7, Networks_INT8, Networks_INT10.
33 Networks_INT1, Networks_INT2, Networks_INT4, Networks_INT5, Networks_INT6, Networks_INT7, Networks_INT8, Networks_INT9, Networks_INT10.
34 Networks_INT1, Networks_INT5, Networks(INT6, Networks_INT9.
35 Policymaker_INT1, Policymaker_INT3, Policymaker_INT6.
36 Networks_INT1, Networks_INT3, Networks_INT4, Networks_INT5, Networks_INT6, Networks_INT7, Networks_INT8, Networks_INT9, Networks_INT10, Private_INT1, Private_INT5, Private_INT7.
37 Networks_INT4, Networks_INT8, Networks_INT10, Private_INT6.
38 Networks_INT4, Networks_INT8, Networks_INT10, Private_INT1, Private_INT6.
40 Networks_INT1, Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT9, Networks_INT10.
41 Networks_INT8, Networks_INT10.
42 Networks_INT1, Networks_INT3, Networks_INT9, Networks_INT10.
43 Policymaker_INT2, Policymaker_INT3, Policymaker_INT4.
44 Policymaker_INT1, Policymaker_INT3, Policymaker_INT4, Policymaker_INT5.
be a tick-box exercise. Some interviewees from charities and PPIE organisations were also motivated to encourage the involvement of health professionals and commissioners in health innovation.

Academics did not often comment on their motivations for being involved in innovation and policy. One interviewee stated that they were not interested in health innovation policy as it did not relate to their role and subject area. However, one academic commented that policies can act as incentives for researchers to engage and collaborate with industry.

B.5.3. Using innovative thinking and research to inform policy

Only academic interviewees were specifically asked about the use of innovative thinking and research in innovation policy, although two charity/PPIE interviewees also commented on this without being prompted. One charity/PPIE interviewee noted that translating research into policy is important to patient wellbeing. Academics generally had a mixed view as to whether innovation policy is influenced by research. Some thought that policy is partially, or not at all, based on research, whereas others though that policy is increasingly being based on evidence. Examples provided for innovative thinking in the NHS included ‘Plan, Do, Study, Act’ (PDSA) and Trish Greenhalgh’s work, such as that on the key variables for successful policy implementation. Many academics felt that policy should be more evidence-based.

Some interviewees provided insight into why current policy may not be based on research. Research may be too nuanced and critical for policymakers and it can be very difficult to translate such research into policy. There can also be a misalignment between academics and the health system, with academia often not focusing on issues faced by the health system, as the two have different priorities. Finally, timelines and resource allocation between research and the NHS are very different. Research often takes years and is highly rigorous, whereas NHS evaluations are often short term and have fewer resources.

45 CharityPPIE_INT1, CharityPPIE_INT4, CharityPPIE_INT5, CharityPPIE_INT9, CharityPPIE_INT10, CharityPPIE_INT12, CharityPPIE_INT14.
46 CharityPPIE_INT8, CharityPPIE_INT10.
47 Academics_INT2.
48 Academics_INT4.
49 CharityPPIE_INT13.
50 Academics_INT1, Academics_INT2, Academics_INT4, Academics_INT7, Academics_INT9, Academics_INT10.
51 Academics_INT3, Academics_INT6, Academics_INT8, Academics_INT11, Academics_INT12.
52 PDSA helps test changes to a system on a small scale to guide how to test them in a structured way and implement them.
53 Academics_INT2.
54 Academics_INT6, Academics_INT10, CharityPPIE_INT13.
57 Academics_INT2, Academics_INT5.
58 Academics_INT7, Academics_INT8.
Academic interviewees provided a range of answers concerning how to increase the use of research in policy development. They expressed that idea that academics have a role to play in many areas, e.g. by conducting more research on receptivity to change and innovation, and addressing cultural barriers to innovation.\(^{59}\) Policymakers can also take action: an academic interviewee thought that policymakers could, for example, adopt the academic interdisciplinary style of working with patients, clinicians and industry to ensure the right problems are being addressed.\(^{60}\) Policymakers could also change their way of thinking about the policy process by considering the end of the process first (i.e. the benefit to patients) and then working back to research and technology development.\(^{61}\)

Charity and PPIE representatives emphasised that they also find it important to remember that charities are often heavily involved in research, noting that policymakers need to be more aware of this as charities can act as messengers between research and policy and can support dissemination of research findings.\(^{62}\)

### B.5.4. Meaningfulness of policies

In general, depending on their specific stakeholder group, interviewees tended to provide different answers when asked what innovation policies are trying to achieve. Interviewees from the private sector and academia thought that the policies were aiming to increase the uptake, adoption and spread of innovation.\(^{63}\) Some academic interviewees mentioned additional aims, including providing incentives for the NHS,\(^{64}\) and bringing stakeholders together, to accelerate innovation.\(^{65}\) One private sector interviewee thought that the policies were trying to improve care and make it more efficient.\(^{66}\)

Interviewees from CCGs and healthcare providers gave a range of answers when asked about what innovation policies were trying to achieve. Many thought they were trying to improve value for money within the NHS and improve financial stability whilst maintaining high-quality care.\(^{67}\) Other interviewees felt as though the policies were providing an area of focus for the NHS, creating conditions for innovation to flourish, providing NHS staff with the confidence to drive innovation themselves, creating a more systematic method for developing and testing innovations in the NHS, and joining up healthcare, including community and social care.\(^{68}\)

---

59 Academics_INT1, Academics_INT10.
60 Academics_INT8.
61 Academics_INT5.
62 CharityPPIE_INT7, CharityPPIE_INT13.
63 Academics_INT4, Academics_INT5, Academics_INT6, Academics_INT8, Academics_INT12, Private_INT1, Private_INT2, Private_INT4, Private_INT8.
64 Academics_INT4.
65 Academics_INT12.
66 Private_INT6.
67 ProviderCCG_INT6, ProviderCCG_INT12, ProviderCCG_INT13, ProviderCCG_INT14, ProviderCCG_INT19, ProviderCCG_INT22.
68 Academics_INT12, ProviderCCG_INT11, ProviderCCG_INT15, ProviderCCG_INT18, ProviderCCG_INT21.
Some additional comments on the meaningfulness of policies were made throughout the interviews. Two policymakers believed that different innovations should not be treated differently in policy, although policy often focuses on drugs and devices rather than other types of innovation. Two academics spoke about some of the drawbacks of current policies. Current initiatives may not be ‘joined-up’ and policy agendas for universities are often too light-touch and they are not enforced, so they can be ignored.

B.5.5. Involving different actors in policy implementation

Interviewees were asked to comment on the role they/their stakeholder group as well as other actors in the system could play in terms of facilitating successful implementation of and impact from health innovation policy efforts. Overall, as policies generally do not apply to only one organisation, interviewees felt that there is a need to ensure that all organisations are involved in facilitating policy implementation. Moreover, interviewees noted that industry and the NHS need to be brought together to collaborate, rather than working independently and not fully understanding each other.

Specifically, interviewees thought that different actors in the system could have the following roles in facilitating successful health innovation policy implementation:

Policymakers
- According to policymaker interviewees, policymakers and other actors with influence over policy are able to involve and empower frontline staff to drive innovation, and thus need to ensure that policy is translated into a language accessible to frontline staff.
- Moreover, policymakers need to ensure that decisions are not only made top down, but also that they involve stakeholders in policy processes, including frontline staff and patients. Engaging other stakeholders, and incorporating their suggestions for change in policies, was seen as key to facilitating successful policy implementation and innovation uptake. Moreover, without other stakeholders’ input, policymakers may not fully understand what implementation actually requires and they may lose a sense of realism.
- Policymakers can play a role in disseminating information on the success and challenges of policies to support shared learning.
- According to the same interviewee, policymakers need to ensure they budget for innovation in the form of a transformation fund. If this budget does not exist, then policymakers need to
accept that there may be a drop in performance whilst a new innovation is being integrated, especially if it is a service innovation.\textsuperscript{78}

**STPs**

- There is a need for **STPs to work more closely with and support CCGs in implementing transformation at scale**, and to help CCGs understand what is available in different CCGs and how they could learn from other parts of the system.\textsuperscript{79}
- **STPs should also provide more dedicated support for introducing and implementing innovations that have the potential to have scale.**\textsuperscript{80}

**Medical Colleges**

- A policymaker and a charity/PPIE interviewee felt that training and education on innovation should be provided to healthcare professionals (from medical students to nurses, managers and other staff) at an early stage, i.e. for undergraduates and postgraduates. Medical Royal Colleges, but also the Faculty of Public Health and the General Medical Council, **should play a role in embedding innovation in curricula.**\textsuperscript{81}
- CCG and provider interviewees thought that Medical Royal Colleges should play a role in **facilitating communication between the frontline and policymakers**. For instance, they could help gather input for policies from the frontline and feed it back up to the top.\textsuperscript{82}
- An interviewee suggested that it might be useful to get all Medical Royal Colleges together at a round table to look at policies together and discuss how to support them as well as select responsibilities. Medical Royal Colleges could focus on certain innovations and discuss how policies affect them.\textsuperscript{83}

**AHSNs**

- As they are working at a regional level, one interviewee thought that **AHSNs are able to, and should, look at the needs of the local system** and what innovators are trying to get adopted locally.\textsuperscript{84}
- A policymaker interviewee felt that **AHSNs need to expand their audience** as they are currently only engaging with a specific tier of an organisation or region, which then does not cascade down. In order to ensure successful policy implementation, they should make more effort to engage frontline staff, who may currently be put off by the academic nature of the AHSNs.\textsuperscript{85}

\textsuperscript{78} Policymaker\_INT6.
\textsuperscript{79} Networks\_INT6, Policymaker\_INT10.
\textsuperscript{80} Policymaker\_INT9.
\textsuperscript{81} Charity\_PPIE\_INT3, Policymaker\_INT2.
\textsuperscript{82} ProviderCCG\_INT8, ProviderCCG\_INT9, ProviderCCG\_INT10, ProviderCCG\_INT14, ProviderCCG\_INT16, ProviderCCG\_INT17, ProviderCCG\_INT18, ProviderCCG\_INT19.
\textsuperscript{83} ProviderCCG\_INT9.
\textsuperscript{84} Policymaker\_INT7.
\textsuperscript{85} Policymaker\_INT3, Policymaker\_INT5.
• **AHSNs need a better liaison process with the local health economy**, perhaps through support from NHS Improvement or the Care Quality Commission (CQC).86

• As they have been involved in the development of the ITT and ITP, **AHSNs should actively contribute to and support the communication of the schemes**, and their spread and adoption in their regions.87

• AHSNs could communicate with different NHS organisations and advise them how they could better spread and adopt innovations, as well as help them measure or evaluate whether introduced innovations are working or not.88

• AHSN interviewees felt that AHSNs could be translators or ‘honest brokers’ between different actors and organisations in the health system, as they are neutral, they are able to translate between the different languages innovators and the NHS speak, they have the right skills to communicate and they have the right local and national networks.89

• Related to the above, AHSNs should **bring together different national and regional actors in the health system**, including AHSNs, AHSCs and Health Education England.90

• AHSNs could help identify clinical Champions or Innovation Scouts within local organisations and teach these organisations how to communicate motivations and how to find early followers.91

• AHSNs could also ‘drive out the benefits’ of innovations, i.e. provide support in creating business cases to sell innovations; some AHSNs already **help innovators develop business cases**.92 When creating business cases, AHSNs could make sure that the financial aspect and impact is in there, so that decision makers can clearly see what they need to invest and what the benefits/impacts are.93

• It was seen as important that AHSNs themselves do not operate in isolation (as some thought they did in the first licence period94), but work closely and efficiently together. This should happen through the new Innovation Exchanges.95

• **AHSNs already unlock some of the barriers to innovation** that have been identified, and should continue to do so. They should **continue rolling out programmes** to deliver innovation and support their spread.96

---

86 Policymaker_INT8.
87 Networks_INT5, Networks_INT9, Networks_INT10.
88 Networks_INT5, Networks_INT8.
89 Networks_INT5, Networks_INT8.
90 Networks_INT1, Networks_INT5, Networks_INT6, Networks_INT9.
91 Networks_INT9.
92 Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT9.
93 Networks_INT9.
94 AHSNs were established in 2013 for an initial five-year licence period until 2018. A second licence of further five years started in April 2018 (The AHSN Network 2017b).
95 Networks_INT9.
96 Networks_INT10.
According to a private sector interviewee, AHSNs could help facilitate more coordinated procurement across England.\textsuperscript{97}

Some interviewees found it important to improve collaboration between NICE and the NHS, suggesting that NICE could place their clinical specialists into hospital units to provide support to explore any problems staff are facing and provide help to overcome them.\textsuperscript{98}

A charity/PPIE representative noted that NHS England should provide health professionals with the time and space to think about innovation and how best to implement it.\textsuperscript{99}

NHS England should set (health policy) priorities that need to be addressed. It is important to have a national actor to do this, because otherwise there would be too many priorities across the system. Priorities then need to be driven forward at a local level.\textsuperscript{100}

A private sector interviewee thought that NHS England could run forums to explain to other stakeholders what the NHS needs and which problems should be tackled. The NHS could learn how to run such forums from initiatives such as the Small Business Research Initiative (SBRI).\textsuperscript{101}

The UK government should ensure that the right incentives for innovation uptake are in place. While policies such as the Industrial Strategy (HM Government 2017) are important and highly relevant, the government should also make sure that such policies are backed up with practical implementation.\textsuperscript{102}

An academic interviewee thought that unlike people in the health system (e.g. clinicians, commissioners, hospital managers, etc.), academics are ‘informed outsiders’ and could thus offer unique value, because they can reflect on what needs to be done in the health system. However, there is a need to find a way to better embed health researchers within health organisations.\textsuperscript{103}

The role of academics in health innovation and policy implementation should ideally be to create a rigorous evidence base for policies. This could also include, for instance, documenting

\textsuperscript{97} Private\_INT4.  
\textsuperscript{98} Policymaker\_INT3, ProviderCCG\_INT7.  
\textsuperscript{99} CharityPPIE\_INT9.  
\textsuperscript{100} Networks\_INT7, Networks\_INT10.  
\textsuperscript{101} Private\_INT2.  
\textsuperscript{102} Networks\_INT10.  
\textsuperscript{103} Academics\_INT3.
different initiatives and comparing their advantages and disadvantages. Moreover, academics already do play a role in evaluating policy initiatives. 104

- Interviewees reflected that while academics are often involved at the policy formulation stage, their engagement usually stops at the implementation stage. 105 They found it important to find a way to better engage academics in the implementation of policies to ensure that implementation is evidence based. However, this would need more flexible academic structures and better incentives, 106 and policies need to articulate more clearly how academics/researchers could contribute to their implementation. 107

- Academic structures (e.g. with a strong focus on publishing and little time for other engagements) often hinder academics’ engagement with health innovation policies. A way to overcome this issue is to give academics more opportunities to provide input into research conducted by health policy researchers working at institutions closer to practice and policy (e.g. think tanks, consultancies, research institutions such as RAND Europe), and thus ‘indirectly’ inform policy. 108

- Academics, particularly senior academics, could engage with policymakers to a greater extent to communicate research findings that may be important for innovation policy. 109 One interviewee suggested that the Research Excellence Framework (REF) 110 could include an assessment of engagement with policymakers. 111 In order for researchers to be able to engage with policymakers, the government needs to be clearer in what their criteria are for making a change. 112

Private sector

- A private sector interviewee thought that the private sector needs to be more proactive and engage with the NHS instead of waiting for others to approach them. 113

- According to the same interviewee, the private sector needs to try to understand the NHS, the system’s needs and problems, and look at things from an NHS point of view. It is important that companies not only sell a product, but also ensure that what they are doing is helping frontline NHS staff. 114

---

104 Academics_INT4.
105 Academics_INT5, Academics_INT10.
106 Academics_INT5.
107 Academics_INT10.
108 Academics_INT10.
109 CharityPPIE_INT7, CharityPPIE_INT13.
110 REF is the system for assessing quality of research in higher education institutes within the UK; see http://www.ref.ac.uk/
111 CharityPPIE_INT13.
112 CharityPPIE_INT7.
113 Private_INT2.
114 Private_INT2.
Charities and PPIE organisations

- Charity and PPIE representatives found it important for charities and PPIE organisations to **develop strong relationships with policymakers**, as they have useful information from the frontline of healthcare, patient intelligence and research knowledge, which is important to share with those developing policies.\(^{115}\) Larger charities and PPIE organisations with established reputations are also in a good position to **influence national policy to ensure that the patient voice is heard, including the voice of minority populations**, and that it is taken into consideration when creating and implementing policies.\(^{116}\)

- Organisations supporting patient and public involvement in policymaking are able to **facilitate discussions government departments are having about PPIE to ensure they are conducting ‘good PPIE practice’**.\(^{117}\)

- Larger charities and PPIE bodies have the power to **bring a range of stakeholders together** and should use this more often.\(^{118}\)

- Charity and PPIE bodies, especially the larger ones, can play a role in **communicating and disseminating policy information to other organisations**.\(^{119}\) National Voices and Genetic Alliance UK, for example, are in a prime position for this as their members include many smaller organisations that may not have the capacity to keep up to date with the changing policy landscape and interact with the health system.\(^{120}\) **Larger charities can support smaller organisations to understand what is happening in the health system and what opportunities there are for them to be involved and contribute.**\(^{121}\)

- As it is generally the same larger charities and organisations that are involved in innovation policy, **there needs to be a greater push in identifying different charitable bodies which could be involved in policy development**. This would indirectly create an additional source of patient representatives to tap into when designing policies and innovations. This is important in ensuring that it is not always the same patient representatives being repeatedly engaged, as they thereby become ‘expert patients’ and can no longer represent other, more typical, patients.\(^{122}\)

Local Enterprise Partnerships

- Interviewees commented on the role of LEPs, noting that they could help **bring together actors in the health system and facilitate collaboration** rather than rivalry between them. Moreover, LEPs could help find out which kind of workforce and skills the health system will need in the future.\(^{123}\)

---

\(^{115}\) CharityPPIE_INT5, CharityPPIE_INT6, CharityPPIE_INT13.

\(^{116}\) CharityPPIE_INT5, CharityPPIE_INT6, CharityPPIE_INT7, CharityPPIE_INT10, CharityPPIE_INT14.

\(^{117}\) CharityPPIE_INT7, CharityPPIE_INT10.

\(^{118}\) CharityPPIE_INT3, CharityPPIE_INT6.

\(^{119}\) CharityPPIE_INT10, CharityPPIE_INT11, CharityPPIE_INT13.

\(^{120}\) CharityPPIE_INT10, CharityPPIE_INT11.

\(^{121}\) CharityPPIE_INT11.

\(^{122}\) CharityPPIE_INT10.

\(^{123}\) Networks_INT6, Private_INT3.
B.6. Supporting health innovation to be more meaningful – insights across the system and innovation drivers

B.6.1. Skills, capabilities and leadership: key issues and necessary actions according to interviewees

Providing improved educational offers and training opportunities to increase the ability of individuals to understand, harness and engage with innovation

Interviewees across all stakeholder groups emphasised the need to include training related to the role of innovation as part of medical education and the continued professional development of health professionals, as well as training for the private sector on how to make a compelling business case. Improved educational offers and training opportunities that specifically focus on the skills needed to identify, promote, access, adopt and diffuse innovation across the system can be used to increase the ability of individuals to harness innovation. Interviewees stressed a range of groups who could benefit from training, including managers, clinicians, undergraduates and postgraduates, and companies, and noted that training should be a constant feature throughout a healthcare professional’s career.124

According to interviewees, specific actions on how to provide improved training include the following:

- A few interviewees suggested engaging the Medical Royal Colleges in providing training for undergraduates and postgraduates in innovation and continue that training throughout a healthcare professional’s career. The Medical Royal Colleges, Faculty of Public Health and the General Medical Council have a lot of influence over the training of future health professionals and part of their responsibility should be to embed innovation early on in health careers.125 These interviewees suggested that using education to teach people to be innovators should be led at a national level by the appropriate Medical Royal College and then reinforced locally once students were dispersed around the country, with some noting this approach was already being adopted by the Royal College of Nursing. In addition, effective communication has been considered as particularly important to enable health innovation and this should be part of education programmes.126

- Some individuals from the private sector suggested providing specific training courses to companies so they know how to work with the NHS and have the skills to do so. Many interviewees from the private sector pointed out that private sector representatives familiar with how the NHS works (e.g. how decisions are made) may be more successful in their efforts to engage with the NHS.127

- Several interviewees from the private sector, networks and CCGs suggested that closer dialogue with the NHS could help overcome companies’ lack of knowledge of what is needed. and in

---

124 CharityPPIE_INT2, CharityPPIE_INT3, Policymaker_INT2, ProviderCCG_INT15, ProviderCCG_INT18, ProviderCCG_INT19.
125 Academics_INT2, CharityPPIE_INT3, Networks_INT1, Policymaker_INT2, Policymaker_INT10, ProviderCCG_INT8, ProviderCCG_INT16, ProviderCCG_INT18.
126 Networks_INT3, Networks_INT4, Networks_INT5, Networks_INT8, Networks_INT9, Networks_INT10.
127 Private_INT4, Private_INT6, Private_INT8.
particular interviewees stressed the need for the private sector to understand what was required for putting together a business case. A few interviewees from networks and the private sector felt that AHSNs could provide training and advice to businesses on what type of evidence they need and on how to create a business case (see also Section B.6.3).

- Finally, one interviewee felt that encouraging flexibility and adaptability within educational programmes could help new healthcare professionals adapt within a changing world and feel able to implement new innovations and approaches as they emerge.

Establishing an innovative culture in the NHS by engaging and empowering frontline staff

Interviewees across all stakeholder groups felt that establishing an innovation-supportive culture in the NHS that is more open to change was important, so that organisational culture is not a barrier to successful innovation. Reluctance to innovate and change, as well as risk aversion, are believed to be present across NHS organisations, and were identified as some of the main barriers to innovation in the health system by interviewees. In particular, across all interview groups there were direct views about how to engage and empower frontline staff in order to embed a culture of innovation, drive the innovation agenda and act as innovation champions. Interviewees expressed that having clinical champions – and in particular local clinical champions – can be useful when it comes to introducing and spreading an innovation.

In order to achieve this, there was broad agreement that NHS England should provide dedicated support and training for clinicians and other frontline staff to engage with innovation. To this end, the following actions were suggested by interviewees:

- Interviewees from charity and PPIE organisations as well as policymakers and academics suggested that giving staff dedicated time to think about how to improve the NHS and engage with innovation, including time to plan for introducing new innovations, would give them the ‘headspace’ needed. It was thought this was particularly important for nurses and doctors. Though some acknowledged they are already provided with some protected time, it was felt that more time could be created by back-filling departments so that staff members are able to take some time out of their normal tasks.

- According to one policymaker interviewee, empowering NHS managers and leaders would enable them to feel confident in delegating control to their staff to promote bottom-up ownership and responsibility for innovation. One way to achieve this is for Trusts and CCGs to be more open to suggestions relating to change and innovation from frontline staff. The

---

128 Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT9, Private_INT4, Private_INT6, Private_INT8, ProviderCCG_INT15.
129 Networks_INT2, Networks_INT8, Private_INT4, Private_INT8.
130 Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT9, ProviderCCG_INT19.
131 Academics_INT8, CharityPPIE_INT9, Networks_INT8, Networks_INT9, Networks_INT10, Policymaker_INT3, Policymaker_INT5, Policymaker_INT6, Private_INT6, Private_INT7, ProviderCCG_INT16, ProviderCCG_INT18.
132 Academics_INT8, Academics_INT10, Academics_INT11, CharityPPIE_INT1, CharityPPIE_INT9, Policymaker_INT3, Policymaker_INT5, Policymaker_INT6, Policymaker_INT9.
interviewee believed that an innovation is likely to gain more traction and quicker adoption if it is initiated by a frontline staff member.\(^\text{133}\)

- A few interviewees felt that the NHS should create opportunities for innovative clinicians to drive forward their ideas. One way to do this would be to ensure that clinicians and junior staff are better engaged in decision-making processes and that they are involved in innovation projects across the pathway.\(^\text{134}\) For example, hospital teams could play a greater role in deciding which innovations they would like to adopt and could then be given the responsibility of implementing that innovation themselves.\(^\text{135}\)

- Interviewees across a range of stakeholder groups identified a need to establish a specific role for clinical champions. These would be individuals supportive of innovations and having the skills and relevant expertise to assess the evidence for an innovation and see its benefits (e.g. for patients and healthcare professionals, and in terms of cost-effectiveness), but also the necessary passion about the innovation. These individuals can be helpful in communicating the benefits of an innovation, as well as articulating how it matches specific patient needs.\(^\text{136}\)

- Some interviewees posited that embedded local champions would support acceptance of innovation on the frontline, since the current mechanisms for introducing innovation are seen to be primarily top-down, which can result in staff not seeing the benefit.\(^\text{137}\) Related to this, one policymaker interviewee commented that involving clinicians in research studies or in the development of innovations (e.g. giving them the opportunity to actively contribute to doing the research, comment on the study design, etc.) could help increase their support of innovations and the associated service changes that might result.\(^\text{138}\)

**Embedding effective leadership throughout organisations and the NHS system**

Interviewees across all stakeholder groups expressed the idea that leadership is needed at all system levels – organisational, local and national – to provide the high-level and managerial commitment to change and support for innovation. In this, leadership needs to be able to have the freedom and ability to adopt a medium- to long-term perspective on innovation and be flexible and dynamic in its approach. Leadership

\(^\text{133}\) Policymaker_INT3.

\(^\text{134}\) Academics_INT12, Policymaker_INT3.

\(^\text{135}\) Policymaker_INT3.

\(^\text{136}\) Academics_INT3, Academics_INT5, Academics_INT6, Academics_INT7, Academics_INT8, CharityPPIE_INT9, Networks_INT8, Networks_INT9, Networks_INT10, Policymaker_INT3, Policymaker_INT5, Policymaker_INT6, Private_INT6, Private_INT7, ProviderCCG_INT16, ProviderCCG_INT18.

\(^\text{137}\) Academics_INT3, Academics_INT5, Academics_INT6, Academics_INT7, Academics_INT8, CharityPPIE_INT9, Networks_INT8, Networks_INT9, Networks_INT10, Policymaker_INT3, Policymaker_INT5, Policymaker_INT6, Private_INT6, Private_INT7, ProviderCCG_INT16, ProviderCCG_INT18.

\(^\text{138}\) Private_INT8.
also needs to enable frontline staff to innovate and provide the relationships and opportunities needed to facilitate innovation, and it also needs to be dynamic and flexible in approach.\textsuperscript{139}

In order to facilitate this approach to leadership, interviewees expressed the view that leadership for innovation needs to be distributed across hierarchies and clinical and managerial professions. Specifically, there were comments that the NHS could take the following actions:

- **Provide dedicated learning opportunities for senior managers, executives and clinical leaders to revise initial plans and to think through the organisational changes needed to introduce innovations:** One interviewee commented that there needs to be training to foster the entrepreneurial attitude and endeavour which leads to an innovative culture.\textsuperscript{140} Another noted that leadership needs to ensure that proposed changes and innovations have clear goals and visions, and that these need to be clearly articulated to staff on the ground.\textsuperscript{141}

- **Provide training for senior managers, executives and clinical leaders to foster an entrepreneurial attitude:** These individuals were seen by some interviewees as key to unlocking the organisational changes that are required to embed new innovation. Training would focus on teaching the skills needed to revise initial plans and to think through the organisational changes needed to introduce innovations and changes to the service, as well as how to balance and adapt to the additional level of risk that is required. These kinds of skills would help to promote entrepreneurial attitudes and endeavour.\textsuperscript{142}

- **Simplify and clearly define leadership responsibilities within organisations to prevent delays in putting innovations into practice** (see also Section B.6.2).\textsuperscript{143}

- **Explore the possibility of different organisational hierarchies:** One interviewee felt that organisations with less hierarchical structures and ‘softer’ management, such as cancer networks, were seen as more successful in brokering service changes than, for example, Trusts with strict management hierarchies.\textsuperscript{144}

Locally and nationally, interviewees commented that in order to promote effective leadership, there must be a will to involve leadership from a range of stakeholders, including charities and the voluntary sector, in order to provide a more balanced viewpoint in policy discussions and highlight potential policies that

\textsuperscript{139} Academics\_INT2, Academics\_INT3, Academics\_INT4, Academics\_INT6, Academics\_INT8, Academics\_INT12, CharityPPIE\_INT1, CharityPPIE\_INT2, CharityPPIE\_INT3, CharityPPIE\_INT9, CharityPPIE\_INT12, Networks\_INT8, Policymaker\_INT3, Policymaker\_INT5, Policymaker\_INT6, Policymaker\_INT9, Private\_INT2, ProviderCCG\_INT8, ProviderCCG\_INT9, ProviderCCG\_INT12, ProviderCCG\_INT13, ProviderCCG\_INT16, ProviderCCG\_INT19, ProviderCCG\_INT22.

\textsuperscript{140} Academics\_INT5.

\textsuperscript{141} Academics\_INT7.

\textsuperscript{142} Academics\_INT5.

\textsuperscript{143} Policymaker\_INT4.

\textsuperscript{144} Academics\_INT1.
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

may not have been thought of. In addition, at the national level, system leaders need to encourage statutory bodies to communicate and collaborate with each other.

Providing dedicated support for the implementation of policies and new innovations within the health system

Interviewees stated that information on innovation and related policies can be difficult for frontline staff to access and engage with. When innovations are being disseminated, a range of guidance is needed to support frontline staff to be engaged with, and involved in, developing implementation and other policy guidance. Interviewees suggested a few different techniques for ensuring frontline staff were engaged in the production of information to support implementation of innovations and policies, including consistent communication, opportunities to support information sharing, and development of implementation guidance alongside new policies.

Specific actions that could be used to support the implementation of innovations identified during the interviews included:

- **Involving staff who worked on implementing an innovation in writing the information on it for wider use in the Trust and/or health system:** This can give individual frontline staff and CCGs the opportunity to share what they have been doing and what they have learnt, and also ensure that the information will reflect challenges and opportunities arising from real-world use.

- **Ensuring guidance on how to put policies into practice comes out as soon as possible after policies are announced:** The NHS could take ownership of communication of policies alongside policymakers, perhaps by appointing policy champions. In communicating about policies, it was seen as important to identify the connection between each stakeholder and policies and to articulate why they would be interested. Using dedicated and tailored messaging in this way can engage people across the healthcare system.

- **Communicating consistently and persistently with managers and frontline staff about new innovation policies:** An interviewee noted that this should include using multiple channels, including through Trusts, regulators, Medical Royal Colleges, etc. The interviewee also highlighted the need not to assume that NHS managers and those on the NHS frontline will understand policies in detail.

- **Providing legal support to tackle intellectual property and patent issues.**

145 CharityPPIE_INT2, CharityPPIE_INT3.
146 CharityPPIE_INT2.
147 CharityPPIE_INT14, Policymaker_INT3, Policymaker_INT6, ProviderCCG_INT14, ProviderCCG_INT18, ProviderCCG_INT21, ProviderCCG_INT22.
148 Policymaker_INT3, Policymaker_INT11.
149 ProviderCCG_INT18.
150 ProviderCCG_INT16.
151 ProviderCCG_INT11.
Motivations and accountabilities: key issues and actions according to interviewees

Creating the right incentives for research and innovation

Interviewees suggested that dedicated incentives that encourage the adoption of innovations are needed to motivate people to engage with innovation. These incentives should be aimed particularly at frontline staff and healthcare professionals. Incentives can demonstrate that an innovation is interesting and worth spending time on as well as that it will help a clinician to do their job, not make it more difficult. To do this, interviewees suggested a range of actions associated with providing a set of incentives to encourage staff to engage with innovation, including: resource-based incentives (funding and time); recognition incentives that appreciate and reward staff efforts to innovate; reputational incentives that emphasise how innovation can improve effectiveness and efficiency; and policy-based incentives. As one interviewee commented, it would be important to find and embed incentives that provide the ‘golden thread’ connecting research, innovation and implementation.\(^{152}\)

One interviewee noted that previous policies (e.g. *Innovation, Health and Wealth* (Department of Health 2011)) often had a strong push element, i.e. pushing healthcare staff to change practices or use/introduce certain products. This push without providing incentives can lead to even more resistance to change.\(^{153}\) In order to support innovation, clinicians and frontline staff need to be shown evidence that the new way of working is the better way (see also Section B.6.3).\(^{154}\) To do this, it was suggested by some interviewees from the networks and CCG/provider groups that energy should be focused on those innovations where there is a compelling need to improve, since it will be easier to get people to put additional time and energy into them.\(^{155}\) Once these areas are chosen, it will then be important to ensure that all leadership within Trusts see these as priorities for investment (in terms of both time and effort).\(^{156}\)

Specifically, interviewees offered the following suggestions for incentives:

- **Providing financial incentives to Trusts to engage with policies around innovation:** Interviewees from the provider/CCG group commented that without financial incentives Trusts are unlikely to have great interest in policies that support innovation.\(^{157}\) Financial incentives for innovation, in particular, could help to align the interests of managers with those of clinicians and other frontline staff.\(^{158}\) A few interviewees offered specific ideas on how to implement such incentives, including: linking financial incentives to performance metrics and monitoring these incentives over time.

---

\(^{152}\) Academics_INT7, Academics_INT8, Academics_INT10, Academics_INT11, Networks_INT1, Networks_INT4, Networks_INT6, Networks_INT7, Networks_INT8, Networks_INT10, Policymaker_INT3, Policymaker_INT5, Policymaker_INT6, Policymaker_INT9, Policymaker_INT11, ProviderCCG_INT13, ProviderCCG_INT16.

\(^{153}\) Private_INT1.

\(^{154}\) Policymaker_INT8.

\(^{155}\) Networks_INT1, Networks_INT4, Networks_INT6, Networks_INT7, Networks_INT8, ProviderCCG_INT8, ProviderCCG_INT16.

\(^{156}\) ProviderCCG_INT20.

\(^{157}\) ProviderCCG_INT11, ProviderCCG_INT17, ProviderCCG_INT22.

\(^{158}\) Academics_INT3, ProviderCCG_INT11, ProviderCCG_INT17, ProviderCCG_INT22.
electronically;\textsuperscript{159} providing funding for innovation that spans academia and healthcare, going from research, innovation, implementation, adoption and through to improvement activities, as this would incentivise more collaboration between different actors in the health system;\textsuperscript{160} and dedicating a certain percentage of a Trust’s or a CCG’s budget to the introduction of innovations.\textsuperscript{161}

- **Finding ways to give healthcare professionals time away from firefighting:** Many interviewees commented that the lack of time for healthcare professionals to engage in innovation is a real barrier and should be included in thinking through a portfolio of resource-based incentives. In addition, some interviewees from the CCG and providers group felt it was important to invest in more staff, including general practitioners (GPs) and nurses.\textsuperscript{162}

- **Appreciating and recognising the achievements of frontline staff on a day-to-day basis could make them more receptive and open to change:** Some interviewees felt there is a lack of recognition and appreciation of what frontline staff achieve every day in the system, in addition to a lack of time to engage with innovation. Giving frontline staff recognition for what they do achieve can be an impactful incentive.\textsuperscript{163}

- **Emphasising the reputational benefits associated with innovation:** One academic interviewee noted that innovation can help to improve the reputation of a hospital by helping staff to do their jobs more quickly, in a more efficient way and with improved clinical outcomes. Such outcomes secure reputational benefits and this can be used as an incentive to encourage the adoption of innovation.\textsuperscript{164}

- **Integrating incentives for engaging with innovation with NHS and organisational policies:** Some interviewees believed that policies currently lack incentives for NHS staff to engage with innovation and policies that are mandated are more likely to be successfully implemented. NHS England could be a key actor in providing such incentives, for example by including innovation in quality of service assessments in hospitals.\textsuperscript{165}

- **Establishing a mechanism helping AHSNs to better incentivise the adoption of innovations:** A networks interviewee thought that such incentives should go beyond existing ones such as tariffs, Quality and Outcomes Frameworks (QOF) or Commissioning for Quality and Innovation (CQUIN) schemes, and include incentives for clinicians and other healthcare personnel. It would be important to integrate and support such incentives when moving towards accountable care systems (ACSs; now being re-branded as ‘integrated care systems’). According to this interviewee, a multidisciplinary team of AHSNs, NHS Improvement, Health Education England, Medical Royal Colleges, CQC and others could develop such a new incentive system.\textsuperscript{166}

\textsuperscript{159} Academics\_INT3.
\textsuperscript{160} Academics\_INT2, Networks\_INT1.
\textsuperscript{161} Networks\_INT10.
\textsuperscript{162} Academics\_INT3, Networks\_INT8, ProviderCCG\_INT12, ProviderCCG\_INT17, ProviderCCG\_INT19.
\textsuperscript{163} Academics\_INT3, Academics\_INT7, Networks\_INT8.
\textsuperscript{164} Academics\_INT3.
\textsuperscript{165} Networks\_INT1, Policymaker\_INT2, Policymaker\_INT11.
\textsuperscript{166} Networks\_INT1.
Finally, though specific incentives are important, a few interviewees did mention that assessing and identifying what motivates people at all levels should be a first priority. Making these motivations coherent to actors across the health system and aligning objectives and priorities in a way that is understandable to everyone could go a long way towards aligning roles and responsibilities.\textsuperscript{167}

**Understanding and embedding appropriate management structures and hierarchies, both organisationally and at a system level, and both regionally and nationally**

For a small number of interviewees, there is a perceived lack of accountability for policy initiatives and their implementation in local provider organisations. Such accountability was seen as necessary to motivate providers’ engagement with these initiatives.\textsuperscript{168} A few interviewees from the private sector and provider/CCG group suggested that there is a need for local ownership and accountability for the successful implementation of policy schemes in a region. This could be achieved by having board-level ownership of the implementation of policy initiatives in NHS Trusts.\textsuperscript{169} Specifically, interviewees suggested the following actions for implementing accountability mechanisms spanning individual and organisational roles:

- **Instigating board-level ownership of the implementation of policy initiatives in NHS Trusts by introducing performance metrics to measure the board’s progress.**\textsuperscript{170}
- **Identifying an organisation (perhaps at the national level) responsible for adopting NIHR evidence:** Currently some of this is being carried out by AHSNs, but they do not cover everything.\textsuperscript{171}

### B.6.3. Information and evidence: key issues and actions according to interviewees

**Developing an open platform for sharing information on innovation**

Interviewees raised the issue of a lack of transparency on where an innovation has been adopted. Data collected within the NHS on innovation can be used to enhance learning opportunities, support innovation adoption and improve the innovation process. Data can also enable the NHS to be more nimble in how innovations are adopted and paid for, and to see how processes can be improved. To enhance data use by the NHS, many interviewees suggested creating a dedicated platform for sharing ideas, identifying successful innovations and providing evaluations of innovations, all of which could help spread innovations and prevent reinventing the wheel.\textsuperscript{172}

In introducing such a platform, interviewees noted that the following issues should be addressed and also suggested some actions that could be taken:

\textsuperscript{167} Academics\_INT2, ProviderCCG\_INT16, ProviderCCG\_INT18, ProviderCCG\_INT19.

\textsuperscript{168} Networks\_INT6, Policymaker\_INT2, Private\_INT7.

\textsuperscript{169} Private\_INT7, ProviderCCG\_INT18.

\textsuperscript{170} Private\_INT7.

\textsuperscript{171} ProviderCCG\_INT15.

\textsuperscript{172} Academics\_INT2, Academics\_INT6, Academics\_INT9, Academics\_INT10, Academics\_INT11, Academics\_INT12, CharityPPIE\_INT2, CharityPPIE\_INT3, CharityPPIE\_INT5, Policymaker\_INT2, Policymaker\_INT8, Policymaker\_INT10.
• Ensuring data collected on innovations are made freely available and easily accessible through an open platform that is used to share information and evidence on innovation ideas and successful innovations: The platform should include examples of success, alongside details on how success was achieved, as quickly as possible through as many channels as possible. It was seen as important to communicate these data in an understandable way and to ensure the platform is accessible to a wide range of stakeholders. This would allow stakeholders across the health system to make better use of current sources of information and networking resources in a timely fashion.

• Ensuring payment, governance and data-sharing issues have been addressed before using the data through such a platform.

• Using established bodies and networks to help spread the word about the platform: AHSNs could help spread information on this platform, and also help to better communicate which promising innovations are already used in the health system.

• In addition to identifying successes within the system, the platform could also help to identify solutions from other systems or sectors and assist in introducing them into the health system: AHSNs already help to identify innovations or solutions working well in some areas and use them to address other health needs. AHSNs, as well as policymakers and actors in the health system, could also identify things working well in other areas and relate them to health needs, for example learning from industry about how to better promote success stories and share them across the system.

Establishing a more systematic and clearly defined approach to provide evidence for, and evaluation of, innovations that are adopted

Some interviewees reported that it is not clear what kind of evidence is needed to support the introduction of a new innovation, and that there are no consistent frameworks for evaluating new innovations in testing or implementation phases. Such a framework would enable information to be shared across the system. Private sector and network stakeholders felt that there needs to be greater clarity around what kind of evidence for innovations is needed, while policymakers and CCG/provider representatives felt that more consistency is needed in the evaluation of innovations before they are implemented. In both cases, initiatives and innovations need to have rigorous evidence behind them and this needs to be clearly articulated and shared across the health system.
Specifically, interviewees noted a range of ways to improve both the definition of evidence to support adoption of new innovations and the way evidence is collected during evaluations of those innovations:

- **Articulating a better definition of the kinds of evidence that innovators need to provide to Trusts and the NHS**: Most private sector stakeholders interviewed felt it was not clear what kind of evidence they have to provide in a business case to the NHS, which made it difficult for them to provide the requisite details. They felt that having a structured and clear definition of the evidence needed would be helpful, instead of having to reinvent the wheel each time. In addition, interviewees thought there is a need for recognition of the transferability of evidence into other settings. Some felt that evidence accepted in one NHS Trust was not recognised in others and that the standardisation of evidence would help this.\(^{180}\) Relatedly, there was recognition from some stakeholders outside the private sector that they needed to inform innovators of what evidence they need to be collecting, the amount of evidence that is required, the standards they need to meet for their product to enter the NHS, and how success is defined.\(^{181}\)

- **Using AHSNs to support the private sector to develop a robust business case for discussions with the NHS**: AHSNs already help innovators develop their business cases by communicating NHS needs and providing advice on what a successful business case should include,\(^{182}\) although it was recognised that AHSNs had limited resources to do this\(^{183}\) and that this was not necessarily within their remit.

- **Establishing rigorous frameworks for evaluating innovations once they are introduced, including indicators of success and feedback systems to support continuous learning**: Several interviewees across different stakeholder groups felt that a consistent framework for data collection and evaluation is needed to bring an innovation to maturity and highlight its benefits. Such a framework would help to ensure all policies and innovations being implemented have indicators of success and feedback systems built into them that are assessed early on and throughout.\(^{184}\) However, one interviewee cautioned that innovations need to be given enough time to grow and establish themselves before they are evaluated.\(^{185}\) Logic models were thought by one interviewee to be a good evaluation tool and can be used to ensure programmes are clearly laid out to show what will be done and when, and what savings or improvements this will create.\(^{186}\) Another interviewee felt that systems such as Commissioning for Quality and Innovation (CQUIN) were useful mechanisms to demonstrate quality improvements and the ability of an innovation to improve care.\(^{187}\) Regardless of the tool, once an evaluation is completed, data need to be collected routinely as this will allow a shared understanding of what

\(^{180}\) Private_INT4, Private_INT7, Private_INT8.

\(^{181}\) CharityPPIE_INT8, Policymaker_INT1, Policymaker_INT2, Policymaker_INT11.

\(^{182}\) Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT9.

\(^{183}\) Policymaker_INT1.

\(^{184}\) CharityPPIE_INT7, CharityPPIE_INT11, Policymaker_INT1, Policymaker_INT11, ProviderCCG_INT8, ProviderCCG_INT16.

\(^{185}\) CharityPPIE_INT10.

\(^{186}\) Policymaker_INT10.

\(^{187}\) Private_INT1.
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

Initiatives are successful, realistic timescales and the best type of data to collect to support sharing of lessons learnt (and methods for sharing).\textsuperscript{188} This links with the point above about establishing open data-sharing platforms and evidence could be fed through to such platforms.

- **Recognising that rigorous evaluations need appropriate resourcing:** Funding, time and human resources are needed for rigorous evaluations and evidence for initiatives should be collected before they are implemented, including evidence of cost-effectiveness.\textsuperscript{189}

- **Using evidence to demonstrate the ability of an innovation to improve care, and being specific in national guidance (NICE, CQC) where that refers to specific products/innovations:** One private sector interviewee felt that NICE guidance should be specific and clear when claiming a technology’s clinical benefit and cost-effectiveness, including by clearly referring to specific products. This would prevent other companies claiming that their products are effective (despite lack of evidence), give healthcare professionals better guidance on which products they should use, and thus also improve patient care (as non-effective products would not be introduced).\textsuperscript{190}

**Developing transparent mechanisms for research evidence to translate into policy, including in areas not at the top of the policy agenda**

Some interviewees highlighted that it can often appear that policy is driving the way in which evidence is collected to support new innovation policy, rather than the evidence driving the development of new policy (i.e. new innovation policies are not based enough on evidence). This may be leading to important research not having reach outside the academic environment.\textsuperscript{191} To support translation of research into policy, the charitable research sector and academics can be used as partners.\textsuperscript{192}

Interviewees suggested a range of mechanisms for supporting the translation of evidence into policy:

- **Developing more transparent and inclusive mechanisms for translating research evidence into policy, and involving research charities in that:** A few interviewees commented that research charities are in a prime position to communicate current research findings to policymakers and encourage researchers to disseminate their work directly to policymakers\textsuperscript{193} and to ‘shout out’ their research to engage policymakers.\textsuperscript{194}

- **Disease areas that are not at the top of the policy agenda still need support with innovation:** One interviewee commented on the lack of commissioning of innovations and treatments for rare diseases.\textsuperscript{195} For example, according to two interviewees, cardiovascular disease (CVD) was not included in the *Five Year Forward View*, as mental health and cancer were higher

\textsuperscript{188} Policymaker\_INT1, Policymaker\_INT2, ProviderCCG\_INT8.

\textsuperscript{189} Academics\_INT5, Academics\_INT7, Policymaker\_INT1.

\textsuperscript{190} Private\_INT1.

\textsuperscript{191} Academics\_INT1, Academics\_INT2, Academics\_INT4, Academics\_INT7, Academics\_INT9, Academics\_INT10, CharityPPIE\_INT7.

\textsuperscript{192} CharityPPIE\_INT7, CharityPPIE\_INT13.

\textsuperscript{193} CharityPPIE\_INT7.

\textsuperscript{194} CharityPPIE\_INT13.

\textsuperscript{195} CharityPPIE\_INT2.
on the agenda, and return on investment for dementia prevention is considered to be years away, so it is not a priority at the moment.196 Charity and PPIE interviewees thought that charities working with underrepresented diseases need to communicate their research to policymakers and commissioners to ensure they are aware of it, in a language that resonates with them.197 In order to do this, researchers and patients can be brought together to identify the top research priorities for a particular condition.198

- **Using evidence gathered during innovation evaluations as a source for policy development and to make the case for investment in innovation**: Some interviewees pointed to the need to use the evidence generated during evaluations of new innovations to compare outcomes and make the most of any cost savings or effectiveness.199 This also applies to rare diseases and those disease areas that are not policy priorities. There should be investment in conducting evaluations to show the benefits of treatments for underrepresented diseases to patient wellbeing,200 as part of making the case for investment in innovations to support them.

B.6.4. Relationships and networks: key issues and actions according to interviewees

*Supporting the development of innovations by introducing a range of mechanisms designed to recognise and actively bring together diverse actors both inside and outside the health system*

Many interviewees commented that it would be beneficial to bring together different actors inside and outside the health system to support the development of innovations. This would increase other actors’ support for introducing innovations and thus accelerate innovation uptake and spread. Collaborations between different organisations in the health system that were mentioned spanned Trusts, CCGs, local government, charities and academics. It was thought that bringing these actors together in diverse ways could help to make change happen on a larger scale.201

Specifically, interviewees raised a number of ideas about how to bring actors and professions in different parts of the health system, and systems related to it, together in order to promote collaboration that can enable change and innovation to occur:

- **Developing more collaborative working between professions, both within and related to the health system**: A variety of starting points for achieving more collaborative working were mentioned by interviewees. For instance, close proximity of research organisations/universities and hospitals can support collaborations between researchers and clinicians; and networks such as AHSNs have experience in bringing together stakeholders.202 AHSNs also offer networking

---

196 CharityPPIE_INT2, CharityPPIE_INT3.
197 CharityPPIE_INT2, CharityPPIE_INT7.
198 CharityPPIE_INT6, CharityPPIE_INT7.
199 Academicians_INT2, Academicians_INT4, CharityPPIE_INT8, Networks_INT7, Policymaker_INT1, Policymaker_INT7, Private_INT1, Private_INT4.
200 CharityPPIE_INT2, CharityPPIE_INT8.
202 ProviderCCG_INT18.
opportunities such as lectures and workshops. One interviewee explicitly pointed to the importance of bringing groups working on the same things in different areas physically together for meetings to learn from each other. Similarly, organisations related to the health system, but which are separate from it, are important and need to provide more hands-on support and collaborate more with the health system. Some interviewees pointed specifically to the Medical Royal Colleges as needing to be engaged to ensure involvement of clinicians from the start of innovation policy development. Finally, one interviewee suggested focusing specifically on establishing local groups that bring together different actors in the local health system.

- **Enabling a strong partnership ethos between managers and clinicians and joining up executive teams and senior managers can show a united commitment and receptivity to change and innovation:** As noted by academic interviewees, leadership needs to ensure that proposed changes and innovations to be introduced into health organisations have clear goals and visions, and these need to be clearly articulated to staff on the ground. They must also provide the necessary support to their staff when it comes to introducing innovation. This requires collaboration to ensure that managers understand the evidence and benefits of clinical innovations, and that clinicians understand the managerial system and how innovations can be introduced into a health organisation.

- **Making the most of existing network schemes:** Knowledge Transfer Networks, the SBRI, LEPs, Health Enterprise East, NHS Innovations South East, NIHR networks, AHSNs, and other informal networks of national experts that already exist, all help to bring together different actors in the system and we should understand what each offers before creating additional new network schemes. These networks are all seen as important in enabling different professions to get to know other actors in the health system, build relationships and learn what is required to enter into the NHS. Another interviewee pointed to the role of intermediaries such as NHS Innovations South East, who can help decide if ideas are worth pursuing, and provide support to develop the necessary evidence and create a business case. Overall, interviewees stressed that innovation efforts involving different actors in the health system – i.e. working in interdisciplinary groups – were seen as more successful since decisions then build on collaborative efforts. Moreover, different actors’ needs and interests can be reflected and accountabilities shared.

- **Exploring alternative mechanisms for cross-learning or connecting people, such as secondments, placement schemes or matchmaking organisations:** One interviewee posited that NICE could place one of their clinical specialists into hospitals to provide support in real time.

---

203 Policymaker_INT3.
204 Policymaker_INT10, ProviderCCG_INT16.
205 Private_INT8.
206 Academics_INT3, Academics_INT7.
207 Academics_INT7, Networks_INT4.
208 Academics_INT3, Academics_INT12.
210 Private_INT4.
time, while another suggested using matchmaking organisations to act as facilitators of innovation implementation, matching up innovators with appropriate healthcare providers to help each other.

- **Raising awareness of what charities can offer:** Interviewees from charity and PPIE organisations were particularly keen to point out that policymakers need to be aware that charities contribute more than just the patient voice. They believed that stronger relationships need to be forged between policymakers and charities to bring more to the discussion. There was recognition this was a two-way street, and that charities need to communicate their intelligence with policymakers to a greater extent, in addition to policymakers needing to build stronger relationships with research charities and listen to their ideas and knowledge. In addition, it was highlighted that larger charities, such as National Voices, should collaborate with smaller charities to ensure that their voice is heard at the national table and to disseminate information on policies.

**Addressing fragmentation and misalignment in the health system**

There is a perception that NHS organisations are not aligned with each other and that there is fragmentation in the system, all of which acts as a barrier to innovation. Better alignment of NHS organisations is needed to address this fragmentation. Interviewees from the private sector and network stakeholder groups, in particular, emphasised the role that AHSNs can play in supporting this. Specifically, interviewees mentioned the following:

- **Greater alignment of AHSNs as well as better support for industry joined-up networks can help create better coherence and prevent reinventing the wheel:** Additional funding for AHSNs targeted specifically at innovation might help support this.

- **AHSN interviewees felt that AHSNs and their work can be an enabler:** AHSNs support businesses to do health economics analyses, which should help set up a business case, they support businesses to generate the necessary evidence base, and they communicate the wider benefits of innovations (i.e. not only cost benefits) to NHS organisations.

---

211 Policymaker_INT3.
212 ProviderCCG_INT7.
213 CharityPPIE_INT2, CharityPPIE_INT3, CharityPPIE_INT13.
214 CharityPPIE_INT10.
215 Academics_INT13, Networks_INT3, Networks_INT5, Networks_INT7, Networks_INT8, Networks_INT10, Private_INT4, Private_INT8.
216 Academics_INT13, Networks_INT3, Networks_INT5, Networks_INT7, Networks_INT8, Networks_INT10, Private_INT4, Private_INT8.
217 Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT9.
218 Networks_INT6.
219 Networks_INT5, Networks_INT7.
220 Networks_INT8.
B.6.5. Engagement with patients and the public: key issues and actions according to interviewees

**Expending greater effort in involving patients in the innovation process across the innovation pathway**

Interviewees felt that there needs to be greater effort to involve patients and the public in the innovation process and throughout all stages in meaningful and varied ways. Patient and public involvement should not be seen as a tick-box exercise, but rather as a way of getting better ideas into the innovation process and at multiple points throughout that process. Organisations across the system need to be made aware of the importance and benefits of PPIE for supporting, and improving, innovation.

Interviewees across several stakeholder groups felt that patients and the public need to be reached out to on a large scale and that they should play a role in several areas: deciding the NHS’s priorities, engaging in change programmes to introduce innovations, designing innovations so they fit patient need, and being provided with clear information about the evidence behind innovations and what constitutes ‘good’ evidence. One interviewee also raised the need to improve patient access to innovations. All of this would provide patients and the public with the tools and confidence to get involved with important conversations.

Interviewees suggested a range of mechanisms for implementing these points:

- **Treating PPIE as a way of getting better ideas into the system, not just a tick-box exercise:** Several interviewees referenced examples where positive PPIE experiences helped to enable innovation, including the introduction of dementia-friendly practices, support from the British Heart Foundation for introducing novel anticoagulants, and priority-setting activities in health research involving affected patients. One interviewee from the private sector emphasised that patients and the public must be engaged in the ‘right’ way at specific levels so they can provide views and opinions that are most relevant, as opposed to just engaging them in generic, high-level issues to fulfil a PPI requirement.

- **Providing dedicated long-term resources for PPIE:** Efforts do not need to be expensive and high-profile, just well-managed, consistent and implemented well. This could include providing guidance to charities on how to establish committed PPIE teams or individuals. CRUK was given as an example of a larger charity whose PPIE team was able to support the policy team to connect with the right patients and understand how best to work with them. There was recognition that not every charity could work in this way due to resource constraints, but the principles of the model and approach could be translated and scaled up/scaled down depending on the charity size.

---

221 Academics_INT7, CharityPPIE_INT1, CharityPPIE_INT2, CharityPPIE_INT9, CharityPPIE_INT10, CharityPPIE_INT11, CharityPPIE_INT12, CharityPPIE_INT13, Policymaker_INT8, Private_INT8.

222 CharityPPIE_INT9.

223 CharityPPIE_INT2, CharityPPIE_INT10, CharityPPIE_INT11.

224 CharityPPIE_INT7, Networks_INT3, Networks_INT8.

225 Private_INT2.

226 CharityPPIE_INT9, CharityPPIE_INT12.
• **Non-charity organisations, including the NHS, need to ensure they support effective PPIE across the innovation pathway:** Patients need to be involved at the very start of innovation and policy processes rather than when an innovation has already been developed.\textsuperscript{227} This includes involvement in setting NHS priorities, something one policymaker interviewed felt was important.\textsuperscript{228} In addition, an academic interviewee thought that patients and the public should be involved in change programmes within hospitals in order to support effective implementation of new innovations, and to ensure that the wider impacts of change are taken into account. This could help better understand what the changes require and what they mean for patients/the public, and could help create the support needed for adoption and spread.\textsuperscript{229} In order to do this, though, it is important to provide patients with relevant education and information so they could be involved in discussions in a meaningful way.

• **Including those from minority backgrounds in patient involvement initiatives:** One interviewee commented that steering groups need to keep track of the types of patients involved and identify ways to reach out to underrepresented groups.\textsuperscript{230}

• **Promoting patient access to innovations:** One interviewee suggested reaching patients through other means, such as charities who have the authority to recommend innovations or via local GPs who could act as champions (although this may mean relying on particularly proactive individuals).\textsuperscript{231}

**Improving PPIE infrastructure at the local and national level in order to promote collaboration and opportunities to share learning and build capacity locally and nationally**

There needs to be a more joined-up approach to engaging patients. While there are various PPIE organisations and groups focusing on specific conditions or in specific local areas, these are not brought together at a more regional and national level. PPIE organisations or groups are often on a very small scale, which makes it difficult for them to get involved with policy.\textsuperscript{232} Promoting collaboration between local and national groups, using digital technologies to share learning, providing practical advice and information on how to involve patients, and incorporating patient involvement informally, as well as formally, were all suggested by interviewees.\textsuperscript{233}

Specific actions mentioned included:

• **Promoting collaboration and opportunities to share learning and build capacity locally and nationally:** It was considered important to support collaboration between local PPIE groups\textsuperscript{234} and share learning from organisations that have effective PPIE systems in place.\textsuperscript{235} Importantly, to

\textsuperscript{227} CharityPPIE_INT1, CharityPPIE_INT10, CharityPPIE_INT12.
\textsuperscript{228} Policymaker_INT8.
\textsuperscript{229} Academics_INT7.
\textsuperscript{230} CharityPPIE_INT6.
\textsuperscript{231} CharityPPIE_INT9.
\textsuperscript{232} CharityPPIE_INT2, CharityPPIE_INT11.
\textsuperscript{233} CharityPPIE_INT1, CharityPPIE_INT10, CharityPPIE_INT11, Policymaker_INT2.
\textsuperscript{234} Policymaker_INT2.
\textsuperscript{235} CharityPPIE_INT10.
ensure that small patient engagement groups are effective, they need to be provided with the capacity and opportunity to provide practical learning support to involve patients in the process, e.g. not holding meetings during working hours when patient representatives are unlikely to be able to attend.\textsuperscript{236} To reach out to a large number of patients, digital technologies can be used.\textsuperscript{237}

- **Developing formal and informal mechanisms to incorporate patient involvement:** While some suggested mechanisms for incorporating patient involvement in a more informal way, e.g. using focus groups or speaking to patients at hospitals about what issues they think are important,\textsuperscript{238} others suggested a formal, national body could be set up to lead PPIE and to support development of patient networks.\textsuperscript{239}

### B.6.6. Funding and commissioning: key issues and actions according to interviewees

**Providing a long-term and sustainable funding strategy to develop, introduce and study innovation**

Interviewees thought that a long-term, sustainable funding strategy to develop, introduce and study innovation, and especially to provide adequate budgets for trialling and implementing innovations with a stronger financial focus on adoption, is important. Interviewees who commented on this point felt that the NHS should commit to sustainable, continuous and long-term funding for policy initiatives.\textsuperscript{240}

Specific actions mentioned by interviewed stakeholders included:

- **Committing to a sustainable, continuous and long-term funding strategy for innovation policy initiatives:** This will require a medium- to long-term policy perspective\textsuperscript{241} and a clear acceptance of the timescales required to see a return on investments in innovation.\textsuperscript{242} This needs to ensure a fair return on investment over a longer period of time as benefits may not be seen until years later or small benefits may be seen across multiple budgets.\textsuperscript{243} This will require a shift away from short-term commissioning (e.g. commissioning for a year),\textsuperscript{244} as well as empowering commissioners to use their existing powers wisely to look for value, not price.\textsuperscript{245}

- **Setting out a funding strategy that highlights the current funding pathways and simultaneously identifies the bottlenecks within services so that funding can be redirected:**

---

\textsuperscript{236} CharityPPIE\_INT11.  
\textsuperscript{237} Policymaker\_INT2.  
\textsuperscript{238} CharityPPIE\_INT1.  
\textsuperscript{239} CharityPPIE\_INT1.  
\textsuperscript{240} Academics\_INT4, Academics\_INT8, Academics\_INT10, CharityPPIE\_INT1, CharityPPIE\_INT3, Networks\_INT4, Policymaker\_INT4, Policymaker\_INT6, Private\_INT4, Private\_INT5, Private\_INT6, Private\_INT7.  
\textsuperscript{241} Academics\_INT4, Academics\_INT8, Academics\_INT10, Networks\_INT4, Policymaker\_INT4, Policymaker\_INT6, Private\_INT4, Private\_INT5, Private\_INT6, Private\_INT7.  
\textsuperscript{242} CharityPPIE\_INT3, CharityPPIE\_INT8, CharityPPIE\_INT11, Networks\_INT1, Private\_INT4.  
\textsuperscript{243} CharityPPIE\_INT3, CharityPPIE\_INT8, CharityPPIE\_INT11.  
\textsuperscript{244} CharityPPIE\_INT9.  
\textsuperscript{245} ProviderCCG\_INT20.
Within the strategy, there needs to be awareness of the funding pathways to highlight where the barriers to funding are\(^{246}\) and whether funding exists to help overcome them.

- **Providing a clear, transparent and holistic assessment of how much innovation really costs in the strategy** to promote sustainability of innovation in the future.\(^{247}\)

**Funding innovation across the pathway, but focusing regionally with national oversight and governance**

Funding innovation can be on a regional scale but with national oversight and governance so as to recognise and give space to regional strengths and differences. In doing so, ensure funding is available across the innovation pathway.\(^{248}\)

Specific actions mentioned by stakeholders included:

- **Providing seed funding or pilot funding from AHSNs or Vanguards** or the charity sector as enablers of innovation that works well at a regional level.\(^{249}\)
- **Ensuring there is funding available to support implementation of innovations**: If necessary, ring-fence money for specific innovation-focused tasks and initiatives so that it does not get sucked up into other things.\(^{250}\) Another interviewee suggested that specific funding for innovation implementation could come from charities, as the NHS is often wary about testing innovations themselves.\(^{251}\)

**B.6.7. System considerations: key issues and necessary actions according to interviewees**

**Developing an overarching health innovation strategy that supports the evolution of more integrated health and social care systems**

A strong message across interview groups was the need for an overarching national health innovation strategy to support innovation. Many interviewees commented, in one way or another, on the importance of a whole-system approach. There were diverse views, as well as some commonalties, about what this might involve and how best to deliver it.

Firstly, the strategy should be based on a robust process of needs identification, so that innovation supply can respond to areas of more stable and certain demand, thus facilitating uptake, and embed a coordinated approach to innovation.\(^{252}\) A national innovation strategy for health should help create a shared understanding of healthcare challenges where innovation may support solutions and consider the entire innovation pathway – supporting not only supply but also implementation efforts – and would set

---

\(^{246}\) CharityPPIE_INT14.

\(^{247}\) CharityPPIE_INT8, CharityPPIE_INT11.

\(^{248}\) ProviderCCG_INT4.

\(^{249}\) ProviderCCG_INT6, ProviderCCG_INT11, ProviderCCG_INT20, ProviderCCG_INT21, ProviderCCG_INT22.

\(^{250}\) ProviderCCG_INT6.

\(^{251}\) CharityPPIE_INT2.

\(^{252}\) Networks_INT1, Networks_INT2, Networks_INT3, Networks_INT8, Networks_INT9, Networks_INT10.
out a roadmap for how innovation can help efforts for a more integrated health and social care system.\(^{253}\) The strategy should also provide policy continuity and opportunities for long-term commissioning, as the current lack of this prevents the bedding down of sustainable changes.\(^{254}\)

Interviewees suggested the following aspects that need to be considered in the development of a national health innovation strategy:

- **Identifying and addressing the needs of the health system:** The health system needs a better process for identifying innovation needs – one that facilitates greater stability in the needs identified and supports uptake. This includes ensuring clear prioritisation processes, coordinating between local- and national-level needs identification processes, and ensuring alignment in terms of agreement on needs between healthcare professionals, managers, executives in provider organisations and commissioners and financial pull mechanisms at national level, so that innovation solutions are more likely to be taken up.\(^{255}\)

- **Improving coordination across stakeholder groups and using the strategy to make clear where responsibilities for different activities across the innovation pathway lie:** The NHS is a federation of smaller organisations, each with its own culture, and these siloed bodies are not sharing their knowledge with each other.\(^{256}\) This can lead to overlapping of functions and parallel initiatives due to the fragmented environment.\(^{257}\) In order to overcome this, silos need to be broken down and an integrated strategy can help this. At a local level, interviewees identified potential in the AHSNs to help broker information and match innovations to need, and through this brokerage role to help support uptake by the health system.\(^{258}\)

Within the innovation strategy, interviewees felt that there needs to be a balanced approach that allows for quick wins alongside a long-term approach that recognises the wider picture of innovation. The NHS needs to see and recognise the wider picture of innovation and adopt a long-term approach to change that harnesses the power of innovation to enable this change.\(^{259}\)

Interviewees suggested the following specific actions to enable this change:

- **Adopting a balanced approach to innovation,** which balances quick wins, to keep motivation up, alongside a long-term approach to change. Leadership needs to recognise timelines and take a

\(^{253}\) Policymaker\_INT1, Policymaker\_INT2, Policymaker\_INT4.

\(^{254}\) Charity\_PPIE\_INT9, Charity\_PPIE\_INT11, Charity\_PPIE\_INT14.

\(^{255}\) Academics\_INT2, Academics\_INT4, Academics\_INT5, Academics\_INT6, Academics\_INT8, Academics\_INT9, Academics\_INT12, Charity\_PPIE\_INT11, Networks\_INT1, Networks\_INT2, Networks\_INT3, Networks\_INT8, Networks\_INT9, Networks\_INT10, Policymaker\_INT2, Policymaker\_INT4, Policymaker\_INT6, Private\_INT2, Private\_INT3, Private\_INT5, Private\_INT7, Private\_INT8.

\(^{256}\) Academics, Charity\_PPIE\_INT2, Charity\_PPIE\_INT3.

\(^{257}\) Charity\_PPIE\_INT8, Charity\_PPIE\_INT9.

\(^{258}\) Networks\_INT8, Networks\_INT10.

\(^{259}\) Academics\_INT2, Academics\_INT4, Academics\_INT7, Academics\_INT8, Academics\_INT10, Charity\_PPIE\_INT3, Charity\_PPIE\_INT9, Charity\_PPIE\_INT11, Charity\_PPIE\_INT14, Networks\_INT4, Networks\_INT8, Networks\_INT9, Policymaker\_INT3, Private\_INT4, Private\_INT5, Private\_INT6, Private\_INT7.
long-term approach, acknowledging that innovations need a longer time to unfold and have an impact, whilst also demonstrating the ability to have quick wins and transformation alongside the long-term changes. There needs to be an active development of the skills and capacity needed for leaders to achieve this balance.260

- **Providing more headspace and capacity** for leaders to allow them to set out the vision and embed the changes that will be required (see also Section B.6.1).261

- **A shift away from short-term commissioning.**262

- **Considering the differing requirements and pathways of different types of innovations:** While there are areas of commonality, policy needs to recognise that there are different requirements, regulations and pathways (e.g. how long it takes to get a product from development to diffusion) for different innovations. For instance, the development and introduction of pharmaceutical products takes longer due to clinical trials and associated regulations, and products such as pharmaceuticals require different regulations than service innovations, diagnostics, digital health or medtech products, because they are associated with different risks.263

**Providing dedicated support for policy implementation at the local level**

Interviewees felt that dedicated support to enable local ownership and accountability for policy implementation is needed; this was seen as a particularly important element to ensure the success of policies and to support innovation uptake and diffusion. Related to this, interviewees thought that local implementation efforts need to be supported at the national level, and that regulatory and governance barriers as well as barriers between commissioners and providers, which delay innovation efforts, need to be removed.264

According to interviewees, the following issues and actions could be addressed:

- **Establishing mechanisms for local ownership/accountability for the successful implementation of policy schemes in a region:** An example mentioned was the introduction of delivery partners from a range of backgrounds to support local implementation and embedding of policies, as NHS RightCare has done.265 One interviewee suggested that devolving resources and staff to regional teams could work and gave the example of the RightCare teams made up of the delivery partners and senior NHS staff who work exclusively on RightCare.266 In addition,
engaging with STPs and accountable care organisations (ACOs) at the regional level can support coordinated innovation.\(^{267}\)

- **Encouraging board-level ownership of the implementation of policy initiatives in NHS Trusts and establishing performance metrics to measure the board’s progress could help incentivise Trusts’ ownership.**\(^{268}\)

- **Writing policies so that they encourage innovation uptake:** a private sector interviewee thought that policies should not imply that they force healthcare staff to change practices/use certain innovations.\(^{269}\)

### Improving the mechanisms for disseminating policies on innovation across the system

Some interviewees thought that the dissemination of policies on innovation across the system needs improving. For this, system-wide leadership is needed to put structures in place that allow Trusts to prioritise what is important, as it is currently difficult for Trusts to pick out what is important for them within policies. Interviewees across stakeholder groups felt that there needed to be specific attention and dedicated mechanisms for communicating and disseminating information about innovation policies across the entire system.\(^{270}\)

According to interviewees, specific issues to be addressed and actions that could be taken which are related to this area include:

- **Clearly communicating healthcare needs to industry.** Policymakers need to make sure that initiatives are clearly communicated, e.g. through easily accessible websites, a social media campaign, series of events, through formal and informal networks, etc. The communication needs to be clear and the information provided needs to be easy to understand.\(^{271}\)

- **Establishing a collective approach to raise awareness of innovation policies.** e.g. engaging charities and other stakeholders earlier in the policy process\(^{272}\) and providing greater clarity on who is responsible for sharing policy information\(^{273}\) so that stakeholders know who to follow and/or approach for up-to-date information.

- **Promoting greater sharing of the successes and challenges of policy development** from those involved in creating it to promote collaborative working.\(^{274}\)

\(^{267}\) Policymaker\_INT1.

\(^{268}\) Private\_INT7.

\(^{269}\) Private\_INT1.

\(^{270}\) Academics\_INT3, Academics\_INT7, Academics\_INT8, Academics\_INT11, CharityPPIE\_INT6, CharityPPIE\_INT8, CharityPPIE\_INT10, CharityPPIE\_INT11, CharityPPIE\_INT13, Policymaker\_INT3, Policymaker\_INT6, Private\_INT2, Private\_INT3.

\(^{271}\) Academics\_INT12, Private\_INT2, Private\_INT3.

\(^{272}\) CharityPPIE\_INT12, CharityPPIE\_INT13.

\(^{273}\) CharityPPIE\_INT12.

\(^{274}\) CharityPPIE\_INT2, CharityPPIE\_INT12, CharityPPIE\_INT14.
B.7. Insights gained from discussion of specific Accelerated Access Review recommendations and associated policy initiatives

Interviewees were asked to comment on a few selected recommendations from the Accelerated Access Review (2016) as well as on some related initiatives. Overall, the degree of familiarity with the Accelerated Access Review and its recommendations differed across stakeholder groups. While interviewees from innovation and improvement networks as well as from the policymaker stakeholder group were generally familiar with the Accelerated Access Review, only a few interviewees from the other four stakeholder groups had an understanding of the policy, and their degree of knowledge varied greatly. Some academics, charity and PPIE organisation representatives and private sector interviewees did not feel familiar enough with the policy to be able to comment on its recommendations.

The following sections provide an overview of the interviewees’ views on Accelerated Access Review recommendations and related initiatives addressed in the interviews.

B.7.1. Knowledge of and reflections on the horizon scanning recommendations of the Accelerated Access Review

The Accelerated Access Review includes two key recommendations that specifically address horizon scanning:

- ‘The NHS should develop an enhanced horizon scanning process and clarify its needs to innovators’ (Accelerated Access Review 2016, 19):
  - An improved horizon-scanning process should help the NHS identify products that have the greatest potential to bring benefits for the NHS and patients. Moreover, it is seen as important that innovators understand the needs of the NHS and patients in order to be able to develop the right products to address them.
- ‘Patients should be involved in horizon scanning and prioritisation, and this involvement should continue along the whole innovation pathway’ (Accelerated Access Review 2016, 23).

Developing a clear strategy and managing NHS horizon scanning centrally

Interviewees felt that there is a need to have a clear approach to horizon scanning and the identification of need, for example in form of a well-defined strategy. Such a strategy should be developed at a central level (e.g. by NHS England or NHS Improvement), and could be, for instance, a prioritisation document or a roadmap to horizon scanning.275

Specifically, interviewees felt that such a strategy should include the following:

- Some interviewees emphasised the importance of clearly defining several factors such as timelines (e.g. long-term scanning over a couple of years vs. short-term scanning, as well as different timelines for different types of innovations), the types of innovations to look for,

275 Academics_INT5, Academics_INT9, CharityPPIE_INT12, Policymaker_INT2, Policymaker_INT4, Private_INT2, Private_INT7, ProviderCCG_INT14.
whether to look for ‘generic’ trends such as digitisation or for individual products, etc., in such a strategy.276

- Moreover, some interviewees noted that the focus of horizon scanning – i.e. what to scan for – should be defined. Ideally, horizon scanning should not be limited to scientific and technological innovations and treatments, but should take a broader view and also consider service changes as well as opportunities supporting staff across the system, which are not necessarily healthcare-related, but could improve the day-to-day work of staff. Interviewees also suggested that the NHS could benefit from looking at practices from other sectors and apply these to health.277

Interviewees referred to the need to enable horizon-scanning activities both at a central/national and local level. Interviewees felt that the main horizon scanning should happen at a central level and that any ongoing horizon-scanning activities should be centrally coordinated in order to create efficiencies and prevent siloed working. However, they also found it important to have horizon-scanning activities at a local level, since this would enable the system to consider region-specific needs and ideas. The overall strategy/mechanism of NHS horizon scanning should thus enable the central level to coordinate and connect the central and local levels.278

In order to facilitate a functioning relationship between the central and local level, interviewees suggested the following actions:

- NHS England or perhaps the Department of Health and Social Care could take on this central role,279 but it needs to be ensured that individuals involved have the right skills to conduct horizon scanning (see more on this point below) and/or that they get support from organisations that have the necessary expertise and skills (e.g. NIHR).280

- AHSNs (or perhaps STPs) could conduct horizon scanning at a local level, as they have the right skills and are most familiar with their regions, and could strategically communicate them to the central level.281 AHSNs should draw on inputs from across the NHS, academia, the private sector, etc.282

- Moreover, a networks interviewee noted that timelines of horizon-scanning processes should be considered: It needs to be recognised that involving a variety of actors requires time, and thus a long-term approach is needed.283

276 Academics_INT9, Policymaker_INT2, Policymaker_INT4, Private_INT2, Private_INT7.
277 Academics_INT5, CharityPPIE_INT12, ProviderCCG_INT14.
278 Academics_INT1, Academics_INT9, Policymaker_INT1, Policymaker_INT2, Policymaker_INT3, Policymaker_INT4, Policymaker_INT6, Private_INT4, ProviderCCG_INT8, ProviderCCG_INT13, ProviderCCG_INT14, ProviderCCG_INT15, ProviderCCG_INT16.
279 Academics_INT1, ProviderCCG_INT14.
280 Academics_INT1, Academics_INT2, Academics_INT6, Academics_INT10.
281 Academics_INT7, Networks_INT8, Networks_INT9, Private_INT4, Private_INT6, ProviderCCG_INT8, ProviderCCG_INT15.
282 Private_INT4, Private_INT6, ProviderCCG_INT13, ProviderCCG_INT14.
283 Networks_INT2.
According to four private sector representatives and a policymaker, a consideration related to connecting the central and local levels is to have a plan how to communicate horizon-scanning information from the regional to the central/national level as well as to have a strategy to coordinate inputs given by actors across the system.\(^{284}\)

**Learning from others and having the right skills**

Interviewees highlighted the need to ensure that the NHS horizon-scanning mechanism works effectively and efficiently. In order to achieve this, they found it to be crucial to have the right scientific and technical skills and expertise to conduct horizon scanning. Moreover, giving actors across the system the opportunity to contribute to horizon scanning rather than simply involving the ‘usual suspects’ was considered to be important. Interviewees also felt that the NHS should consider incentivising engagement with horizon scanning.\(^{285}\)

Related to these needs, interviewees mentioned some specific actions:

- Interviewees noted that it could be useful to take up other organisations’ approaches to horizon scanning and to bring different resources together: Several organisations across the system, but also in other sectors, are already conducting horizon scanning; mentioned organisations and actors include the SBRI, BEIS, the Office of Science and Technology, NICE or the NIHR Innovation Observatory (NIHRIO) and some academics. Interviewees emphasised that rather than reinventing the wheel, the NHS should build on the horizon-scanning efforts of other organisations and actors, learn from their best practices and take up their mechanisms. Moreover, they thought it would be useful to find a way to share approaches to horizon scanning across organisations and systems as well as existing registries of innovations.\(^{286}\)

- Individuals engaged in horizon scanning should include clinical staff, patients as well as those with management, business and finance expertise. These individuals should be picked according to their skills and an expert group could be set up to oversee their involvement.\(^{287}\)

- In order to involve NHS staff in horizon scanning, the NHS could consider incentivising engagement through job plans and objectives: Moreover, interviewees found it important to give staff the required time and headspace in order to help incentivise and measure engagement.\(^{288}\)

- Some interviewees suggested creating a two-way horizon-scanning process between the NHS and the healthcare industry, and perhaps also other sectors: This could help prevent horizon...

\(^{284}\) Policymaker\_INT6, Private\_INT3, Private\_INT4, Private\_INT6, Private\_INT8.

\(^{285}\) Academics\_INT2, Academics\_INT4, Academics\_INT5, Academics\_INT8, CharityPPIE\_INT12, CharityPPIE\_INT13, Networks\_INT4, Networks\_INT7, Policymaker\_INT1, Policymaker\_INT3, Policymaker\_INT5, Policymaker\_INT7, Private\_INT2, Private\_INT3, Private\_INT6, ProviderCCG\_INT21, ProviderCCG\_INT22.

\(^{286}\) Academics\_INT5, Networks\_INT7, Policymaker\_INT5, Policymaker\_INT7, Private\_INT2, Private\_INT3, Private\_INT6.

\(^{287}\) Policymaker\_INT1, Policymaker\_INT3.

\(^{288}\) Academics\_INT4, Academics\_INT8, ProviderCCG\_INT21, ProviderCCG\_INT22.
scanning happening in a silo and also help make innovators aware of NHS needs; moreover, a two-way horizon-scanning process could help innovators develop innovations able to address these needs as well as enable them to share innovations that could provide benefit to the NHS.\textsuperscript{289} An academic interviewee thought that innovators could be given embedded access to the clinical environment to better understand the needs of frontline staff.\textsuperscript{290}

\textbf{Ensuring that the right needs are addressed}

Several interviewees emphasised the importance of addressing the right needs in horizon-scanning activities. Interviewees found it important to involve NHS staff – especially frontline staff, but also finance managers, procurement, etc. – and patients in identifying needs, as they are the ones who know best what the health system requires.\textsuperscript{291}

In order to ensure successful NHS staff involvement, academic interviewees suggested the following:

- To enable frontline staff to better articulate their needs, non-clinical staff should give them the headspace to think about these.\textsuperscript{292}
- Innovation champions within NHS organisations could support key clinicians in looking for what could be done better to help them do their jobs, and to help them identify what is needed technology-wise.\textsuperscript{293}

Two interviewees explicitly noted that patients should not be engaged in horizon scanning, but only in identifying needs, as they would not have the capacity and capability to conduct horizon scanning.\textsuperscript{294} Other interviewees, however, indicated that involving patients would be helpful as they often know better than anyone else in the system what could work, and they are often better informed than clinicians about the latest drugs and technologies available for treating their conditions.\textsuperscript{295}

Moreover, there was broad agreement that patients and the public should be involved as the NHS is tax-financed and its purpose is to benefit patients. Some interviewees also explicitly noted that patients should be involved from the early stage onwards, as this could help ensure that real needs are addressed and met and that innovations are taken up.\textsuperscript{296} An interviewee from the charity and PPIE stakeholder

\textsuperscript{289} Academics_INT2, CharityPPIE_INT12, CharityPPIE_INT13, Networks_INT4.
\textsuperscript{290} Academics_INT2.
\textsuperscript{291} Academics_INT1, Academics_INT2, Academics_INT4, Academics_INT5, Academics_INT6, Academics_INT8, Academics_INT12, Academics_INT13, CharityPPIE_INT12, Networks_INT1, Networks_INT3, Networks_INT4, Networks_INT5, Networks_INT7, Networks_INT8, Networks_INT9, Networks_INT10, Policymaker_INT2, Policymaker_INT6, Private_INT2, Private_INT5, Private_INT7, Private_INT8, ProviderCCG_INT6, ProviderCCG_INT9, ProviderCCG_INT12, ProviderCCG_INT13, ProviderCCG_INT14, ProviderCCG_INT18, ProviderCCG_INT19, ProviderCCG_INT20, ProviderCCG_INT21, ProviderCCG_INT22.
\textsuperscript{292} Academics_INT4, Academics_INT8.
\textsuperscript{293} Academics_INT8.
\textsuperscript{294} Academics_INT9, Private_INT7.
\textsuperscript{295} Academics_INT4, Academics_INT6, Academics_INT8, Private_INT2, Private_INT5.
\textsuperscript{296} Academics_INT1, Academics_INT2, Academics_INT4, Academics_INT5, Academics_INT6, Academics_INT8, Academics_INT12, Academics_INT13, Networks_INT1, Networks_INT3, Networks_INT4,
group noted that patient involvement will need long-term resourcing and support to ensure it is successful. Moreover, an academic interviewee felt that patient representatives often do not have the skills and expertise to contribute to research and innovation development. In order to overcome this, they found it important to offer more training and support for patients to be able to better contribute. 

Related to the need to involve patients and the public in horizon scanning and identifying needs, interviewees suggested the following actions:

- **Charity and PPIE representatives suggested setting up a community of patients who are involved in horizon scanning in order to have a pool of resources.** Different representatives from this pool could then attend relevant meetings.

- **Charities and PPIE organisations can help NHS organisations to engage patients in needs identification, and interviewees therefore found it important to develop relationships with a wide range of charities and PPIE organisations:** This should ensure that the NHS has a large pool of patients that can be mobilised for targeted areas. Interviewees found large organisations such as National Voices, Genetic Alliance UK or the James Lind Alliance (JLA) particularly important, as they work with a variety of patient groups.

- **The NHS could reach out to organisations experienced in patient and public engagement and learn how to best mobilise them and how to engage the right patients and members of the public:** Interviewees referred to NIHR networks and also noted that the NHS could learn from the industry model of getting customers' perspectives. NIHR’s model of patient and public engagement throughout the lifecycle of a project – e.g. in the project selection, in the steering group of the project and commenting on the delivery and design – was seen as particularly useful.

- **An interviewee from the provider and commissioner stakeholder group suggested holding events covering how patients and the public could contribute, which are accessible to them and use non-technical language.**

- **Some interviewees noted that patients and members of the public should be incentivised to contribute. The NHS should thus think about paying them and make engagement as easy as possible.**

---

297 CharityPPIE_INT9.
298 Academics_INT8.
299 CharityPPIE_INT8, CharityPPIE_INT9.
300 CharityPPIE_INT8.
301 Academics_INT1, Academics_INT8, Academics_INT11, CharityPPIE_INT7, CharityPPIE_INT8, CharityPPIE_INT10, CharityPPIE_INT11, CharityPPIE_INT12, CharityPPIE_INT13, Policymaker_INT2, Policymaker_INT4, Policymaker_INT6, Private_INT8, ProviderCCG_INT7, ProviderCCG_INT9.
302 Private_INT7, Private_INT8, ProviderCCG_INT7, ProviderCCG_INT14, ProviderCCG_INT15.
303 ProviderCCG_INT13.
as possible, e.g. by not putting meetings on weekdays when they will be unable to attend, and covering their expenses.304

- Providing surveys in hospital or GP waiting rooms could help the NHS involve patients.305
- An interviewee suggested using crowdsourcing approaches, such as those trialled by The Healthcare Improvement Studies (THIS) Institute.306

Interviewees also highlighted some key criteria that should be considered in order to ensure successful patient and public involvement and engagement:

- While it can be useful to reach out to patients and the public via charities and PPIE organisations, two interviewees also found it also important to engage patients who are not part of these formal networks.307
- Several interviewees emphasised that patient and public involvement and engagement should be targeted, i.e. patients/the public should only be involved when they can add value and it is necessary to ensure that the right patients are engaged in specific activities (e.g. diabetes patients and their families when aiming to address diabetes challenges). Moreover, patients are more likely to be motivated if the activity is meaningful to them.308
- However, a few interviewees noted that there needs to be a balance of different types of patients/the public and their roles: If patients are over-trained or have a lot of expertise in a specific area, they also often have specific opinions and act differently than lay patients. It is thus crucial to consider the tension between expert patients and lay patients, and what types of patients are needed in a specific PPIE initiative.309

Some interviewees provided specific examples of existing effective patient and public involvement and engagement capacity, which include:310

- Medical Royal Colleges’ lay groups
- NIHR networks
- Patient forums of large hospitals
- James Lind Alliance (JLA)
- The Health Living Lab at Liverpool John Moores University, which is running a Centre for Collaborative Innovation in Dementia
- Councils of governors of NHS foundation Trusts, which represent patients and the community

304 CharityPPIE_INT8, CharityPPIE_INT11, ProviderCCG_INT14.
305 Policymaker_INT6.
306 ProviderCCG_INT22.
307 Policymaker_INT6, ProviderCCG_INT16.
308 Academics_INT1, CharityPPIE_INT7, CharityPPIE_INT10, CharityPPIE_INT12, Networks_INT9, Policymaker_INT5, ProviderCCG_INT7, ProviderCCG_INT12.
309 Networks_INT7, Networks_INT8, Networks_INT10, ProviderCCG_INT14.
310 Private_INT7, Private_INT8, ProviderCCG_INT12, ProviderCCG_INT13, ProviderCCG_INT14, ProviderCCG_INT15, ProviderCCG_INT22.
• PPIE initiatives of Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)
• Engagement teams in CCGs.

Similarly to horizon-scanning activities, some interviewees noted that there needs to be a **collaborative approach to the identification and articulation of needs**. While needs can and should be identified at a regional level, they should be articulated at a central level, where the main horizon scanning should take place.311 Related to this, interviewees suggested the following:

- **Identified needs could be fed into a central database or ‘national library’**, where they can be reviewed and organised in certain categories or areas for review. This could help identify the most important unmet needs. **AHSNs could collect and bring together these region-specific needs in such a database, and prioritise them at a central level**, which should help to avoid duplication. A potential strategy is to develop statements on four to six challenges per year, which should also show the drivers of each challenge, show patients’ priorities, indicate what the outcome of addressing the challenges would be as well as show the scale of the market.312

- **There needs to be a mechanism to bring together different actors involved in the identification, prioritisation and addressing of needs**, i.e. to bring together (1) clinicians and patients (those who should identify needs); (2) ‘blue sky thinkers’ (those who have ideas how to address these needs); and (3) innovators (those who might be able to address the needs). **At Trust level, senior clinicians could bring together the needs of their Trusts and prioritise them before articulating them to the central level** (e.g. to AHSNs) and/or innovators, as they have the credibility and the ability to identify what is needed and what could work in their context.313

**Other points raised**

Interviewees mentioned a few other points to be considered in the context of horizon scanning and the identification and prioritisation of needs:

- **There are some needs that have been clear to the NHS for many years**, such as challenges associated with winter and antibiotic resistance, where systematic programmes to tackle these are still not in place, and should thus be considered when looking for innovative solutions for them.314

- Some interviewees thought that horizon scanning for new innovations is not a good idea as there are already so many helpful innovations available to the NHS. **Instead of looking for new ones, the NHS should use and spread existing innovations.**315

- Some interviewees were asked if they had heard of the NIHR Innovation Observatory (NIHRIO): only a few316 had heard of it, and only one had worked with it.317

---

311 Academics_INT2, Academics_INT9, Academics_INT12, Policymaker_INT4.
312 Academics_INT2, Academics_INT12, Networks_INT1, Networks_INT7, Networks_INT8, Networks_INT9, Networks_INT10.
313 Academics_INT2, ProviderCCG_INT19, ProviderCCG_INT21.
314 CharityPPIE_INT11.
315 Networks_INT4, Networks_INT5, ProviderCCG_INT20.
B.7.2. Knowledge of and reflections on the strategic commercial unit

The Accelerated Access Review sets out a recommendation to have a unit within the NHS that is able to articulate NHS needs and effectively communicate with innovators. Specifically, the recommendation states that ‘A new strategic commercial unit should be established in NHS England’ (Accelerated Access Review 2016, 32).

Establishing a well-defined strategy and ensuring efficient management of the unit

Interviewees across stakeholder groups (except for private sector representatives) indicated that the strategic commercial unit should follow a well-defined strategy with clear priorities, objectives and foci. It was considered especially important to make sure that work is not duplicated. Interviewees pointed out that other NHS organisations already do similar things, such as NHS Digital, and it is therefore crucial to ensure that another silo is not created.318

Related to such a strategy and priorities, interviewees highlighted the following potential actions and key factors to be considered:

- According to academic, provider and commissioner representatives, the unit should enable standardised entry into the NHS, which includes a standardised approach to contracting and agreements as well as procurement. This would help make the unit’s work more efficient and it could help overcome the identified barrier of delays related to negotiations, contracting and procurement. However, while standardised, there also needs to be a degree of flexibility to be able to respond to changing demands and requirements.319

- While the unit may be commercial, provider and commissioner interviewees felt that there also needs to be a focus on non-commercial benefits, for both patients and the NHS.320

- Private sector interviewees emphasised that the unit should have a longer-term and overarching approach to innovation.321

- Two interviewees noted that the NHS should ensure that there is more efficient management of information and data on innovations that are already available to create efficiencies and prevent activities being carried out twice.322

- An academic interviewee thought that the unit could select a few priorities and focus only on these (e.g. dementia, diabetes, obesity).323

316 Networks_INT4, Networks_INT9, Networks_INT10, Private_INT3, Private_INT7.
317 Networks_INT9.
318 Academics_INT2, Academics_INT8, Academics_INT10, Academics_INT11, Academics_INT12, Networks_INT5, Private_INT2, Private_INT4, Private_INT5, ProviderCCG_INT9, ProviderCCG_INT13, ProviderCCG_INT14.
319 Academics_INT2, Academics_INT8, ProviderCCG_INT9, ProviderCCG_INT13, ProviderCCG_INT14.
320 ProviderCCG_INT6, ProviderCCG_INT12, ProviderCCG_INT15.
321 Private_INT2, Private_INT4, Private_INT5.
322 Academics_INT10, ProviderCCG_INT4.
323 Academics_INT11.
Involving both external and internal actors to ensure that the right commercial skills are available, but also that NHS-specific knowledge is given

Interviewees across stakeholder groups felt that the strategic commercial unit should involve individuals from a diverse set of backgrounds, and they should be external as well as from the NHS. Interviewees found it important to have external actors skilled in commercialising and who are able to speak the same language as industry, but also to involve people familiar with NHS procurement. Moreover, clinicians and local and national commissioners should be represented to ensure that needs of the NHS are addressed when negotiating with industry.324

In order to achieve this goal, interviewees mentioned the following actions:

- A private sector interviewee suggested that the unit could engage with and involve individuals from the SBRI, as they have the commercial skills required and could bring in other actors who also have the right skills.325
- Two interviewees noted that AHSNs should be involved in the unit, as they have expertise in talking to the commercial sector.326
- A policymaker representative thought that the NHS should work with NICE to support the translation of NICE decisions into a commercial language to aid commercial discussions.327
- The NHS should consider learning from others in the system and in other sectors. Engagement with other organisations in the health system and with other sectors could help the NHS learn how such a unit could be successfully run.328 Organisations mentioned include:
  - AHSNs.329
  - The Center for Medicare & Medicaid Innovation (CMMI) in the US, as they have a similar role as the strategic commercial unit is supposed to have, and they may be able to suggest particular approaches to avoid.330

Interviewees across all six stakeholder groups also emphasised the importance of having actors with the right skills involved in the strategic commercial unit. Relevant skills and areas of expertise mentioned include: commercialisation, legal, contractual and operational approaches, risk assessment, return on investment approaches, knowledge of large companies’ and SMEs’ needs, and expertise in the different

---

324 Academics_INT2, Academics_INT11, CharityPPIE_INT8, CharityPPIE_INT13, Networks_INT2, Networks_INT6, Networks_INT8, Networks_INT10, Policymaker_INT4, Policymaker_INT5, Policymaker_INT7, Private_INT2, Private_INT7, Private_INT8, ProviderCCG_INT19, ProviderCCG_INT22.
325 Private_INT2.
326 Networks_INT8, ProviderCCG_INT22.
327 Policymaker_INT7.
328 Networks_INT8, Policymaker_INT4, ProviderCCG_INT22.
329 Networks_INT8, ProviderCCG_INT22.
330 Policymaker_INT4.
requirements of different innovations (e.g. pharmaceutical products, digital products). It should also be ensured that the actors involved can gain these skills.\footnote{Academics\_INT9, Academics\_INT11, Academics\_INT12, Academics\_INT13, CharityPPIE\_INT13, Networks\_INT2, Networks\_INT6, Networks\_INT8, Networks\_INT10, Policymaker\_INT4, ProviderCCG\_INT11, ProviderCCG\_INT12, ProviderCCG\_INT18, Policymaker\_INT4, Policymaker\_INT6.}

**Other points raised**

- Two interviewees felt that the **unit should have links to patient groups to ensure that patient needs are considered.**\footnote{Academics\_INT2, Private\_INT8.}
- A private sector representative noted that **effective communication of the needs of the NHS to industry and working closely with external (industry) stakeholders is important.** The unit could consider running regular events with external stakeholders so that they can get to know the needs of the NHS.\footnote{Private\_INT2.}
- A networks interviewee emphasised that **the NHS needs to be more receptive to innovations to make the unit successful.** The interviewee referred to their experiences with innovators where the NHS made promises or showed interest in an innovation, but did not purchase it in the end. The interviewee thought that this is often related to the NHS’s reluctance to change.\footnote{Networks\_INT4.}
- A private sector representative noted that **sustainable and long-term funding is needed to ensure the unit’s success.**\footnote{Private\_INT7.}
- One interviewee suggested the unit could also cover **procurement of legal support** as there is currently no central unit addressing intellectual property issues.\footnote{ProviderCCG\_INT11.}
- Two interviewees expressed concern about a unit making it easier to buy in innovations, noting that they felt the **NHS should focus on adoption of things already proved to be of value,** and that there was a **too strong a focus on external innovations,** and there should be a shift towards innovations developed by those working within the NHS.\footnote{ProviderCCG\_INT20.}
- One interviewee thought it is important to **evaluate new payment approaches,** although the interviewee was sceptical that resources would be allocated for this purpose.\footnote{Policymaker\_INT4.}
- A policymaker interviewee felt that the unit needs **influence over local decision makers to speed up processes.**\footnote{Policymaker\_INT6.}
B.7.3. Knowledge of and reflections on the Innovation and Technology Tariff and Innovation and Technology Payment

The Accelerated Access Review as well as the UK government’s response to it (Department of Health & Department for Business, Energy & Industrial Strategy 2017) provide detail on the Innovation and Technology Tariff (ITT), which was announced in 2016 and first offered in 2017. The ITT supports selected value-proven and strategically important health innovations by providing a central reimbursement route, and thus removes multiple price negotiations at the local level (Accelerated Access Review 2016, 37).

The UK government’s response to the Accelerated Access Review also includes more detailed information on the Innovation and Technology Payment (ITP), which started in April 2018. Similarly to the ITT, it should reduce the financial and procurement barriers faced by innovators entering the NHS, but is competitive and offers reimbursement for a small number of low-cost innovations able to deliver significant patient outcomes as well as cost savings (Department of Health & Department for Business, Energy & Industrial Strategy 2017, 10).

Interviewees were asked to comment on whether they thought the ITT and ITP will make a difference to encouraging engagement with innovation as well as support innovation uptake. Overall, only few interviewees had heard of the ITT and/or ITP prior to the interview. Charity and PPIE representatives, providers, commissioners and academics were least familiar with the initiatives, and many interviewees could not and/or did not want to comment on them. Innovation and improvement networks representatives, by contrast, were very familiar with them (9 out of 10 interviewees had heard of them).

Ensuring that the ITT and ITP have large-scale impact

Overall, interviewees across five stakeholder groups (academics, networks, private sector, policymakers, and providers and commissioners)341 felt that the ITT and ITP are important mechanisms to support the spread and adoption of innovations as they are able to tackle financial barriers. Interviewees noted that innovations selected on the ITT and ITP should be able to address real and relevant NHS needs, and this could help ensure that they have a large-scale impact.342 Products should thus be carefully selected based on where the greatest local demand is and it needs to be ensured that they can be implemented nationally. They should be likely to have big impacts (clinical outcomes), should be easy to use and should be cost-effective.343 A charity and PPIE representative also explicitly noted that the ITT and ITP should have more relevance to patients, indicating that they believe that the schemes are targeting the wrong blockages in the NHS.344

---

341 As noted above, charity and PPIE representatives were least familiar with the ITT and ITP, and interviewees from this stakeholder group often did not want to comment on the schemes, or only did so at a very high level.
342 Academics_INT2, Networks_INT1, Networks_INT2, Networks_INT5, Policymaker_INT4, Policymaker_INT7, Private_INT1, Private_INT4, Private_INT5, Private_INT7, ProviderCCG_INT21.
343 Academics_INT2, Networks_INT1, Networks_INT2, Networks_INT5.
344 CharityPPIE_INT1.
In order to select innovations that meet NHS needs, two interviewees suggested the following:

- **Clinicians should be involved in identifying the key problems and needs** to ensure that only innovations able to tackle these are selected. This could also help incentivise frontline staff's use of the innovations since such innovations are more likely to be able to help them in their day jobs.345

A few interviewees raised concerns about the current structure of the ITT and ITP. Some private sector interviewees, for instance, felt that the number of innovations or themes on the schemes is very low and not enough to make change happen on a large scale, noting that the ITT and ITP should be expanded. The same interviewees also indicated that the timelines of the ITT and ITP (one-year support) are not long enough, noting that continuity of the schemes would be needed to enable innovations to demonstrate their value.346

Two policymaker interviewees also thought that the ITT and ITP do not include a strong enough emphasis on public health and prevention.347

In order to improve the ITT and ITP, interviewees suggested the following:

- **The NHS should be more transparent on how innovations included in the ITT and ITP are selected.** Some interviewees felt that it is unclear how innovations are chosen. More transparency on why they were selected and what their benefit is could support providers’ uptake of the innovations.348

- Some interviewees noted that many providers and commissioners do not know that the initiatives exist, and felt that **the NHS should communicate the schemes better as well as the purpose and benefits of the selected innovations/themes.** This communication should be in a language providers and commissioners are able to understand.349
  
  Related to the above, two networks interviewees thought that **AHSNs should play a role in communicating the ITT and ITP** as they have been involved with the schemes.350

- Some interviewees reflected that the ITT and ITP might increase the introduction of innovations, but not necessarily the uptake and spread of them, as **financial incentives are not sufficient to increase uptake and spread.** It should therefore be considered how the ITT and ITP could be improved to incentivise uptake and spread.351

- An AHSN representative indicated the importance of **measuring the success of innovations covered by the ITT and ITP** (i.e. their uptake and spread) and mapping where uptake and

345 Academics_INT2, ProviderCCG_INT21.
346 Private_INT1, Private_INT4, Private_INT5, Private_INT7.
347 Policymaker_INT4, Policymaker_INT7.
348 Networks_INT3, Networks_INT6, ProviderCCG_INT11.
349 Academics_INT2, Networks_INT5, Networks_INT10.
350 Networks_INT5, Networks_INT10.
351 Academics_INT8, Networks_INT3, Networks_INT6.
spread happens. This could help AHSNs target their actions towards organisations with little/no use of the schemes.

B.7.4. Knowledge of and reflections on the Accelerated Access Pathway

The Accelerated Access Review includes the recommendation to set up an Accelerated Access Pathway, which should help bring selected important innovations into the NHS more quickly. Specifically, it is stated that: ‘An Accelerated Access Pathway for strategically important, transformative products should align and coordinate regulatory, reimbursement, evaluation and diffusion processes to bring these transformative products to patients more quickly’ (Accelerated Access Review 2016, 26).

The UK government’s response to the Accelerated Access Review included detail on the Accelerated Access Collaborative – a multi-stakeholder group involving, for example, governmental departments, NHS organisation representatives and industry – which should select the products to be included on the pathway (Department of Health & Department for Business, Energy & Industrial Strategy 2017, 15).

As of May 2018, the following actors and bodies are brought together in the Accelerated Access Collaborative:

- NHS England
- Department of Health and Social Care
- Department for Business, Energy and Industrial Strategy
- NICE
- Medicines and Healthcare products Regulatory Agency (MHRA)
- NHS Improvement
- AHSNs
- A representative from the pharmaceutical industry
- A representative from the medical technologies industry
- A representative from the diagnostics industry
- A representative from the digital health industry
- National Voices (representing patients)
- Association of Medical Royal Colleges (representing clinicians) (National Institute for Health and Care Excellence n.d.).

Interviewees were asked to share their views on key criteria to be considered in order to make the pathway successful as well as on the role different actors on the Accelerated Access Collaborative should have.

Ensuring that the Accelerated Access Pathway meets key criteria relevant for its success

Interviewees across all stakeholder groups were concerned that the Accelerated Access Pathway could become too bureaucratic, particularly as there are many organisations involved. Several interviewees felt

---

352 Networks_INT9.
353 Academics_INT4, Academics_INT5, Networks_INT2, Policymaker_INT7, ProviderCCG_INT16, ProviderCCG_INT18, ProviderCCG_INT19.
that the pathway needs a clear strategy and should have active programme management of the strategy.\textsuperscript{354} An interviewee from the provider and commissioner stakeholder group noted, however, that managing and coordinating the pathway between organisations will need to involve contractual levers or incentives.\textsuperscript{355}

Related to the need to have a clear strategy and good programme management, interviewees mentioned the following actions and key factors to be considered:

- Some interviewees thought that actors involved should collaboratively define a strategy for the pathway, which should include clear objectives, milestones, etc.\textsuperscript{356} A networks interviewee thought that having a shared strategy could help increase involved actors’ endorsements.\textsuperscript{357}
- A few interviewees noted that it should be clear from the strategy how the Accelerated Access Pathway differs from other bodies undertaking similar activities (e.g. NICE, AHSNs).\textsuperscript{358}
- Interviewees also identified the need to find a balance between low bureaucracy and high patient safety: While it should be ensured that the pathway is not too bureaucratic, as this could be a barrier to adoption and spread, acceleration should not mean that innovations are not sufficiently tested. Interviewees emphasised that it needs to be ensured that innovations are rigorously tested, that they have a robust evidence base and do not endanger patient safety.\textsuperscript{359} Related to this, two interviewees noted that it is important to identify ways in which evidence collection (e.g. by NICE) and testing could be accelerated.\textsuperscript{360}

A private sector representative also thought that the strategy should have innovative thinking, but they did not provide any details on what they mean by this.\textsuperscript{361}

Interviewees also commented on factors to be taken into account when selecting the innovations on the pathway. In particular, they felt that the following should be considered:

- A few interviewees said that the strategy needs to have key criteria on how to select innovations on the pathway: The Accelerated Access Collaborative should develop robust key criteria, which should consider that only innovations able to address real health system needs and population health issues are selected (e.g. heart disease, diabetes, respiratory diseases, etc.), as well

\textsuperscript{354} Academics\_INT1, Academics\_INT2, Academics\_INT5, Academics\_INT12, Networks\_INT8, Networks\_INT9, Networks\_INT10, ProviderCCG\_INT9, ProviderCCG\_INT13.

\textsuperscript{355} ProviderCCG\_INT15.

\textsuperscript{356} Academics\_INT1, Academics\_INT2, Academics\_INT5, Academics\_INT12, Networks\_INT9, Networks\_INT10, ProviderCCG\_INT9, ProviderCCG\_INT13.

\textsuperscript{357} Networks\_INT8.

\textsuperscript{358} Private\_INT2, ProviderCCG\_INT9, ProviderCCG\_INT13.

\textsuperscript{359} Academics\_INT2, Networks\_INT2, Networks\_INT7, ProviderCCG\_INT18, ProviderCCG\_INT21, ProviderCCG\_INT22.

\textsuperscript{360} Networks\_INT7, ProviderCCG\_INT16.

\textsuperscript{361} Private\_INT2.
as those having the best chance of being spread across the country.\textsuperscript{362} One interviewee felt that discussions on which innovations should be selected should happen at the national level.\textsuperscript{363}

- A policymaker interviewee found it important not to have a one-size-fits-all approach, but to consider the different timelines and challenges specific to innovation categories. For example, the development of drugs or equipment is likely to take longer than changes in service delivery, as more rigorous testing is required. On the other hand, the implementation of drugs or equipment innovations is likely to be more straightforward than service delivery changes, which take more time and commitment from staff.\textsuperscript{364}

- Some interviewees emphasised that there should be a mechanism to measure the success of innovations as well as a mechanism to take innovations off the pathway if they do not meet success criteria. Interviewees felt that this would help make the pathway more sustainable. Measures could include the assessment of costs, the return on investment, clinical effectiveness, values, uptake and spread, but also qualitative measures such as staff satisfaction.\textsuperscript{365} A charity and PPIE representative thought that Trish Greenhalgh’s variables for successful innovation implementation could be used to develop a framework for identifying which variables are important at each step of the process.\textsuperscript{366}

In addition to the above, interviewees identified the following factors as important to ensure the pathway’s success:

- Interviewees from the charity and PPIE, networks, and provider and commissioner stakeholder groups emphasised that policy needs to ensure that there is sustainable funding for the pathway and that there are incentives for NHS organisations to overcome financial barriers. Having long-term funding as well as incentives (e.g. tariffs) could support the uptake and spread of innovations. Moreover, it was noted that financial incentive systems should recognise that innovations may have higher initial costs, but that the costs may decrease over time.\textsuperscript{367}

- Some interviewees felt that it is important to be transparent about how decisions on innovations are made and that information about the pathway is communicated across the system, such as general information about the pathway and its aims, its intended clinical outcomes, improved patient experiences, cost-effectiveness, creation of wealth for the country, etc. Interviewees thought that transparency and clear communication could help increase the uptake and spread of innovations.\textsuperscript{368}

---

\textsuperscript{362} Networks\_INT8, Networks\_INT10, ProviderCCG\_INT20.

\textsuperscript{363} Academics\_INT2.

\textsuperscript{364} Policymaker\_INT5.

\textsuperscript{365} Charity\_PPIE\_INT13, Policymaker\_INT7, ProviderCCG\_INT6, ProviderCCG\_INT14.

\textsuperscript{366} Charity\_PPIE\_INT13.

\textsuperscript{367} Charity\_PPIE\_INT13, Networks\_INT7, Networks\_INT9, Networks\_INT10, ProviderCCG\_INT11, ProviderCCG\_INT16.

\textsuperscript{368} Networks\_INT2, Networks\_INT10, ProviderCCG\_INT6, ProviderCCG\_INT14.
• A provider and commissioner representative thought that **appropriate IT support and data infrastructure** could help clinicians identify how they or patients could benefit from selected innovations.369

• Some interviewees emphasised that **clinicians need to have the capacity to engage with the pathway and its innovations at a local level.** Having champions in the regions could help overcome this challenge and support adoption and spread.370

• A private sector representative noted that there should be a ‘genuine co-production’ with the **private sector,** i.e. the Accelerated Access Collaborative should work closely with industry to collaboratively develop solutions. Engaging with the private sector could also help overcome the procurement barrier.371

Several interviewees emphasised that **organisations involved with the Accelerated Access Pathway should be carefully selected, and their roles and accountabilities need to be clarified.**372 While some interviewees felt that the number of bodies involved should be kept as low as possible to ensure that the process does not become overly complicated and that decisions can be made quickly,373 a policymaker interviewee commented that a wide range of stakeholders should be involved to ensure that important questions can be resolved.374

To ensure efficient collaboration of all organisations involved, interviewees suggested the following:

- **Roles and accountabilities should be collaboratively defined and agreed on,** as sharing such decisions could lead to more commitment.375 Related to this, a networks interviewee suggested that AHSNs could be accountable for innovation adoption at the regional level.376

**Actors and their roles in the pathway**

Interviewees across stakeholder groups reflected on the roles that specific bodies involved in the Accelerated Access Collaborative should have in the pathway. Some interviewees also identified actors and bodies that are currently not in the Collaborative, but should play a role.

According to interviewees, the roles of actors in the pathway should be:

- **NHS England:**
  - They should be a key body in the Collaborative and have a centralised leadership role.377

369 ProviderCCG_INT19.
370 Academics_INT5, Networks_INT7, Networks_INT8, Networks_INT9.
371 Private_INT7.
372 Academics_INT4, Academics_INT5, Networks_INT6, Policymaker_INT4, Policymaker_INT7, ProviderCCG_INT6, ProviderCCG_INT16, ProviderCCG_INT18, Provider_CCG_INT19.
373 Networks_INT2, ProviderCCG_INT16, ProviderCCG_INT18, Provider_CCG_INT19.
374 Policymaker_INT4.
375 Academics_INT4, Academics_INT5, Networks_INT1, Networks_INT6, Policymaker_INT4, Policymaker_INT7, Private_INT1, ProviderCCG_INT6, ProviderCCG_INT16, ProviderCCG_INT18, Provider_CCG_INT19.
376 Networks_INT6.
377 Networks_INT7, Private_INT4, Private_INT7, Private_INT8, ProviderCCG_INT15.
They could help communicate with policy leaders within the NHS.\textsuperscript{378}
They could help develop clinical pathways to support the innovations.\textsuperscript{379}
They need to create a culture within the NHS that is more open to innovations. This could happen, for instance, by giving staff more headspace.\textsuperscript{380}
They should be responsible for the uptake of pathway innovations and ensure that support for uptake is given.\textsuperscript{381}

- **NHS Improvement:**
  - Similarly to NHS England, they could have a role in communication with NHS policy leaders.\textsuperscript{382}
  - An interviewee thought that they could be involved in data collection; however, the interviewee did not provide any details on what data they were referring to.\textsuperscript{383}

- **AHSNs:**
  - AHSNs and local networks should play a role in communicating and spreading the innovations that come through the pathway.\textsuperscript{384}
  - AHSNs could identify and communicate what is needed regionally, and which innovations are already used and could be included on the pathway.\textsuperscript{385}
  - They should make sure that needs match innovators’ new products.\textsuperscript{386}
  - They could also play a role in engaging with industry and academia to identify potential opportunities. They should also be the relationship broker between industry, the NHS and academia.\textsuperscript{387}
  - They could provide support to innovators to develop their products.\textsuperscript{388}

- **Public Health England:**
  - They should ensure that the prevention of illness is promoted, rather than focusing only on treatment.\textsuperscript{389}

- **NIHR:**
  - Their role could be to support products on the pathway, i.e. in the study design, to collect evidence and to evaluate.\textsuperscript{390}

\textsuperscript{378} Networks\_INT10.
\textsuperscript{379} Networks\_INT10.
\textsuperscript{380} Academics\_INT8, ProviderCCG\_INT22.
\textsuperscript{381} Academics\_INT11.
\textsuperscript{382} Networks\_INT10, Private\_INT7.
\textsuperscript{383} Academics\_INT10.
\textsuperscript{384} Networks\_INT7, Networks\_INT9, Networks\_INT10, Policymaker\_INT6, Private\_INT7, Private\_INT8, ProviderCCG\_INT15, ProviderCCG\_INT22.
\textsuperscript{385} Networks\_INT8, Networks\_INT9, Networks\_INT10.
\textsuperscript{386} Networks\_INT10.
\textsuperscript{387} Networks\_INT9, Private\_INT7, Private\_INT8.
\textsuperscript{388} Networks\_INT10.
\textsuperscript{389} CharityPPIE\_INT1.
\textsuperscript{390} Networks\_INT7.
Their role would be to ensure that there is a link into the research side and that innovations on the pathway are sufficiently supported by research evidence.391

**NICE:**
- NICE should provide and assess clinical evidence as well as demonstrate their cost-effectiveness.392
- They could make sure that innovations are tested with real-world evidence (and not in the lab/clinical trials). This could help demonstrate that they work in practice.393
- They were also seen as key to the pathway as the source of advice and in terms of regulation.394

**Medicines and Healthcare products Regulatory Agency (MHRA):**
- They play a key role in the regulation of pharmaceutical products on the pathway.395
- They need to make sure that the regulatory pathway is not inhibiting the process. This would be particularly important in the context of Brexit, as the MHRA might not be a member of the European Medicines Agency (EMA) anymore, which could mean that medicines and products cannot be brought as quickly to patients in the UK.396
- Two interviewees noted that the MHRA has a role to play in being vigilant around the use of real-world data,397 while another interviewee thought that it should not have a role at all, as it is not focusing on creating innovations, but is a regulatory body with an objective to reduce risks.398

**Department for Business, Energy and Industrial Strategy:**
- They could stimulate the innovation ecosystem, i.e. stimulate future innovations and the industry that is going to be able to produce them.399
- They should be involved in the horizon-scanning part of the pathway as well as in the commercial part, as they have the necessary economic skills and can bring in an economic perspective from other countries.400
- They could provide funding for the pathway.401

**Industry representatives:**
- Ideally, representatives who understand the process of entering the market, including how to get regulatory clearance as well as how to introduce products into the NHS, should be involved.402
Industrial trade organisations such as the Association of the British Pharmaceutical Industry (APBI), the BioIndustry Association (BIA) and the Association of British HealthTech Industries (ABHI) could represent industry and ensure that private sector needs and interests are considered.403

- **Clinical Research Networks:**
  - They could help with the administration and the actual research on the ground.404

- **Patients and the public:**
  - Some interviewees found it particularly important to involve patients and the public.405
  - They should be involved in prioritisation to ensure that selected innovations are taken up.406
  - Patient champions could create demand for particular innovations and communication teams can increase awareness of innovations.407

- **Office for Life Sciences:**
  - They should help tie things together, and could link industry to policy.408

- **Clinicians:**
  - Clinicians are aware of healthcare system needs and therefore some interviewees found it particularly important to involve them.409

### B.7.5. Knowledge of and reflections on other policy initiatives

Interviewees were asked to reflect on what health innovation policy in general has done well in recent years as well as on things policy is missing or could do better.

**Things that policy has done well**

Interviewees referred to the following overarching areas where health innovation policy has done well:

- Health innovation policy has promoted an increased research focus in hospitals,410 enabling a more joined-up thinking between researchers and the healthcare system with regards to innovation.411 One of the interviewees felt that one process that had enabled this was the simplification of research approvals and ethics approvals, which they felt had made organisations more willing to be research active.412
Overall, recent policy has allowed innovation to become more visible and enabled individuals to innovate.\textsuperscript{413}

Schemes, pathways and bodies set up to support early innovation stages – e.g. Innovate UK, SBRI, Innovation Scouts and AHSNs – were seen as important. They are particularly helpful in encouraging people to think of new ideas, provide funding and support to gather the right evidence, etc.\textsuperscript{414}

Policy is focused on the right issues (e.g. primary care, integrated care).\textsuperscript{415}

It has been able to create the processes that need to be put in place to be able to facilitate technology development.\textsuperscript{416}

Policy has started to recognise that the innovation process is not straightforward.\textsuperscript{417}

Linking together the NHS with the Office for Life Sciences, BEIS and Innovate UK was seen as useful, as this helped create a better link between industry and the national healthcare delivery system.\textsuperscript{418}

When asked about what policy has done well, interviewees mostly referred to specific policies, initiatives and schemes that were considered to be particularly useful:

- **NHS RightCare:**\textsuperscript{419}
  - Seen as a positive policy as it bridges the gap between national policy and local implementation, and it also provides a like-for-like comparison between similar Trusts to highlight good variation that should be shared and unwarranted variation which should be tackled.\textsuperscript{420}
  - A policymaker interviewee thought that it has been successful in its implementation as it is mandated, it was prioritised in the *Five Year Forward View* and the evidence is very compelling, which makes it hard for CCGs to resist it. NHS RightCare also gives CCGs specific areas to focus on.\textsuperscript{421}
  - The same policymaker interviewee felt that the difficulty with NHS RightCare is making the changes happen and ensuring they are sustainable.\textsuperscript{422}

\textsuperscript{413} Academics\_INT4, ProviderCCG\_INT6.
\textsuperscript{414} Private\_INT2, Private\_INT4, Private\_INT7.
\textsuperscript{415} Academics\_INT7, Academics\_INT12.
\textsuperscript{416} Academics\_INT12.
\textsuperscript{417} Academics\_INT10.
\textsuperscript{418} Academics\_INT11, Networks\_INT8.
\textsuperscript{419} Charity\_PPIE\_INT2, Policymaker\_INT1, Policymaker\_INT11.
\textsuperscript{420} Policymaker\_INT1, Policymaker\_INT11.
\textsuperscript{421} Policymaker\_INT11.
\textsuperscript{422} Policymaker\_INT11.
AHSNs: Four interviewees found that AHSNs are important in bringing the NHS, industry and academia closer together. Some interviewees also noted that they are important actors delivering health innovation as well as facilitating spread and adoption at regional level. Provider and commissioner representatives felt that they have been helpful at providing a regional approach to horizon scanning.

NIHR: According to an academic interviewee, the NIHR has developed very good and fair processes for the allocation of funding across grant applications. A provider and commissioner representative noted that it helped increase the ability for organisations to get involved in research.

Getting It Right First Time (GIRFT): GIRFT was described as a positive policy that has come out of the last five years of health innovation and improvement, as it provides support for Trusts to overcome challenges and keep processes moving. Accelerated access is incorporated into GIRFT so there is a system whereby experts can be consulted and support can be provided for implementation. A policymaker interviewee also noted that GIRFT has included creation of the model hospital, which shows ‘what good looks like’ within certain areas and innovations. If there is a lack of or missing data in a particular area, GIRFT would collect data from departments across England to assess where an innovation is being implemented and its success against standard metrics.

Accelerated Access Review (2016): Three networks interviewees found the intentions of the Accelerated Access Review particularly relevant, as they are a move towards a slightly more uniform approach to innovating in the NHS.

423 Academics_INT1, Academics_INT8, Networks_INT2, Networks_INT8, Networks_INT10, ProviderCCG_INT11, ProviderCCG_INT16.
424 Academics_INT1, Academics_INT8, ProviderCCG_INT11.
425 Networks_INT2, Networks_INT8, Networks_INT10, ProviderCCG_INT16.
426 ProviderCCG_INT11, ProviderCCG_INT16.
427 ProviderCCG_INT19.
428 Academics_INT6.
429 Policymaker_INT19.
430 CharityPPIE_INT2, Policymaker_INT1, Policymaker_INT8, Private_INT7.
431 Policymaker_INT1.
432 Policymaker_INT8.
433 Policymaker_INT8.
434 Networks_INT1, Networks_INT7, Networks_INT8.
435 Networks_INT1, Networks_INT7, Networks_INT8.
• **Carter Review** (Lord Carter of Coles 2016):\(^{436}\)
  - A policymaker interviewee described the *Carter Review* as driving the adoption of existing innovations rather than bringing in new ones. It is able to do this as it incorporates innovations within NHS Improvements architecture so it becomes a requirement for Trusts to adopt it.\(^{437}\)
  - Another policymaker interviewee referred to Weighted Activity Units (WAUs), which were introduced in the review, and which enable case-adjusted comparisons of Trust performance. This provides an incentive for Trust staff members to improve their performance.\(^{438}\)
  - A policymaker interviewee explained that although the *Carter Review* is applicable to higher-level management in Trusts, such as those in procurement and commissioning, it is rarely shared with lower management and frontline staff, so they lack knowledge of the review.\(^{439}\) Another policymaker representative noted that there was also no comparison of like-for-like, making it difficult to identify Trusts that are similar to each other.\(^{440}\)

• **Five Year Forward View** (NHS England 2014a):\(^{441}\)
  - Two provider and commissioner representatives noted that the *Five Year Forward View* had helped to provide an organisational working perspective on innovation and legitimised activities that were already ongoing.\(^{442}\)

• **The SBRI programme and SBRI awards**:\(^{443}\)
  - A networks interviewee found the SBRI programme helpful for early stage innovations.\(^{444}\)
  - Two academic interviewees found SBRI awards to be a particularly good example of how to drive innovation. They gave small businesses a clear incentive to develop innovations able to meet NHS needs.\(^{445}\)

• **NICE guidance.**\(^{446}\)

• **AHSCs:** They were important in bridging fundamental clinical research and practice.\(^{447}\)

• **MedCity London:** An academic interviewee found this collaboration between the Mayor of London, health science centres and academic institutions to be a good example of successful collaboration supporting innovation adoption.\(^{448}\)

\(^{436}\) Policymaker\_INT1, Policymaker\_INT3, Policymaker\_INT8, Policymaker\_INT11.

\(^{437}\) Policymaker\_INT1.

\(^{438}\) Policymaker\_INT8.

\(^{439}\) Policymaker\_INT3.

\(^{440}\) Policymaker\_INT11.

\(^{441}\) ProviderCCG\_INT16, ProviderCCG\_INT22.

\(^{442}\) ProviderCCG\_INT16, ProviderCCG\_INT22.

\(^{443}\) Academics\_INT9, Academics\_INT11, Networks\_INT1.

\(^{444}\) Networks\_INT1.

\(^{445}\) Academics\_INT9, Academics\_INT11.

\(^{446}\) Networks\_INT10, ProviderCCG\_INT22.

\(^{447}\) Academics\_INT1.

\(^{448}\)
• **Innovation, Health and Wealth** (Department of Health 2011) was described as a well written and successful policy, as it was able to grasp the big issues.\(^{449}\)

• **Innovate UK**, as it provides funding to develop new products according to one academic interviewee.\(^{450}\)

• **Catapults**, as they were seen as playing an important intermediary role in taking innovation not just through to market but also into the public sector.\(^{451}\)

• The **Life Sciences Industrial Strategy** (Bell 2017) was seen as important in providing a focus for the UK in terms of support for developing industry in the life sciences sector.\(^{452}\)

• **Vanguards** were considered to be a promising concept by two interviewees.\(^{453}\)

• A private sector representative found the **NHS National Innovation Centre** helpful, because they look at national needs, and centralised activities around these needs.\(^{454}\)

• **STPs** were mentioned by two networks interviewees,\(^{455}\) although one interviewee highlighted that STPs’ decision-making processes often take too long.\(^{456}\)

• The **JLA method** was seen as a positive approach by two charity and PPIE interviewees, and has a potentially important role in horizon scanning to identify the questions that need answering and the challenges which may occur. JLA can also support charities to identify what their research priorities should be in order to move these areas up the national agenda.\(^{457}\)

• **NHS Innovation Accelerator fellowships** were mentioned by two interviewees,\(^{458}\) although one thought that the fellowships often focus on specialised areas and do not necessarily address ‘the big spread and adoption challenges’.\(^{459}\)

• **Innovation Champions**.\(^{460}\)

• **Innovation Exchanges**.\(^{461}\)

• **CareCity**.\(^{462}\)

• The **Department of Health and Social Care’s recent focus on industry**.\(^{463}\)

---

\(^{448}\) Academics_INT1.

\(^{449}\) Academics_INT1, Networks_INT2, Networks_INT8, Networks_INT10.

\(^{450}\) Academics_INT8.

\(^{451}\) Academics_INT10, Policymaker_INT7.

\(^{452}\) Academics_INT12, Networks_INT9.

\(^{453}\) CharityPPIE_INT2, CharityPPIE_INT10, Private_INT1.

\(^{454}\) Private_INT5.

\(^{455}\) Networks_INT2, Networks_INT3.

\(^{456}\) Networks_INT2.

\(^{457}\) CharityPPIE_INT2, CharityPPIE_INT7.

\(^{458}\) Networks_INT5, ProviderCCG_INT16.

\(^{459}\) Networks_INT5.

\(^{460}\) ProviderCCG_INT16.

\(^{461}\) Networks_INT9.

\(^{462}\) CharityPPIE_INT2.

\(^{463}\) Private_INT7.
ACSs were seen as a good example of aligning areas across the health system by two networks interviewees.\(^{464}\)

The work of Prof Tony Young, NHS England’s National Clinical Director for Innovation, in involving doctors in innovation.\(^{465}\)

The Stroke Pathway, which used specialist expertise in a smaller number of centres to improve outcomes, was mentioned by one provider and commissioner representative.\(^{466}\)

The Liaison and Diversion (L&D) programme.\(^{467}\)

The Five Year Forward View for Mental Health (Mental Health Taskforce 2016).\(^{468}\)

**Things policy is missing or could do better**

Interviewees identified the following main areas health innovation policy is currently missing or could do better:

- **Culture in the NHS:**
  - Three interviewees thought that there is too little focus on taking risk in health innovation policies. Policies should enable NHS stakeholders to take risks, as this is important to make innovations happen and to promote their adoption and spread. Moreover, the system needs to be more open to admitting that some things do not work.\(^{469}\)
  - Some networks interviewees felt that the challenge of how to address the culture within the NHS – including the tendency not to take risks – is missing from current policies.\(^{470}\)

- **Lack of sustainable funding:**
  - According to three interviewees, policy often fails to provide sustainable funding needed to successfully implement policy initiatives.\(^{471}\) There is a need for central support and funds for innovation-related activities such as: support for prototyping, the cost of finding patents, and the cost of negotiating contracts, etc. Lack of funding and support was seen as a key barrier for Trusts to take on innovations.\(^{472}\)
  - Another networks interviewee noted that policy often does not recognise how much effort is needed to create effective ‘soil conditions’ for individual projects to start, i.e. the time and money needed to first work on the preconditions necessary before a project starts.\(^{473}\)

\(^{464}\) Networks_INT1, Networks_INT3.

\(^{465}\) ProviderCCG_INT12.

\(^{466}\) ProviderCCG_INT13.

\(^{467}\) ProviderCCG_INT10.

\(^{468}\) ProviderCCG_INT6.

\(^{469}\) Academics_INT2, Networks_INT5, ProviderCCG_INT22.

\(^{470}\) Networks_INT4, Networks_INT5, Networks_INT7.

\(^{471}\) Academics_INT3, ProviderCCG_INT11, ProviderCCG_INT17.

\(^{472}\) ProviderCCG_INT11, ProviderCCG_INT17.

\(^{473}\) Networks_INT3.
Lack of incentives for innovation uptake in policies:
- Three interviewees felt that policy does not provide incentives to increase innovation uptake. Incentives or rewards for staff were seen as especially important, as they could help drive a more innovative culture.\textsuperscript{474}

Disconnectedness and complexity of policies:
- Several networks interviewees felt that some of the policy initiatives are disconnected. They are sometimes even contradictory and should be more closely aligned, as this could help create more synergies. Moreover, policies often do not draw on previous policies, which would be important to create more consistency and make policies more efficient.\textsuperscript{475}
- Two provider and commissioner interviewees commented that they felt the innovation landscape in the NHS is too complex, and that there are many organisations and initiatives doing the same things.\textsuperscript{476}

Missing areas of focus in policies:
- An academic interviewee thought that policy has not yet sufficiently addressed some of the UK’s biggest health issues, such as obesity and diabetes.\textsuperscript{477}
- Insufficient frontline staff involvement: Policy initiatives do not sufficiently involve the NHS workforce, which is important as a lot of good ideas come from frontline staff.\textsuperscript{478} However, staff need to have the time and ‘headspace’ both to understand and participate in policies and to carry out innovation activities.\textsuperscript{479}
- Some interviewees thought that policy lacks sufficient focus on patient and public involvement: Engaging patients and the public at the design stage and having more bottom-up approaches could help the health system save money, since innovations that have had patient/public input are likely to be more successful.\textsuperscript{480}
- According to a networks interviewee, policy initiatives do not sufficiently address issues around intellectual property. Very often people in the NHS come up with ideas, which are brought forward to industry, but the idea generators do not own (parts of) the IP.\textsuperscript{481}
- Policies do not sufficiently invest in the adoption and spread of innovation.\textsuperscript{482}

A private sector representative felt that current policies do not include research into how other countries deal with health innovation issues. They suggested looking at other countries’

\textsuperscript{474} Academics_INT9, Networks_INT7, Networks_INT10.
\textsuperscript{475} Networks_INT1, Networks_INT5, Networks_INT7, Networks_INT8, Networks_INT9.
\textsuperscript{476} ProviderCCG_INT15, ProviderCCG_INT19.
\textsuperscript{477} Academics_INT1.
\textsuperscript{478} Networks_INT1, ProviderCCG_INT18.
\textsuperscript{479} ProviderCCG_INT13, ProviderCCG_INT16.
\textsuperscript{480} Academics_INT5, Academics_INT7, ProviderCCG_INT9, ProviderCCG_INT13.
\textsuperscript{481} Networks_INT1.
\textsuperscript{482} Networks_INT10.
approaches to better understand what the UK could do better rather than reinventing new ways of working.  

- Three provider and commissioner interviewees felt that policy is too far away from what is happening on the ground and is ‘just words’.  
- An academic interviewee thought that policy could focus more on things that work well and recreate these instead of ‘reinventing the wheel’.  
- Two provider and commissioner interviewees felt that IT and technology policies need improvement to speed up the use of new technology. This was also seen as a workforce issue, i.e. ensuring that staff have the skills to operate new systems.  
- A provider and commissioner representative felt that policy ignores the local picture. For example, in the Five Year Forward View for Mental Health (Mental Health Taskforce 2016), there is a focus on five areas, but no clarity on what would happen in other areas.

Interviewees also referred to the following specific policies, initiatives and schemes when speaking about what they could do better:

- According to some interviewees, there are gaps in the Five Year Forward View (NHS England 2014a):
  - The policy does not sufficiently address public health and prevention, highly important diseases, operational efficiencies and practical actions. An interviewee said that if charity and PPIE organisations representing these lower-priority diseases were able to communicate in the same language as policymakers to engage them and highlight the importance of including a certain condition, then this barrier could be overcome.
  - Although the Five Year Forward View aimed to empower communities and patients, a charity and PPIE representative identified a lack of inclusion of carers within the narrative. Carers are often ‘tacked onto’ policies such as this in a similar way that ‘social care gets tacked onto health’.
- Although they found the Accelerated Access Review (2016) to be an important and good policy, a networks interviewee thought that it – as well as other policies – should have clearer targets in

483 Private_INT2.
484 ProviderCCG_INT11, ProviderCCG_INT12, ProviderCCG_INT17.
485 ProviderCCG_INT12.
486 Academics_INT8.
487 ProviderCCG_INT14, ProviderCCG_INT19.
488 ProviderCCG_INT19.
489 ProviderCCG_INT6.
490 CharityPPIE_INT2, CharityPPIE_INT9, Policymaker_INT3, Policymaker_INT4, Policymaker_INT6.
491 CharityPPIE_INT2, Policymaker_INT3, Policymaker_INT4, Policymaker_INT6.
492 CharityPPIE_INT2.
493 CharityPPIE_INT9.
terms of implementation as well as clear timelines and descriptions of how recommendations/tasks of policies should be measured or reviewed.\footnote{Networks_INT8.}
B.8. Appendix to Annex B: interview protocols

B.8.1. Interview protocol used for academics and researchers

*Introduction, awareness and engagement with innovation and with the policy context*

1. Can you just briefly tell us about your individual role and the role of your organisation as it relates to innovation (be it in products, technologies or services/service model innovation) and across the pathway (i.e. development and uptake of innovation in the system)?
   o [Clarification: By innovation we mean any new product, technology or service alike that is new to the health system, or applied in a way that is new to the health system, aimed at delivering affordable and improved care.]

2. We are particularly interested in the enablers of innovation, would you be able to talk us through one example of where you engaged with a particular innovation (be it a medicine, device, diagnostic, digital, other technology or service model innovation) in some way, and tell us about what helped you along the way?
   o At what stages of the pathway were you involved (assuming it goes from idea generation through to development all the way through to evaluation, uptake and diffusion)?
   o If applicable: what allowed you/helped you to move from idea generation through to development and through to uptake and diffusion of the innovation?
   o Are there particular local and national schemes, programmes, policy initiatives, that have helped?

3. Have you been involved with any of the recent policy developments related to health innovation in any way (e.g. *Accelerated Access Review*, *Five Year Forward View*, *Next Steps on the NHS Five Year Forward View*, *Carter Review*)?
   o If yes, how?
   o If not, why not?

4. Related to the above, how did you become aware of these policy efforts?

5. In your own words, what is your personal understanding of what these policy efforts are trying to achieve?

*Policy implementation*

6. As an academic, to what extent do you think these policy initiatives are informed by research on what is needed to support an innovative health system (along the whole pathway from development to uptake)?
   o Do they build on the current knowledge base on innovation thinking and health services thinking (e.g. influence of innovation systems thinking, improvement science, implementation science)?

7. As an academic, do you see scope for engaging with the implementation of these efforts in any way, and therefore facilitate impact on patients and the service? If so, how?
8. What would be some key learning from academic research and your own work that is relevant for the implementation of these policy initiatives?

9. What are some of the key factors that you think will influence whether the schemes are successfully implemented and whether they have an impact on the health system and health innovation landscape?

**Accelerated Access Review recommendations**

10. One of the key identified needs in the *Accelerated Access Review* relates to improved horizon-scanning capacity in the system to identify potentially transformative innovations. Related to that, one of the *Accelerated Access Review* recommendations is that ‘the NHS should develop an enhanced horizon-scanning process and clarify its needs to innovators’ (*Accelerated Access Review* 2016, 19). In terms of implementing this recommendation, in your view, how could the capacity for greater NHS clarity on innovation needs and greater horizon-scanning capacity be achieved in the NHS?

   - Who needs to be involved in clarifying needs and how?
   - Who needs to be involved in identifying/horizon scanning for needed innovations and how?
   - Have you heard of the NIHR Innovation Observatory (NIHRIO) and have you used it?

11. The *Accelerated Access Review* as well as the UK government’s response to the review provide detail on the Innovation and Technology Tariff (ITT), which was announced in June 2016 and first offered in 2017. The UK government’s response to the *Accelerated Access Review* also includes more detailed information on the Innovation and Technology Payment (ITP), which was announced in June 2017. Do you think the ITT and ITP will make a difference to encouraging innovation uptake and incentivising engagement with innovations in the NHS?

   - Are they meaningful for you and the academic community in general? Why/why not?

12. One of the *Accelerated Access Review* recommendations has to do with setting up a new strategic commercial unit in NHS England, to handle negotiations with companies and allow for clarifications of NHS needs. How should this strategic commercial unit in NHS function to be effective? What are some of the key implementation criteria to consider in your view (e.g. skills, information and relationships that are likely to be important for implementation)?

13. An *Accelerated Access Review* recommendation states that: ‘Patients should be involved in horizon scanning and prioritisation, and this involvement should continue along the whole innovation pathway’. What does this mean to you in practice? i.e. what would it look like and what needs to happen in order for patient and public involvement and engagement with these innovation initiatives to function effectively (e.g. to support Academic Health Science Network (AHSN) work and innovation exchanges, to engage the Accelerated Access Partnership, to engage with needs of the pathway transformation fund or digital catalyst efforts)?

   - Can you provide examples of existing patient and public involvement and engagement capacity that can be mobilised (in your region/that you are aware of)?

   - Probe on:
     - Supporting effective implementation of AHSNs new roles, and those of Innovation Exchanges and Innovation National Networks.
     - Engaging with the digital catalyst.
14. The *Accelerated Access Review* states that: ‘An Accelerated Access Pathway for strategically important, transformative products should align and coordinate regulatory, reimbursement, evaluation and diffusion processes to bring these transformative products to patients more quickly’ (Accelerated Access Review 2016, 26). In order for the Accelerated Access Pathway to deliver on its goals, what are the key considerations that need to be borne in mind in terms of enabling implementation? How can this move from design to implementation?

- What role, in your view, do the following need to play in the Accelerated Access Pathway:
  - NHS England
  - NHS Improvement
  - The Medicines and Healthcare products Regulatory Agency (MHRA)
  - AHSNs
  - The Department of Health and Social Care
  - NICE
  - The Office for Life Sciences
  - The Department for Business, Energy & Industrial Strategy.

- What do you see as the key implementation challenges and how might these be overcome?

15. Over the recent years, what has policy done well with respect to innovating in health (specifically in relation to innovation and the *Accelerated Access Review* and *Next Steps on the NHS Five Year Forward View* innovation-related aspects)?

16. What are they missing or could do better?

17. Do you have any final reflections in the light of what you have said today?

18. Is there anyone else that you think it would be worth us speaking to?
**B.8.2. Interview protocol used for charity and PPIE representatives**

*Introduction, awareness and engagement with innovation and with the policy context*

1. Can you just briefly tell us about your individual role and the role of your organisation as it relates to innovation (be it in products, technologies or services/service model innovation) and across the pathway (i.e. development and uptake of innovation in the system)?
   - [Clarification: By innovation we mean any new product, technology or service alike that is new to the health system, or applied in a way that is new to the health system, aimed at delivering affordable and improved care.]

2. We are particularly interested in the enablers of innovation, would you be able to talk us through one example of where you engaged with a particular innovation (be it a medicine, device, diagnostic, digital, other technology or service model innovation) in some way, and tell us about what helped you along the way?
   - At what stages of the pathway were you involved (assuming it goes from idea generation through to development all the way through to evaluation, uptake and diffusion)?
   - If applicable: what allowed you/helped you to move from idea generation through to development and through to uptake and diffusion of the innovation?
   - Are there particular local and national schemes, programmes, policy initiatives, that have helped?

3. Have you been involved with any of the recent policy developments related to health innovation in any way (e.g. *Accelerated Access Review*, *Five Year Forward View*, *Next Steps on the NHS Five Year Forward View*, *Carter Review*)?
   - If yes, how?
   - If not, why not?

4. Related to the above, how did you become aware of these policy efforts?

5. In your own words, what is your personal understanding of what these policy efforts are trying to achieve?

6. In your opinion, how meaningful are these developments to you and your organisation, and in general to charities and/or patient and public involvement and engagement groups and bodies?
   - What is meaningful about them and why? What effect could they have on you/your organisation/charities/patient and public involvement and engagement groups and bodies, and how?
   - If you do not think they are meaningful – why do you think so?

7. Is there anything about the design and nature of these initiatives/schemes that would make them (even) more meaningful for you/your organisation/charities/patient and public involvement and engagement groups and bodies, in terms of helping you engage with innovation (development, uptake and diffusion) and supporting you in the delivery on your goals and role?
Policy implementation

8. In your view, what can you/your organisation/charities/patient and public involvement and engagement groups and bodies do to contribute to successful implementation of these policy efforts/schemes to facilitate impact on patients and the service?
   - More specifically, how do you see yourself engaging with these schemes?
   - How could you and your organisation benefit from them?
   - What specifically have you/your organisation/stakeholder group got to contribute to them?
   - What would you need to know about them that you do not yet know in order to engage?

9. What are some of the key factors that you think will influence whether the schemes are successfully implemented and whether they have an impact on the health system and health innovation landscape?
   - What are some of the implementation requirements especially related to effective patient and public involvement and engagement (PPIE)?

10. What role could other actors play in terms of facilitating successful implementation and impact from policy developments and how? What are the key concrete practical actions that need to be taken? Can you comment on this in terms of building the right:
   - Skills, capabilities and leadership
   - Motivations and accountabilities
   - The information and evidence environment
   - Relationships and networks
   - Patient and public involvement and engagement with innovation
   - Funding and commissioning.

11. What are some of the gaps that need to be filled? In other words, what are some of the key needs you/your organisation/charities/patient and public involvement and engagement groups and bodies have that would need to be met to support your effective engagement implementation of these core policy schemes – locally?
   - How do you think this could be done? What has to happen locally and what at national levels?
   - Why would the actions you mentioned strengthen the support system for effective policy implementation in terms of supporting the skills, incentives, leadership, networks, resource availability, information and evidence that are required to create receptive and connected innovation landscapes?

Accelerated Access Review recommendations

12. One of the key identified needs in the Accelerated Access Review relates to improved horizon-scanning capacity in the system to identify potentially transformative innovations. Related to that, one of the Accelerated Access Review recommendations is that ‘the NHS should develop an enhanced horizon scanning process and clarify its needs to innovators’ (Accelerated Access Review 2016, 19). In terms of implementing this recommendation, in your view, how could the capacity for greater NHS clarity on innovation needs and greater horizon scanning capacity be achieved in the NHS?
   - Who needs to be involved in clarifying needs and how?
o Who needs to be involved in identifying/horizon scanning for needed innovations and how?
o Have you heard of the NIHR Innovation Observatory (NIHRIO) and have you used it?

13. An Accelerated Access Review recommendation states that: ‘Patients should be involved in horizon scanning and prioritisation, and this involvement should continue along the whole innovation pathway’. What does this mean to you in practice? I.e. what would it look like and what needs to happen in order for patient and public involvement and engagement with these innovation initiatives to function effectively (e.g. to support Academic Health Science Network (AHSN) work and innovation exchanges, to engage the Accelerated Access Partnership, to engage with needs of the pathway transformation fund or digital catalyst efforts)?

o Can you provide examples of existing patient and public involvement and engagement capacity that can be mobilised (in your region/that you are aware of)?
o Probe on:
  - Supporting effective implementation of AHSNs new roles, and those of Innovation Exchanges and Innovation National Networks.
  - Engaging with the digital catalyst.
  - Scheme to help small and medium-sized enterprises (SMEs)/innovators with innovative medicines and devices get the evidence they need by testing in the real world.
  - Pathway transformation fund.
  - Engaging with the Accelerated Access Pathway, as it has multiple components such as horizon scanning, getting products on the pathway, working with commercial units in the NHS and NICE, evaluation, etc.
  - Engaging with Next Steps on the NHS Five Year Forward View efforts in terms of supporting self-care, apps, digitisation of hospitals, sharing of health data appropriately, patient access online to booking appointments and online access to care.

14. The Accelerated Access Review as well as the UK government’s response to the review provide detail on the Innovation and Technology Tariff (ITT), which was announced in June 2016 and first offered in 2017. The UK government’s response to the Accelerated Access Review also includes more detailed information on the Innovation and Technology Payment (ITP), which was announced in June 2017. Do you think the ITT and ITP will make a difference to encouraging innovation uptake and incentivising engagement with innovations in the NHS?

o Are they meaningful you/your organisation/charities/patient and public engagement groups and bodies? Why/why not?

15. One of the Accelerated Access Review recommendations has to do with setting up a new strategic commercial unit in NHS England, to handle negotiations with companies and allow for clarifications of NHS needs. How should this strategic commercial unit in NHS function to be effective? What are some of the key implementation criteria to consider in your view (e.g. skills, information and relationships that are likely to be important for implementation)?

16. The Accelerated Access Review states that: ‘An Accelerated Access Pathway for strategically important, transformative products should align and coordinate regulatory, reimbursement, evaluation and
diffusion processes to bring these transformative products to patients more quickly’ (Accelerated Access Review 2016, 26). In order for the Accelerated Access Pathway to deliver on its goals, what are the key considerations that need to be borne in mind in terms of enabling implementation? How can this move from design to implementation?

- What role, in your view, do the following need to play in the Accelerated Access Pathway:
  - NHS England
  - NHS Improvement
  - The Medicines and Healthcare products Regulatory Agency (MHRA)
  - AHSNs
  - The Department of Health and Social Care
  - NICE
  - The Office for Life Sciences
  - The Department for Business, Energy & Industrial Strategy.

- What do you see as the key implementation challenges and how might these be overcome?

17. Over the recent years, what has policy done well with respect to supporting patient and public involvement and engagement with innovating in health (specifically in relation to innovation and the Accelerated Access Review and Next Steps on the NHS Five Year Forward View innovation-related aspects)?

18. What are they missing or could do better regarding patient and public involvement and engagement with innovating in health?

19. Do you have any final reflections in the light of what you have said today?

20. Is there anyone else that you think it would be worth us speaking to?

B.8.3. Interview protocol used for innovation and improvement network, commissioner and provider representatives

Introduction, awareness and engagement with innovation and with the policy context

1. Can you just briefly tell us about your individual role and the role of your organisation as it relates to innovation (be it in products, technologies or services/service model innovation) and across the pathway (i.e. development and uptake of innovation in the system)?
   - [Clarification: By innovation we mean any new product, technology or service alike that is new to the health system, or applied in a way that is new to the health system, aimed at delivering affordable and improved care.]

2. We are particularly interested in the enablers of innovation, would you be able to talk us through one example of where you engaged with a particular innovation (be it a medicine, device, diagnostic, digital, other technology or service model innovation) in some way, and tell us about what helped you along the way?
   - At what stages of the pathway were you involved (assuming it goes from idea generation through to development all the way through to evaluation, uptake and diffusion)?
If applicable: what allowed you/helped you to move from idea generation through to development and through to uptake and diffusion of the innovation?

Are there particular local and national schemes, programmes, policy initiatives, that have helped?

3. Have you been involved with any of the recent policy developments related to health innovation in any way (e.g. Accelerated Access Review, Five Year Forward View, Next Steps on the NHS Five Year Forward View, Carter Review)?
   - If yes, how?
   - If not, why not?

4. Related to the above, how did you become aware of these policy efforts?

5. In your own words, what is your personal understanding of what these policy efforts are trying to achieve?

Policy implementation

6. What are some of the key factors that you think will influence whether the schemes are successfully implemented and whether they have an impact on the health system and health innovation landscape?

7. What role could other actors play in terms of facilitating successful implementation and impact from policy developments and how? What are the key concrete practical actions that need to be taken? Can you comment on this in terms of building the right:
   - Skills, capabilities and leadership
   - Motivations and accountabilities
   - The information and evidence environment
   - Relationships and networks
   - Patient and public involvement and engagement with innovation
   - Funding and commissioning.

8. In your view, what can you/your organisation/[your stakeholder group (innovation and improvement networks; commissioners and providers)] do to contribute to successful implementation of these policy efforts/schemes, and therefore to facilitate impact on patients and the service? More specifically, how do you see yourself engaging with current health innovation schemes offered?
   - How could you and your organisation benefit from them?
   - How might you/your organisation/[your stakeholder group (innovation and improvement networks; commissioners and providers)] contribute to their success?
   - Are there any aspects of the schemes that were there further clarity you would be able to better engage?

Accelerated Access Review recommendations

9. One of the key identified needs in the Accelerated Access Review relates to improved horizon-scanning capacity in the system to identify potentially transformative innovations. Related to that, one of the Accelerated Access Review recommendations is that ‘the NHS should develop an enhanced horizon
scanning process and clarify its needs to innovators’ (Accelerated Access Review 2016, 19). In terms of implementing this recommendation, in your view, how could the capacity for greater NHS clarity on innovation needs and greater horizon-scanning capacity be achieved in the NHS?

- Who needs to be involved in clarifying needs and how?
- Who needs to be involved in identifying/horizon scanning for needed innovations and how?
- Have you heard of the NIHR Innovation Observatory (NIHRIO) and have you used it?

10. The Accelerated Access Review as well as the UK government’s response to the review provide detail on the Innovation and Technology Tariff (ITT), which was announced in June 2016 and first offered in 2017. The UK government’s response to the Accelerated Access Review also includes more detailed information on the Innovation and Technology Payment (ITP), which was announced in June 2017. Do you think the ITT and ITP will make a difference to encouraging innovation uptake and incentivising engagement with innovations in the NHS?

- Are they meaningful for you/your organisation/[your stakeholder group (innovation and improvement networks; commissioners and providers)]? Why/why not?

11. One of the Accelerated Access Review recommendations has to do with setting up a new strategic commercial unit in NHS England, to handle negotiations with companies and allow for clarifications of NHS needs. How should this strategic commercial unit in NHS function to be effective? What are some of the key implementation criteria to consider in your view (e.g. skills, information and relationships that are likely to be important for implementation)?

12. An Accelerated Access Review recommendation states that: ‘Patients should be involved in horizon scanning and prioritisation, and this involvement should continue along the whole innovation pathway’. What does this mean to you in practice? I.e. what would it look like and what needs to happen in order for patient and public involvement and engagement with these innovation initiatives to function effectively (e.g. to support Academic Health Science Network (AHSN) work and innovation exchanges, to engage the Accelerated Access Partnership, to engage with needs of the pathway transformation fund or digital catalyst efforts)?

- Can you provide examples of existing patient and public involvement and engagement capacity that can be mobilised (in your region/that you are aware of)?
- Probe on:
  - Supporting effective implementation of AHSNs new roles, and those of Innovation Exchanges and Innovation National Networks.
  - Engaging with the digital catalyst.
  - Scheme to help small and medium-sized enterprises (SMEs)/innovators with innovative medicines and devices get the evidence they need by testing in the real world.
  - Pathway transformation fund.
  - Engaging with the Accelerated Access Pathway, as it has multiple components such as horizon scanning, getting products on the pathway, working with commercial units in the NHS and NICE, evaluation, etc.
  - Engaging with Next Steps on the NHS Five Year Forward View efforts in terms of supporting self-care, apps, digitisation of hospitals, sharing of health data.
appropriately, patient access online to booking appointments and online access to care.

13. The *Accelerated Access Review* states that: ‘An Accelerated Access Pathway for strategically important, transformative products should align and coordinate regulatory, reimbursement, evaluation and diffusion processes to bring these transformative products to patients more quickly’ (Accelerated Access Review 2016, 26). In order for the Accelerated Access Pathway to deliver on its goals, what are the key considerations that need to be borne in mind in terms of enabling implementation? How can this move from design to implementation?

   o What role, in your view, do the following need to play in the Accelerated Access Pathway:
     - NHS England
     - NHS Improvement
     - The Medicines and Healthcare products Regulatory Agency (MHRA)
     - AHSNs
     - The Department of Health and Social Care
     - NICE
     - The Office for Life Sciences
     - The Department for Business, Energy & Industrial Strategy.

   o What do you see as the key implementation challenges and how might these be overcome?

14. Over the recent years, what has policy done well with respect to innovating in health (specifically in relation to innovation and the *Accelerated Access Review* and *Next Steps on the NHS Five Year Forward View* innovation-related aspects)?

15. What are they missing or could do better?

16. Do you have any final reflections in the light of what you have said today?

17. Is there anyone else that you think it would be worth us speaking to?

**B.8.4. Interview protocol used for policymaker representatives**

*Introduction, awareness and engagement with innovation and with the policy context*

1. Can you just briefly tell us about your individual role and the role of your organisation as it relates to innovation (be it in products, technologies or services/service model innovation) and across the pathway (i.e. development and uptake of innovation in the system)?
   o [Clarification: By innovation we mean any new product, technology or service alike that is new to the health system, or applied in a way that is new to the health system, aimed at delivering affordable and improved care.]

2. Have you been involved with any of the recent policy developments related to health innovation in any way (e.g. *Accelerated Access Review, Five Year Forward View, Next Steps on the NHS Five Year Forward View, Carter Review*)?
   o If yes, how?
   o If not, why not?
3. In your own words, what is your personal understanding of what these policy efforts are trying to achieve?

4. In your opinion, how meaningful are these developments for the health system and why?
   - What is meaningful about them and why? What effect could they have and how?
   - If you do not think they are meaningful – why do you think so?

**Policy implementation**

5. In your view, what can you/your organisation do to contribute to successful implementation of these policy efforts/schemes, and therefore to facilitate impact on patients and the service? More specifically, how do you see yourself engaging with current health innovation schemes offered?
   - What specifically have you/your organisation got to contribute to them?
   - What would you need to know about the schemes that you do not yet know in order to engage as effectively as possible?

6. What about other policymakers/policymaking bodies? Where do you see their roles in successful implementation to lie? Most importantly, what will be different to how things were done previously?

7. What are some of the key factors that you think will influence whether the schemes are successfully implemented and whether they have an impact on the health system and health innovation landscape?

8. What are some of the gaps that need to be filled? In other words, what are some of the key needs your specific organisation as well as other policymakers more widely have that would need to be met to support effective implementation of these core policy schemes?
   - How do you think this could be done? What has to happen locally and what at national levels?
   - Why would the actions you mentioned strengthen the support system for effective policy implementation in terms of supporting the skills, incentives, leadership, networks, resource availability, information and evidence that are required to create receptive and connected innovation landscapes?

**Accelerated Access Review recommendations**

9. One of the key identified needs in the *Accelerated Access Review* relates to improved horizon-scanning capacity in the system to identify potentially transformative innovations. Related to that, one of the *Accelerated Access Review* recommendations is that ‘the NHS should develop an enhanced horizon scanning process and clarify its needs to innovators’ (Accelerated Access Review 2016, 19). In terms of implementing this recommendation, in your view, how could the capacity for greater NHS clarity on innovation needs and greater horizon-scanning capacity be achieved in the NHS?
   - Who needs to be involved in clarifying needs and how?
   - Who needs to be involved in identifying/horizon scanning for needed innovations and how?
   - Have you heard of the NIHR Innovation Observatory (NIHRIO) and have you used it?

10. The *Accelerated Access Review* as well as the UK government’s response to the review provide detail on the Innovation and Technology Tariff (ITT), which was announced in June 2016 and first offered in
2017. The UK government’s response to the Accelerated Access Review also includes more detailed information on the Innovation and Technology Payment (ITP), which was announced in June 2017. Do you think the ITT and ITP will make a difference to encouraging innovation uptake and incentivising engagement with innovations in the NHS?

- Are they meaningful for you/your organisation/[your stakeholder group (innovation and improvement networks; commissioners and providers)]? Why/why not?

11. One of the Accelerated Access Review recommendations has to do with setting up a new strategic commercial unit in NHS England, to handle negotiations with companies and allow for clarifications of NHS needs. How should this strategic commercial unit in NHS function to be effective? What are some of the key implementation criteria to consider in your view (e.g. skills, information and relationships that are likely to be important for implementation)?

12. An Accelerated Access Review recommendation states that: ‘Patients should be involved in horizon scanning and prioritisation, and this involvement should continue along the whole innovation pathway’. What does this mean to you in practice? I.e. what would it look like and what needs to happen in order for patient and public involvement and engagement with these innovation initiatives to function effectively (e.g. to support Academic Health Science Network (AHSN) work and innovation exchanges, to engage the Accelerated Access Partnership, to engage with needs of the pathway transformation fund or digital catalyst efforts)?

- Can you provide examples of existing patient and public involvement and engagement capacity that can be mobilised (in your region/that you are aware of)?

- Probe on:
  - Supporting effective implementation of AHSNs new roles, and those of Innovation Exchanges and Innovation National Networks.
  - Engaging with the digital catalyst.
  - Scheme to help small and medium-sized enterprises (SMEs)/innovators with innovative medicines and devices get the evidence they need by testing in the real world.
  - Pathway transformation fund.
  - Engaging with the Accelerated Access Pathway, as it has multiple components such as horizon scanning, getting products on the pathway, working with commercial units in the NHS and NICE, evaluation, etc.
  - Engaging with Next Steps on the NHS Five Year Forward View efforts in terms of supporting self-care, apps, digitisation of hospitals, sharing of health data appropriately, patient access online to booking appointments and online access to care.

13. The Accelerated Access Review states that: ‘An Accelerated Access Pathway for strategically important, transformative products should align and coordinate regulatory, reimbursement, evaluation and diffusion processes to bring these transformative products to patients more quickly’ (Accelerated Access Review 2016, 26). In order for the Accelerated Access Pathway to deliver on its goals, what are the key considerations that need to be borne in mind in terms of enabling implementation? How can this move from design to implementation?
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

- What role, in your view, do the following need to play in the Accelerated Access Pathway:
  - NHS England
  - NHS Improvement
  - The Medicines and Healthcare products Regulatory Agency (MHRA)
  - AHSNs
  - The Department of Health and Social Care
  - NICE
  - The Office for Life Sciences
  - The Department for Business, Energy & Industrial Strategy.

- What do you see as the key implementation challenges and how might these be overcome?

14. Over the recent years, what has policy done well with respect to innovating in health (specifically in relation to innovation and the Accelerated Access Review and Next Steps on the NHS Five Year Forward View innovation-related aspects)?

15. What are they missing or could do better?

16. Do you have any final reflections in the light of what you have said today?

17. Is there anyone else that you think it would be worth us speaking to?
Annex C. Case vignettes

C.1. Summary

Aims
- In-depth case vignettes for 14 health innovations were developed to explore the enablers of innovation across the health system from the perspective of innovators, healthcare providers and healthcare commissioners, as well as others involved in the development, implementation and diffusion of innovations.

Design and implementation
- The 14 innovations were selected through discussions and advice from the Department of Health and Social Care, NHS England and the Office for Life Sciences. The selection was based on: (1) an effort to consider a mix of innovation types; (2) a focus on innovations considered to be of particular policy relevance at the time of the research; (3) an effort not to duplicate research on innovations covered in other reports and case studies; and (4) a focus on innovations where we could secure an interest in participation from stakeholders in the innovator and NHS adopter communities.
- Information for the case vignettes was collected through semi-structured interviews with innovators, healthcare providers, commissioners and other individuals involved in the innovations pathway. Each case vignette includes insights from between one and seven interviews.
- Interviewees were identified through publicly available sources, individuals from AHSNs, participants from the workshops, the project team’s professional networks, individuals identified through literature, the project working group and snowballing from those we interviewed.
- The case vignette write-ups follow a structured template covering: the background and context of the innovation; idea generation; entry into the health system; diffusion, scale-up and spread; impact; and enablers of innovation development, introduction into the health system in England, uptake and spread.

Innovations chosen as case vignettes
- **High-sensitivity troponin assays.** Troponin is a diagnostic marker used to detect heart disorders, in particular heart attacks. High-sensitivity troponin assays can detect smaller amounts of troponin in the blood than traditional assays, and therefore can be used to identify heart disorders closer to the onset of symptoms than previously possible.
- **Remote cardiac monitoring devices**, which are devices in patients’ homes that monitor the technical performance of cardiac devices, such as pacemakers or implantable cardioverter defibrillators, as well as patients’ health condition. The systems send device performance and patient health data to clinicians via the Internet, allowing them to monitor their patients from a distance, and to reduce the number of face-to-face consultations required.
- **One-step nucleic acid amplification (OSNA)** for sentinel lymph node intra-operative molecular analysis in breast cancer analyses the sentinel lymph node (the lymph node a cancerous tumour is most likely to spread to first) intra-operatively to facilitate removal of the non-sentinel lymph nodes (those further away) if metastasis is detected in breast cancer to prevent further spread. This technique analyses the sentinel lymph node within 45 minutes and, if required, the lymph nodes can be removed during the same operation.
- **Prostatic urethral lift for treating benign prostatic hyperplasia (UroLift®)** is a minimally invasive surgical technique for benign prostatic hyperplasia that involves introducing a device through the obstructed urethra to lift and hold the enlarged prostate tissue in order to clear the opening of the urethra, allowing for the urine to flow normally again and to relieve patients’ symptoms.
- **Drug-eluting stents** were developed to treat the effects of restenosis (arterial narrowing in the heart), which can occur after a balloon angioplasty to treat coronary heart disease. The drug-eluting
stents work by opening the narrowed blood vessels to increase blood flow to the heart and by also releasing an anti-inflammatory agent.

- **Kooth** is an online mental health and emotional wellbeing platform for children and adolescents with mental health or emotional problems, which can reach out to those who cannot access face-to-face services, or prefer to engage through online means.

- **Sleepio** is a digital cognitive behavioural therapy (CBT) programme aiming to help users improve their sleep and overcome insomnia.

- **MoodGYM** is a form of computerised cognitive behavioural therapy aimed at young people suffering mild to moderate anxiety or depression.

- The **NHS Blood Donor Chair** was developed in response issues faced when using the previous version of the donor chair, including poor user experience and fainting. The new chair addresses these limitations as the shape improves patient comfort and reduces the risk of fainting. It is also easier for donor services to transport and clean the chair.

- **Cascade model for genetic testing of familial hypercholesterolemia**. Cascade testing is a systematic and cost-effective way of identifying individuals with Familial Hypercholesterolemia (FH). FH is a genetic condition that causes increased cholesterol levels from birth, and hence a higher risk of heart disease in young adults.

- **ENDOCUFF VISION™** is a medical device used as a colonoscope attachment to improve mucosal visibility in view of detecting abnormalities such as polyps, ultimately leading to a better prevention of bowel cancer.

- The **Continuing Healthcare Checklist and the Decision Support Toolkit (CHC2DST)**. Continuing healthcare (CHC) provides funding for social care to individuals with complex, long-term health conditions. CHC2DST assessment software allows the assessments to be conducted electronically, which is quicker and more accurate.

- **SecurAcath** is a single-use device to secure and stabilise central venous catheters. The innovation decreases accidental dislodgements during dressing changes in comparison to incumbent products, and reduces the risk of medical adhesive-related skin injury (Marsi).

- **HeartFlow FFRct Analysis** is a non-invasive coronary artery disease detection tool using regular computed tomography (CT) scans to develop a 3D model of coronary arteries and determine the impact of artery blockages on the blood flow. The technology should help assess the impact of blockages and prevent having invasive – and potentially unnecessary – tests.

### Overarching findings

The 14 case vignettes highlight a wide range of enablers across the innovation pathway. Key enablers of successful innovation development, introduction, uptake and spread include:

- The ability of the innovations to respond to a clear innovation need.

- Pricing arrangements, financial support, policy schemes, policy initiatives and programmes (e.g. reimbursement schemes, tariffs).

- Strong evidence on the clinical benefit and cost-effectiveness of the innovations and the ability to demonstrate it.

- Strong informal and formal clinical networks, NHS organisations, other health organisations, etc., supporting communication, negotiations, etc., between innovators and providers.

- Networking and ongoing communication between innovators, providers, commissioners, etc.

- Positive National Institute for Health and Care Excellence (NICE) assessments and recommendations.

- Training and implementation support provided by the innovators.

- Innovations being ‘add-ons’ to other products or services used in the NHS rather than replacements, or the ability of the innovations to align to existing clinical pathways.

- Involvement of patients, the public and/or frontline staff in the development of the innovations.

- Clinical engagement and/or autonomy in purchasing decisions.

- Support from individual frontline staff members.
C.2. Introduction

As part of this study, qualitative case vignettes for 14 health innovations were conducted to explore the enablers of innovation in the health system, with an interest in the whole pathway approach from development to uptake and spread as well as in gaining insights into the key processes, enablers and challenges across the pathway, with particular attention to adoption and spread. The case vignettes served to complement the workshops, interviews, survey and literature review and add further life to the thematic insights gained in prior work streams. The focus on particular innovations was selected to enable us to identify the often subtle processes, dynamics and contextual influences of how and why an innovation is developed, taken up and spread, as well as to better understand why there are variations in the uptake of innovations.

C.2.1. Case vignette approach

The 14 innovations were selected in discussion with the Department of Health and Social Care, NHS England and the Office for Life Sciences. The selection was based on: (1) an effort to consider a mix of innovation types; (2) a focus on innovations considered to be of particular policy relevance at the time of the research; (3) an effort not to duplicate research on innovations covered in other reports and case studies; and (4) a focus on innovations where we could secure an interest in participation from stakeholders in the innovator and NHS adopter communities. They include innovations with a positive National Institute for Health and Care Excellence (NICE) approval.

The case vignettes mainly built on information gained through interviews with innovators, healthcare provider and commissioner representatives offering or commissioning the innovations, as well as other individuals who have been involved on the innovation’s pathway. The interviews were conducted following semi-structured protocols, which enabled us to ask follow-up questions and tailor the questions to the interviewed individual. Overall, we developed three different protocols, one each for innovator, commissioner and provider representatives (see Section C.17). The interviews explored the timelines of the development of the innovations as well as their entry into the health system; the reasons behind the development, commissioning or introduction into a Trust; any barriers and enablers observed along the pathway; the role of potential drivers such as national guidance, policy initiatives, NICE recommendations, available evidence, funding, recommendations, etc., for the uptake and rollout; approaches to pricing and funding; return on investments and health economy analyses; and the impact of the UK policy landscape on development, uptake and spread.

The interviews were conducted by telephone between September 2017 and April 2018. Most lasted between 30 and 65 minutes and were conducted with one individual, except for four that involved two individuals. Similarly to the thematic stakeholder interviews, interviewees provided informed consent
prior to the interviewee using an online consent form in line with the Data Protection Act 1998\(^1\) as well as conformant with ISO 27001 to protect personal data. All interviews were audio recorded and transcribed by the study team.

The write-up of the case vignettes followed the structure of the interview protocols. Information obtained through the interviews was supplemented by additional desk research on the innovations and disease areas they are addressing as well as by any references and data (e.g. information on returns on investment) given in the interviews.

Interviewees were identified using publicly available sources (e.g. websites of innovators or Trusts), suggestions made by AHSN contacts as well as by workshop participants, snowballing approaches, our own professional networks, leads from the literature and in discussion with our project working group. Each case vignette includes insights from between one and seven interviews. We used several methods to find interviewees from each stakeholder group as well as additional interviewees for each case vignette, including asking interviewees to suggest other potential interviewees or to establish contact with them, contacting potential interviewees using publicly available contact details (e.g. from websites of Trusts), reaching out to Trust and clinical commissioning group (CCG) representatives via AHSN representatives, and using our own networks.

**Caveats**

Although we tried to engage with as many individuals as possible for each of the case vignettes and to ensure a balance between innovators, commissioners and providers, some case vignettes only include information from the innovators’ perspective. We have considered this limitation in the analysis and the write-up.

In addition, as the individuals' involvement with the innovation dates back to several years in some cases, the information shared was based on recollection. To overcome this limitation, we have conducted additional desk research to confirm some of the information (e.g. timelines) provided.

\(^1\) All of the interviews conducted for this study were completed in April 2018 and thus before the EU General Data Protection Regulation (GDPR) 2018 was fully implemented in the UK.
C.3. High-Sensitivity Troponin Assays

Box C.1: Key messages – High-Sensitivity Troponin Assays

- **The innovation:** Troponin is a diagnostic marker used to detect heart disorders, in particular heart attacks. High-sensitivity troponin assays can detect smaller amounts of troponin in the blood than traditional assays, and therefore can be used to identify heart disorders closer to the onset of symptoms than previously possible.

- **Enablers of successful innovation development and uptake:** The successful adoption and spread of the innovation was enabled by:
  - The assays are recommended in NICE guidelines, which helped bring them to the attention of clinicians.
  - The new high-sensitivity assays do not cost more than the previously available assays, and in at least some cases have simply been directly replaced by the supplier, meaning that many hospitals automatically gained access to them.
  - Companies supplying the assays provided training and help to staff in hospitals so that they understood how to use the assays and how to implement new diagnostic protocols.
  - Interested clinicians within hospitals have been trying out new ways of using the high-sensitivity troponin assays, including different diagnostic pathways they can fit in. This helps in providing evidence of how the tests can be used and the benefits they can provide.
  - The assays can be used to make a compelling business case to change practice as they can in principle be used to ‘rule out’ individuals who are not having heart attacks quicker than traditional methods. Hence, they are aligned with national efforts to meet waiting time targets, for example in accident and emergency departments.

- **Evidence of impact:** There is no national audit of the use of high-sensitivity troponin assays, or the impact that the use of these assays is having on clinical practice. However, within hospitals where pathways for use of the assays have been successfully implemented there is evidence of both improving health and reduced financial costs.

C.3.1. Background and context

In the UK, heart attacks lead to nearly 200,000 hospital visits each year (British Heart Foundation 2018). Being able to identify individuals suffering from heart attacks quickly is key to treating them successfully, and to reduce unnecessary hospital admissions (Body et al. 2011).

This case vignette is based on the perceptions and experiences shared by an individual familiar with the introduction of high-sensitivity troponin assays into the health system in England. It is supported by additional desk research, drawing in particular on a case study of the assays in an Innovation Unit report (Albury et al. 2018). For the purposes of respecting informed consent, the interviewed individual and their organisation are not named.

C.3.2. Idea generation

Troponin is a protein complex present in cardiac muscle, first described in 1963 by Setsuro Ebashi (Perry 2008). When the heart is damaged, troponin is released into the blood; two of the proteins that make up the protein complex, troponin I and troponin T, can be used as biomarkers to identify heart attacks. In 2000, following extensive research on troponin, and development of assays for identifying whether troponin is present in blood, the Joint European Society for Cardiology included troponin in the essential criteria defining heart attacks (Antman et al. 2000). Troponin tests continued to be developed over the
next few years, in particular aiming for increased sensitivity so that troponin can be identified in the blood earlier, after a heart attack occurs. The new high-sensitivity assays can identify changes in troponin levels within three hours, rather than the typical detection period of up to 12 hours (Albury et al. 2018).

C.3.3. Entry into the health system

In 2014, NICE published new guidelines for the identification of heart attacks that recommended the use of two high-sensitivity assays: the Roche Elecsys Troponin T high-sensitive assay and the Abbott ARCHITECT STAT High Sensitive Troponin-I assay (National Institute for Health and Care Excellence 2014). The European Society of Cardiology also recommended use of high-sensitivity assays in 2015 (Roffi et al. 2016). Diagnostic assays tend to be purchased as a package; in other words a hospital buys an entire set of diagnostic tests and laboratory equipment from one provider. Troponin assays were already part of their current contracts so when high-sensitivity assays became available hospitals would have access to them via their provider (where available).

C.3.4. Diffusion, scale-up and spread

Access to high-sensitivity troponin assays is widespread across the UK and Ireland. A 2015 survey of laboratory contacts found that 80 per cent of laboratories had a high-sensitivity troponin assay; the majority of those that did not reported that it was not an option in the contract they currently held for diagnostic tests (McKeeman & Auld 2015).

However, both clinicians and providers of the assays report wide variation in how the assays are implemented, and whether they are used to their full potential (Albury et al. 2018; McKeeman & Auld 2015). For example, in a survey by McKeeman and Auld (2015), over 50 per cent of laboratory contacts said they still waited between 6 and 12 hours before resampling troponin levels, instead of resampling after 3 hours as is possible with the high-sensitivity troponin assay (McKeeman & Auld 2015).

The variation in use is largely attributed to the need to make changes to diagnostic pathways in order to be able to take advantage of the high sensitivity of the assays (Albury et al. 2018). Depending on the setup within hospitals, these pathways need to be hospital specific. According to insights from an interview with an assay supplier, providing support to hospitals in the form of information and training can enable usage. This support involves general provision of information on what the guidelines are for use of these tests, and how they can be implemented within hospital pathways. It also involves bringing stakeholders within hospitals together (e.g. clinicians from the emergency department, heads of diagnostic laboratories, and cardiologists) to discuss how they can change their pathways to make the most of the improved diagnostic testing. Despite providing this support, some hospitals struggle to get all stakeholders engaged and ‘bought into the change’ and therefore continue to use their previous protocols that do not take advantage of the increased sensitivity.

An additional barrier to appropriate use of these assays is the need for education around their clinical interpretation. While the ability of the test to identify the presence of troponin is increased, correct

---

2 Anonymous_INT1.
3 Anonymous_INT1.
clinical interpretation is more challenging because low levels of troponin in the blood can be caused in a
variety of ways, not just by heart attacks. Clinicians therefore have to consider the results together with
other information that they have (Albury et al. 2018). A number of studies are ongoing to determine the
best way to use these tests, and include exploring whether just one troponin test could be used to rule out
heart attacks in the emergency department (Albury et al. 2018).

In the absence of a healthcare provider body or professional association to drive further adoption, assay
manufacturers are currently devoting substantial marketing efforts to encourage wider use of high-
sensitivity troponin assays. This includes sharing the protocols and outcomes from those sites that have
successfully implemented the three-hour protocol and the improved patient outcomes as a result (Albury
et al. 2018).

In addition, NICE have produced clinical protocols and adoption guides to help the implementation of
early ‘rule out’ pathways, to identify those definitely not having a heart attack, although there is currently
no evidence as to the effect this has had (Albury et al. 2018).

C.3.5. Impact

There is no regular national audit of the use and impact of high-sensitivity troponin assays on clinical
practice. There are, however, specific illustrations of impact within NHS Trusts: for example, in
Wolverhampton, a clinician designed a new chest pain pathway using a high-sensitivity test, carried out
while the patient is in A&E, to identify their risk of cardiac arrest (Albury et al. 2018). This pathway was
designed to reduce the number of breaches of the 4-hour wait target within A&E departments, and to
reduce unnecessary admissions, easing patient flow within the hospital. As well as reducing the average
time between arrival at A&E and discharge from 23 hours to 9 hours, it is also saving money for the
whole local health economy due to reduced overnight stays (Albury et al. 2018).

C.3.6. Enablers

Our analysis suggests that there are several main factors that have supported the uptake and spread of
high-sensitivity troponin assays in the health system in England so far. These include:

- NICE guidelines recommended the use of high-sensitivity troponin assays, bringing them to
  the attention of clinicians who need to be informed in order to develop pathways for using the
  assays in their hospitals.

- At least some suppliers of high-sensitivity troponin assays replaced their previous assays
  with the high-sensitivity assays automatically, without increasing the cost. This meant that
  high-sensitivity assays quickly became available in hospitals already using diagnostic assays from
  these providers and did not lead to any switching costs.

- Companies supplying the high-sensitivity assays provided support in the form of training
  and help to staff in hospitals so that they understood how to use the assays and how to
  implement new diagnostic protocols.

- Interested clinicians within hospitals have been trying out new ways of using the high-
sensitivity troponin assays, including different diagnostic pathways they can fit in. This helps in
  providing evidence of how the tests can be used and the benefits they can provide.
• **The assays can be used to make a compelling business case to change practice** as they can in principle be used to ‘rule out’ individuals who are not having heart attacks quicker than traditional methods. Hence, they are aligned with national efforts to meet waiting time targets, for example in A&E departments.
C.4. Remote cardiac monitoring devices

Box C.2: Key messages – Remote cardiac monitoring devices

- **The innovation:** Remote cardiac monitoring devices are systems in patients’ homes monitoring the technical performance of patients’ cardiac devices, such as pacemakers or implantable cardioverter defibrillators (ICDs), as well as patients’ health condition. The systems send device performance and patient health data to clinicians via the Internet, allowing them to monitor their patients from a distance, and to reduce the number of face-to-face consultations required.

- **Enablers of successful innovation development and uptake:** The successful adoption and spread of the innovation was enabled by:
  - An ‘add-on’ innovation supporting and improving already used cardiac devices enabled the introduction and spread of remote monitoring systems.
  - The ability to demonstrate the value of the innovation for the health system, workforce and patients helped support uptake and acceptance by clinicians.
  - The support provided by the developers to hospitals who were negotiating the system’s introduction with Primary Care Trusts (PCTs) was an enabler of the introduction of the product into the health system.
  - Clear benefits to patients and carers (e.g. more effective care, convenience for patients) enabled patient uptake of the innovation.
  - Support of individual clinicians as well as specialty centres helped to introduce the innovation in hospitals in England as well as increase its spread.
  - Strong clinical networks linking individual hospitals enabled the further spread of the devices.
  - The introduction of reimbursement for remote patient follow-up supported the spread of remote monitoring devices.

- **Evidence of impact:** A comparative review of four remote cardiac monitoring device systems available in England (Boston Scientific’s LATITUDE, Medtronic’s CareLink, St. Jude Medical’s Merlin and Biotronik Home Monitoring) showed that they are able to effectively alert about major clinical or device-related events (de Ruvo et al. 2016). NICE medtech innovation briefings on two products (Boston Scientific’s LATITUDE NXT and Medtronic’s CareLink) indicate that the systems decrease mortality and hospital re-admissions and decrease the number of emergency and follow-up visits compared to face-to-face consultations (National Institute for Health and Care Excellence 2016a, 2016d). Health economics analyses from the US also suggest that remote cardiac device monitoring systems could help save costs in the health system.

C.4.1. Background and context: the need for improving the monitoring of cardiac devices

The implantation of artificial cardiac pacemakers is one of the most frequent types of heart surgery performed in the UK (NHS Choices 2015). In 2014/2015, 592 people per million population – i.e. more than 31,000 individuals – had a pacemaker fitted in England, and data show an increase of new implantations between 2004 and 2014 (Murgatroyd et al. 2016). Similarly, implantable cardioverter defibrillators (ICDs), automated devices able to undertake cardioversion and defibrillation, have also been used increasingly: around 4,400 were implanted in England in 2014/2015, which is approximately double the number implanted ten years prior (Murgatroyd et al. 2016). Patients with pacemakers, ICDs or other cardiac devices need regular monitoring of their heart’s condition and their device, to ensure that both work as intended. Most of these follow-ups have historically been conducted face-to-face. Since the early 2000s, remote monitoring systems have emerged as an innovation that presents an alternative approach.
These systems seek to enable better ongoing monitoring and increase patients’ quality of life, and to reduce the number of attendances at hospitals (Arrhythmia Alliance n.d.).

The case vignette below discusses the development and uptake of remote monitoring systems to oversee the technical performance of cardiac devices as well as patients’ health condition. The focus is not on any particular system. This case vignette is based on experiences shared by two individuals familiar with remote cardiac monitoring devices and it is supported by additional desk research. For the purposes of respecting informed consent, the individuals interviewed for the case vignette and their organisations are not named.

Despite repeated efforts, we were unable to secure interviews with individuals at Trusts or clinical commissioning groups (CCGs) using these devices. This may be linked to the fact that remote monitoring devices have been in use in the UK since the mid-2000s, and many of the individuals involved in their early adoption are now difficult to identify and contact.

C.4.2. Idea generation

The development of remote cardiac monitoring devices was driven by the idea of reducing routine follow-ups at hospitals for patients with cardiac conditions (and using pacemakers or ICDs). Remote systems were hoped to enable better access to care, better patient quality of life and more cost-effective care.4

Depending on the complexity of the device and the condition of the patient, patients need to visit a hospital two to four times a year, which can be a burden (particularly for elderly people, who constitute the majority of people with cardiac devices, as well as people living in remote areas). Given ageing populations and the growing burden of comorbidities in western countries such as the UK, interviewees noted that developers of cardiac devices expected an increase in patients having the devices fitted in the future, and related to this an increase in costs and staff resources, as more patients would also need hospital-based monitoring.5 Geographical distances for accessing hospital care present further burdens for patients.6

Remote systems, enabled by technological advances in information and communication technology (ICT), were intended to allow clinicians to regularly assess their patients’ conditions as well as the functionality of the technology without seeing them in person. Data on irregularities, trends, cardiac devices’ interventions as well as any technical issues are communicated to the monitoring device, which is placed in the patient’s home, and information is transferred via the Internet to clinicians.7

---

4 Anonymous_INT7, Anonymous_INT8.
5 Anonymous_INT7, Anonymous_INT8.
6 Anonymous_INT7.
7 Anonymous_INT7, Anonymous_INT8.
C.4.3. Entry into the health system

While the first attempts to remotely monitor cardiac devices were made in the 1970s in the USA, monitoring systems similar to those used today were first introduced by German biomedical technology company Biotronik in 2001. These early systems used mobile telephone technology to send information to clinicians, while today’s devices are mostly Internet-based (Sutton 2013). Sutton’s (2013) review of remote cardiac monitoring devices indicates that the global uptake of these innovations was initially slow. This was due to the products’ initial high prices and lack of funding to support their uptake by the health system, as well as due to hospital workforce fears that the systems would increase their workload due to data monitoring and analysis demands.

However, the review concludes that these barriers decreased over the time once the devices showed their value and ability to improve clinicians’ work as well as patient experience (Sutton 2013). In the UK, remote cardiac monitoring devices were introduced in the mid-2000s; most of the companies developing the devices available in the UK launched their products in the UK market at around the same time.8

One of the interviewees indicated that the rollout of the system they are familiar with was gradual and progressive, and that they did not observe any UK-specific barriers. However, in the case of another system, which was originally developed for the US market, more preparation and adaptation work was needed for product entry into the UK system. This preparation included ensuring that the systems can operate with the data infrastructure in the UK (e.g., the local telephone network) as well as that compliance with UK data protection law was ensured. Necessary steps to meet these requirements included the system’s adaptation to ensure compatibility with UK IT infrastructure as well as the company’s relocation into mainland Europe to provide greater capacity for support and increase the company’s resilience prior to the system’s launch.9 An interviewee also thought that national policy had an impact on the introduction of the system they are familiar with, in that the national pricing for non-face-to-face interventions of £26 was set at too low a value. Hence, the developing company found it difficult to negotiate higher prices to cover their costs at the time of the rollout. According to an interviewee, this pricing was based on the general assumption that remote services must be cheaper than face-to-face services. However, the pricing did not consider the higher upfront costs at the time of the

---

8 Anonymous_INT7, Anonymous_INT8.
implementation, and that cost savings for the health system would require time to accrue.\(^{10}\) Although this non-face-to-face pricing was supposed to be flexibly used at the local level (i.e. negotiating higher prices should have been possible), the interviewee felt that the local level still was very much linked to the national level, which meant that there was little scope for price negotiations in practice.

According to one interviewee, good relationships between developers and hospitals as well as potential buyers are one of the ways through which some of the challenges associated with national policy have been reduced.\(^{11}\) Negotiations thus mostly happened at individual Trust level, but the company also supported hospitals in their negotiations with their Primary Care Trusts (PCT’s), the predecessors of CCGs. Such conversations – as well as the degree of their success – differed from PCT to PCT.\(^{12}\) Following NHS England’s introduction of a reimbursement for remote patient follow-ups, which is aligned across all CCGs, the rollout of remote systems has become simpler.\(^{13}\)

As cardiac monitoring systems rely on patient compliance, testing human factors is an important part of successful market entry. Both companies that interviewees were familiar with started with a soft launch, piloting the systems’ functionality and usability in a few selected specialist hospitals. After the successful limited launch, the products were also offered to and commissioned by other healthcare institutions.\(^{14}\)

The interviewees did not observe any relevant or wide-spread uncertainties or barriers on behalf of clinicians at the time of the introduction.\(^{15}\) Only a few clinicians raised concerns or opposed the use of the devices; for example, some clinicians initially did not want to use the system as they thought that their patient population would be too old to understand it.\(^{16}\) Other clinicians, however, were convinced of the devices from the very beginning, and their enthusiasm transferred to their patients: according to one interviewee, patient uptake of innovations such as remote monitoring devices is very much biased by the attitude of clinicians.\(^{17}\)

Specialty centres such as the Liverpool Heart and Chest Hospital, teaching hospitals such as the University Hospital Southampton as well as the Royal United Hospitals Bath were some of the early adopters of the devices and continue to be progressive in their use.\(^{18}\) Rolling out the devices in London, by contrast, was more difficult as there was larger competition between individual Trusts.\(^{19}\)

\(^{10}\) Anonymous_INT7.
\(^{11}\) Anonymous_INT7.
\(^{12}\) Anonymous_INT7.
\(^{13}\) Anonymous_INT8.
\(^{14}\) Anonymous_INT7, Anonymous_INT8.
\(^{15}\) Anonymous_INT7, Anonymous_INT8.
\(^{16}\) Anonymous_INT7.
\(^{17}\) Anonymous_INT7.
\(^{18}\) Anonymous_INT7, Anonymous_INT8.
\(^{19}\) Anonymous_INT7.
C.4.4. Diffusion, scale-up and spread

Overall, remote cardiac monitoring devices are now successfully spread across regions in England, with one interviewee noting that the use of cardiac devices in combination with monitoring systems ‘seems to be a default’ today. However, the interviewees also indicated that while their devices are available across the country, there is variation in uptake within regions and within hospitals, which they attributed to the personalities and attitudes of individual clinicians or Trust management, and their approaches and priorities.20

According to data published by NICE, Boston Scientific’s system LATITUDE NXT was used by at least 21 NHS Trusts and Medtronic’s CareLink system by 163 NHS hospitals (UK and Northern Ireland) in May 2016 (National Institute for Health and Care Excellence 2016a, 2016d).

C.4.5. Impact

The effectiveness of remote cardiac monitoring devices has been independently tested and analysed by academic clinical researchers as well as by NICE. A 2016 comparative review of four systems (Boston Scientific’s LATITUDE, Medtronic’s CareLink, St. Jude Medical’s Merlin and Biotronik Home Monitoring), where researchers followed 211 patients with ICDs using a remote monitoring device over the period of a year, showed that all systems effectively alerted major clinical or device-related events (de Ruvo et al. 2016).

NICE published medtech innovation briefings for Boston Scientific’s LATITUDE NXT and Medtronic’s CareLink in May 2016. As of April 2018, NICE has not reviewed any other similar devices currently available in the NHS.21 The briefing on LATITUDE NXT indicates that there is statistically significant data showing that using the remote monitoring systems reduces all-cause mortality and the number of hospital re-admissions compared to no use of remote monitoring (National Institute for Health and Care Excellence 2016d). NICE concluded that CareLink reduces the number of emergency and follow-up visits in people with heart failure compared to face-to-face consultations (National Institute for Health and Care Excellence 2016a).

Economic analyses included in the medtech innovation briefings also indicate the cost-effectiveness of both devices: a study in Italy showed that CareLink significantly reduced the annual costs to patients and their families (National Institute for Health and Care Excellence 2016a). US economic analysis data on LATITUDE NXT indicate a reduction of costs for the health system due to a reduction of face-to-face follow-up visits; however NICE concludes that these US data may not be applicable to the NHS (National Institute for Health and Care Excellence 2016d).

As part of the medtech briefings, NICE consulted Arrhythmia Alliance to learn more about the patient and carer perspective. According to the Alliance, both CareLink and LATITUDE NXT patients and users are satisfied with the devices as they provide better quality of life, reduce patients’ and carers’ anxieties and increase their confidence (National Institute for Health and Care Excellence 2016a, 2016d).

20 Anonymous_INT7, Anonymous_INT8.
21 According to NICE, other similar products used in the NHS are Merlin@home by St Jude Medical and Biotronik Home Monitoring.
C.4.6. Enablers

Several key factors have supported the development and introduction of remote cardiac monitoring systems into the health system in England. Insights shared in interviews, coupled with our own reflections, indicate that these key enablers were:

- **An ‘add-on’ innovation supporting and improving already used cardiac devices enabled the introduction and spread of remote monitoring systems** – this was not a replacement but a complementary innovation to enhance the usability and performance of an existing product: As cardiac devices had already been widely offered and used in England, remote monitoring devices were supposed to improve the use of these existing devices, provide more efficient care as well as save costs.²²

- **The ability to demonstrate the value of the innovation for the health system, workforce and patients helped support uptake and acceptance by clinicians**: While hospital members initially feared that remote monitoring devices may lead to more work, innovators were soon able to demonstrate the system’s value, including reduction of routine face-to-face follow-ups at hospitals (and associated time demands on staff, health system costs and impacts on patient quality of life).²³

- **The support provided by the developers to hospitals who were negotiating the system’s introduction with Primary Care Trusts (PCTs) was an enabler of the introduction of the product into the health system.**²⁴

- **Clear benefits to patients and carers (e.g. more effective care, convenience for patients) enabled patient uptake of the innovation**: Interviewees and the Arrhythmia Alliance suggest that patients and carers are strongly in favour of remote monitoring devices, as they consider them to be more reliable than face-to-face follow-ups, improve their quality of life as well as decrease their anxieties.²⁵

- **Support of individual clinicians as well as specialty centres helped introduce the innovation in hospitals in England as well as increase their spread**: Good relationships between the innovators and specialty centres in England and the ability of individual clinicians to see the benefits of the innovation for the health system and for patients were considered to be very important in the early stages of the product’s introduction.²⁶

- **Strong clinical networks between individual hospitals enabled the further spread of the devices**: Hospitals that were part of strong informal networks with other hospitals already using remote monitoring devices were more likely to also introduce the innovation, indicating that strong clinical networks help spread innovations.²⁷

---

²² Anonymous_INT7, Anonymous_INT8.
²³ Anonymous_INT7.
²⁴ Anonymous_INT7.
²⁵ Anonymous_INT7, Anonymous_INT8.
²⁶ Anonymous_INT7.
²⁷ Anonymous_INT7.
The introduction of reimbursement for remote patient follow-up supported the spread of remote monitoring devices.28

When reflecting on what could have further helped support uptake and diffusion at the time of entry into the health system in England, the two interviewees highlighted that NICE guidelines on remote monitoring systems and better reimbursement of non-face-to-face interventions or a specific tariff (at the time of system entry into the UK market) would have been useful.29

28 Anonymous_INT8.
29 Anonymous_INT7, Anonymous_INT8.
### C.5. One-step nucleic acid amplification (OSNA) for sentinel lymph node intra-operative molecular analysis in breast cancer

#### Box C.3: Key messages – One-step nucleic acid amplification (OSNA)

- **The innovation:** One-step nucleic acid amplification (OSNA) analyses the sentinel lymph node (the lymph node a cancerous tumour is most likely to spread to first) intra-operatively to facilitate removal of the non-sentinel lymph nodes (those further away) if metastasis is detected in breast cancer to prevent further spread. This technique analyses the sentinel lymph node within 45 minutes and, if required, the lymph nodes can be removed during the same operation. This is an improvement on previous techniques that took days to partially analyse the sentinel node and would require a second operation to remove the non-sentinel nodes if metastasis had occurred.

- **Enablers of successful innovation development and uptake:** The successful adoption and spread of the innovation was enabled by:
  - Gathering robust evidence on the benefits of OSNA in the UK enabled service providers to see the benefit that the technology could provide in the UK context, increasing the likelihood of adoption.
  - Support from the NHS National Technology Adoption Centre (NTAC) in collecting evidence of clinical benefit and cost-effectiveness and translating this into a business case to present to the NHS.\(^{30}\)
  - Support from the NTAC for hospitals implementing OSNA, such as a toolkit called the ‘How to Why to Guide’.\(^{31}\)
  - OSNA is the only system of this type with formal NICE approval, which added credibility to the business case.

- **Evidence of impact:** NICE analysis identified that OSNA is equally or more cost-effective than the traditional methods of lymph node analysis and improves patient outcomes and wellbeing (National Institute for Health and Care Excellence 2013).

#### C.5.1. Background and context: the need for innovation in treatment for breast cancer

OSNA tests sentinel lymph node\(^ {32}\) biopsies during breast cancer surgery to identify whether the non-sentinel lymph nodes (the other lymph nodes the tumour can spread to) should be removed if metastasis\(^ {33}\) is detected. Before OSNA was developed, sentinel lymph node biopsy was performed during an initial surgery and was tested postoperatively to identify whether the tumour had become metastatic. If the cancer had spread, a second operation was then conducted to remove the non-sentinel lymph nodes. With OSNA, however, metastasis can be detected during the first surgery, allowing the non-sentinel lymph node dissection to be performed in the same surgery if needed.\(^ {34}\) Conducting only one operation reduces financial and logistical stress on the NHS and reduces the length of waiting lists by opening up future theatre slots. Patients also benefit by receiving immediate lymph node clearance at the hospital, which is a

---

30 Innovator\_INT12.
31 Innovator\_INT12, Provider\_INT13.
32 The sentinel lymph node is the first lymph node a cancerous tumour is likely to spread to.
33 Metastasis is the spread of cancer away from its primary site, causing development of additional tumours.
34 Innovator\_INT12.
benefit to the patient psychologically and allows for a faster recovery and earlier access to treatment, should it be needed.35

This case vignette is based on experiences shared by an individual at Sysmex, the developers of OSNA, and a provider responsible for the development of OSNA, and is supported by additional desk research. For purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

**Figure C.2: OSNA**

![Image of OSNA](https://example.com/osna_image)

*Source: Image courtesy of Innovator_INT12*

### C.5.2. Developing the innovation

Sysmex, a global diagnostics company based in Japan, entered into a licensing agreement with Eiken Chemical Company for their reverse transcription loop-mediated isothermal amplification (RT-LAMP)36 and developed the assay and associated robotic hardware for the use of OSNA in breast cancer.37 Following extensive research into molecular biology and oncology, which were identified as key areas for development in the medical diagnostics arena, the Sysmex Life Science Division was set up.38 The first product bought forward for commercialisation within the Life Sciences Division was OSNA for lymph node analysis in breast cancer.39

The development of the OSNA system and its reagents was undertaken by research and development teams from Sysmex in Japan and funded by Sysmex Corporation.40 Development in the UK was focused on proving the concept of OSNA, its performance and the data quality compared to traditional treatment methods. This included involvement from a range of individuals, including breast surgeons, consultant histopathologists and biomedical scientists across four hospitals in England.41

---

35 Innovator_INT12.
36 This technology is used to assess the extent of metastasis in cancer.
37 Innovator_INT12.
38 Innovator_INT12.
39 Innovator_INT12.
40 Provider_INT13.
41 Innovator_INT12.
Before introducing OSNA into the healthcare system in England, development analysis and testing had already been conducted and published in Japan. To increase the likelihood of adoption in England, our interviewee from Sysmex commented that they needed to develop and provide evidence for the concept of OSNA in England via independent peer-reviewed studies and evaluations, as Trusts prefer to see data on the benefit of an innovation from their own country so they can assess the benefit to their specific population.\footnote{Innovator\_INT12.}

A two-year study was conducted within four healthcare centres in England (Royal Surrey County Hospital, Wycombe General Hospital, Northwick Park Hospital and Charing Cross Hospital). These four centres funded and independently performed the studies to ensure the research was impartial and unbiased.\footnote{Provider\_INT13.} This resulted in the first published study worldwide using OSNA in an intra-operative setting (Snook et al. 2010).\footnote{Innovator\_INT12, Provider\_INT13.} However, there was a long delay between the study and the publication of the 2010 paper, which one of our interviewees speculates was due to some of the paper reviewers and pathologists believing that OSNA was not an appropriate technique.\footnote{Provider\_INT13.} This led to many challenges later whilst developing the technique in clinical practice, with one individual calling for surgeons using OSNA to be taken to the General Medical Council for harming their patients.\footnote{Provider\_INT13.}

After these initial studies were completed, a number of other centres carried out in-house evaluations of OSNA to assess the performance and logistics of the intra-operative service prior to its introduction into clinical use.\footnote{Innovator\_INT12.} The first routine use of OSNA was in 2008 in Guilford (Snook et al. 2010), with additional centres following after this.\footnote{Innovator\_INT12.}

Although patients were involved in the clinical trials of OSNA, this was only as study participants rather than in a patient voice role. Our interviewee from Sysmex thought that they deemed it unfair to promote the use of a treatment the patients may have then wished to have when the hospitals would have been unable to provide it.\footnote{Innovator\_INT12.} However, 30 patients were invited to participate in a focus group during the clinical testing of OSNA.\footnote{Provider\_INT13.} This focus group was conducted to understand patients’ thoughts on OSNA and to assess whether it would increase post-surgery anxiety as results were given to the patient straight away, rather than them having the time to comprehend what the results may mean.\footnote{Provider\_INT13.} Patients were very enthusiastic about OSNA and could clearly see its benefits by only having one, rather than two,
operations. One interviewee believed that this support from patients was an important driver in commissioners’ decisions to adopt OSNA.

C.5.3. Entry into the health system

Once the clinical trial had been conducted, the NHS National Technology Adoption Centre (NTAC) selected OSNA and another system available at the time, Genesearch from Johnson & Johnson, to support their adoption into the NHS. NTAC worked with specific technologies with the goal of overcoming adoption barriers, understanding what the enablers of adoption were and supporting embedding of the technology in day-to-day work (Llewellyn et al. 2014). NTAC worked with Sysmex to gather information on the effectiveness and value for money of OSNA in a way that could be presented to the NHS to increase the likelihood that it would be adopted. NTAC also created online support tools for hospitals implementing OSNA, such as the creation of a toolkit called the ‘How to Why to Guide’. Although Sysmex initially faced some competition with Genesearch, the latter product was removed from the market during Sysmex’s work with NTAC. It was speculated that this was due to the USA having little interest in developing intra-operative methods for treating breast cancer, and so Johnson & Johnson, a US-based company, pulled the product from the UK market. The USA’s negative stance on intra-operative methods may have stemmed from the need to have one less doctor involved in the operation, raising concerns of job security in the medical community, as speculated by one of our interviewees. One of our interviewees also suggested that the USA’s American College of Surgeons Oncology Group (ACOSOG) Z0011 Trial also hindered the adoption of OSNA in England. This was due to the findings that further dissection of the lymph node in some breast cancer patients may not be necessary after detection of a positive sentinel lymph node. This trial remains controversial today but led to the Association of Breast Surgery (ABS) taking a more generalised stance against this form of treatment, which may have subsequently led to England taking a similar stance to that in the USA.

---

52 Provider_INT13.
53 Provider_INT13.
54 No longer operational.
55 Innovator_INT12, Provider_INT13.
56 Innovator_INT12.
57 Innovator_INT12, Provider_INT13.
58 Innovator_INT12.
59 Provider_INT13.
60 Provider_INT13.
61 Innovator_INT12, Provider_INT13.
62 The ABS consensus came to three final conclusions depending on the level of metastasis. In isolated tumour cells and micro-metastases, ‘no further axillary treatment is required in addition to breast conserving surgery or mastectomy.’ If one or two sentinel nodes show macro-metastases, further axillary treatment is not mandatory in patients receiving whole breast radiotherapy but is recommended for patients undergoing mastectomy. In patients with three or more sentinel nodes with macro-metastases, further axillary treatment is usually recommended (Association of Breast Surgery 2015).
In addition, US patients were less aware of the benefits of OSNA and so there was less patient advocacy to adopt it. Although Johnson & Johnson pulled out of the UK market, leaving Sysmex’s OSNA as the only available product on the market, the lack of a pro-OSNA viewpoint in the USA added to the difficulty in establishing initial adoption in England.

NTAC was an important step forward for OSNA, and this, alongside interest from clinicians, led to engagement with NICE. To obtain NICE approval, Sysmex developed documentation relating to OSNA and its clinical relevance (available research, publications and existing routine clinical use of OSNA in breast cancer management) that was reviewed by NICE and other stakeholders, including clinicians, patient groups, healthcare representatives and manufacturers. A draft report was written after this, which was reviewed by the NICE committee and public consultation in May 2013. After a final consultation meeting, which included clinical, financial and patient representation, formal NICE approval was obtained in August 2013. A marketing campaign was carried out informing Trusts, commissioners and clinicians of the new NICE recommendations. OSNA remains the only system approved by NICE for this analysis and our interviewee from Sysmex reported that approval has been positive in terms of supporting Sysmex’s business case, although it didn’t support widespread adoption as much as they anticipated. The interviewee believed that this was due to OSNA being recommended as just ‘an option’ for treatment, rather than the best option or mandating its use for patients requiring sentinel lymph node biopsy. Review of NICE approval was scheduled to take place in 2016, but this has not yet happened, which may have slowed adoption further as the many subsequent developments with OSNA have not been discussed with and then reviewed by NICE.

C.5.4. Diffusion, scale-up and spread

Barriers to wider adoption in England

Our interviewees described four primary barriers to wider NHS adoption of OSNA: issues with reimbursement codes, the structural design of the NHS, individual attitudes towards OSNA and bureaucracy. As a result of these challenges, OSNA is currently used in 26 NHS centres, and has been involved in the treatment of approximately 22,000 patients so far. However, these 26 centres only represent roughly 12 per cent of all NHS centres that have the capabilities to implement OSNA.

---

63 Provider_INT13.
64 Provider_INT13.
65 Innovator_INT12.
66 Innovator_INT12.
67 Innovator_INT12.
68 Innovator_INT12.
69 Innovator_INT12.
70 Innovator_INT12.
71 Innovator_INT12.
Implementation was overseen by Sysmex, rather than by the hospital teams that conducted the initial clinical trials.72 Healthcare Resource Group (HRG) codes are used to define hospital surgical procedures for calculating reimbursement costs (NHS England & Department of Health 2012). When calculating the procedure costs for OSNA, hospitals identified that they would receive approximately £1,000 less per patient than if they performed the traditional treatment method as compared to reimbursement for two separate procedures. Commissioners and the wider NHS would pay less per patient, Trust costs per patient would be reduced (one surgery vs two surgeries) and the wider NHS System would save money and be more efficient. Our interviewee speculated that it was possible that Trust accountants viewed this as a loss of income and so did not want to adopt it.73 However, our interviewee reflected that this is the wrong way to look at this issue, since the use of OSNA leaves an additional theatre slot for another patient, reducing waiting times and improving patient outcomes.74 To date, Sysmex has not been able to overcome this issue as no figure was assigned specifically to OSNA, nor was OSNA included in the NHS Supply Chain,75 making it very difficult to create an effective business case.76 To overcome this issue, our interviewee from Sysmex believes that there should be a change to the way costing assessments are done in the NHS to create a more realistic reflection of the cost of a procedure, and that the NHS should work more closely with industry and develop relationships with specific individuals and companies to accurately establish this for individual technologies.77

The structural shift towards clinical commissioning groups (CCGs) created problems in getting commissioning approval, resulting in negotiations having to be on a local level between Trusts and local commissioners, with Sysmex and hospital personnel having to re-invent the wheel each time.78 The need for some Trusts to adopt OSNA across multiple hospitals also became a barrier to wider adoption, as reported by both interviewees, as they needed to implement the system across these centres and have the staff and resources available to provide the service.79 Trusts in this situation often didn’t make the investment as they were facing financial strains and did not recognise the benefits of OSNA for the hospital and patients.80

Adoption of OSNA is often dependent on whether commissioners and management are willing to initiate change.81 It was difficult to convince managers and commissioners to adopt OSNA as fewer operations could be done in one day, which made it appear as though it was being less productive; however,
implementing OSNA meant two-thirds of patients would not need an additional surgery, freeing up future theatre slots.\textsuperscript{82} This challenge was only overcome because of the good relationships the team conducting the clinical trials had with the senior management of hospitals and because some individuals in the clinical trials team were senior leaders in the hospitals and so had influence over the decision to adopt OSNA.\textsuperscript{83} Pathology departments are frequently more resistant to adopting OSNA as it requires a change in the way they work, often resulting in them being ‘on hold’ whilst they wait for the biopsy.\textsuperscript{84} Both of our interviewees felt as though some pathologists are against adoption as they see OSNA as a threat to their job, despite it only performing one task out of many.\textsuperscript{85} Similar attitudes are now appearing after the introduction of OSNA for colon cancer.\textsuperscript{86}

On the other hand, some clinicians and pathologists have seen the benefit OSNA can provide and have adopted it themselves with local commissioning support.\textsuperscript{87} Leading breast cancer surgeons were often the champions of adopting OSNA and they then spread it throughout their hospital.\textsuperscript{88} In 2016, The Royal College of Pathologists formally included OSNA into their guidelines, effectively citing the findings of NICE three years earlier.\textsuperscript{89}

Meanwhile, elsewhere, positive attitudes towards OSNA are primarily how Spain has become the most receptive country in terms of OSNA implementation in Europe, having adopted it in approximately 140 centres. Spain has recognised the clinical benefits and has an environment in which it is easier to implement a new validated technology.\textsuperscript{90} Adoption in other countries may have been easier due to the lower level of red-tape and bureaucracy. Processes in England are perceived to be drawn out and decisions are made slowly due to the level of bureaucracy.\textsuperscript{91} This has been noted by Sysmex, which has faced delays in the reviewing of NICE approval for OSNA, and their involvement with the \textit{Carter Review} (Lord Carter of Coles 2016) had a ‘limbo’ period of 1 to 1.5 years. No progress has yet been made to link Sysmex with the Trusts or clinicians who will be involved in the Ministerial Medical Technology Strategy Group (MMTSG) Project arising from the \textit{Carter Review},\textsuperscript{92} which has selected OSNA for inclusion. Some European healthcare systems appear to be more responsive when it comes to treatment of the axillary lymph node and so readily adopted the new OSNA technique on the basis of published data.\textsuperscript{93}

\textsuperscript{82} Provider\_INT13.
\textsuperscript{83} Provider\_INT13.
\textsuperscript{84} Innovator\_INT12.
\textsuperscript{85} Innovator\_INT12, Provider\_INT13.
\textsuperscript{86} Innovator\_INT12.
\textsuperscript{87} Innovator\_INT12, Provider\_INT13.
\textsuperscript{88} Provider\_INT13.
\textsuperscript{89} Innovator\_INT12.
\textsuperscript{90} Innovator\_INT12.
\textsuperscript{91} Innovator\_INT12.
\textsuperscript{92} Innovator\_INT12.
\textsuperscript{93} Provider\_INT13.
To support wider adoption in the future, commissioners, hospital management and hospital healthcare staff need to be educated on the OSNA process, what it involves and what its benefits are. Pathologists and management, who are often more negative towards OSNA, would benefit most from this training. Events for health professionals to learn about OSNA have already proved successful in supporting wider implementation.

**Engagement with health innovation policy**

OSNA has been selected to be involved in the MMTSG Project arising from the *Carter Review*, and Sysmex is said to be excited about the benefits this could provide to raise the profile of the technique. However, after Sysmex was notified that they were to be included, the process has seemed to some to grind to a halt. The aim of the MMTSG is to explore barriers to adoption of innovations. OSNA was selected as it is a product that could provide a benefit to the NHS and has NICE approval but has not yet achieved widespread adoption in England. The goal is that the MMTSG will bring Sysmex together with a number of NHS Trusts to identify a clear path for implementation and overcome barriers of adoption. This process is ongoing.

Local policy has influenced the development of OSNA as local negotiations between commissioners and Trusts are required for implementation. Also, in some situations centralised pathology labs are involved and this is becoming increasingly relevant. Our interviewee from Sysmex commented that the pathology service would either be non-supportive, as staff need to be located at more than one hospital to provide the service, or, in other cases, would support the implementation of the same service for more than one hospital. In all cases, pathology departments would highlight the need for additional biomedical scientific staff in order to implement the service and include additional headcount into business cases. This in turn would negatively impact business cases due to the financial constraints on individual Trusts. However, according to one of our interviewees, these cases would rarely account for the fact that consultant pathologists already involved in conventional analysis would not be required for OSNA analysis, thereby releasing them to deal with other aspects of an extensive consultant workload. As part of the 2013 review, NICE had cited the estimated cost of the conventional postoperative approach was £472 per patient. In addition, some Trusts had moved to implement OSNA at more than one hospital to ensure parity of services for patients attending different hospitals. Finally, some patients started requesting

---

94 Provider_INT13.
95 Provider_INT13.
96 Provider_INT13.
97 Innovator_INT12.
98 Innovator_INT12.
99 Innovator_INT12.
100 Innovator_INT12.
101 Innovator_INT12.
102 Innovator_INT12.
referrals to hospitals offering OSNA, which meant that other hospitals introduced the technique for competitive reasons.103

C.5.5. Impact

Patient surveys were conducted after the clinical trials of OSNA in the hospitals involved. They suggested that 97 per cent of patients who were treated with OSNA would be happy to have the procedure again (Athwal et al. 2016). The focus group conducted during OSNA’s testing also highlighted patient’s positive attitude and enthusiasm for the technique.104

The NICE analysis of OSNA in 2013 identified that it is equally or more cost-effective than the traditional two-operation method, and could reduce clinical complications as well as patient anxiety when awaiting test results (National Institute for Health and Care Excellence 2013).

Multiple clinical trials have been conducted on OSNA since it was first developed. For example, Tamaki et al. (2009) and Tsujimoto et al. (2007) identified that OSNA detected metastasis as accurately as the conventional pathology approaches. The first UK clinical trial as well as a trial conducted in Germany highlighted OSNA’s high specificity and sensitivity as compared to extensive (more intensive analysis than carried out by pathologists in routine) histopathology (Schem et al. 2009; Snook et al. 2010), and today there are well over 100 publications on OSNA.105

C.5.6. Enablers

The interviews with one innovator and one provider suggest that there are several factors that supported the development, rollout, spread and uptake so far. Their views, coupled with our reflections on the case vignette evidence, suggest that the key enablers of the development and early entry of OSNA into the health system in England were:

- **Gathering robust evidence on the benefits of OSNA in the UK** to provide individual Trusts with clinical trial data relevant to their population. As a result of this, Sysmex conducted a two-year clinical trial, published in 2010, and further trials have been conducted subsequently (Snook et al. 2010).106 NHS commissioners and clinicians who could see the benefit of OSNA in a UK context and put greater weight on the evidence behind it, such as has been seen in Spain, were more likely to adopt it.107

- **Support from the NHS National Technology Adoption Centre (NTAC)**: The NTAC was an organisation that supported innovators in achieving widespread adoption of a health technology and embedding it in the system (Llewellyn et al. 2014). NTAC supported Sysmex to gather the clinical and cost-effective evidence for OSNA and present it in a business case targeted at the

---

103 Innovator_INT12.
104 Provider_INT13.
105 Innovator_INT12.
106 Innovator_INT12.
107 Innovator_INT12, Provider_INT13.
NHS.\textsuperscript{108} It also created online resources, such as a toolkit, to support hospitals in implementing OSNA.\textsuperscript{109}

- **Support for frontline staff:** NTAC created online support tools for hospitals implementing OSNA, such as a toolkit called the ‘How to Why to Guide’.\textsuperscript{110}

- **OSNA is currently the only system of its kind that has obtained NICE approval.**\textsuperscript{111} It is also formally recognised in the Royal College of Pathologists Guidelines of 2016. This approval added credibility to the business case Sysmex was developing to present to the NHS, although it has not been as much of a driver of wider adoption as originally predicted.\textsuperscript{112}
C.6. Prostatic urethral lift for treating benign prostatic hyperplasia (UroLift®)

Box C.4: Key messages – Prostatic urethral lift for treating benign prostatic hyperplasia (UroLift®)

- **The innovation:** UroLift® is a minimally invasive surgical technique for benign prostatic hyperplasia. It involves introducing a device through the obstructed urethra to lift and hold the enlarged prostate tissue in order to clear the opening of the urethra, allowing for the urine to flow normally again and to relieve patients’ symptoms.

- **Enablers of successful innovation development and uptake:** The successful design, introduction and uptake of the innovation was enabled by:
  - The investors had a long-term perspective when it came to investments in start-ups – recognising the time frames required for the development, adoption and diffusion of this type of product in the health system.
  - The innovators felt that they were nimble in the face of events outside their control (e.g. the global financial crisis) and invested in improving their product through testing in various settings and involving different stakeholders – such as patients, doctors, payers and healthcare administrators, which later facilitated adoption.
  - The innovators developed a good understanding of how health systems are handling reimbursements and in particular a thorough understanding of appropriate coding specifications (which are used to describe a medical, service or diagnosis service in view of reporting these to various entities including health insurance companies).
  - NICE recommendation, the Innovation and Technology Tariff (ITT) and AHSNs played a positive role in increasing uptake at system level through regulatory approval (NICE), financial support for adoption by healthcare providers (ITT), and support in brokering networks for adoption (via AHSNs).
  - Compelling and robust evidence on clinical effectiveness was seen to support adoption among clinicians.

- **Evidence of impact:** UroLift® has been the subject of various research studies that proved its clinical efficacy and provided indications on cost savings compared to Transurethral Resection of the Prostate (TURP) (National Institute for Health and Care Excellence 2015).

C.6.1. Background and context: the need for innovation in the treatment of enlarged prostate conditions

Benign prostatic hyperplasia (BPH), also referred to as prostate enlargement, is a non-cancerous common condition specific to men, in which the bladder increases in size, making it difficult to urinate. BPH affects over 30 per cent of men in their 50s and 80 per cent of men over 70 (The AHSN Network 2017a).

In addition to urinary discomfort it can lead to urinary tract infections and urinary retention as well as renal failure in some cases. The traditional surgical treatments – Transurethral Resection of the Prostate (TURP) or holmium laser enucleation (HoLEP), involve cutting of prostate tissue, which could have several permanent side effects. These include impaired sexual function and other surgery-related complications that ultimately result not only in patient discomfort but also impose further costs on the

---

113 Benign prostatic hyperplasia is a non-cancerous enlargement of the prostate.

114 Innovator_INT11, Provider_INT8.
NHS. It is estimated that TURP procedures (approximately 20,000 each year) cost the NHS £50m and an additional £109m is spent on treating complications resulting from TURP (The AHSN Network 2017a). Non-surgical treatment can also have side effects that can affect the quality of life of patients (for example hormonal agents can reduce testosterone production).

UroLift® was created to offer a minimally invasive treatment for BPH that would have fewer side effects associated with it, and also reduce the costs of the overall management of enlarged prostate cases in the NHS.

This case vignette is based on experiences shared by an innovator and an investigator that introduced UroLift® in his practice and is supported by additional desk research. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

C.6.2. Idea generation

UroLift® was conceived as a solution that would not only entail fewer side effects but also eliminate the need for an overnight stay in hospital and be easy to adopt from a logistical and clinical staff point of view. UroLift® is a minimally invasive surgical technique for BPH which involves using the 'UroLift®' devices produced by NeoTract Inc., based in the USA (NeoTract Inc. n.d.). The UroLift® procedure consists of a delivery device that is introduced through the obstructed urethra to reach the enlarged prostate. With the help of the delivery device, UroLift® implants are introduced to lift and hold the enlarged prostate tissue in order to clear the opening of the urethra (see Figure C.3).

Figure C.3: UroLift® system treatment steps

Enlarged prostate UroLift® delivery device accessing the urethra Permanent UroLift® implants being inserted with the help of the delivery device Prostate with the permanent UroLift® implants, which have cleared the urethra

Source: Image courtesy of NeoTract

NeoTract was established in 2004 through the ExploraMed Development LLC medical device incubator. The incubator was set up to foster the development of radical medical device innovations that would improve healthcare in a major way (Nelson 2016). In a published interview for Medsier, Ted Lamson, one of the founders of NeoTract, highlighted that the incubator was an environment that stressed the need to invest money upfront in order to develop a device that responds to existing need in a comprehensive way (Nelson 2016). Lamson also stressed the importance of engaging with patients,
doctors, payers and healthcare administrators, allowing for continual learning to be reflected in the design and development of the product and in the approach to the commercial offer. The stakeholder engagement was also a way of providing feedback to the innovators themselves, and according to our interviewees\textsuperscript{115} also brought a boost of confidence for the innovators, a dose of ‘irrational optimism’ (Nelson 2016) that helped surmount difficult situations (such as those associated with regulatory approvals) later down the line.

In addition to stakeholder engagement, the development of UroLift\textsuperscript{®} benefited from four major rounds of financing in 2006, 2009, 2011 and 2014, during which time the innovators were supported by various companies including Johnson & Johnson Development Corp and others (Nelson 2016). Lamson highlights that the important lesson in this process is to partner with a company that takes the long view, given the development lifecycles and time it can take for innovations to reach the market (Nelson 2016).

The UroLift\textsuperscript{®} system obtained a CE mark in November 2009.\textsuperscript{116} The system was extensively tested in various clinical trials\textsuperscript{117} in the US and UK, resulting in US Food and Drug Administration (FDA) approval in September 2013 and a positive NICE recommendation in January 2014 for use by doctors in England. The decision to enter the UK market was taken in light of a combination of financial pressures created by the 2009 crisis, which created a climate where it was difficult to raise capital, and regulatory pressures linked to the 2009 FDA blockage, which stalled regulatory review (Nelson 2016).\textsuperscript{118} Given this landscape, NeoTract’s founders committed to undertake further testing of the product in the UK. During this testing phase the company engaged with consultants and medical associations, which later proved to have a ‘pull’ effect during the adoption stage as these actors had a chance to familiarise themselves with the product from the testing stage and develop confidence in it.

This strategy had also originally proved successful in the US, where the American Medical Association is also responsible for approving the Current Procedural Terminology (CTP) codes,\textsuperscript{119} on which the introduction of new procedures into medical practice depends. Codes are used to describe a medical or diagnosis service in view of reporting these to various entities including health insurance companies in view of reimbursement. Issuing of the CTP code for UroLift\textsuperscript{®} took five months, which was highlighted as a quick process compared to normal timelines, leading to a faster introduction into current medical practice (Nelson 2016).\textsuperscript{120}

\textsuperscript{115} Innovator\_INT11, Provider\_INT8.

\textsuperscript{116} CE marking states that the medical device product meets requirements of all relevant European Medical Device Directives (BSI n.d.).

\textsuperscript{117} UroLift\textsuperscript{®} has been investigated in sixteen clinical studies. From these we mention five cohort studies (Bozkurt et al. 2016; Chin et al. 2012; McNicholas et al. 2013; Shore et al. 2014; Woo et al. 2011), one crossover study (Cantwell et al. 2014) and two randomised studies (Roehrborn et al. 2015; Sønksen et al. 2015).

\textsuperscript{118} In this interview with Ted Lamson (Nelson 2016), Lamson describes the various issues he perceived the FDA was facing in the period 2009–2010, including whistle-blowers and internal management problems, which were making it difficult to set up new clinical studies.

\textsuperscript{119} These codes are used to describe a medical, service or diagnosis service in view of reporting these to various entities including health insurance companies.

\textsuperscript{120} Innovator\_INT11.
C.6.3. Entry into the health system

NICE has issued the Interventional Procedure Guidance (IPG), therefore recommending UroLift® for use in England in 2014 (National Institute for Health and Care Excellence 2016c; NeoTract Inc. 2014). The process of obtaining the IPG relies on considerable evidence for the safety and efficacy of the product which is rigorously scrutinised. At the time of the UroLift® application, the process also involved applying for a code that would be used to reimburse the device in the NHS. The innovators considered that the code initially assigned to UroLift® did not perfectly match the product’s specifications. Therefore the company embarked on a process of providing further clarifications and evidence in order to obtain the desired coding. These efforts amounted to an extra year and relied on both economic evidence as well as feedback from clinical staff and patients about using UroLift®.

C.6.4. Diffusion, scale-up and spread

Following NICE recommendation, UroLift® also received a code under the Innovation and Technology Tariff (ITT), being one of the six technologies selected under this reimbursement mechanism (NHS England 2017a).

Obtaining the ITT designation triggered the support of Academic Health Science Networks (AHSNs), which were highlighted by one interviewee as having contributed to diffusing the product in the NHS. As stated by the interviewee, the brokerage role of AHSNs helped NeoTract to engage in discussions with commissioners and providers and presented an opportunity for the company to showcase the evidence behind UroLift®.

Evidence was highlighted as a key enabler in communicating with clinicians and convincing them of adopting new practices. This evidence needs to be communicated to a broad range of stakeholders in a manner relevant to each role. For example, it was highlighted that while general practitioners (GPs) do not deliver the UroLift® procedure, they still need to be considered as one target audience as they are in direct contact with the patients who could opt for this procedure.

In addition to being available in the USA and several countries in Europe, UroLift® is also available in Australia, Canada, Mexico and South Korea (NeoTract Inc. n.d.).

C.6.5. Impact

UroLift® has been the subject of various research studies that proved its clinical efficacy and provided indications on cost savings compared to TURP. The NICE costing statement estimated that the cost

---

121 Innovator_INT11.
122 Innovator_INT11.
123 Innovator_INT11.
124 Provider_INT8.
125 Several cohort studies, a crossover study and randomised studies have investigated UroLift®’s clinical efficacy (Bozkurt et al. 2016; Cantwell et al. 2014; Chin et al. 2012; McNicholas et al. 2013; Roehrborn et al. 2015; Shore et al. 2014; Sønksen et al. 2015; Woo et al. 2011).
saving per patient was £159 for UroLift®, if executed as a day-case procedure, compared with inpatient monopolar and bipolar TURP (National Institute for Health and Care Excellence 2015).

In a 2016 systematic review, Jones et al. (2016) report that UroLift® also leads to improvements in patient-reported outcomes considering quality of life and wellbeing issues. These include the International Prostate Symptom Score, which improved from 4.5 preoperative to 2.3 postoperatively (Jones et al. 2016). Other subjective outcomes that showed improvement postoperatively were Quality of Life and Sexual Health Inventory for Men.

When it comes to hospital-level impacts, the clinical practice interviewee considered that the UroLift® procedure was a very attractive proposition for the hospital as it reduced the overall pressure on the system, as the UroLift® procedure is a day case and does not require an in-hospital overnight stay.\footnote{Provider_INT8.}

C.6.6. Enablers

The design and introduction of UroLift® highlighted the following main enablers of innovation:

- **The investors in NeoTract had a long-term perspective when it came to investments in start-ups** – recognising the time frames required for the development, adoption and diffusion of this type of product in the health system (Nelson 2016).

- **The innovators felt that they were nimble in the face of events outside their control** (e.g. the global financial crisis) and invested in improving their product through testing in various settings and involving different stakeholders – such as patients, doctors, payers and healthcare administrators, which later facilitated adoption (Nelson 2016).\footnote{Innovator_INT11, Provider_INT8.}

- **The innovators developed a good understanding of how health systems are handling reimbursements and** in particular a thorough understanding of appropriate coding specifications (which are used to describe a medical or diagnosis service in view of reporting these to various entities including health insurance companies) (Nelson 2016).\footnote{Innovator_INT11.}

- **NICE recommendation, the Innovation and Technology Tariff (ITT) and AHSNs played a positive role in increasing uptake at system level** through regulatory approval (NICE), financial support for adoption by healthcare providers (ITT), and support in brokering networks for adoption (via AHSNs).\footnote{Innovator_INT11.}

- **Compelling and robust evidence on clinical effectiveness was seen to support adoption among clinicians.**

\footnote{Provider_INT8.}
C.7. Drug-eluting stents

Box C.5: Key messages – Drug-eluting stents

- **The innovation:** Drug-eluting stents were developed to treat the effects of restenosis (arterial narrowing in the heart), which can occur after a balloon angioplasty\(^\text{130}\) to treat coronary heart disease. The drug-eluting stents work by opening the narrowed blood vessels to increase blood flow to the heart and by also releasing an anti-inflammatory agent. When first introduced into the health system in 2001, drug-eluting stents were seen as an important innovation as they reduce the vessel wall damage that can occur after balloon angioplasty and stenting is a less invasive method than previous treatments.

- **Enablers of successful innovation development and uptake:** The successful adoption and spread of the innovation was enabled by:
  - The creation of the National Service Framework to drive development of a less invasive cardiac treatment method meant resources were mobilised to accelerate development and adoption of innovations.
  - The large evidence base for drug-eluting stents meant clinicians were able to see the benefits to patient outcomes and cost savings.
  - Certain clinical commissioning groups (CCGs) and Trusts were more progressive in adopting drug-eluting stents as they had clear policies on which patients were more appropriate for drug-eluting stents and built capacity into the clinical pathway to treat them.
  - The British Cardiac Intervention Society published credible data on comparative adoption of drug-eluting stents, which encouraged clinicians to implement them.

- **Evidence of impact:** The benefits of drug-eluting stents have been shown to outweigh some side effects they can have, and the stents have been shown to reduce a patient’s risk of adverse coronary outcomes (National Institute for Health and Care Excellence 2008a).

C.7.1. Background and context: the need for innovation in stent systems and the development of drug-eluting stents

To help treat coronary heart disease (CHD), balloon angioplasties were developed in the 1970s. This procedure inserts a small, deflated balloon into the affected artery and then inflates it to open up the vessel and improve blood flow to the heart. This operation prevents CHD from worsening and means further operations are not needed, providing a great benefit for patients as well as cost savings. Although this procedure was highly valuable, some patients’ arteries would begin to narrow again a few years later (restenosis). This then led to the development of scaffolds (stents), which were put in after the balloon angioplasty to prevent the artery from narrowing again. However, this led to some side effects as the immune system detected the stent as a foreign body and would attack it, or the smooth muscle cells would over-proliferate, both causing damage to the artery wall. This led to the development of drug-eluting stents, which release a drug to suppress the immune system, reducing inflammation, or an antimitotic to reduce cell division (National Institute for Health and Care Excellence 2008a).

This case vignette is based on experiences shared by an innovator of drug-eluting stents, and is supported by information provided by a private sector interviewee and additional desk research. For the purposes of

\(^{130}\) A balloon catheter is inserted into the blocked or narrowed blood vessels and expanded to widen the vessels, allowing improved blood flow.
respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

**Figure C.4: Drug-eluting stent**

![Drug-eluting stent](image)

*Source: Image courtesy of Boston Scientific*

### C.7.2. Development of the innovation

The development of the initial range of drug-eluting stents by Boston Scientific involved a range of internal experts and external clinical advisors who were specialists in the field. The majority of the engineering and clinical analysis of the drug was conducted in-house and internationally recognised external expert support was sought to assess the behaviour of the drug. All costs were covered by Boston Scientific research and development funding.\(^{131}\)

Two clinical pathways were assessed when trialling the drug-eluting stents: a series of TAXUS trials and the SYNTAX™ clinical trial. Six clinical trials were conducted within the TAXUS series, which compared the effects of the drug-eluting stents with traditional bare metal stents.\(^{132}\) The SYNTAX trial compared the effects of drug-eluting stents with coronary artery bypass surgery (CABG), the gold standard treatment at the time (U.S. National Library of Medicine 2017).\(^{133}\) A health economic analysis was conducted during this study to determine the cost per quality-adjusted life year (QALY). Drug-eluting stents were found to be more cost-effective both in the short and long term compared to CABG, saving an estimated US$5,000 (c. £3,840\(^{134}\)) per patient, although this was only seen in patients with a less complex disease (Cohen et al. 2014). Both the TAXUS and SYNTAX trials provided evidence that supported the use of drug-eluting stents over bare metal stents and CABG. They also highlighted which

---

\(^{131}\) Innovator_INT3.

\(^{132}\) Innovator_INT3.

\(^{133}\) Innovator_INT3.

\(^{134}\) Exchange rate as of 9 May 2019.
type of patient would receive the most benefit at different points in the disease pathway and what the cost was of providing this benefit to patients.

According to the innovator we interviewed, a market bid approach was taken with pricing. This meant Boston Scientific entered the market with a less expensive product than the competition, Johnson & Johnson, had at the time, making Boston Scientific’s stent more attractive to potential customers. This proved to be a successful approach and the company took a large market share in a short space of time. 

C.7.3. Entry into the health system

The first commercially available drug-eluting stent came from Johnson & Johnson, and the second was released by Boston Scientific in 2004 (DES TAXUS™ and TAXUS Liberté™). The drug-eluting stents differed between the two companies in their drug, polymer and mode of action. Boston Scientific then moved on from the TAXUS range to develop the Promus™ range of drug-eluting stents, which were a different, improved type of drug-polymer mix, and then the Synergy™ stent, released in 2012.

The first mode of entry of the innovation into the health system in England was through the SYNTAX clinical trials. This large evidence base for drug-eluting stents was a strong driver for initial adoption as the clinical community across the country could see that it resulted in good patient outcomes whilst providing financial savings. For entry of the drug-eluting stents into the NHS market, Boston Scientific worked with well-respected, leading cardiology clinicians from across the NHS. These experts provided advice on the right patients to use in clinical trials and the best approach to take.

When the product was first launched for market use, this was done on a small, hospital-by-hospital basis, using different clinicians than in the original trials, which then built up into regional procurement. Many NHS Trusts across England, in combination with their clinical commissioning groups (CCGs), were involved. Whether a Trust was involved often depended on their level of interest in collection of data and dissemination of clinical research; some institutions are much more interested in this compared to others.

Another driver of adoption was the National Service Framework. This set out a 10-year strategy for creating quality standards for the treatment of CHD, with the aim to reducing deaths from CHD and strokes and supporting adoption of treatments that have been proven to be clinically beneficial and cost-effective (Department of Health 2000). This provided support as it set a very clear, national direction for the treatment of CHD and allowed for the building of capacity within hospitals to implement drug-

135 Innovator_INT3.
136 Innovator_INT3.
137 Innovator_INT3.
138 Innovator_INT3.
139 PrivateSector_INT7.
140 Innovator_INT3.
141 Innovator_INT3, PrivateSector_INT7.
142 Innovator_INT3.
143 Innovator_INT3.
eluting stents.\textsuperscript{144} Local health communities were expected to adopt these standards, and as drug-eluting stents had a solid evidence base and NICE approval, they were chosen to be adopted so that Trusts could meet these standards.\textsuperscript{145}

A competitive pricing strategy also supported entry into the system. At the time of developing drug-eluting stents, Johnson & Johnson and Boston Scientific were both aware that the first one to market would have a significant competitive advantage. Although Johnson & Johnson got their product to market roughly six months ahead, Boston Scientific’s competitive pricing strategy allowed for their commercial success.\textsuperscript{146} The competition between the two providers was also beneficial for the customer in terms of a better commercial offer.\textsuperscript{147} Pricing negotiations between Boston Scientific and UK clients were often with individual clinicians or the procurement department of the hospital if they were closely linked with the clinician.\textsuperscript{148}

**C.7.4. Diffusion, scale-up and spread**

To identify potential adoption sites, Boston Scientific investigated the extent to which metal and drug-eluting stents were used in different UK locations and found that the drug-eluting stents occupied roughly 70 per cent of the market. However, this varied greatly depending on the region, with some areas reaching 80 per cent use of drug-eluting stents and some only reaching 30 per cent.\textsuperscript{149} Boston Scientific then approached hospitals with low uptake to listen to their concerns about the stents and outline the policy and NICE guidelines promoting their use. The positive recommendations by NICE were seen as an enabler of adoption, but according to our interviewee the lack of mandatory compliance inhibits adoption of the most cost-effective solution.\textsuperscript{150}

In addition, Boston Scientific had a relationship with the British Cardiac Intervention Society through the involvement of both in policy matters.\textsuperscript{151} The British Cardiac Intervention Society provided diffusion support by publishing credible data on the comparative adoption of drug-eluting stents.\textsuperscript{152} Our innovator interviewee thought that this may have helped influence clinicians behaviour, since if they saw a neighbouring hospital had adopted the stents, they may have been more likely to do the same.\textsuperscript{153}

**C.7.5. Impact**

Although the SYNTAX trial and NICE evidence suggest that drug-eluting stents have similar rates of mortality to standard bare metal stents and other traditional methods, they have been shown to reduce the

\textsuperscript{144} Innovator\textunderscore INT3.
\textsuperscript{145} Innovator\textunderscore INT3, PrivateSector\textunderscore INT7.
\textsuperscript{146} Innovator\textunderscore INT3.
\textsuperscript{147} Innovator\textunderscore INT3.
\textsuperscript{148} Innovator\textunderscore INT3.
\textsuperscript{149} Innovator\textunderscore INT3.
\textsuperscript{150} Innovator\textunderscore INT3.
\textsuperscript{151} Innovator\textunderscore INT3.
\textsuperscript{152} Innovator\textunderscore INT3.
\textsuperscript{153} Innovator\textunderscore INT3.
number of target vessel revascularisation and major adverse coronary events (Gulati, Rihal & Gersh 2009; National Institute for Health and Care Excellence 2008a). The SYNTAX trial also provided evidence for a reduction in stroke risk after surgery compared to the gold standard treatment at the time (two fewer strokes per 100 patients treated), which was highly clinically relevant due to the huge impact a stroke can have on an individual’s quality of life (Gulati, Rihal & Gersh 2009). According to NICE, although there is a slightly higher risk of thrombosis when using drug-eluting stents, this risk has been deemed small enough for the benefits to outweigh it (National Institute for Health and Care Excellence 2008a).

Evidence from the last NICE technology appraisal guidance in 2008 suggests that, despite the positive impact drug-eluting stents can have on health, they are not yet cost-effective for the NHS. NICE stated that once the cost difference between metal and drug-eluting stents is £300 or less, drug-eluting stents can be classed as cost-effective (National Institute for Health and Care Excellence 2008a). The NICE evaluation committee noted that at the time of writing, procurement arrangements were in place in many NHS regions that had a price difference of £300 (National Institute for Health and Care Excellence 2008a). In the ten years since this evaluation, it is possible that drug-eluting stents have become a more cost-effective investment for the NHS; however, we could not find any information regarding this.

C.7.6. Enablers

An interview with one innovator suggests that there are several factors that have supported the development, rollout, spread and uptake of drug-eluting stents so far. Their views, coupled with our reflections on the case vignette evidence, suggest that the key enablers of development and early entry of drug-eluting stents into the health system in England were:

- **The creation of the National Service Framework for Coronary Heart Disease** (Department of Health 2000), set out by the Department of Health (now the Department of Health and Social Care) in 2000. This outlines a national 10-year strategy to develop a standard of care for CHD that local health communities were expected to adopt. This framework also supported the NHS in deciding the best treatment to adopt based on clinical evidence and cost-effectiveness. As drug-eluting stents already had evidence of their effectiveness from clinical trials and the NICE health technology assessment recommendations, Trusts were able to make the decision to adopt the innovation and there were also greater resources and capacity available for further development and implementation of the stents.154

- **Certain CCGs and Trusts were more progressive in adopting drug-eluting stents**, as they had clear polices on which patients were more appropriate for drug-eluting stents and built capacity into the clinical pathway to treat them.155

- **The engagement of the British Cardiac Intervention Society supported Boston Scientific in increasing the adoption of the drug-eluting stents due to the local variation in implementation**. The Society published credible data on the different levels of adoption across

---

154 Innovator_INT3.
155 Innovator_INT3.
CCGs, which may have influenced clinicians’ behaviour and encouraged them to adopt drug-eluting stents in their hospital.\textsuperscript{156}

- The large evidence base for drug-eluting stents meant clinicians were able to see the benefits to patient outcomes as well as cost savings. Combined with NICE approval, Trusts were more likely to adopt drug-eluting stents to meet the standards set out in the National Service Framework for CHD.\textsuperscript{157}

\textsuperscript{156} Innovator\_INT3.

\textsuperscript{157} Innovator\_INT3.
C.8. Kooth

Box C.6: Key messages – Kooth

- **The innovation**: Kooth is an online mental health and emotional wellbeing platform for children and adolescents experiencing mental health or emotional challenges, which can reach out to those who cannot access face-to-face services, or prefer to engage through online means.

- **Enablers of successful innovation development and uptake**: The successful adoption and spread of the innovation was enabled by:
  - The direct ability to respond to a clear innovation need.
  - Early intelligence and groundwork to assess local needs across stakeholder communities.
  - Innovators’ personal networking and attendance at conferences were an enabler of early uptake through facilitating awareness-raising and relationships needed for uptake (e.g. with existing service providers).
  - Efforts of the innovating team and its collaborators to provide training on how to use the service for health professionals and advertising of the service.
  - Being a supplement to an existing service, rather than a replacement for one.
  - Local service transformation funds.
  - National policy developments putting the spotlight on both mental health innovation for young people, and digital solutions more widely.
  - Ensuring that contracting and commissioning works within the existing system architecture.

- **Evidence of impact**: While it is difficult to measure outcomes other than usage figures as children and young people access the service anonymously, case studies conducted by the innovator as well as self-reporting scaling tools integrated into the service helped to demonstrate that young people’s mental health and emotional wellbeing had improved following engagement with Kooth.

C.8.1. Background and context: the need for innovation in online mental health services for young people

The Office for National Statistics showed that one in eight children and adolescents aged 10 to 15 years reported symptoms of mental ill-health in 2011 to 2012 (Vizard 2018). The most recent comprehensive survey data also show that, in 2004, 10 per cent of 5- to 16-year-olds had a clinically diagnosable mental health disorder (Vizard 2018). In England, mental health treatment for young children is provided through NHS England’s Child and Adolescent Mental Health Services (CAMHS), which aims to help children and adolescents experiencing emotional, behavioural or mental health challenges or difficulties (Young Minds n.d.). In 2015, spending on child and adolescent mental health services was £901m across three funding sources – NHS England (38 per cent), clinical commissioning group (CCG) commissioning (48 per cent) and local authority commissioning (16 per cent) (NHS England 2016). In March 2015, NHS England published the ‘Future in Mind’ report, which delivered recommendations from a taskforce on how to improve support for children’s mental wellbeing. Existing problems and recommendations were clustered around five key themes, of which the first focuses on ‘promoting resilience, prevention and early intervention’ (Department of Health & NHS England 2015, 13). At the same time, NHS England released guidance for local transformation plans to deliver improvements in children and young people’s mental health and wellbeing from 2015 to 2020. Principles described as underpinning this transformation included an integrated, whole-system approach, an emphasis on prevention and early intervention and a move towards a joined-up approach (Department of Health &
NHS England 2015). In parallel, NHS England has also been responsible for the delivery of the Children’s and Young People’s Improving Access to Psychological Therapies programme (CYP IAPT), that, among other objectives, aims to improve access to evidence-based therapies through staff training in NICE-approved and evidence-based therapies (NHS England n.d.-a).

This case vignette is based on experiences shared by two individuals working at XenZone, the company behind Kooth, one individual from a healthcare provider organisation offering Kooth, one individual from a CCG that commissioned the service and one individual who wanted to remain anonymous, and is supported by additional desk research. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

### C.8.2. Idea generation

In 2004, XenZone founder Elaine Bousfield developed and launched Kooth, the UK’s first online counselling service for young people, in Stockport (Frith 2017). Bousfield, who was working as a psychotherapist in Manchester before founding XenZone, observed in her work that men and boys were less often seeking help when struggling with mental health issues. Research in the early 2000s suggested that online support could help this group of people, as it would be more accessible than face-to-face services as well as anonymous. As Bousfield wanted to reach out to people unable to access traditional services, she started to work on an online alternative. Kooth can also be a response to the growing problem of young people accessing inappropriate counselling material through existing online platforms (not tailored to their age and needs). According to an innovator interviewee, external healthcare professionals initially did not contribute to the development of Kooth, but later collaboratively further developed the service in pilots, providing data for analysing the use and acceptance of the service. 

---

158 CCG_INT10.
159 Anonymous_INT2, Innovator_INT1, Innovator_INT14.
160 Anonymous_INT2, Innovator_INT1, Innovator_INT14.
161 Innovator_INT1.
C.8.3. Entry into the health system

Kooth began as a local authority-funded service. One of the first adopters of Kooth was Stockport Council, and over time other local authorities also started to use the service.162 Early adoption was primarily driven by personal relations of XenZone to councils, and later on through recommendations to other potential providers and commissioners.

Through personal networks between XenZone and local services, as well as through awareness-raising at relevant conferences, CCGs in the North West of England started to commission the service. Kooth spread even more when commissioners moving to other organisations introduced the service in their new CCGs, because of good experiences in their previous roles.163 Early NHS adopters, such as Warrington CCG, worked with XenZone to develop Kooth further and advance the offer provided.164 The business case for Kooth was easy to articulate: it took pressure off the local system (given high demand for counselling), and it met a need that had been articulated by the target public population and was recommended by CCGs already commissioning the service.165 Given the general challenges in demonstrating return on investment from the commissioning of innovations, an interviewee from a CCG highlighted that the relatively straightforward business case for Kooth was important and an enabler of uptake and sustainability.166

162 Innovator_INT1.
163 Innovator_INT1.
164 CCG_INT10.
165 Innovator_INT1.
166 CCG_INT10.
Early pilots of the service were conducted in collaboration with local councils, such as West Sussex County Council, which used their local CAMHS transformation money to fund the pilots. Through such pilots XenZone came in contact with face-to-face providers such as YMCA Dialogue and partnered with them to provide a blended model where the Council promoted and contracted face-to-face and online services together. Kooth’s acceptability and growth as a service was helped by this type of working as they demonstrated they were a good system partner, providing a service the system did not currently have and that was a supplement rather than a replacement, and at a competitive price. XenZone adopted the approach to collaboratively offer face-to-face and online services when they started to work with NHS providers. One of the first Trusts they collaborated with was the North West Boroughs Healthcare NHS Foundation Trust (under its previous name as 5 Boroughs NHS Foundation Trust), with which they submitted a collaborative bid. As part of this bid, XenZone was a subcontractor of the NHS provider: this helped with commissioning as it meant that the number of contracts the commissioning body had to deal with was reduced; it also provided flexibility by fitting into the funding envelope available for commissioning counselling services more generally, and it helped streamline the commissioning process.

Lack of accreditation can present a particular challenge for uptake of digital products by the health system. To address this, Kooth worked with the University of Manchester to develop online counselling guidelines that included evidence from Kooth and other online counselling providers, and also collaborated with the University to deliver a British Association for Counselling and Psychotherapy (BACP)-accredited service through their counsellors, which provides a powerful assurance to commissioners about the quality of the service.

When XenZone negotiate with potential new commissioners of Kooth, they usually internally analyse the situation in the affected region by assessing the face-to-face services available as well as what else would be needed and how Kooth could fill those gaps. This assessment is often made together with commissioners. In addition, XenZone conduct an internal health economic analysis each time they make a new commissioning contract. The analysis includes an assessment of available face-to-face services in the population where Kooth should be provided to find out what else would be needed. This assessment should help to identify the demand needed in order to provide a sufficient amount of service and facilitate the articulation of a value offer.

When XenZone introduced Kooth into the NHS, competition was not an issue as the service was unique in its approach and in terms of the audience addressed. Commissioners appreciated that Kooth met their

---

167 In England, CAMHS are provided by several organisations such as NHS Trusts, local authorities, the private sector and voluntary organisations, and they are commissioned by CCGs (Parkin, Long & Bate 2017).
168 Innovator_INT1.
169 Innovator_INT1.
170 CCG_INT10.
171 CCG_INT10, Innovator_INT1.
172 CCG_INT10, Innovator_INT1.
173 Innovator_INT1, Innovator_INT14.
174 Innovator_INT1.
needs and that when they commissioned it there was no other product that provided all the elements of the service they wanted to offer. Over the years, competitive products have been introduced onto the market, but XenZone do not think that this affects the uptake or commissioning of Kooth. By contrast, interviewees noted that competition brings opportunities in terms of partnership and from a service perspective a wider range of products is beneficial for patients. An interviewee from XenZone also felt that they have an advantage over other innovators as they have many years of experience, which in addition has helped them ensure price-competitiveness.

C.8.4. Diffusion, scale-up and spread

In its infancy, XenZone relied heavily on personal networks and conferences for cross-pollination of information relevant for the development, refinement and market entry of its product. As it has become more established XenZone has more sophisticated development plans, but ultimately is still subject to the needs and interests of a local area. To ensure the service is used once commissioned in an area, XenZone provide in-reach in local schools and community settings to raise awareness and the profile of the Kooth service.

The increased policy focus on the development of digital solutions in the NHS helped drive interest from NHS commissioners. The ‘Future in Mind’ report’s call for harnessing the power of digital technology to help protect young people from mental harm and associated awareness-raising of this issue by MPs caused local transformation plans to look for digital solutions and thus discover and engage with Kooth. Over time this has caused a shift from local authorities to NHS organisations as commissioners of the service. The i-THRIVE model for CAMHS rollout, facilitated by the NHS Innovation Accelerator, has also helped the spread of an alternative model to Tier 2 services, which did not entirely fulfil the needs articulated by mental health service providers and patients, and has helped break through the boundaries of tiered service provision – it represents a shift towards an integrated approach to delivery that is much more suited to XenZone’s offer through Kooth.

Kooth innovators were initially concerned that the short termism of NHS contracts (sometimes as short as 12 months initially) and the lack of distinct performance measures for digital services may present a challenge for collecting evidence and demonstrating the benefits an online service, especially in

175 Anonymous_INT2, Innovator_INT1, Provider_INT1.
176 Anonymous_INT2, CCG_INT10, Innovator_INT1, Innovator_INT14.
177 Innovator_INT14.
178 Innovator_INT1.
179 Innovator_INT1.
180 CCG_INT10.
182 Anonymous_INT2, Innovator_INT1.
comparison to traditional face-to-face counselling. XenZone thus invested in educating commissioners and providers and actively collecting data to demonstrate the benefits of Kooth (see also Section C.8.5).\textsuperscript{183} Generally, Kooth was quickly taken up by both young people and healthcare professionals. The availability of the service outside normal working hours – in contrast to face-to-face counselling – was considered to have contributed to its success.\textsuperscript{184} The rollout of the service was enabled by both commissioners and Kooth working directly with schools in the commissioned region. In some regions, champions such as the CCG clinical lead for mental health in children gave credibility to the service so that providers, and particularly general practitioners (GPs), were comfortable signposting to the online platform.\textsuperscript{185}

When reflecting on the future of the adoption and spread of Kooth, interviewees noted that innovations such as Kooth are under threat, as there are increasing financial pressures in combination with the fact that mental health services cannot deliver cashable return on investment in the short term. More generally, payment-by-results funding models in Foundation Trusts for secondary care mean that block contracts for mental health are at risk.\textsuperscript{186}

A particular concern for XenZone in terms of recent policy developments, particularly related to the Digital Catalyst, is that their work is part of the evolving digital world where the evidence base is still growing. This means that their delivery model does not sit within NICE guidelines and does not carry the weight of other treatment options such as online cognitive behavioural therapy (CBT). However, XenZone interviewees noted that their service provides other benefits, such as reach, engagement and flexibility, that work for children and young people. Interviewees emphasised that there is a need for a shift towards accepting other evidence bases that reflect what digital approaches and services deliver.\textsuperscript{187}

As of May 2018, Kooth is being provided in 82 CCG areas in England, and two Health Boards in Wales.\textsuperscript{188}

\subsection*{C.8.5. Impact}

An inherent challenge given the anonymity of the service is that it is difficult to measure outcomes other than usage figures. XenZone have recognised this and, in this absence of metrics, have provided case studies and quarterly reports to illustrate the needs they are dealing with and the impact they are having. XenZone have also built in self-reporting scaling tools that demonstrate that young people using the service feel better following engagement with Kooth; however, as interviews across innovators, providers and CCGs themselves recognise, this does not enable them to quantify return on investment.\textsuperscript{189} According to an innovator interviewee, there are ongoing attempts to allow Kooth to report into national

\begin{itemize}
\item \textsuperscript{183} Innovator\_INT1, Innovator\_INT14.
\item \textsuperscript{184} Innovator\_INT1, Provider\_INT1.
\item \textsuperscript{185} Provider\_INT1.
\item \textsuperscript{186} CCG\_INT10, Innovator\_INT1.
\item \textsuperscript{187} Innovator\_INT1, Innovator\_INT14, Provider\_INT1.
\item \textsuperscript{188} Innovator\_INT1.
\item \textsuperscript{189} Anonymous\_INT2, CCG\_INT10, Innovator\_INT1, Provider\_INT1.
\end{itemize}
datasets for waiting times and access targets, which would help show how its activity contributes to nationally mandated targets. XenZone’s own usage figures and feedback mechanisms suggest that Kooth is more accessible than traditional services, with a better balance of ethnic minorities using it and other vulnerable groups providing positive feedback.190

C.8.6. Enablers

The interviews with innovator, CCG and provider representatives suggest that there are several key factors that supported the development, rollout, spread and uptake of Kooth so far. Insights shared in interviews, coupled with our own reflections, indicate that the key enablers of Kooth’s entry into and uptake in the health system in England were:

- **The direct ability to respond to a clear innovation need**: Both XenZone and commissioners think that the main enabler of Kooth’s successful introduction and uptake was that it was meeting several needs identified by frontline staff, which included offering a service outside regular counselling hours, offering something online that was an articulated need of children and teenagers as well as the possibility to use the service anonymously.191

- **Early intelligence and groundwork to assess local needs across stakeholder communities**: This helped develop an offer that is widely considered to be fit for purpose and helped articulate the value proposition.192

- **Innovators’ personal networking and attendance at conferences** were an enabler of early uptake through facilitating awareness-raising and relationships needed for uptake (e.g. with existing service providers).193

- **Efforts of the innovating team and its collaborators to provide training on how to use the service for health professionals and advertising of the service was seen to help adoption**: This included collaborating with face-to-face service providers around advertising the service and communicating the benefits of the service, as well as providing training for health professionals offering Kooth.194

- **Being a supplement to an existing service, rather than a replacement for one**: The idea of Kooth not being a replacement of existing face-to-face services, but an added value to available services, also helped spread.195

- **Local service transformation funds** have been consistently referred to as enabling the development and spread of Kooth.196

- **Successful pilots and reputation**: While XenZone had to go through official commissioning processes in each locality, its availability in other areas and its good reputation may have

190 Innovator_INT1.
191 Anonymous_INT2, Innovator_INT1, CCG_INT10.
192 Innovator_INT1, Innovator_INT14.
193 Anonymous_INT2, Innovator_INT1.
194 CCG_INT10, Innovator_INT14.
195 Innovator_INT1.
196 CCG_INT10, Innovator_INT1.
influenced new contracting decisions. A general shift towards accountable and integrated care as well as joint working in the NHS is also seen as beneficial for the commissioning and spread of Kooth.

- **National policy developments putting the spotlight on both mental health innovation for young people, and digital solutions more widely** (e.g. ‘Future in Mind’, i-THRIVE, local efforts of STPs, the House of Lords Library Note ‘NHS: Ability to Meet Present and Future Demand’).

- **Ensuring that contracting and commissioning works within the existing system architecture**: Subcontracting Kooth as part of overall mental health service provision and as a supplement to face-to-face services helped uptake, as it did not challenge existing systems or require new arrangements.

---

197 Anonymous_INT2.
198 Provider_INT1.
200 Anonymous_INT2, CCG_INT10, Innovator_INT1.
201 CCG_INT10.
C.9. Sleepio

Box C.7: Key messages – Sleepio

- **The innovation**: Sleepio is a digital cognitive behavioural therapy (CBT) programme aiming to help users improve their sleep and overcome insomnia.

- **Enablers of successful innovation development and uptake**: The successful development of Sleepio and its introduction into the health system in England was enabled by:
  o An innovator’s personal experience of the health condition was a driver behind the idea and the programme development, and a provider representative’s own sleep problems influenced the decision to offer the programme to their employees.
  o The relevance of the innovation to a significant health challenge for which existing solutions did not meet the scale and nature of need has supported uptake.
  o Patients and healthcare professionals were engaged in the design and testing of the programme, which enhanced its user-friendliness and helped ensure that relevant and effective content is provided. Ongoing feedback from users further facilitated adaptations over time.
  o The nature of the innovation as a complement rather than a full replacement for existing services, or in some cases as an alternative to existing services.
  o A rigorous evidence base on the clinical effectiveness of Sleepio lent credibility and inspired confidence in users and commissioners.
  o Participation in national innovation policy initiatives such as the NHS Innovation Accelerator fellowship programme facilitated uptake.
  o Personal networking and word-of-mouth recommendations.
  o Support from the innovator throughout the introduction and diffusion of the innovation into the NHS.
  o Collaborative commissioning efforts are helping to support scale-up and spread.
  o The user-friendly design of the programme supports quick uptake.

- **Evidence of impact**: Randomised controlled trials (RCTs) conducted by the innovators as well as a NICE medtech innovation briefing present evidence of Sleepio’s clinical effectiveness. The NICE briefing also suggests that Sleepio could lead to better recovery rates from insomnia compared to face-to-face services, and indicates that it could save costs in the health system, but existing cost analyses do not sufficiently satisfy NICE’s requirements of economic evaluation (National Institute for Health and Care Excellence 2017a).

C.9.1. Background and context: the need for innovation to address sleep problems

It is estimated that one third of the UK population will experience the symptoms of insomnia (Harding 2014; Mental Health Foundation 2011; Morphy et al. 2007; Stewart et al. 2006). Women are thought to develop insomnia 1.5 to 2 times more often than men (Harding 2014; Morphy et al. 2007; Stewart et al. 2006). Prior to the release of Sleepio, researchers set out to understand the impact of insomnia in the UK (Espie et al. 2012). In 2011, an online survey of 11,129 respondents indicated that a quarter of people with insomnia had lived with it for more than 11 years. Sleep deprivation and poor sleep has a negative impact on concentration, productivity, energy levels and mood: the 2011 survey showed that 77 per cent of insomnia sufferers had concentration problems, 64 per cent were less productive, 93 per cent reported lack of energy and 83 per cent mood problems. More than half of the respondents also reported that their insomnia resulted in relationship difficulties (Espie et al. 2012; McVeigh 2011). Indeed, persistent insomnia has been shown to be a major risk factor for mental health problems, especially the development of depression (Baglioni et al. 2011). Other studies indicate that insufficient sleep is linked to poor health including cardiovascular disease, coronary heart disease, cerebrovascular disease, diabetes mellitus, hypertension, malignant neoplasm and septicaemia (see, e.g., Kochanek et al. 2014; Nagai, Hoshide &
Kario 2010). A recent RAND Europe study also showed that sleep deprivation has an impact on the economy, suggesting that sleep-deprived employees cost the UK economy $50 billion (£36 billion) per year (Hafner et al. 2016).

This case vignette is based on experiences shared by individuals working at Big Health, the US-based company behind the mental health programme Sleepio, one representative from Public Health England as well as two representatives of NHS Trusts offering Sleepio to their staff. Interview evidence is supported by additional desk research. As the entry of the programme into the healthcare system in England was at relatively early stages at the time of conducting the research for this case vignette, we were unable to speak to NHS England providers offering Sleepio to their patients (but could speak to providers offering Sleepio to their staff). For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

C.9.2. Idea generation

Peter Hames, psychology graduate and CEO of Big Health, the company behind Sleepio, developed insomnia in the early 2000s, and referred to it as ‘one of the worst experiences of [his] life’ (Hames 2012). Despite good evidence for the effectiveness of CBT in overcoming insomnia existing at that time (see, e.g., Espie et al. 2007; Sivertsen et al. 2006; Wang, Wang & Tsai 2005), Hames’ general practitioner (GP) only prescribed sleeping pills. He took the pills, but they did not solve his sleeping problems. Hames eventually became aware of research conducted by Colin Espie, Professor of Sleep Medicine in the Nuffield Department of Clinical Neuroscience at the University of Oxford. Espie had extensively worked in the area of insomnia and its management using CBT. Making use of Espie’s CBT methods and six-week programme (see, e.g., Espie 2006; Espie et al. 2007), Hames found that he was able to address his insomnia and overcome his sleeping problems in a short time frame of six weeks (Hames 2012).

Although Hames’ sleep had significantly improved, he remained frustrated that CBT for managing insomnia specifically (as opposed to more general CBT, which is widely utilised in England to treat anxiety or depression (NHS Choices 2016a)) was not widely supported in the healthcare system in England, despite research evidence demonstrating its effectiveness.

This led Hames to explore the idea of using the internet to provide tailored online CBT-based tools to help other people suffering from insomnia. Hames contacted Espie, who was enthusiastic about Hames’ vision. An initial team of four people – Hames, Espie, one engineer and an intern – developed the first version of Sleepio, which was completed in 2010 (Hames 2012). From the very beginning, Sleepio was entirely based on clinically validated and evidence-based data. As an interviewee noted, before Hames and Espie recruited more engineers to develop the programme, they engaged researchers to generate

---

202 As of early 2018.

203 More recent evidence includes, e.g., Qaseem et al. (2016), Riemann et al. (2017) and Wilson et al. (2010).

204 Innovator_INT2.

205 Innovator_INT2, Innovator_INT7.

206 Innovator_INT5, Innovator_INT7.
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

evidence of clinical effectiveness, such as data showing improvement in initiating or maintaining sleep, the quality of sleep or less frequent early morning waking (Espie et al. 2012). Evidence was generated through a placebo randomised-controlled trial. According to Big Health representatives, they were the first ones to conduct a placebo-controlled trial for an online CBT sleep improvement course. Since the first study published in the journal Sleep, a further seven randomised controlled trials (RCTs) (with a total sample of 6,937 participants) demonstrating Sleepio’s clinical effectiveness have been published in several peer-reviewed academic journals, including Lancet Psychiatry, Sleep, Psychological Medicine, BMJ Open, Journal of Clinical Psychiatry and Journal of Applied Psychology.

Patients and members of the public were not only involved in the RCTs, but also informally when designing the programme. For instance, they were asked to test it and provide feedback on its usability and design. In addition, a strong community of early users regularly provided feedback, which has informed adaptations over time. In the initial stages of the development of Sleepio, Big Health also conducted focus groups with clinicians to find out about their expectations and sought input from other healthcare specialists such as clinical psychologists and academics. Big Health still works with advisors from academia and clinical practice to further improve the programme (Sleepio n.d.).

Figure C.6: Sleepio programme on a smartphone

Source: Hames (Sleepio.com/blog) (2014), image courtesy of Big Health

207 Innovator_INT7.
208 Innovator_INT2, Innovator_INT5, Innovator_INT7.
209 Innovator_INT2.
210 Innovator_INT7.
211 Innovator_INT7.
C.9.3. Entry into the health system

According to the innovators behind Sleepio that were consulted for this case vignette, entry into the UK healthcare system has been a slow process.\textsuperscript{212} Despite being a UK-founded company, Hames and Espie established a Big Health office in San Francisco, USA, in 2015, as there was opportunity for greater traction in the US healthcare market. Nevertheless, Big Health is still trying to ensure Sleepio is commissioned more widely in the UK, and to that end have invested in growing their UK team.\textsuperscript{213} At the time of this study, a few Trusts, clinical commissioning groups (CCGs) and individual services were offering the programme, but the uptake across England was still fragmented.\textsuperscript{214}

The programme was first recommended – on a voluntary basis – by GP friends of the team, and in 2012, pharmacy chain Boots started to sell a six-week Sleepio course online (The Sleep Council 2013).\textsuperscript{215} The first official step into the NHS was made in March 2013, when Sleepio was included as one of the first NHS-reviewed and accredited apps in the NHS Health Apps Library hosted by NHS Choices, which was created to make it easier for patients to find NHS-endorsed health apps and programmes. In 2014, an Improving Access to Psychological Therapies (IAPT) service in Manchester, which had heard of Sleepio from patients using the programme, approached Big Health. This contact developed into a first pilot with initially 50 patients, which was eventually extended to 100 patients. Big Health provided Sleepio for free to the IAPT service, receiving tracked outcomes in return.\textsuperscript{216} As the clinical outcomes and the feedback from users were throughout positive, the IAPT service decided to commission Sleepio after the pilot in 2015.\textsuperscript{217} The results of this work suggested that Sleepio could improve not only sleep but also symptoms of depression and anxiety, and were published in 2017 (Luik et al. 2017).\textsuperscript{218} The positive experience of the IAPT service also helped Big Health to introduce Sleepio into other therapy and counselling services in the North West and North of England.\textsuperscript{219}

C.9.4. Diffusion, scale-up and spread

A major step in the diffusion of Sleepio into the NHS was taken in 2015, when Big Health co-founder Peter Hames was selected as a fellow by the NHS Innovation Accelerator programme. The programme enabled Hames to get in contact with relevant people in the NHS as well as other innovators and to test routes to the market. It also facilitated engagements with CCGs and Community Pharmacists, increased media publicity and helped to initiate a pilot in which Sleepio was offered to NHS employees (UCL Partners et al. 2016).

\textsuperscript{212} Innovator\_INT2, Innovator\_INT7.
\textsuperscript{213} Innovator\_INT2.
\textsuperscript{214} Innovator\_INT7.
\textsuperscript{215} Innovator\_INT7.
\textsuperscript{216} Innovator\_INT7.
\textsuperscript{217} Innovator\_INT7.
\textsuperscript{218} Innovator\_INT2.
\textsuperscript{219} Innovator\_INT7.
From 2015, Big Health also reached out to bring Sleepio to more regions in England. The idea was to make it available nationally; however, Big Health interviewees found it difficult to make this happen, as commissioning agreements usually happen at a local level with individual organisations. An interviewee noted that a big barrier in this context is capacity to advocate and negotiate with individual organisations, which small companies usually do not have.\textsuperscript{220}

Big Health representatives emphasised that the slow entry into the NHS is also partly related to Sleepio being a digital service, for which there is a lack of a clear centralised mechanism to commission innovations nationally.\textsuperscript{221} Another barrier is related to the lack of clear cost data on different services in the NHS, which can create difficulties for a small start-up aiming to negotiate with potential commissioners and providers.\textsuperscript{222}

However, NHS organisations currently pay for patient access to Sleepio in selected areas. As of November 2017, it was available to IAPT patients from ten CCGs in England and to staff in three Trusts (National Institute for Health and Care Excellence 2017a).\textsuperscript{223} In addition, and more recently, patients from 32 London CCGs can access Sleepio as part of the Healthy London Partnership.\textsuperscript{224}

The Healthy London Partnership – a collaborative of NHS organisations, councils, the Mayor of London and other organisations based in London – have set up a digital wellbeing initiative, ‘Good Thinking’, to contribute to the overall wellbeing of Londoners. As part of this initiative, which at the time of writing was still in a beta phase, 12 mental health programmes addressing anxiety, low mood, sleep issues and stress have been commissioned – one of them being Sleepio. Sleepio’s successful uptake through this programme was facilitated by a combination of a strong evidence base on effectiveness (including a positive NICE medtech innovation briefing) and that it met the criteria set out in the ‘Digital Assessment Questions’,\textsuperscript{225} which are part of the NHS health app assessment process developed by NICE, NHS England, NHS Digital and Public Health England (NHS Health Developer Network 2018).\textsuperscript{226} Moreover, it was considered to be important to offer programmes addressing sleep issues, as research suggested that sleeplessness may cause mental health problems.\textsuperscript{227}

As the Healthy London Partnership aimed to offer digital self-help programmes across London, they had to negotiate with local authorities and CCGs to participate in the initiative as well as to contribute to the funding. Overall, 19 local authorities and all London CCGs currently support the initiative. A number of

\textsuperscript{220} Innovator_INT7.

\textsuperscript{221} Innovator_INT5, Innovator_INT7.

\textsuperscript{222} Innovator_INT7.

\textsuperscript{223} We were unable to acquire a full list of CCGs and providers currently offering Sleepio and contact points to follow-up with.

\textsuperscript{224} CCG_INT5, Innovator_INT7.

\textsuperscript{225} The questionnaire includes questions on, for example, indicators of effectiveness and the service’s evidence base, ongoing studies, regulatory approval, clinical safety, privacy and security, usability and accessibility, interoperability and technical stability (NHS Health Developer Network 2018).

\textsuperscript{226} CCG_INT5.

\textsuperscript{227} CCG_INT5.
participating authorities and CCGs also supported pricing negotiations with the innovators. Similarly, recognition of the scale of burden posed by sleep problems drove acceptance by provider organisations. According to some of our interviewees, the ability to access Sleepio from the privacy of home was also felt to be an attractive feature for some user groups. In addition, this alternative offer to face-to-face CBT was seen to be a way to cope with demand for CBT-based therapies and reduce pressures on the health system.

Big Health has worked with both commissioners and providers to support Sleepio’s uptake. The company’s approach to engaging with providers has varied. In some cases, Big Health has approached Trusts for participation in pilots offering the programme for free to staff for a period of a year in the hope of wider uptake post pilot stages, and in others they have been actively approached. One of these Trusts, which had heard of Sleepio from satisfied users, negotiated pricing directly with Big Health, agreeing on an adequate price for the company that also allowed the Trust not to overstrain their budget for health initiatives. Both Trusts continued to offer Sleepio to their staff after an initial period of 12 months, as they received a lot of positive feedback from employees using the programme. In addition, usage data provided by Big Health showed the positive impact of Sleepio on sleep, productivity and stress levels.

According to innovators behind the Sleepio programme, the competitive landscape has not influenced Sleepio’s development or the spread of their innovation. This is attributed to the strong evidence base that the innovators think distinguishes their programme from other products, as well as to, according to provider representatives, the absence of directly comparable products. The ‘Good Thinking’ initiative, however, also includes a second programme addressing sleep issues, as they wanted to offer people more than one choice.

In early 2018, it was announced that Big Health had been awarded funding from Innovate UK through the Digital Health Technology Catalyst programme. Working with the Oxford Academic Health Science Network (AHSN), total funding of almost £1m will enable Big Health to provide access to Sleepio to people living in Berkshire, Buckinghamshire and Oxfordshire (Oxford Academic Health Science Network 2018). According to an interviewee, this is the first NHS rollout of a direct-access digital programme. Big
Health will develop a blueprint for wider uptake of digital interventions to improve sleep across the NHS in England.\(^{238}\)

### C.9.5. Impact

As part of its aspiration to enter the UK health system, Big Health undertook health economic analyses. Data from the pilot study in Manchester showed that Sleepio led to a better recovery rate, compared with the average recovery rate of IAPT services (Sleepio: 59 per cent reliable recovery rate; IAPT services (2015): 43 per cent reliable recovery rate) (Luik et al. 2017).\(^{239}\)

As ‘Good Thinking’ only started in November 2017, it was too early at the time of the interview\(^ {240}\) to have observed any return on investment or indicators of value for money from adoption and rollout of the Sleepio programme, beyond pilots, but an evaluation will be conducted by King’s College London.\(^ {241}\)

Despite the lack of formal evaluation evidence, initial feedback from users in two Trusts offering Sleepio to their staff has been very positive. Big Health’s own data suggest significant improvements amongst 2,300 employees who have used the programme: sleep improved by an average of 2 hours and 36 minutes per week, stress was reduced by 34 per cent, absenteeism due to sleep problems fell by 56 per cent and presenteeism\(^ {242}\) by 32 per cent.\(^ {243}, 244\)

Research suggests that Sleepio also reduces symptoms of depression and anxiety and that this happens in parallel to improved sleep (e.g. Bostock 2015; McGrath et al. 2017). However, Big Health interviewees noted that while economists found that Sleepio is viable and may save costs compared to face-to-face CBT,\(^ {245}\) there is not yet enough data to demonstrate its cost-effectiveness from wider scale usage in the real world.\(^ {246}\)

A recent NICE medtech innovation briefing indicated that Sleepio could save costs and provide a better recovery rate than face-to-face CBT, but existing cost analyses do not sufficiently satisfy NICE’s requirements of economic evaluation to prove this assumption (National Institute for Health and Care Excellence 2017a).

According to a Big Health representative, it is particularly challenging for small and medium-sized enterprises (SMEs) working with the NHS to demonstrate cost savings, as they often do not have the

\(^{238}\) Innovator_INT2.

\(^{239}\) Innovator_INT7.

\(^{240}\) March 2018.

\(^{241}\) CCG_INT5.

\(^{242}\) Presenteeism is understood as ‘reduction in job effectiveness’, and how sleep affects productivity at work (Bostock, Luik & Espie 2016, 684).

\(^{243}\) Big Health measures changes to stress, absenteeism and presenteeism based on users’ self-reported data in their sleep diaries on Sleepio, which is a common and recognised tool for insomnia assessments (see, e.g., Coates et al. 1982; Edinger et al. 1997; Espie et al. 2012; Morin & Espie 2003).

\(^{244}\) Provider_INT10.

\(^{245}\) See, e.g., Thiart et al. (2016), indicating an 87 per cent probability that internet-based CBT for insomnia in occupational health is more cost-effective than face-to-face treatments, and suggesting that an employer offering internet-based CBT for insomnia would get €3.70 (c. £3.20; exchange rate as of 9 May 2019) back for every €1 (c. £0.90; exchange rate as of 9 May 2019) invested.

\(^{246}\) Innovator_INT7.
capacity to undertake wide-scale analyses to show cost impact.\textsuperscript{247} A further challenge related to this is the nature of Sleepio: as it is a programme used by patients at home it is harder to evaluate the innovation’s cost-effectiveness compared to treatments received in a clinical setting, due to greater difficulty in collecting evaluation evidence.\textsuperscript{248}

C.9.6. Enablers

Several key factors have supported the development and introduction of Sleepio into the health system in England so far. Insights shared in interviews, coupled with our own reflections, indicate that these key enablers were:

- An innovator’s personal experience of the health condition was a driver behind the idea and the programme development, and a provider representative’s own sleep problems influenced the decision to offer the programme to their employees.\textsuperscript{249}
- The relevance of the innovation to a significant health challenge for which existing solutions did not meet the scale and nature of need has supported uptake.\textsuperscript{250}
- Patients and healthcare professionals were engaged in the design and testing of the programme, which enhanced its user-friendliness and helped ensure that relevant and effective content is provided. Ongoing feedback from users further facilitated adaptations over time.\textsuperscript{251}
- The nature of the innovation as a complement rather than a full replacement for existing services, or in some cases as an alternative to existing services (e.g. to reach people unable or unwilling to make use of conventional face-to-face therapies) enables uptake as it provides value in terms of reducing pressures on the service but does not raise concerns amongst the workforce that their services will not be needed.\textsuperscript{252}
- A rigorous evidence base on the clinical effectiveness of Sleepio lent credibility and inspired confidence in users and commissioners and was a distinguishing feature compared to competitor products. Research results were also published in peer-reviewed journals such as *Lancet Psychiatry*, *Sleep*, *Psychological Medicine*, *BMJ Open*, *Journal of Clinical Psychiatry* and *Journal of Applied Psychology*.\textsuperscript{253}
- Participation in national innovation policy initiatives such as the NHS Innovation Accelerator fellowship programme facilitated uptake due to the support offered through the programme in terms of access to key decision makers and networks, support in testing routes to market and building relationships with potential future providers.\textsuperscript{254}

\textsuperscript{247} Innovator\_INT7.
\textsuperscript{248} Innovator\_INT7.
\textsuperscript{249} Innovator\_INT2, Innovator\_INT5, Innovator\_INT7, Provider\_INT10.
\textsuperscript{250} Provider\_INT10.
\textsuperscript{251} Innovator\_INT7.
\textsuperscript{252} CCG\_INT5, Innovator\_INT2, Innovator\_INT5, Innovator\_INT7, Provider\_INT10.
\textsuperscript{253} CCG\_INT5, Innovator\_INT2, Innovator\_INT5, Innovator\_INT7, Provider\_INT4, Provider\_INT10.
\textsuperscript{254} Innovator\_INT7.
• **Personal networking and word-of-mouth recommendations enabled the spread of the programme:** Word-of-mouth recommendations were particularly helpful in the first years after Sleepio was developed. It enabled the team to reach out to and more effectively negotiate with other potential providers. Big Health was also approached by the IAPT service in Manchester after some of their patients recommended the programme.\(^{255}\) Similarly, according to Trust interviewees, they became aware of Sleepio through satisfied users and recommendations helped spread Sleepio across their organisations.\(^{256}\)

• **Support from the innovator throughout the introduction and diffusion of the innovation into the NHS** allowed for an easier introduction into organisations and informed potential users about the offer (e.g., provision of background information and other material, IT support, sharing of data on users’ progress).\(^{257}\)

• **Collaborative commissioning efforts are helping to support spread and have brought benefits to both commissioners and innovators:** The ‘Good Thinking’ initiative will enable the efficient rollout of Sleepio across 32 CCGs in London at pace and at scale and also involved an agreement on pricing satisfying both commissioners and innovators.\(^{258}\)

• **The user-friendly design of the programme supports quick uptake:** The interactive nature of Sleepio, its usability as well as its availability 24/7 were seen as important factors when deciding to adopt the programme.\(^{259}\)

In reflecting on current policy initiatives, an interviewee noted that they find Sustainability and Transformation Partnerships (STPs) to be a promising idea. As they would cover larger areas than individual CCGs, there is the hope that this would facilitate commissioning and the spread of innovations developed by start-ups. In addition, the interviewee believes that a more centralised approach to commissioning would also make the healthcare system more efficient and would reduce the costs for both innovators and the NHS.\(^{260}\) The Innovation and Technology Payment (ITP) is also seen as a useful initiative to speed up innovation uptake and diffusion.

---

\(^{255}\) Innovator\_INT7.

\(^{256}\) Provider\_INT4, Provider\_INT10.

\(^{257}\) Provider\_INT10.

\(^{258}\) CCG\_INT5, Innovator\_INT7.

\(^{259}\) Provider\_INT10.

\(^{260}\) Innovator\_INT7.
C.10. MoodGYM

Box C.8: Key messages – MoodGYM

- **The innovation**: MoodGYM is a form of computerised cognitive behavioural therapy aimed at young people suffering mild to moderate anxiety or depression (Mental Health Innovation Network 2014; MoodGYM n.d.).

- **Enablers of successful innovation development and uptake**: The successful adoption and spread of the innovation was enabled by:
  - Stakeholder engagement in product development, which ensured relevant content and the user-friendly design of the programme. This included engagement of service providers and service users, research experts on mental health and graphic designers.
  - Collecting rigorous evidence for the clinical and cost efficacy of MoodGYM through randomised controlled trials (RCTs) enabled MoodGYM to attract additional funding to support its development and spread.
  - Advocacy by influential individuals helped ensure and sustain commitment to funding from the Australian government, which helped support the sustainability and scale-up of the programme in Australia. Evidence of success in the Australian context supported the Australian National University, and later eHealth Hub (the company that delivers MoodGYM), in their efforts to make MoodGYM available in other countries, including the UK.
  - Changing the provider of the software from the Australian National University to a private company enabled sustainability in MoodGym provision because the university was not in a position to deliver MoodGYM on a long-term basis. This was relevant for both the Australian context where MoodGym originated and for England, as the provision of the service in England was via the Australian-based company.

- **Evidence of impact**: MoodGYM has been shown to be more cost-effective than prescribing antidepressants (Christensen & Griffiths 2007). Evidence suggests it reduces symptoms of depression and anxiety, and that this effect is sustained at least a year after individuals complete the MoodGYM programme (Christensen, Griffiths & Jorm 2004; Mackinnon, Griffiths & Christensen 2008).

C.10.1. Background and context: The need for innovation in treatment for mental health illnesses in young people

In England, it is estimated that one in six individuals experience a common mental health illness, with 3.3 in every 100 people suffering from depression, 5.9 in every 100 people suffering from anxiety and 7.8 in every 100 suffering from a mix of these (Mind 2017). There is evidence to suggest that many mental health issues begin early on in life; for example, anxiety disorders are thought to emerge at around age 11 (Mental Health Foundation 2016). Later childhood and adolescence can often be a trigger for mental health illnesses, such as starting new schools or university, puberty, school pressures and changes to family structures, although statistics on the numbers affected in the UK are currently outdated (Mental Health Foundation 2016).

Anxiety and depression are often treated with drug therapy and/or psychotherapies, such as cognitive behavioural therapy (CBT). CBT combines cognitive and behavioural therapy to change the thought processes of individuals to improve their coping mechanisms during difficult situations, with the aim to reduce the symptoms of depression or anxiety (Mind 2017). Computerised CBT (cCBT), is CBT delivered by a computer, and NICE guidelines in England promote this as an initial, low intensity treatment for depression. cCBT can either be provided commercially, or free to use, and evidence is
mounting for its efficacy, with some studies suggesting similar results to those seen in face-to-face CBT (Gilbody et al. 2016).

MoodGYM is a form of cCBT provided online. It is a self-help programme for individuals at risk of or suffering from mild to moderate anxiety or depression (Mental Health Innovation Network 2014; MoodGYM n.d.). MoodGYM is made up of five modules that involve interactive exercises, assessments and relaxation audio to teach the principles of CBT (Mental Health Innovation Network 2014). The interviewee said that, as of November 2017, MoodGYM had 1.2 million users worldwide.261

This case vignette was developed after an interview with an innovator of MoodGYM alongside desk research. For the purposes of respecting the interviewee’s informed consent, the individual is not named in this case vignette. As MoodGYM is not yet delivered by the NHS (it is marketed directly to consumers), we were unable to speak with any commissioners or providers.

**Figure C.7: Interface of MoodGYM**

![Image of MoodGYM interface](Source: Reproduced from ReachOut.com [n.d.] with permission from the interviewee)

**C.10.2. Idea generation**

The idea to create MoodGYM was born in 2001 after researchers in Australia conducted a review of Australia’s clinical guidelines for depression in young people (National Health and Medical Research Council 1997). The review identified that young adults aged 18 to 24, especially men, were at the highest risk of mental disorders, but were very difficult to target with prevention programmes due to various barriers (National Health and Medical Research Council 1997).262 These include the cost of face-to-face psychiatry appointments, the lack of psychologists trained in treating mental illness in young people, and the stigma that young people attach to attending face-to-face psychiatry appointments (National Health and Medical Research Council 1997).263 According to an interviewee for this case vignette, a lack of

---

261 Innovator_INT6.
262 Innovator_INT6.
263 Innovator_INT6.
locally available programmes and the financial resources required to bring in external mental health support into provider organisations in Australia further confound the challenge.264

These challenges to access to psychotherapy inspired a team of researchers and the Australian National University to develop an internet-based mental health support programme (MoodGYM). At the time, the Australian government had also established a National Action Plan for the promotion of mental health and prevention of mental disorders in Australia, supported by the Department of Health (Commonwealth Department of Health and Aged Care 1998).

C.10.3. Development of the innovation

The initial development of MoodGYM was driven by a small group of stakeholders spanning clinicians, academic researchers and potential service users (i.e. young people with mental health issues). Clinicians from a range of backgrounds, mental health experts and trained research psychologists contributed to the content of the CBT programme during the initial development phase.265 This included contributions through writing or reviewing content. The innovation team also involved young people themselves (i.e. potential service users) in early product testing (acceptance testing) to help ensure appropriateness of content and identify any potential barriers to access.266 These views from the future end users were gathered during informal focus groups. Finally, graphic designers and web developers were commissioned to create the actual online platform.267

MoodGYM had an initial rapid development stage in the early 2000s, coinciding with the expansion of the internet. The first edition of MoodGYM was developed as a pilot in Australia and once adaptations and changes had been made to the first edition (after user feedback), a randomised controlled trial (RCT) was conducted, with the results published in 2004 (Christensen, Griffiths & Jorm 2004). The results of the RCT reported that that MoodGYM was effective at reducing dysfunctional thinking, anxiety and symptoms of depression (Bennett 2016). A follow-up study four years later showed the 12-month outcomes of MoodGYM (Mackinnon, Griffiths & Christensen 2008).

This process of piloting and adapting the MoodGYM service involved end user feedback to ensure it remained user-friendly and accessible to the target patient group. The early development phase occurred at the Australian National University, funded by research grants from the government and other sources, and support from the university. Additional funding was obtained from the Australian government in 2007 to support sustainable delivery of MoodGYM (updates to maintenance and ongoing security, content and IT, user and clinical support and promotion of the programme to Australian users), and this funding is continuing today. This is largely due to the lobbying efforts of senior figures in politics, including public servants and policy advisors, to ensure eMental health programmes remain an area of

264 Innovator_INT6, referring to evidence from a colleague.
265 Innovator_INT6.
266 Innovator_INT6.
267 Ongoing work from software developers is key to ensuring that MoodGYM stays up to date, remains user friendly and is resilient against cyber-attacks.
focus and investment, as well as MoodGYM reaching individuals in rural areas, rather than being focused on urban areas, which makes it attractive investment for the government.\(^{268}\)

After the initial clinical trial (Christensen, Griffiths & Jorm 2004), an in-house software team was established at the Australian National University to advance the original version of MoodGYM. This allowed for automated research trials to be undertaken, to help improve the service offered (Bennett 2016).\(^{269}\)

By 2016, it became apparent that it was becoming difficult for the Australian National University to sustainably offer MoodGYM to users due to universities not being in a good position to deliver such services. Consequently, a spin-off company, eHub Health, was set up to deliver MoodGYM to patients and to create a sustainable future for the innovative platform and the service being offered through it. As part of the commercialisation, users outside of Australia now pay to use the MoodGym (whereas it had previously been free), although eHub Health ensured that the cost remains as low as possible.\(^{270}\)

Creation of the new company to deliver MoodGYM also allowed individuals with business experience to be involved in its management. The more powerful version of MoodGYM was delivered by eHub Health until 2017, when an updated version was released that is now mobile responsive and has adapted to new website trends.\(^{271}\)

C.10.4. Entry into the health system and wider adoption

As the internet became widely accessible shortly after MoodGYM was delivered, the programme could be delivered to users worldwide. The majority of MoodGYM users are in the UK, which the interviewee felt is likely to be related to NICE guidelines promoting the use of eCBT. According to an interviewee involved with developing the innovation,\(^{272}\) these guidelines may have been influenced by the large body of research that had been conducted on MoodGYM, and other eCBT programmes, showing its beneficial effects. These guidelines were some of the first in the world to promote eCBT.

Although some NHS Trust websites provide links to the MoodGYM website, the NHS itself has not adopted MoodGYM and does not provide access to it. Discussions with the NHS did take place, but our interviewee felt that attitudes to supporting self-help in the UK are still somewhat averse, and that this may have hindered adoption through the health system despite NICE endorsement.\(^{273}\)

Currently, individuals subscribe to MoodGYM individually at a cost of Aus$39 per year (c. £21)\(^{274}\) (MoodGYM n.d.).\(^{275}\) Despite not being offered by the NHS, according to the innovator we interviewed for this case vignette, MoodGYM still has relatively high individual uptake in the UK and organisations

\(^{268}\) Innovator_INT6.
\(^{269}\) Innovator_INT6.
\(^{270}\) Innovator_INT6.
\(^{271}\) Innovator_INT6.
\(^{272}\) Innovator_INT6.
\(^{273}\) Innovator_INT6.
\(^{274}\) Exchange rate as of 9 May 2019.
\(^{275}\) Innovator_INT6.
looking to promote high-quality mental health support, for example universities and workplaces, are able to buy subscriptions.\textsuperscript{276} The cost of these subscriptions varies depending on the size of the organisation, although large discounts are provided for educational institutions.\textsuperscript{277} According to an innovator we spoke to, the adoption of MoodGYM has not been influenced by the current competitive landscape.\textsuperscript{278} A wide variety of programmes were seen as conducive to continual improvement of offers to patients and shared learning between innovators,\textsuperscript{279} especially in the presence of guidelines supporting specific practices and features, over specific products. However, our interviewee felt that there has been a recent increase in the development of cCBT programmes that are not research- and evidence-based, raising concerns about benefit to patients and – according to our interviewee – being an area in need of regulatory attention.\textsuperscript{280} Policy has had little impact on MoodGYM development and adoption to date.\textsuperscript{281}

\textbf{C.10.5. Impact}

The initial testing of MoodGYM did not include a health economic assessment, although a main driver of the early development of MoodGYM was to deliver a cost-effective service to patients.\textsuperscript{282} Later trials did include health economics analysis and these found that using MoodGYM was more cost-effective than the use of antidepressant medication (Christensen & Griffiths 2007), although more recent evidence has found that MoodGYM is actually less cost-effective than usual general practice (GP) care (Duarte et al. 2017). According to our interviewee, although these assessments helped to show that MoodGYM is cost-effective, the success of the innovation was more likely to be due to its clinical efficacy.\textsuperscript{283}

The first two clinical trials on MoodGYM found that it was significantly better than a control at reducing symptoms of depression and dysfunctional thinking and improving knowledge of CBT (Christensen, Griffiths & Jorm 2004). The reduction in depression symptoms could still be detected 12 months later (Mackinnon, Griffiths & Christensen 2008). Over 25 RCTs have been conducted on MoodGYM across a variety of settings and populations, including schools, universities and NHS Choices online, covering both prevention and treatment of anxiety and depression. These have shown the beneficial effect of MoodGYM on reducing depression, anxiety, alcohol abuse, suicidal thoughts, dysfunctional thinking and the stigma attached to mental health (Bennett 2016). A summary of the research evidence indicates that these beneficial effects on depression are sustained 6 to 12 months after patients took part in MoodGYM and that these effects may be stronger in adolescent girls (Beacon 2.0 2016). MoodGYM has also been shown to improve patient knowledge about both CBT and mental health illness (Beacon 2.0 2016).
C.10.6. Enablers

The interview with one innovator suggests that there are several factors that have supported the development, rollout, spread and uptake of MoodGYM so far. Their views, coupled with our reflections on the case vignette evidence, suggest that the key enablers of development and early entry of MoodGYM into health system in England were:

- **Stakeholder and end user engagement in product development**, including mental health clinicians and experts, as well as research psychologists. This ensured that the content was appropriate for the target patient group (young people with mild to moderate depression or anxiety). A focus group to demonstrate the MoodGYM pilot to users provided the innovation team with feedback on how to improve the user-friendliness of the software and ensure there were no barriers to accessing it.  

- **Collecting rigorous evidence for the clinical and cost efficacy of MoodGYM**. Since the first version of MoodGYM was developed, there have been over 25 clinical trials conducted (Bennett 2016) to evaluate its effects on patient mental health and its cost-effectiveness compared to other cCBT and traditional treatments. In general, these have shown that MoodGYM improves patient mental wellbeing, reducing symptoms of anxiety and depression in a cost-effective way (although more recent evidence disputes this) (Beacon 2.0 2016; Duarte et al. 2017). The large body of positive research evidence for MoodGYM is likely to have been one of the contributing factors to NICE promoting the use of cCBT, which our interviewee thought drove the higher adoption seen in England compared to other countries.

- **Long-term funding commitments** from the Australian government from 2007 to the present. The interviewee speculated that this long-term funding was provided due to the lobbying efforts of senior figures, keeping eMental health treatments on the government agenda. Robust evidence collected on MoodGYM is also a likely reason for continued funding, especially the statistics indicating that patients in rural areas are able to access the software.  

- **Changing the provider of the software from the university to a private company** meant MoodGYM could be provided on a more sustainable, long-term basis, as the university was not in a position to continue maintaining and updating the programme. Our interviewee described how this enabled them to engage with individuals with business experience to support a sustainable business model for the new service.

---

284 Innovator_INT6.
C.11. NHS Blood Donor Chair

Box C.9: Key messages – NHS Blood Donor Chair

- **The innovation:** An innovative blood donor chair was developed in response to issues faced when using the previous version of the donor chair, including poor patient experience and process disruption due to fainting. The new chair addresses these limitations as the shape improves patient comfort and reduces the risk of fainting. It is also easier for donor services to transport and clean the chair.

- **Enablers of successful innovation development and uptake:** The successful introduction and uptake of the innovation was enabled by:
  - The NHS National Innovation Centre acted as a ‘brokering’ body that was able to bridge the NHS Blood and Transplant (NHSBT) service’s requests with the market offers and engage the public in the process, thereby leading to a product that responded to the needs of patients.
  - A participatory and iterative design process engaging chair users (i.e. both blood donors and clinical staff) to ensure relevance and user-friendly specifications.
  - A pre-commercial procurement process for innovators with guaranteed purchases for the successful supplier, therefore incentivising applications from industry in the development stage.
  - The existence of a centralised buyer (NHSBT) that could ensure financial viability and diffusion of the innovation.
  - Alignment of the innovation to existing clinical pathways and existing competencies meant that there were no major technical or training barriers that could cause logistical or personnel problems. No major disruption to current clinical practice took place.

- **Evidence of impact:** According to evidence collected by the innovation supplier, the use of the chair has decreased incidences of fainting, re-bleeds and failed venepuncture that had been associated with the limitations of the previous chairs.

C.11.1. Background and context: the need for innovation in blood donation chair design

NHS Blood and Transplant (NHSBT) is the UK Department of Health and Social Care’s responsible body for managing organ, blood and tissue donation across England. NHSBT uses fixed donation centres and mobile teams for blood collection. It identified poor patient experience and process disruption (as a result of donor fainting) to be key problems associated with current blood donation practice. According to an individual involved with the innovation’s development, blood donors were suffering ill health and risks of injury as a result of the old system for blood collection, which relied on unstable and uncomfortable chairs. These chairs could also make it difficult to provide fast and efficient care to members of the public, who are at risk of fainting during the blood donation process. According to estimates by Bedin et al. (2015), approximately 300 patients per day would faint across donating centres in England, and would hence need subsequent medical attention. This would disturb the blood donation process by leading to delays or cancellations from people who were waiting to donate blood.

This case vignette is based on two interviews – with a representative of the procurement body and an individual who did not wish to reveal their stakeholder affiliation – supplemented by desk research. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

---

286 Anonymous_INT3.
C.11.2. Idea generation and specification

Given the challenges described above, NHSBT identified a need for innovation in the design of blood donor chairs, to ensure that they are more fit for purpose – safer, more comfortable for patients and transportable.

According to one interviewee, NHSBT first conducted a scan of available chairs at the international level but did not find any that they felt would respond to the challenges they were hoping to address. As a result, NHSBT embarked on a procurement exercise with the support of the NHS National Innovation Centre (NIC) and put out a tender for the design of a new type of blood donation chair. Prior to commissioning the design and manufacturing of the product, NHSBT compiled a business case to estimate the value for money that could arise from such a product. This analysis suggested that commissioning the design and manufacturing of an innovative chair would represent good value for money for NHSBT.

At the request of NHSBT and working under their programme ‘Wouldn’t it be great if…?’, the NIC sent out questionnaires to blood collection teams and to blood donors to elicit their views. As a result they generated a list of 80 areas for improvement in the current blood collection service. Among these one of the most important highlighted improvements was that the new chair had to account for the differences between the recovery position and the position required for blood donating. Therefore the design innovation needed to make sure that the blood donor could easily be switched between the two. This consideration together with the feedback gathered through the consultative process, shaped the design tender specifications. The specifications described the problem that was to be addressed in line with the key functional parameters that blood donation units need to consider, as well as taking into account the new (at that time) Gold Standard Clinical Pathway for Blood Donation.

Four applications were received and two companies were shortlisted and asked to provide working prototypes that would function in a real-world environment.

---

287 CCG_INT2.
288 The National Innovation Centre was established to provide pre-commercial innovation development support to innovators, industry and academia with a view to benefiting NHS patients. It was closed down in 2013.
289 CCG_INT2.
290 CCG_INT2.
The first stage of the NIC competition had two finalists. In the next stage the two companies spent several months conducting ‘observational design’, working collaboratively with clinical staff and donors, whereby they observed their use of equipment in order to better identify the problems and unmet needs. This enabled them to develop concepts for solutions, which were reviewed multiple times by the NHSBT steering group. The concepts were further selected and developed into prototypes – which lead to production of 25 sets of chairs, trolleys and stackable units. Further testing took place spanning a number of months, which also involved data collection by a review team on the prototypes’ performance.

The winning design (shown in Figure C.8) belonged to the Renfrew Group and was chosen following testing by NHSBT services in over 20 different locations involving over 200 blood donations (National Innovation Centre n.d.). NHSBT is the legal holder of intellectual property rights for the blood donor chair.

As described by Renfrew Group documentation (Renfrew Group 2015), the new donor chair presents the following benefits:

- The chair allows for multiple seating positions and adjustment mechanisms so that the body can have various positions throughout the blood donating process.
- The adjustment mechanism is smooth, which avoids the head of the donor moving backwards too fast when lowering the head rest.
- The chair suits donors of various weights or heights (weight up to approx. 160kg).
- The chair is easily transportable while remaining robust and meeting ergonomic standards, which makes it suitable for mobile sessions.
- The chair is easy to clean.

C.11.3. Entry into the health system

The design process was subsequently followed by tendering for manufacturing and supply. This consisted of an open tender to which the Renfrew Group International applied and subsequently won. As

---

291 CCG_INT2.
292 Anonymous_INT3.
293 CCG_INT2.
expressed by one interviewee, while Renfrew Group International was familiar with the product specifications due to their role in the design phase, the overall decision from NHSBT considered the price offer in addition to the capacity of the supplier to deliver.\textsuperscript{294} The manufacturing tender did not contain a maximum value for procurement, which implied that each applicant could estimate their own financial offer and associated costs. It was considered that the Renfrew Group International’s offer was advantageous both financially and in terms of the quality criteria.\textsuperscript{295} As highlighted by one interviewee,\textsuperscript{296} a key enabler of innovation was the knowledge that the designed product would be later subjected to a procurement process. The interviewee further reflected that in general the private sector is incentivised by the availability of a budget not only for the design and creation of the innovation but also for its manufacturing, implementation and distribution. In recognition of the successful procurement process, the donor chair received the ‘Procurement Initiative of the Year’ at the annual Health Service Journal Awards in London in November 2011 (National Innovation Centre n.d.).

In total Renfrew Group International has manufactured and supplied approximately 1,000 blood chairs, which have been used by NHSBT services since 2011.

C.11.4. Diffusion, scale-up and spread

NHSBT services are the only client of the chairs as they are also the sole users of this type of equipment. According to one interviewee,\textsuperscript{297} the chairs have been rolled out throughout England and there is interest in these chairs from authorities in Scotland and Wales.

C.11.5. Impact

The donor blood chair is showing signs of positive impact. National data on side effects associated with blood donation were provided by Renfrew Group International for 2011 and 2012 and are presented in Table C.1. The data show reductions when it comes to effects such as fainting and failed venepuncture. Compared to baseline data from 2010 there are also reductions in re-bleeds. It should be noted that the provided documentation did not include sufficient detail on the methodology of gathering and interpreting these data, therefore results should be interpreted with caution.

<table>
<thead>
<tr>
<th>Year</th>
<th>VV1+2+3 (principally fainting)</th>
<th>Re-bleeds</th>
<th>Failed venepuncture</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1.58%</td>
<td>0.72%</td>
<td>1.25%</td>
</tr>
<tr>
<td>2011</td>
<td>1.37%</td>
<td>0.25%</td>
<td>1.18%</td>
</tr>
<tr>
<td>2012</td>
<td>1.32%</td>
<td>0.33%</td>
<td>1.17%</td>
</tr>
</tbody>
</table>

Source: Data supplied by Renfrew Group International

\textsuperscript{294} CCG_INT2.
\textsuperscript{295} CCG_INT2.
\textsuperscript{296} Anonymous_INT3.
\textsuperscript{297} CCG_INT2.
An independent evaluation has not been conducted, but the Renfrew Group collected feedback on the chair from blood donors. This feedback was, according to NHSBT staff, positive, and this also resonates with the views of the NHSBT service representative who was interviewed for the purposes of this case vignette. The feedback from NHSBT staff highlighted improvements in terms of comfort and ease of transport.

On the whole, according to interviewees for this case vignette it is considered that the blood chair is able to support the body of the blood donor in various positions and is easy to manipulate by NHSBT staff, therefore increasing the safety and efficacy of the donation process.

C.11.6. Enablers

The design and introduction of the blood donor chair was enabled by a series of key factors:

- **The NIC as a ‘brokering’ body**, which was able to bridge NHSBT requests with market offers and engage the public in the process, therefore creating a product that responded to the needs of patients.
- **A participatory and iterative design process engaging chair users** (i.e. both blood donors and clinical staff) ensured relevance and user-friendly specifications.
- **A pre-commercial procurement process for innovators**, with guaranteed purchases for the successful supplier, incentivised applications from industry in the development stage.
- **The existence of a centralised buyer (NHSBT)** that could ensure financial viability and diffusion of the innovation.
- **Alignment of the innovation to existing clinical pathways and existing competencies** meant that there were no major technical or training barriers that could cause logistical or personnel problems. No major disruption to current clinical practice took place.

---

298 CCG_INT2.
299 Anonymous_INT3, CCG_INT2.
C.12. Cascade model for genetic testing of Familial Hypercholesterolemia

Box C.10: Key messages – Cascade model for genetic testing of Familial Hypercholesterolemia

- **The innovation:** Cascade testing is a systematic and cost-effective way of identifying individuals with Familial Hypercholesterolemia (FH). FH is a genetic condition that causes increased cholesterol levels from birth, and hence higher risk of heart disease in young adults. It affects at least 1 in 250 people in the UK (National Institute for Health and Care Excellence 2008b, 27, last updated 2017; Wald et al. 2016, 1633).

- **Enablers of successful innovation development and uptake:** The successful adoption and spread of the innovation was enabled by:
  - Cascade testing of FH had already proven to be a success in the Netherlands, providing evidence as to how such a service can function successfully.
  - Funding from the BHF for FH nurses and from HEART UK for pedigree drawing software (PASS Clinical) has enabled FH services to be established in many places in England and prove their value.
  - The reduction in price of genetic testing, coupled with the political emphasis being placed on personalised medicine, will lead to all genetics testing being commissioned centrally towards the end of 2018; this will mean that genetic testing for FH will be available more consistently across the whole of England.

- **Evidence of impact:** Cascade testing has been shown to be highly cost effective, with an estimated cost per quality-adjusted life year (QALY) incremental cost-effectiveness ratio (ICER) of £5,806 per tested relative (Kerr et al. 2017); however there is no published evidence as to the actual impact its use is having in England.

C.12.1. Background

Familial hypercholesterolemia (FH) is a genetically inherited condition leading to high cholesterol levels from birth. If untreated, by the age of 55, 30 per cent of women and 50 per cent of men with FH will have developed coronary heart disease (Slack 1969). Once diagnosed, FH can be treated (usually using statins), reducing the risk of heart disease and, if treatment is started early enough, giving people with FH a normal life expectancy. It is estimated that at least 1 in 250 people in the UK may have FH (over 250,000 people), and less than 10 per cent of the cases are currently diagnosed (National Institute for Health and Care Excellence 2008b, last updated 2017; Wald et al. 2016).

This case vignette discusses the uptake of cascade testing for FH. As the focus is on the cascade testing of relatives of those diagnosed with FH rather than the genetic test itself, we do not describe the development of the genetic test. The case vignette is based on perceptions and experiences shared by a representative from the British Heart Foundation (BHF), a representative from HEART UK, three FH nurses, a cardiologist, a general practitioner (GP) and an individual who wished to remain anonymous. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.
C.12.2. Idea generation

FH is a monogenic and autosomal dominant condition, meaning that you only need one gene mutation to have it, and if a parent has FH there is a 50 per cent chance that their offspring will also have FH. Because of this, once an individual is known to have FH, it is possible to test their relatives to find others with FH who would not be identified otherwise. This makes FH amenable to cascade testing where, once an individual with FH is genetically tested and the genetic mutation is identified, all of their relatives can be tested for that specific gene mutation.

Figure C.9: Diagram showing how a family pedigree would be developed by an FH nurse and who would be tested

Source: Image courtesy of an interviewee

In 1994, cascade testing for FH was established in the Netherlands and shown to be effective (Umans-Eckenhausen et al. 2001). At this point genetic testing for FH was not available in the UK. However, in 1997, Professor Steve Humphries, a researcher in genetics of cardiac conditions, with a particular focus on FH, instigated genetic testing of FH at the diagnostic lab in Great Ormond Street Hospital (GOSH). This allowed GOSH to test for and accurately diagnose patients with FH; at the time, however, they did not use this facility to carry out cascade testing once an individual with FH had been identified. At this time, there was not a national FH service, but instead lipid clinics were clinically diagnosing FH patients and some families were being supported by limited access to genetic testing.

In 2003, a UK government white paper referenced the successful use of cascade testing in the Netherlands and announced that the Department of Health (now the Department of Health and Social Care) would fund a two-year programme of pilots of cascade testing, in five lipid centres around England (Department

300 Innovator_INT17.
301 Provider_INT9.
of Health 2003). This trial, led by Humphries, demonstrated proof of concept for the use of cascade testing in the UK, and disproved concerns about ‘the public not liking people messing with their families’, DNA tests scaring patients, or DNA tests falsely reassuring them. The trial showed that, as there was a pill (statin) that could be taken once an individual was diagnosed, the DNA testing was seen by patients as beneficial.302

In 2008, using evidence from the pilots of the feasibility and cost-effectiveness of cascade testing, Humphries and colleagues from GOSH registered the DNA test for FH as an official genetic test that could be carried out within the NHS. The same year NICE guidance on management and treatment of FH (CG71; National Institute for Health and Care Excellence 2008b) was released, stating that DNA testing should be offered to all FH patients and cascade testing should be used to identify relatives with the condition. At this time, the test cost around £500.303

C.12.3. Entry into the health system

Despite the success of the pilot, NICE guidance recommending FH cascade testing and economic evidence as to its cost-effectiveness, it initially saw limited rollout in the UK. Interviewees highlighted a number of reasons for this, the majority of which are linked to problems in commissioning FH cascade testing. As FH is common enough not to be considered a rare genetic abnormality, genetic testing of FH was not covered by specialist commissioning, and instead it was commissioned at clinical commissioning group (CCG) level. Each of the 211 CCGs therefore had to decide to commission the service, rather than it being done at a national level.304 Interviewees noted that for most CCGs treating FH was not a priority.305 Cascade testing for FH is only cost-effective in the longer term, which interviewees felt made it difficult to make the business case to CCGs, given their short-term budgeting cycles.306 Also, at the time of efforts to improve take up by the health system, genetic testing was perceived by GPs and CCGs to be expensive (and to some extent it was).307

A particular challenge of cascade testing is the time and resources required to ‘run’ the cascade element, including talking to patients about their diagnosis, taking down their family history, contacting relatives (where appropriate), gaining consent, and testing. CCGs need to employ an individual (generally a nurse although it was noted by an interviewee that nursing skills are not a pre-requisite) to ‘run’ the cascade element. Due to the size of any individual CCG’s population, it is unlikely that one CCG would need a full-time nurse for this purpose. In practice, this means that CCGs would need to agree to jointly fund a nurse. Furthermore, as cascade testing is a new service, rather than a physical innovation being sold by a

302 Innovator_INT17.
303 Innovator_INT17.
304 Anonymous_INT4.
305 Anonymous_INT4, Innovator_INT17.
306 Innovator_INT17.
company, there was no one person responsible for championing the uptake within CCGs, hindering wider-scale uptake.  

While most CCGs in England did not commission FH cascade testing of their own accord, in 2010 the BHF, working in partnership with NHS Wales and the Welsh Assembly Government, funded an FH service in Wales carrying out cascade testing. The BHF provided £450,000 to pay for FH nurses for three years, with the proviso that the service would be funded locally following this period. As of 2013, 550 people in Wales had tested positive for FH. The BHF focused on Wales because it was a smaller defined area in which to test out the service.

By 2010, cascade testing in England was only being carried out in a small number of locations, largely where pilot studies had been run and staff had been able to continue sourcing funding for the services; however, FH was starting to ‘move higher up the health policy priority radar’. In 2013, the Department of Health (now the Department of Health and Social Care) developed a Cardiovascular Disease Outcomes Strategy, which highlighted the benefits and lack of use of cascade testing, despite the NICE guidelines, and set out as one of its actions that the ‘National Clinical Director for Heart Disease’ will work with all relevant stakeholders to develop and spread good practice in relation to FH and sudden cardiac death’ (Department of Health 2013, 30). As a result, a steering committee for FH was established, made up of experts in genetics, commissioners, and representatives from both BHF and HEART UK.

C.12.4. Diffusion, scale-up and spread

Following the success of the Welsh trial, the BHF also started funding nurses in England (via CCGs), with the proviso that if they provided one year of full funding, the CCG would then provide 50 per cent of the funding in the second year, and take over the funding completely from the third year onwards. Between a third and half of the country are now covered by FH testing services, and where the BHF funding has ended, these services have continued to be funded by CCGs.

The success of the FH nurses has been supported by the provision of PASS Clinical, a software tool for drawing pedigrees and sharing them between clinics. The software was developed in the Netherlands for cascade testing, and then translated into English and funded for use in UK FH services by industry and HEART UK.

---

308 Anonymous_INT4.
309 A number of interviewees commented that they felt BHF had a particular interest in cascade testing for FH as the BHF funded a lot of the research into FH carried out in the UK (Anonymous_INT4).
310 Anonymous_INT4.
311 Professor Huon Gray.
312 Innovator_INT17.
313 Anonymous_INT4, Innovator_INT17.
314 Provider_INT9.
315 Family trees.
316 Provider_INT9.
While, as of July 2018, there are a number of FH services across England that offer cascade testing, there is significant variation in the exact process of testing. For example, some FH nurses operate within lipid clinics themselves, and tend to see the index cases to carry out the genetic testing and then carry out the cascade if appropriate. Others function within genetics services and only see cases once they have already been diagnosed to discuss the process of the cascade with them. There is also variation in how patients are contacted, due to governance structures of hospitals. This can involve direct contact, where the FH nurse contacts the relatives directly explaining the service, or indirect contact, where letters are provided to patients to give to members of their family. Finally, there is variation in how appointments are held, with some services, for example those in specialised hospitals which may cover large geographical areas, doing the majority of their appointments over the phone, while others have patients attend clinics. Although the services vary significantly, all nurses and the HEART UK representative interviewed noted that there is shared learning, facilitated in particular through the annual HEART UK conference and the regular monthly FH Intelligence Network telephone conference provided by HEART UK. A particular challenge for the nurses is that generally they only cover their own localities, and as FH nurses are not present over the whole country, relatives living in areas without FH nurses may not be tested.

Looking to the future, interviewees had a positive outlook, feeling that cascade testing for FH had finally started to take off within the UK. In particular they felt that since the first NICE guidelines were published in 2008 (CG71; National Institute for Health and Care Excellence 2008b), there had been a number of changes within the UK helping to place FH cascade testing higher up on the agenda. In particular two interviewees highlighted that the importance now placed on personalised medicine helps make the case for cascade testing for FH, as it can be used as an exemplar of how personalised medicine benefits individuals. Genomics testing is also being redesigned within the NHS, and all of the seven new NHS diagnostic testing centres will have FH testing funded as part of their core services, meaning that genetic testing for FH will be equally available across the whole of the UK. In addition, the cost of gene sequencing has reduced dramatically over time, so that DNA-based cascade testing for index cases now costs about £250, and for relatives about £70 per person tested.

C.12.5. Impact

Cascade testing for FH has been shown to be highly cost-effective. A recent study using data from the established FH services in Wales, Northern Ireland and Scotland estimated the cost per quality-adjusted life year (QALY) incremental cost-effectiveness ratio (ICER) of DNA cascade testing at £5,806 per tested relative (Kerr et al. 2017). There is no published evidence as to the impact of the FH services that are currently present in England.

317 Provider_INT5, Provider_INT6, Provider_INT7, Provider_INT9.
318 Provider_INT5, Provider_INT6, Provider_INT7.
319 Anonymous_INT4, Provider_INT9.
320 Innovator_INT17.
C.12.6. Enablers

The interviews with innovators, CCG and provider representatives suggest that there are several key factors that supported the development, rollout, spread and uptake of cascade testing for FH in the health system in England so far. Insights from interviews, coupled with our own reflections, indicate that these key factors were:

- **Cascade testing of FH had already been proven to be a success in the Netherlands.** Providing compelling evidence that this service can be cost effective and evidence as to how the service might be run.\(^{322}\)

- **Funding from charities – BHF for FH nurses and from HEART UK for pedigree drawing software (PASS Clinical) – has enabled FH services to be established and prove their value.** FH nurses are now increasingly being funded by CCGs for nurses and it is anticipated that the software will also be funded in the future.\(^{323}\)

- **The reduction in price of genetic testing, coupled with the political emphasis being placed on personalised medicine** has led to all genetics testing being moved to being commissioned centrally, which will mean that genetic testing for FH will be equally available across the whole of England.\(^{324}\)

---

\(^{322}\) Provider_INT9.

\(^{323}\) Anonymous_INT4, Innovator_INT17, Provider_INT9.

\(^{324}\) Anonymous_INT4.
C.13. **ENDOCUFF VISION™**

**Box C.11: Key messages – ENDOCUFF VISION™**

- **The innovation**: ENDOCUFF VISION™ is a medical device used as a colonoscope attachment to improve mucosal visibility in view of detecting abnormalities such as polyps, ultimately leading to better prevention of bowel cancer.
- **Enablers of successful innovation development and uptake**: The successful introduction and uptake of the innovation was enabled by:
  - Key clinical opinion leaders who have been beneficial in communicating the product’s clinical benefits and in facilitating peer-to-peer training through videos.
  - Engaging clinicians at conferences and through direct contact, which has led to greater uptake of the product at hospital level. This was perceived to have been the case in particular for clinicians that had greater influence in the purchasing process.
  - Direct purchasing by healthcare providers (hospitals) and clinical engagement in purchasing decisions facilitated product uptake.
  - ENDOCUFF VISION™ does not require change in existing clinical pathways, which is an enabler of adoption.
  - Some training on how to use the innovation was provided to healthcare staff by the innovating company and this facilitated adoption.
  - Selection for Innovation and Technology Payment support has been recent, but is expected to enable wider uptake of ENDOCUFF VISION™ in the NHS, by overcoming financial barriers.
- **Evidence of impact**: ENDOCUFF VISION™-assisted colonoscopy has been found to lead to greater adenoma detection rate (ADR), leading to a 10.8 per cent increase compared to standard colonoscopy. It also facilitates faster colonic intubation while causing minimal additional discomfort to patients (Ngu et al. 2018).

C.13.1. **Background and context: the need to improve mucosal visibility for better prevention of bowel cancer**

Bowel cancer is the fourth most common type of cancer in the UK with approximately 41,800 new cases per year and 16,400 deaths per year (Cancer Research UK 2015). Deaths from bowel cancer are caused by a colon adenomatous polyp or adenoma – a tumour formed when a polyp, which is an abnormal growth of tissue in the bowel, becomes cancerous. The detection of such polyps, and potential removal (leading to fewer bowel cancer cases), is performed using a colonoscope, a procedure which involves an endoscopic examination using a camera. ENDOCUFF VISION™ is a medical device used as a colonoscope attachment to improve mucosal visibility in view of detecting abnormalities such as polyps, ultimately leading to a better prevention of bowel cancer.

This case vignette is based on experiences shared by two innovators and it is supported by additional desk research. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

---

325 Bowel cancer is used to describe cancer that begins in the large bowel, but the term can also cover cancers found in the colon, rectum, small bowel or anus.
C.13.2. Idea generation

ENDOCUFF VISION™, as shown in Figure C.10, consists of a single-use plastic device that is attached to a colonoscope. The device is equipped with plastic arms that help keep the bowel’s folds back to facilitate a wide view of the bowels inside. This allows the examining physician to detect polyps during colonoscopy and potentially remove them.

**Figure C.10: ENDOCUFF VISION™**

![Source: Norgine (n.d.), provided by one of the interviewees](image)

In its original form, ENDOCUFF VISION™ was developed by ARC Medical and DesignEdge in 2012 to allow better detection routes for polyps by improving the colonoscopy procedure. In recognition of its innovative design, ENDOCUFF VISION™ has won a number of design awards including Industrial Product Design of the Year category of the Plastics Industry Awards 2013, a Red Dot award in 2012, a silver award in the A’ Design Awards and was a finalist in the Design Week and D&AD Awards (DesignEdge n.d.).

In 2015 Norgine entered into a partnership with ARC Medical and bought the second generation of ENDOCUFF VISION™ ahead of launch and commercialisation. This device has one set of arms instead of the original two, which offers improved safety.

C.13.3. Entry into the health system

ENDOCUFF VISION™ was launched in England in the second quarter of 2015 and was sold directly by key account managers to hospitals. Norgine’s key account managers currently interact with all centres that provide colonoscopy in the UK and engage with medical staff in this process.

No further data were available for researchers on who were the early adopters of ENDOCUFF VISION™.

---

326 Innovator_INT20.
327 Innovator_INT15, Innovator_INT20.
C.13.4. Diffusion, scale-up and spread

It was not possible to gain information on the specific healthcare provider organisations using ENDOCUFF VISION™, nor on the commissioners involved in the adoption process. Hence, this section provides general insights from the perspective of the innovators behind the product.

As colonoscopy is part of current medical practice, the device does not change the clinical pathway and was described as an easy-to-use product by both interviewees. However, a degree of training is needed and Norgine worked with key opinion leaders (KOLs) to develop educational videos for peer-to-peer training on the use of ENDOCUFF VISION™. These videos were then disseminated with the help of the KOLs and were made available on the company’s website. Norgine also provided free samples of the device to the NHS to facilitate training. Identification of potential clients also relied on promoting the device at a number of medical conferences as well as to the British Society of Gastroenterology.

According to one interviewee, challenges with procurement and finance at the hospital level have been one of the reasons behind variance in the product’s uptake across adopting organisations and through time. ENDOCUFF VISION™ is sold directly to hospitals (rather than being subject to block contracts through clinical commissioning groups (CCGs)). Related to this, where clinical engagement existed in purchasing decisions (e.g. such as in one of the largest gastroenterology units in the country, the name of which was not provided), uptake has been facilitated.

Although clinician engagement in purchasing the product enabled uptake, processes of direct sale to providers are not without challenges. Changing NHS tendering processes and the timelines for becoming listed on the NHS supply chain delayed procurement of ENDOCUFF VISION™ in some hospitals.

Timelines are particularly important for medical devices when considering market competitors and potential market-exclusivity and time to recuperate investments in research and development, and especially clinical trials. A competitor can create equivalent products relatively quickly (e.g. in six months) without having to go through the extensive testing phase the original product had been subjected to. ENDOCUFF VISION™ has recently been included in the NHS Innovation and Technology Payment (ITP) 2018/2019 programme, which eases the financial challenges of uptake (NHS England 2018a).

328 Innovator_INT15, Innovator_INT20.
329 Innovator_INT20.
330 Innovator_INT20.
331 Innovator_INT15.
332 Innovator_INT15.
333 Innovator_INT20.
334 Innovator_INT15.
335 The interviewee commented that the NHS changed their tendering process and they did not get on the supply chain list. This meant that if the hospital wanted to buy ENDOCUFF VISION™, there was a time period when that was not possible because the company was not listed in the system as a supplier.
336 Innovator_INT20.
337 Innovator_INT15, Innovator_INT20.
Norgine applied for this scheme as part of a desire to work with NHS England and overcome the financial barriers associated with uptake.338

The process of applying for the ITP and previous engagement with the NHS Innovation Accelerator helped the innovators engage with diverse stakeholders around product uptake, and helped identify entry points into the NHS.339 This helped create time-efficiencies and allowed the company to better understand the requirements of different stakeholders.

Norgine is also working to gather the evidence needed to obtain a NICE recommendation,340 which could facilitate wider uptake (one of the largest studies on ENDOCUFF VISION™, the ADENOMA study, published its findings in 2018) (Ngu et al. 2018).

Following introduction into the health system in England, ENDOCUFF VISION™ is now available across Europe, in Australia and in the USA,341 but we could not find evidence for the current scale of use.

C.13.5. Impact

ENDOCUFF VISION™-assisted colonoscopy has been found to lead to greater adenoma detection rate, specifically a 10.8 per cent increase compared to standard colonoscopy in bowel screening patients that underwent the UK Bowel Cancer Screening Programme (BCSP) (Ngu et al. 2018). This is the main finding of the Accuracy of Detection using Endocuff Optimisation of Mucosal Abnormalities (ADENOMA) study published in 2018, which presents the results of a 2014–2016 study run in seven English hospitals. The study also offers evidence that ENDOCUFF VISION™ facilitates faster colonic intubation while causing minimal discomfort to patients. The trial did not report any adverse events, which showed that the device was safe to use (Ngu et al. 2018).

There are challenges to showing immediate economic benefits from the use of the device and such data would take time to accrue. The main benefit of the device is to prevent cancers, therefore any cost savings would only emerge over time and may not be visible in the same department that the device is being used in.342, 343

C.13.6. Enablers

The interviews with the two innovators, together with our analysis of the evidence presented, suggest the following enablers when it comes to development, entry and uptake of ENDOCUFF VISION™ into the NHS:

- **Key clinical opinion leaders** have been beneficial in communicating the product’s clinical benefits and in facilitating peer-to-peer training through videos.

---

338 Innovator_INT15.
339 Innovator_INT15.
341 Innovator_INT15.
342 The device is used in gastroenterology departments, while cost reductions are expected primarily in oncology departments.
343 Innovator_INT20.
• Engaging clinicians at conferences and through direct contact has led to greater uptake of the product at hospital level. This was perceived to have been the case in particular for clinicians that had greater influence in the purchasing process.

• Direct purchasing by healthcare providers (hospitals) and clinical engagement in purchasing decisions facilitated product uptake.

• ENDOCUFF VISION™ does not require change in existing clinical pathways, which is an enabler of adoption.

• Some training on how to use the innovation was provided to healthcare staff by the innovating company and this facilitated adoption.

• Selection for the ITP scheme has been recent, but is expected to enable wider uptake of ENDOCUFF VISION™ in the NHS, by overcoming financial barriers.

Box C.12: Key messages – Continuing Healthcare Checklist and the Decision Support Toolkit (CHC2DST)

- **The innovation**: Continuing healthcare (CHC) provides funding for social care to individuals with complex, long-term health conditions (NHS Choices 2018). The current assessments for CHC are on paper and the process is slow and inefficient, causing distress to patients and their families (IEG4 n.d.-c). The CHC2DST assessment software allows the assessments to be conducted electronically.

- **Enablers of successful innovation development and uptake**: The successful adoption and spread of the innovation was enabled by:
  - IEG4, the company behind the development of CHC2DST, worked intensively with frontline staff to develop the toolkit. This co-production approach enabled the development of a unique, user-friendly product and facilitated uptake by healthcare providers and commissioners.
  - IEG4 received financial support through the Small Business Research Initiative (SBRI) funding scheme, which helped support the further development of CHC2DST.
  - The approach to commissioning encouraged adoption. Short, one-year contracts to commission CHC2DST encouraged commissioners to adopt it as there is less financial risk than investing for three years. In addition, a flexible payment approach was introduced, which enabled clinical commissioning groups (CCGs) representing smaller populations to pay less for the software.
  - The Yorkshire and Humber Academic Health Science Network (AHSN) helped increase awareness of CHC2DST among CCGs, provided advice on the pricing model and collected feedback from frontline staff. This helped aid further product development and market entry strategy.
  - Some individual commissioners viewed the benefits of CHC2DST as outweighing the risks. This increased the likelihood of them adopting it in their particular CCG, especially if they were aware of other CCGs implementing the software successfully.
  - A shift towards more enabling policy for improving continuing healthcare needs assessment approaches and the shift towards the digitisation of the NHS are supporting adoption of CHC2DST, given that it is a product that aligns to these policy developments.

- **Evidence of impact**: Across England, savings of administrative costs, such as printing, faxing, posting and photocopying, are estimated at £200,000 per CCG each year. The quicker, more transparent and accurate approach to CHC assessments using CHC2DST allows less to be spent on CHC care packages, with £180,000 saved each year per IEG4 2018. The CHC2DST software also allows the CHC process to be implemented faster as decisions can be made quicker, improving patient experience (IEG4 2018).

C.14.1. Background and context: the need for innovation in the continuing healthcare assessment process

The NHS funds continuing healthcare (CHC), which provides social care for patients over 18 with complex and long-term health conditions. To be eligible for this support, patients must undergo CHC assessments by their clinical commissioning group (CCG) (NHS Choices 2018). These assessments are conducted on paper, resulting in the process becoming long and complex, with patients often getting lost in the system (IEG4 n.d.-c). IEG4 have developed CHC2DST software that allows the assessments to be conducted electronically, making the process faster and more efficient, and at a lower cost.

---

344 Anonymous_INT6.
This case vignette is based on interviews with an individual from IEG4, the developers of the CHC2DST software, three commissioners, who are at various stages of procuring and implementing the software, one networking stakeholder, and two individuals who wished to remain anonymous. The case vignette was also supplemented by additional desk research. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

Figure C.11: Interface of CHC2DST

Source: Reproduced from IEG4 (IEG4 n.d.-a)

C.14.2. Development of the innovation

IEG4 is a UK-based company that supports change within a range of sectors, including local government, housing and health (IEG4 n.d.-b). IEG4 wanted to investigate whether the online tools that they introduced into local governments to improve efficiency could be adapted for use in the NHS. Therefore, IEG4 ran a workshop open to all NHS commissioners and frontline staff to discuss areas where digital technologies could improve quality and efficiency. Two frontline staff members advocated the need for improvements to the CHC assessment process, describing the challenges associated with CCGs’ current lack of control over the process, lack of accountability and the inability to visually see what is happening to patients. To investigate this issue further, IEG4 spoke with patients and their families who were undergoing the assessment. They reported that the process was highly complex and was damaging their health further due to stress. This feedback from frontline staff and patients led to IEG4 identifying the CHC assessment as a key area in need of improvement. This also coincided with the introduction of NHS England’s CHC Strategic Improvement Programme (NHS England 2017c), which set out a two-year plan from 2017 to 2019 to improve the CHC assessment process to reduce variation, promote collaborative work across CCGs and health teams and ensure assessments are taking place at the right time and place.

---

345 Image provided courtesy of Innovator_INT18 at IEG4.
346 Innovator_INT18.
347 Anonymous_INT6, Innovator_INT18, CCG_INT8, CCG_INT9.
348 Innovator_INT18.
The development of the CHC2DST software was undertaken in collaboration with NHS staff, commissioning managers, CHC project leads and performance managers and funded primarily by IEG4. A Small Business Research Initiative (SBRI) funding scheme call coincided with the start of IE4G’s development work on CHC2DST, and success in applying for this scheme not only supported technical development but also provided credibility for the innovation (given NHS support for the application and collaboration in the application process).349 During the early stages of software development, IEG4 worked with frontline staff members and commissioning managers from the Cheshire and Wirral CCGs to submit a project plan to the SBRI funding process. Throughout this eight-week period, CHC2DST was shown to end users who tested it and made suggestions for improvement. This process was repeated every two weeks until the end users were happy with the software.350 This collaboration with frontline staff is often highlighted as the most important reason why CCGs have engaged with IEG4 and the product.351 Families of patients undergoing the CHC assessment were shown the initial software design and provided their feedback to aid the development process.352 There was often surprise that such software did not already exist.353 Cheshire and Wirral CCGs have also involved patients during the software implementation process by gathering their opinions on how the hospitals should communicate with them during their CHC journey, in order to improve their experience of the process.354 To ensure that CHC2DST is compliant with government regulations, IEG4 put it through the NHS information governance toolkit, which allows organisations to assess their product against information governance policies and standards (Department of Health 2016). CHC2DST has also been through the NHS digital assessment questionnaire process, which helps developers ensure that their digital products meet NHS standards (NHS Health Developer Network 2018).355

C.14.3. Entry into the health system

Initial entry of CHC2DST into the health system was greatly facilitated by the co-development of the software and user interface with NHS staff, who could as a result see benefits from the innovation and help champion its use.356 This co-production also helped promote good relationships between IE4G and CCGs: commissioners realised that IE4G was not motivated just by sales but had a strong commitment to finding a solution to a health and care system challenge.357

349 Innovator_INT18, Networker_INT1.
350 Innovator_INT18, CCG_INT9.
351 Anonymous_INT5, Anonymous_INT6, CCG_INT7, Networker_INT1.
352 CCG_INT9, Innovator_INT18.
353 CCG_INT9.
354 CCG_INT9.
355 This information was obtained when asking the developer how they approached regulatory aspects of development.
356 Anonymous_INT6, CCG_INT9, Innovator_INT18.
357 Anonymous_INT6, CCG_INT9.
Cheshire and Wirral CCGs were the first to commission CHC2DST.358 Cheshire and Wirral CCGs initially entered into an innovation agreement with IEG4; there was no money exchanged during this process as the CCG was acting as a ’testbed’ for IEG4 and there was no commitment that the CCG would buy the software at the end of the agreement.359 However, the CCG commissioned CHC2DST in summer 2017 having gone through a standard procurement processes, including exploring whether there was another company that could provide similar software at a lower cost.360 The initial commissioning contract was for one year (rather than the traditional three years), which was seen as an enabler of uptake because the CCGs were exposed to less financial risk.361 Cheshire and Wirral CCGs have now re-contracted CHC2DST for a further two-year period based on an updated version of the platform, which is likely to provide an even greater benefit.362

Further supporting initial adoption was the commissioner from Cheshire CCG viewing the benefits of CHC2DST as outweighing the risks. The commissioner was also personally committed to improving the continuing healthcare needs assessment process, having met patients and their families and understanding the challenges with the traditional approach.363

To date, five CCGs across Cheshire and the Wirral have now fully adopted CHC2DST.364 The software spread from the first CCG because the other CCGs were able to see that Cheshire had been successful in implementing it.365 The events put on by the Yorkshire and Humber Academic Health Science Network (AHSN) increased awareness of CHC2DST across the other CCGs and communicated the benefits of adopting the software.366

Implementation across the five CCGs was supported by training for those using the software and IEG4’s positive attitude to solving problems.367 Training by IEG4 was provided for all staff members using the software and a user-friendly manual was created to further support implementation.368 Throughout the process, frontline staff have been able to provide feedback to IEG4 regarding any issues they have faced and these problems have been solved very quickly.369 There had been some IT issues with implementation in the early stages, primarily with the system crashing, not being able to access the software offline, and some required contacts not being in the system.370 However, all implementation issues have now been

---

358 Innovator_INT18.
359 CCG_INT9.
360 CCG_INT9.
361 CCG_INT9.
362 CCG_INT9, Innovator_INT18.
363 Innovator_INT18.
364 Innovator_INT18.
365 CCG_INT9.
366 Anonymous_INT5, Anonymous_INT6, CCG_INT8, Innovator_INT18, Networker_INT1.
368 Anonymous_INT6.
370 Anonymous_INT6.
resolved and upgrades are released as the app is developed further. In addition, offline capability through an app has now been set up.371

When entering the health system, IEG4, with advice from the Yorkshire and Humber AHSN, decided that CCGs would pay for CHC2DST as the CHC process spans multiple services, such as social workers, community district nurses and external assessors.372 The pricing model was set out in a way that allows CCGs serving smaller populations to pay less.373 IEG4 went through the digital marketplace framework for procurement, which allows developers to sell digital products and technologies online. CCGs can now procure CHC2DST through this marketplace.374

All the CCG representatives interviewed either plan to adopt or have already adopted CHC2DST, and see it as being unique in responding to an identified challenge for their populations and health and care service. According to one commissioner interviewed for this work, who had already adopted the software, the solutions being offered were seen as outweighing the initial investment cost of CHC2DST.375 Particularly valued were:

- The ability of the software to help track patients through their CHC journey and to help healthcare providers manage case distribution across a large workforce, which was very difficult with paper assessments.376
- IEG4’s track record, financial viability and customer satisfaction were important in the Cheshire CCG’s decision to commission the software.377

As the software was developed in Cheshire, our interviewee from IEG4 highlighted how the company needed to prevent it becoming too ‘Cheshire-specific’, which would hinder its wider adoption. To overcome this issue, IEG4 contacted the Yorkshire and Humber AHSN and informed them of the software and the benefits it could provide.378 Together, they engaged frontline staff, commissioning managers and Foundation Trust hospitals across Yorkshire to collect feedback on the software. IEG4 then made further changes to the software to ensure it could be adopted by any CCG.379

Yorkshire and Humber AHSN hosted an event in Leeds for CHC2DST at which representatives from a broad range of CCGs attended.380 During this event, frontline staff involved in CHC2DST development highlighted the benefits of CHC2DST and focused on the solutions it provides to a shared problem, rather than it being a sales pitch.381 This event put the software on the CCGs’ radar and gave IEG4

371 Innovator_INT18.
372 Innovator_INT18, Networker_INT1.
373 Innovator_INT18.
374 Innovator_INT18.
375 CCG_INT9.
376 Anonymous_INT5, Anonymous_INT6, CCG_INT7, CCG_INT8, CCG_INT9.
377 CCG_INT9.
378 Networker_INT1.
379 Innovator_INT18.
380 Networker_INT1.
381 Anonymous_INT6, Networker_INT1.
credibility. As a result of this event, as well as the successful implementation of the software in Cheshire, IEG4 is now in advanced discussions with three other CCGs who are interested in adopting CHC2DST.

As CHC2DST is the only software of its kind on the market at the moment, IEG4 is seeking to rapidly scale and ensure a viable and sustainable market. One of the challenges the company faces and needs to navigate is slow decision-making processes in the NHS, including with funding schemes for development and uptake of products, such as tariff-based support schemes.

Although IEG4’s software is the only product on the market that performs its exact function, BroadCare, delivered by Bray Leino, is software that complements the activities of CCH2DST. BroadCare is an electronic platform for CCGs to manage their CHC activities (Bray Leino n.d.). BroadCare and CHC2DST are distinct and have been described as representing two halves of the same process. CHC2DST was described as being the front end of the process, where the patient is checked for their CHC eligibility and their care package is arranged. BroadCare then acts as the back end of the process, allowing management of the care package, storage of patient data and financial overviews for individual patients. The two systems are not currently interoperable. As the companies evolve their offerings they will need to manage risks of duplication and to balance competition and coordination opportunities and challenges.

C.14.4. Diffusion, scale-up and spread

IEG4 applied to the Innovation and Technology Payment (ITP), the result of which should have been released in December 2017. The continued inclusion of CHC2DST in the ITP process has given IEG4 further confidence that the NHS views CHC2DST as a serious solution. Although CHC2DST was a finalist in the ITP and identified as being one of ten high-impact innovations, the software was not chosen to be included in the funded ITP innovations announced in April 2018 (NHS England 2018a). If the software had been included in the ITP, our interviewee from IEG4 thought it would have provided the company with more credibility and encouraged additional CCGs to consider adopting it. It could also have allowed IEG4 to co-fund some CCGs in commissioning the software, enabling ten current potential customers to adopt it. However, our interviewee from IEG4 highlighted that the outcome is still positive: the fact that CHC2DST was considered in the top ten of 270 applications is good evidence of the appreciation of its impact.

382 CCG_INT8.
384 Innovator_INT18.
385 CCG_INT8, CCG_INT9.
386 Anonymous_INT5, Anonymous_INT6, CCG_INT9.
387 Anonymous_INT5, CCG_INT8, CCG_INT9.
388 Innovator_INT18.
389 Innovator_INT18.
390 Innovator_INT18.
391 Innovator_INT18.
Two national policy drivers have pushed CCGs that do not currently use CHC2DST towards adopting it; the NHS 2020 drive to be paperless (NHS Digital n.d.) and NHS England’s CHC Strategic Improvement Programme (NHS England 2017c). The NHS’ goal to be paperless by 2020 is driving CCGs to shift towards the use of electronic platforms across healthcare, including CHC assessments. Cheshire CCG is now closer to reaching this goal due to the adoption of the software. The NHS CHC Strategic Improvement Programme also encourages CCGs to improve their CHC process.

For future wider adoption and implementation, interviewees from various CCGs suggested some possible enablers. Senior leadership sponsorship is needed to ensure frontline staff are aware of the changes CHC2DST will bring and how it will affect their day-to-day work. The CCGs that have already implemented the software should share their experiences so others are able to see the advantage of adopting it and know how best to implement it. Finally, NHS England could make CHC2DST available on a national basis to promote adoption across England. This would then allow multiple CCGs in an area to adopt it at the same time, reducing variation.

C.14.5. Impact

CHC2DST has allowed staff to complete forms more accurately and more quickly, and there was a reduction in admin, printer and post costs and greater collaboration between the teams involved. It is estimated that an average CCG could save £200,000 per year on administrative costs (IEG4 2018). The use of CHC2DST allows the CHC process to be faster, more transparent and conducted with greater accuracy, which results in less being spent on CHC care packages. An average CCG is estimated to save £180,000 per year as a result of this, which equates to an estimated £37m across NHS England (IEG4 2018). An additional £45–50m could be saved per year due to a reduction in the number of CHC care packages delivered, as the CHC2DST software allows for a more robust review and reassessment of patients (IEG4 2018).

Time trials on CHC2DST have been conducted to assess the efficiency of the software; these showed that completing CHC assessments using a Word document rather than CHC2DST was 50 per cent slower. Results from the Cheshire and Wirral CCGs demonstrate improvement in the achievement of 80 per cent of assessments completed in 28 days. Before implementation Cheshire and Wirral were at 62 per cent, and six months after they are now achieving the standard at 82 per cent (NHS England 2018b).

The software will improve communication and collaboration between NHS staff due to its smart scheduling tool. This gives the assessment greater transparency at an early stage in the process and allows communication with patients and families via email (Belsey 2017). All of this speeds up the overall assessment process and allows for better clinical triage of the initial checklist to reduce the number of full

---

392 CCG_INT9.
393 Anonymous_INT5, CCG_INT8, Networker_INT1.
394 Anonymous_INT6.
395 CCG_INT9.
396 Innovator_INT18.
397 CCG_INT7.
assessments required. This saves a lot of effort in progressing full assessments that can be resolved at an earlier stage and delivers productivity savings for a CCG.398

Testimonies collected from individuals and their families who were assessed using the CHC software recognised that it was working more efficiently than previous methods.399

C.14.6. Enablers

The interviews with one innovator, four commissioners, one networker stakeholder and one healthcare provider suggest that there are several factors that have supported the development, rollout, spread and uptake of CHC2DST so far. Their views, coupled with our reflections on the case vignette evidence, suggest that the key enablers of development and early entry of CHC2DST into the health system in England were:

- **IEG4’s ethos and approach to development.** Cheshire CCG were willing to work with IEG4 due to their drive to create solutions that would work for the NHS, rather than putting on sales pitches for commissioners.400 Co-developing CHC2DST with frontline staff, rather than IEG4 telling NHS staff what they needed, was frequently referred to as one of the main reasons CCGs first became interested in the product. As a result of co-development, CHC2DST is user-friendly and this facilitated uptake by healthcare providers and commissioners.

- **IEG4’s successful application to the SBRI funding scheme** enabled IEG4 to receive additional funding to improve CHC2DST further.401 A health economic assessment was conducted using this funding, which found that CHC2DST could provide huge savings across England, improving the business case IEG4 presented to CCGs (Belsey 2017).

- **The approach to commissioning encouraged adoption.** Short, one-year contracts to commission CHC2DST encouraged commissioners to adopt it as there is less financial risk than investing for three years.402 In addition, a flexible payment approach was introduced, which enabled CCGs representing smaller populations to pay less for the software.403

- **Support from Yorkshire and Humber AHSN** throughout the innovation pathway. The AHSN collected feedback on the early versions of the product from frontline staff and commissioners to feed into the product adaptation process. An event they hosted for CCG representatives increased the awareness of CHC2DST and resulted in IEG4 entering into discussions with a diverse range of CCGs looking to adopt the product.404 Finally, the AHSN advised IEG4 on various aspects of development and implementation, such as the pricing model.405

---

398 Innovator_INT18.
399 Networker_INT1.
400 Anonymous_INT6, CCG_INT9.
401 Innovator_INT18.
402 CCG_INT9.
403 Innovator_INT18.
404 Innovator_INT18, Networker_INT1.
405 Networker_INT1.
• Individual commissioners viewing the benefits of CHC2DST as outweighing the risks was particularly important in terms of Cheshire CCG adopting CHC2DST; this CCG paved the way and their success has encouraged other CCGs to take the risk in adopting it.\textsuperscript{406} Ensuring commissioning managers are on board with adoption and are willing to take the risk of implementing the software to get the benefits is a driver of adoption for this innovation, but also innovation more generally.\textsuperscript{407}

• The innovation’s alignment with wider national NHS goals. The NHS is driving for improvements across the CHC process with the CHC Strategic Improvement Process (NHS England 2017c) as well as broader changes to digitise the NHS, such as the paperless 2020 goal (NHS Digital n.d.). These have put the CHC process and a move to electronic systems high on CCGs’ agenda, and as CHC2DST can support CCGs to reach both of these goals, this makes it a very attractive product to adopt.\textsuperscript{408}

\textsuperscript{406} Anonymous\_INT5, Innovator\_INT18.
\textsuperscript{407} CCG\_INT8, Networker\_INT1.
\textsuperscript{408} Anonymous\_INT5, CCG\_INT9.
C.15. SecurAcath

Box C.13: Key messages – SecurAcath

- **The innovation**: SecurAcath is a single-use device to secure and stabilise central venous catheters. The innovation decreases accidental dislodgements during dressing changes in comparison to existing products, and reduces the risk of medical adhesive-related skin injury (MARSI).

- **Enablers of successful innovation development and uptake**: The successful development, introduction and uptake SecurAcath into the health system in England was enabled by:
  - The ability of the innovation to address a significant problem observed by the innovator and specialist clinical staff (in an area of unmet clinical need) supported its development, uptake and spread.
  - Funding provided by angel investors and small venture capital groups enabled the early development of the innovation.
  - Attendance at specialist conferences in Europe provided first contacts to relevant clinical staff to connect with, and facilitated early uptake.
  - The cost-effectiveness and evidence for clinical efficacy of the product compared to other stabilisation methods is seen as a key enabler of uptake and spread.
  - Early support and enthusiasm from specialist nurses interested in testing and using the device facilitated its introduction into early adopter hospitals.
  - Specialist nurses’ autonomy in decision making as well as budget autonomy were key enablers of an early and fast introduction of SecurAcath in some Trusts.
  - In-house training on how to use SecurAcath, strongly and proactively supported by the innovator, helped overcome uncertainties and secure buy-in from clinical staff.
  - A UK-based distributor supported the further introduction of SecurAcath into the UK and increased its spread across the country.
  - Conversations with NICE about the types of evidence that would be needed to support uptake in the health system in England and on available support schemes were seen as useful for targeting market entry and spread strategies.
  - A positive NICE medtech innovation briefing as well as full NICE guidance have increased the uptake of the innovation.

- **Evidence of impact**: Studies published in peer-reviewed journals as well as a NICE assessment indicate SecurAcath’s clinical and cost-effectiveness compared to existing suturing and adhesive methods to stabilise catheters. NICE concluded that the innovation reduces catheter-related complications, is time-saving and could annually save NHS England at least £4.2m (National Institute for Health and Care Excellence 2017d).

C.15.1. Background and context: the need to secure and stabilise central venous catheters

Central venous catheters (CVCs) – thin, flexible and hollow lines inserted into peripheral veins or proximal central veins – are considered to be critical devices for fluid management, medical treatment, extracorporeal blood circuits as well as for monitoring purposes (Smith & Nolan 2013). The volume of CVC use in the UK at present is unknown; the latest assessments (from 1998) estimate 200,000 CVC insertions per year (Wong et al. 2018).

Various studies suggest that CVC insertion and CVC care are associated with a number of complications, such as vascular injury, infection, misplacement and skin injuries (Hitchcock & Savine 2017; Kornbau et al. 2015). Some of the complications are related to accidental CVC dislodgements by patients or during dressing changes (Lorente et al. 2004). In the mid- to late 1990s, attempts had been made to secure CVCs
with adhesive-based products, in order to decrease accidental removals and related infections, as well as to reduce the number of sutures used for stabilisation (i.e. fixation using needle and thread) (Yamamoto et al. 2002). While such adhesive-based products helped reduce dislodgements and largely replaced sutures, they are associated with medical adhesive-related skin injury (MARSI) (National Institute for Health and Care Excellence 2017c, 2017d). More recently developed systems aim to address this problem and offer secure and non-adhesive solutions to CVC stabilisation. SecurAcath is a single-use non-adhesive device to secure and stabilise central venous catheters such as peripherally inserted central catheters (PICCs).

This case vignette is based on experiences shared by two representatives of Interrad Medical Inc. (the company behind SecurAcath) during a joint interview, a representative of one of the first Trusts in the UK to use the innovation, and additional desk research. For the purposes of respecting informed consent, individuals are not named and their organisations only mentioned when explicit permission has been provided.

C.15.2. Idea generation

In the early 2000s, Dr Michael Rosenberg, a practical interventional radiologist based in Minnesota (USA), had become frustrated with complications caused by sutures and adhesives resulting from securing catheters, including MARSI and needle stick injuries. The physician thought that there must be a better way to secure catheters without causing unnecessary injuries and other complications: the idea was to have an anchor-type device beneath the skin, which is then clamped on to the catheter at the skin surface. The innovation, if successfully developed and adopted, was also expected to result in cost savings for the health system (given that dislodgements and infections associated with the traditional designs imposed costs) (Nelson 2011).

Rosenberg started to work with other physicians and engineers in the Minneapolis area who wanted to pursue this idea further, and they established Interrad Medical in 2004 (Nelson 2011). In the early years, engineers and clinicians in the team tested their ideas on the ‘lab bench’ to help examine potential designs and materials. The company founders found it important to protect their intellectual property as early as possible, especially given that they were a small company that did not have the resources to make as quick progress in developing products as larger companies, and were awarded their first patent in 2004, which was before the product was tested in an actual living organism. As there was no other comparable technology available at the time, Interrad Medical was able to get a very comprehensive first patent. As of March 2018, the company has 49 patents in the US and 5 European patents for their product, which was named SecurAcath Universal Subcutaneous Catheter Securement System.

The first animal study was conducted in 2006, to prove that the device works in an actual living organism. The first version of the product for use in humans was finalised in 2010. In the same year, SecurAcath received clearance from the US Food and Drug Administration (FDA) and Health Canada as

---

409 Innovator_INT16.
410 Innovator_INT16.
411 Innovator_INT16.
412 Innovator_INT16.
well as the CE marking granting clearance for the European Economic Area (EEA) (News Medical Life Sciences 2010).

Interrad Medical did not undertake any health economics analysis prior to market entry, but they worked with a consulting firm to assess how they should price SecurAcath. The assessment was based on studying papers and reports on existing suturing and adhesive CVC stabilisation methods, analysing complications associated with these methods and related costs, and mapping this evidence against the expected clinical and cost benefits of SecurAcath. As SecurAcath only needs to be inserted once at the time of the CVC placement, the analysis concluded that it would be more cost-effective than adhesive methods, which have to be changed weekly. The assessed price of one device was US$25 (c. £19\(^{413}\)).\(^{414}\) According to NICE, the current UK price per device is £20 (National Institute for Health and Care Excellence 2017d).

Initial funding for the development of SecurAcath was provided by angel investors,\(^ {415}\) who were convinced of the idea, and to a small extent by small venture capital groups.\(^ {416}\)

Figure C.12 illustrates the insertion of SecurAcath and Figure C.13 shows an inserted device.

---

\(^{413}\) Exchange rate as of 9 May 2019.

\(^{414}\) Innovator_INT16.

\(^{415}\) Angel investors are individuals providing financial resources at an early stage of start-ups (Virgin Start Up 2015).

\(^{416}\) Innovator_INT16.
C.15.3. Entry into the health system

SecurAcath was introduced into the Canadian, EU and US health systems in 2010, when the product had received regulatory clearance in these countries. Early attempts to enter the UK market specifically were made in 2010/2011, when Interrad Medical representatives attended vascular access-specific conferences in Europe, including the inaugural annual conference of the UK National Infusion and Vascular Access Society (NIVAS), where SecurAcath was presented as an interesting new technology. Some UK clinicians and specialist nurses attending these conferences expressed interest in using the device and got in contact with Interrad Medical. As the company did not have any distributor in the UK, they worked directly with clinicians and nurses initially. The first four hospitals they worked with were the Clatterbridge Cancer Centre Liverpool, the Royal Marsden Hospital in London, University College London Hospitals (UCLH) and the Velindre Cancer Centre in Cardiff.417 When negotiating the pricing with these early adopters, the basis for the discussions was the economically assessed US$25 (c. £19418) per device, but as the company did not have a lot of evidence backing up the product at that time, lower prices were arranged in some cases.419

A specialist nurse from one of the first UK hospitals to use SecurAcath, who was strongly involved in its introduction into their Trust, remembered hearing about the innovation at a conference in the UK in the early 2010s. After initial scepticism, the team around the specialist nurse soon found it to be a promising solution to one of the most relevant challenges in their practice. The team had recently started using electrocardiographic (ECG) tip location, a method to place tips of PICCs in the right position. Although this method helped to better locate PICCs, the nurses observed an increase of accidental dislodgements. Back then, the Trust used an adhesive securement device, StatLock, to stabilise the PICCs. However, StatLock was quite expensive as it had to be changed weekly, and it frequently also caused skin irritations or injuries. The idea was thus to find a better solution to stop lines coming out accidentally, and SecurAcath seemed to be able to resolve this issue.420 As the team around the specialist nurse could manage their own budget to introduce new products, resource availability did not play a role in the decision-making process. The team was also convinced that using SecurAcath would help them save costs as it could reduce the number of accidental dislodgements and related expensive catheter replacements. Moreover, although SecurAcath costs more than StatLock, they expected cost savings over time as SecurAcath is only placed at the time the catheter is inserted and does not need to be changed regularly.421

The introduction of SecurAcath into the Trust was very straightforward: the team directly negotiated with and ordered from Interrad Medical, and started an internal pilot study with a small number of patients in 2012. What the interviewee found particularly helpful was the proactive support provided by Interrad Medical at the time of the introduction, which helped them to immediately address any concerns as well as to learn how best to use SecurAcath. The interviewed specialist nurse noted that while they did not

417 Innovator_INT16.
418 Exchange rate as of 9 May 2019.
419 Innovator_INT16.
420 Provider_INT11.
421 Provider_INT11.
observe any uncertainties about product uptake on the part of the specialist nurses in their small team, they faced resistance from outside nurses caring for the patients and taking out SecurAcath. Early resistance and scepticism was mostly related to resistance to change and some nurses’ assumption that SecurAcath would be painful for patients. Training sessions offered to these nurses, which were supported by the company, as well as working with SecurAcath in practice, helped to overcome these issues.422

The initial pilot involving 22 patients was successful in terms of reducing the number of accidentally dislodged catheters. Moreover, the majority of patients (19) reported minor or no discomfort related to the device. The success of the pilot led to a Trust-wide introduction of SecurAcath in March 2013. However, as SecurAcath could not stop all lines being dislodged, the nurses continued using StatLock in patients at risk of accidentally pulling them. While the Trust never undertook a cost analysis, the interviewee assumed that since SecurAcath is less expensive than StatLock over time, costs were probably significantly reduced.423

C.15.4. Diffusion, scale-up and spread

Interrad Medical received very positive feedback from the first Trusts using SecurAcath, and positive experiences shared among UK Trusts led to increased demand. In 2012, they engaged a UK-based distributor to improve supply, which was initially done from the USA. According to innovator interviewees, working with a distributor located in Europe helped them increase the number of Trusts using the device.424 In order to accelerate and increase UK uptake even more, Interrad Medical went through a NICE medical appraisal process. The full NICE guidance on using SecurAcath for securing percutaneous catheters as well as a medtech innovation briefing on its use for securing cerebrospinal fluid catheters were published in June 2017 (National Institute for Health and Care Excellence 2017c, 2017d). Overall, the NICE guidance was positive, suggesting significant reductions of catheter-related complications as well as significant cost savings for both individual centres and for NHS England. Interrad Medical found the guidance very helpful for increasing the diffusion of SecurAcath in England; while it was too early at the time of the interview to provide any numbers on increased use across NHS England organisations, the company observed more demand after its publication.425 Overall, the innovator interviewees thought that conversations with NICE helped them better understand important issues regarding the product’s entry into the market (e.g. types of evidence that matter for the NHS, uptake-related schemes) and they saw the independent NICE assessments on cost savings as an enabler.426

After receiving the positive NICE guidance, NICE encouraged Interrad Medical to apply for the NHS Innovation and Technology Payment (ITP). In April 2018, it was announced that SecurAcath is one of the four innovations on the ITP for 2018/2019 (NHS England 2018a).
Innovator interviewees could not provide any numbers on how many Trusts currently use SecurAcath in the UK or specifically England, but they assumed that its use is equally spread across the UK. The NICE medtech innovation briefing indicated that, as of June 2017, 23 NHS Trusts were using SecurAcath (National Institute for Health and Care Excellence 2017c).

C.15.5. Impact

Several studies published in peer-reviewed journals as well as independent assessment from NICE indicate that SecurAcath is both clinically beneficial and cost-effective. Hughes (2014) and Zerla, Canelli and Cerne (2017) suggested that SecurAcath is associated with fewer cases of catheter migration and lower incidence of complications. Both studies also provide evidence of the technology’s cost-effectiveness; Zerla et al. (2017), for instance, compares cost data from 30 patients having SecurAcath for more than 30 days with costs for an assumed number of StatLock devices needed for the same period. Their analysis shows overall savings of €3,354 (c. £2,888) (Zerla et al. 2017). Egan et al. (2013) found in their study of 68 patients strong acceptance among patients and nurses, and showed that device malfunction and adverse events were only observed in 9.8 per cent of SecurAcath patients.

The NICE guidance concluded that SecurAcath decreases the number of catheter-related complications, is at least as effective as other devices, reduces patients’ anxieties related to potential catheter displacements, and that using it saves a considerable amount of time compared to using StatLock (National Institute for Health and Care Excellence 2017d). Moreover, NICE assessed that a single centre placing 1,100 PICCs in six months could save up to £59,000 over this period when compared with StatLock. In addition, based on current numbers of PICCs used in NHS hospitals, the estimated cost saving for NHS England is at least £4.2m (National Institute for Health and Care Excellence 2017d).

In the adopting Trust we spoke to, the specialist nurse team undertook two surveys of patients and a survey of nurses, which showed significant reported positive impact on patient experience and nurses’ work. For instance, patients indicated their preference for SecurAcath over other securement methods, almost 90 per cent of nurses experienced fewer line migrations and more than 60 per cent found dressing changes easier than when working with StatLock.

C.15.6. Enablers

Several key factors have supported the development, introduction and diffusion of SecurAcath in the health system in England so far. Insights shared in interviews, coupled with our own reflections, indicate that these key enablers were:

- The ability of the innovation to address a significant problem observed by the innovator and specialist clinical staff (in an area of unmet clinical need) supported its development,

---

427 Innovator_INT16.
428 Exchange rate as of 9 May 2019.
429 However, as this analysis did not focus on the NHS in England context specifically, (potential) cost savings in England may differ from these numbers.
430 Provider_INT11.
uptake and spread: The inventor’s frustration with complications caused by existing methods of securing catheters drove the idea to develop a device able to reduce or eliminate such issues.\textsuperscript{431} The Trust interviewee also noted that the promise of SecurAcath being able to help reduce catheter dislodgments and related complications convinced them of the innovation.\textsuperscript{432}

- **Funding provided by angel investors and small venture capital groups enabled the early development of the innovation.**\textsuperscript{433}

- **Attendance at specialist conferences in Europe provided first contacts to clinical staff and facilitated early uptake.**\textsuperscript{434} The Trust interviewee also noted that the possibility provided to nurses and clinicians to attend such international events helped in getting to know innovations able to address relevant health system needs.\textsuperscript{435}

- **The cost-effectiveness and evidence for clinical efficacy of the product compared to other stabilisation methods is seen as a key enabler of uptake and spread:** The potential cost-effectiveness compared to existing methods was one of the main drivers of the interviewed Trust’s decision to use SecurAcath.\textsuperscript{436} Innovator interviewees also indicated that cost savings are a key argument in negotiations with providers and commissioners, and they felt that evidence for clinical and cost efficacy has contributed to positive NICE guidance.\textsuperscript{437}

- **Early support and enthusiasm from specialist nurses interested in testing and using the device facilitated its introduction into the UK:** The interest of a few specialist nurses who became aware of the device through conferences, as well as their willingness to take a risk, enabled introduction into the UK health system. These contacts and their recommendations to colleagues also led to further interest from other providers.\textsuperscript{438}

- **Specialist nurses’ autonomy in decision making as well as budget autonomy were key enablers of an early and fast introduction of SecurAcath in some Trusts:** The absence of bureaucratic or financial obstacles and the specialist nurse team’s autonomy enabled the interviewed Trust to test SecurAcath. The Trust interviewee thought that if they had gone through official procurement processes, an introduction at this stage would have been very unlikely.\textsuperscript{439}

- **In-house training on how to use SecurAcath, strongly and proactively supported by the innovator, helped overcome uncertainties and secure buy-in from clinical staff.**\textsuperscript{440}

- **A UK-based distributor supported the further introduction of SecurAcath into the UK and increased its spread across the country.**\textsuperscript{441}

\textsuperscript{431} Innovator\_INT16.
\textsuperscript{432} Provider\_INT11.
\textsuperscript{433} Innovator\_INT16.
\textsuperscript{434} Innovator\_INT16, Provider\_INT11.
\textsuperscript{435} Provider\_INT11.
\textsuperscript{436} Provider\_INT11.
\textsuperscript{437} Innovator\_INT16.
\textsuperscript{438} Innovator\_INT16, Provider\_INT11.
\textsuperscript{439} Provider\_INT11.
\textsuperscript{440} Provider\_INT11.
\textsuperscript{441} Provider\_INT11.
• Conversations with NICE about the types of evidence that would be needed to support uptake in the health system in England and on available support schemes were seen as useful for targeting market entry and spread strategies.442

• A positive NICE medtech innovation briefing as well as full NICE guidance have increased the uptake of the innovation.443

---

441 Innovator_INT16.
442 Innovator_INT16.
443 Innovator_INT16.
C.16. HeartFlow FFR\textsubscript{CT} Analysis

Box C.14: Key messages – HeartFlow FFR\textsubscript{CT} Analysis

- **The innovation**: HeartFlow FFR\textsubscript{CT} Analysis is a non-invasive coronary artery disease detection tool that uses regular computed tomography (CT) scans to develop a 3D model of coronary arteries and determine the impact of artery blockages on blood flow. The technology helps to assess the impact of blockages and prevents invasive – and potentially unnecessary – tests.

- **Enablers of successful innovation development and uptake**: The successful development of the innovation and its introduction into the health system in England was enabled by:
  - Interdisciplinary collaboration between an engineer and a vascular surgery specialist gave rise to an innovative idea.
  - Venture capital funding for early development followed by funding for later-stage development from established corporations.
  - A strong focus on the collection and dissemination of compelling performance evidence (clinical and cost) supported the uptake.
  - Innovators directly approaching potential adopters to broker information and evidence, build relationships and communicate the value of the tool enabled its uptake.
  - NHS RightCare data showing opportunities for improvement in the area of cardiovascular disease initiated discussions on changing the chest pain pathway and supported the idea of introducing HeartFlow FFR\textsubscript{CT} Analysis.
  - Collaborative commissioning efforts in a Sustainability and Transformation Partnership (STP) region, a committed team supportive of change to the chest pain pathway as well as close engagement with stakeholders across the health system helped achieve the support needed to introduce the technology.
  - A positive NICE assessment and recommendation was seen as a door opener for adoption discussions and had credibility in adoption circles (amongst providers and commissioners).
  - The reduction of the number of expensive and invasive tests, and the technology’s ability to work with existing data instead of introducing a new testing method requiring staff training, enabled its introduction.

- **Evidence of impact**: Health economic analyses conducted and commissioned by HeartFlow indicate that the innovation is cost-saving compared to other diagnostic tests. NICE guidance on HeartFlow FFR\textsubscript{CT} Analysis demonstrated that the technology is not only cost-effective, but results in cost savings. NICE indicates that HeartFlow could save the NHS at least £9.1m by 2022 (National Institute for Health and Care Excellence 2017b). However, as the product has only been recently introduced in the NHS, interviewees could not provide any further evidence or thoughts on its (potential) UK-specific impact.

C.16.1. Background and context: the need for innovation in the diagnosis of coronary heart disease

Coronary heart disease (CHD) is one of the major causes of death worldwide. The British Heart Foundation estimates that in the UK around 42,000 people under 75 years old die from CHD disease each year; in England alone it caused 33,812 deaths in 2016 (British Heart Foundation 2018). CHD, otherwise known as coronary artery disease (CAD), is often a result of blockages in the blood vessels to the heart limiting blood flow, which increases the risk of heart attacks (University Hospitals Birmingham NHS Foundation Trust 2018). Symptoms of CAD usually include chest pain, angina, shortness of breath, feelings of chest tightness and heart palpitations (HeartFlow 2017; NHS Choices 2017). If patients with symptoms are considered to be at risk of CAD/CHD, general practitioners usually order non-invasive tests, such as stress echocardiograms or single-photon emission computed tomography.
(SPECT), to determine whether the patient in fact has ischemia and whether additional testing is needed (Al-Shehri, Small & Chow 2011).\footnote{Innovator\_INT17.} If these tests do not provide sufficient information, an invasive cardiac catheterisation is often conducted. While the risks of such invasive tests are in general considered to be low, they sometimes cause bleeding where the catheter was placed, or damage the artery. In addition, people may be allergic to the contrast dye used in the test (NHS Choices 2016b). These challenges raised a need for less harmful, non-invasive tests or alternative diagnostic tools.

This case vignette covers the non-invasive coronary artery disease detection tool HeartFlow FFR\textsubscript{CT} Analysis, which uses regular computed tomography (CT) scans to develop a 3D model of coronary arteries, which should help analyse the impact of artery blockages on the blood flow. The technology should advance the identification of the causes of blockages and prevent invasive – and potentially unnecessary – tests. The case vignette is based on experiences shared by two individuals working at HeartFlow, the company behind HeartFlow FFR\textsubscript{CT} Analysis; an individual working at Liverpool Heart and Chest Hospital NHS Foundation Trust who was involved in a clinical trial on HeartFlow FFR\textsubscript{CT} Analysis; and a representative of a clinical commissioning group (CCG) commissioning the product. It is also supported by additional desk research. For the purposes of respecting informed consent, individuals or their organisations are named only when explicit permission has been provided.

C.16.2. Idea generation

More than 20 years ago, Charles Taylor, then an engineering student at Stanford University, attended a talk by Christopher K. Zarins, chief of vascular surgery at the Stanford Medical Centre, on how engineering methods could be used to understand how blood flows through arteries. While Taylor’s PhD focus was on simulating airflow over airplanes, Zarins’ talk aroused his interest in using engineering techniques in medicine. Zarins asked Taylor if computational methods for simulating fluid dynamics could be applied to blood vessels. Taylor responded that this should be feasible. This initial meeting was the beginning of a long-term collaboration between Taylor and Zarins, who then started to develop a technology to combine established principles from engineering analysis with diagnostic imaging to predict blood flow to arteries. Over several years – Taylor became first an Assistant Professor in the Department of Surgery, and eventually an Associate Professor in Bioengineering and Surgery at Stanford University – the two researchers worked on the technology that would eventually become HeartFlow FFR\textsubscript{CT} Analysis.

Unlike existing non-invasive tests, their intention for the technology they were developing was that it should model blood flows using existing CT scans and be able to non-invasively measure fractional flow reserve (FFR) and evaluate the existence of CAD.\footnote{Innovator\_INT17.} This was seen as important as it responded to an identified need for non-invasive tests and providing more accurate measurements to decrease the number of unnecessary invasive tests.\footnote{Innovator\_INT17, Innovator\_INT19.}

The results of their theoretical work were very promising, but Taylor and Zarins soon found that in order for the technology to be brought to patients, it had to be clinically tested with real patients; the academic
project also needed to be moved from the university to a company setting. In July 2007, the two academics founded the company Cardiovascular Simulation Inc., the predecessor to HeartFlow.\textsuperscript{447} Two years later, the co-founders started their first clinical trial, confirming the potential for this technology to decrease the number of unnecessary catheterisation procedures.\textsuperscript{448} According to one of the innovators, clinical trials and providing evidence for the effectiveness of their technology were considered to be a priority from the beginning and continue to be an important element of the company’s strategy in order to meet regulatory requirements, but also to provide evidence that their technology meets high standards and to further develop it.\textsuperscript{449} As of 2018, there were more than 200 peer-reviewed journal papers on the HeartFlow technology, indicating its clinical effectiveness.\textsuperscript{450}

The funding for the further development of their technology as well as the clinical trials came from venture capital funds provided by investors with an interest in Taylor and Zarins’ idea. As the start-up grew, they also attracted larger corporations and investors to finance their work.\textsuperscript{451}

\textbf{Figure C.14: 3D model of HeartFlow FFR\textsubscript{CT} Analysis}

Source: Image courtesy of HeartFlow

C.16.3. Entry into the health system

In 2010, HeartFlow focused on preparing the technology for commercial release – as well as its entry into the health system. This required conducting further clinical trials and tests to get regulatory clearance from the US Food and Drug Administration (FDA), and a CE mark to be able to introduce the product onto the EU market.\textsuperscript{452} The first major clinical trials outside the USA were focused on European,\textsuperscript{447,448,449,450,451,452}
Australian, South Korean and Japanese centres, and also involved clinical centres in the UK. Clinicians employed by HeartFlow used their existing networks to find clinical trial partners in the UK and were also approached by institutions interested in using HeartFlow FFR_{CT} Analysis.\footnote{Innovator\_INT19.}

As part of their preparation to bring the product to market, HeartFlow also conducted health economic analyses to show its cost savings. Before official analyses were conducted, HeartFlow already estimated that their product would save US$3,000 (\(\approx £2,304\)) or more per patient in the US healthcare system. Economic assessments for the UK and other countries also showed that the technology would be cost-effective in those health system contexts. HeartFlow’s own analyses were also confirmed by external evaluators.\footnote{Innovator\_INT17, Innovator\_INT19.} In general, interviewees from HeartFlow noted that they use a ‘value-based’ pricing model when negotiating with providers, as they are able to demonstrate the value and cost savings of their product in their trials and cost-benefit analyses.\footnote{Innovator\_INT17, Innovator\_INT19.}

After finishing a clinical trial in the UK in 2013, HeartFlow went through a NICE technology appraisal process, which was finalised and published in February 2017 (National Institute for Health and Care Excellence 2017b). The medical technologies guidance (NICE MTG32) provided evidence for the non-invasiveness, safety and diagnostic accuracy of HeartFlow FFR_{CT} Analysis. Furthermore, NICE showed that its use could lead to savings of £214 per patient. Moreover, NICE estimated minimum annual cost savings for NHS England of £9.1m by 2022 if a coronary CT followed by a HeartFlow FFR_{CT} Analysis (if needed) were used instead of other diagnostic tests (National Institute for Health and Care Excellence 2017b).

In April 2018, NHS England announced that HeartFlow had been selected from more than 270 applicants\footnote{Innovator\_INT17, Innovator\_INT19.} as an innovation to receive NHS funding through the Innovation and Technology Payment (ITP) programme for 2018/2019 (NHS England 2018a). Under this programme, medical sites with demonstrated CT imaging expertise will be qualified by the NHS and allowed to order HeartFlow FFR_{CT} Analysis at no cost.\footnote{Innovator\_INT17.} The qualification process requires sites to demonstrate their CT imaging experience and capability, as well as their commitment to use the technology to improve patient care. For the HeartFlow FFR_{CT} Analyses performed at ITP qualified sites, NHS England will reimburse HeartFlow directly.\footnote{Innovator\_INT17, Innovator\_INT19.} According to HeartFlow interviewees, the positive NICE guidance, now supported by NHS ITP funding, is the company’s ‘gate opener’ to the healthcare system in England and could help physicians and patients experience the benefits of HeartFlow’s technology in a real-world setting.\footnote{Innovator\_INT17, Innovator\_INT19.}

Just one month after the NHS announcement, the first sites started providing the technology to their patients. Furthermore, in May 2018, HeartFlow FFR_{CT} Analysis was supported by a Sustainability and
Transformation Partnership (STP) and commissioned by several CCGs in the South of England. The company is in early conversations with other commissioners. In such negotiations, HeartFlow uses a list price of £700, which was used in the NICE assessment.

As HeartFlow FFR\textsubscript{CT} Analysis only recently entered the healthcare system in England, HeartFlow interviewees were unable to provide an estimate of the diffusion, spread or variation in uptake in England. An early provider of HeartFlow FFR\textsubscript{CT} Analysis, besides Trusts and specialist centres involved in clinical trials, is the Liverpool Heart and Chest Hospital NHS Foundation Trust. The Trust was approached by HeartFlow in 2015, when the company was looking for specialised large centres in England to use their technology. After a few meetings with HeartFlow and reading publications on the technology, Trust members involved in the negotiations felt that given its strong evidence, HeartFlow FFR\textsubscript{CT} Analysis would be a clinically useful technology as well as beneficial for patients, and were strongly interested in using it in the Trust. However, as neither the Trust nor the responsible CCG would have been able to finance its use, HeartFlow offered the Trust the opportunity to take part in one of their registry studies, which would include the free use of the technology over a period of 18 months. The interviewee from the Trust noted that working with HeartFlow FFR\textsubscript{CT} Analysis as well as the company’s team was overall a very positive experience for all involved Trust members and clinicians. They did not observe any uncertainties on the part of the clinicians or any insecurities or questions on how to use the technology. Issues could be quickly resolved, as HeartFlow’s team provided ongoing and strong support. Clinicians also found it positive that CT scans would be sent anonymously to HeartFlow, who would then analyse the data. Our interviewee from the Trust also indicated that patients found the HeartFlow FFR\textsubscript{CT} Analysis beneficial, as they would not have to return to the hospital to undergo additional tests.

Only a few months after the Trust started using HeartFlow FFR\textsubscript{CT} Analysis, NICE published its updated clinical guideline on assessing and diagnosing chest pain (CG95), which suggested a move from functional non-invasive investigations to coronary CT as a first line test (National Institute for Health and Care Excellence 2016b). NICE also published medical technologies guidance (MTG32) on HeartFlow FFR\textsubscript{CT} Analysis, which confirmed Liverpool Heart and Chest Hospital's positive experiences with the technology as one of the participating centres in the ADVANCE registry clinical study (U.S. National Library of Medicine 2018). Our interviewee from the Trust noted that study enrolment ended in late 2017. At that time, Liverpool Heart and Chest Hospital had to stop using the technology, as they could not raise the necessary funding for commissioning. Over a period of more than a year during the 18-month trial, the interviewee was negotiating with the relevant CCG, specialised commissioners, NHS England and the Trust’s STP, using evidence provided in the NICE guidance. Liverpool Heart and Chest Hospital referred to recommendations made in the NICE clinical guidance on chest pain diagnosis as well as their own data and experience with using HeartFlow FFR\textsubscript{CT} Analysis. While the evidence convinced the

---

461 We could not obtain any data on how many CCGs currently commission HeartFlow FFR\textsubscript{CT} Analysis.
462 Innovator\_INT19.
463 Provider\_INT3.
464 Provider\_INT3.
465 Provider\_INT3.
interviewee’s discussion partners, local financing has not been granted yet. According to the interviewee, NHS England, for instance, explained that funding for introducing new technologies into the area of cardiology was already oversubscribed. Innovator interviewees indicated that the ITP programme will allow Liverpool Heart and Chest Hospital to use HeartFlow FFR\textsubscript{CT} Analysis again. 467

As mentioned above, one STP has already shown support and commissioned HeartFlow in Southern England. This STP brought together several regional stakeholders – including commissioning managers, practice nurses, consultants, pharmacists, general practitioners (GPs), clinical leads and hospital managers – in mid-2017 to discuss opportunities for improvement for patients with suspected coronary artery disease. NHS RightCare had determined that a vast number of coronary angiographies were being performed in England on patients without obstructive disease. This group decided to address the issue in their region. An interviewee involved in this work stream noted that they found it important to involve stakeholders across the chest pain pathway, including primary care, in these discussions, as all of them would be affected by any changes to the pathway. None of the involved stakeholders challenged the RightCare data; on the contrary, they all shared the vision that change is needed. A cardiologist already working with HeartFlow FFR\textsubscript{CT} Analysis suggested that the technology should be used to more accurately and non-invasively diagnose patients presenting with suspected disease and reduce the angiography rate. NICE guidance and data collected by other Trusts already using HeartFlow supported its clinical utility and cost-effectiveness. The group decided to introduce HeartFlow in their region. A group of patients consulted at the beginning of the discussions was also in favour of the technology, as it would prevent them returning to hospital for additional tests. The fact that HeartFlow FFR\textsubscript{CT} Analysis uses existing data and does not require the patient to return for another test, and does not involve extensive staff training, was seen as an attractive feature of the technology.469

As of late April 2018, the introduction of HeartFlow FFR\textsubscript{CT} Analysis in the STP region was approved. The IT preparations (e.g. regarding data transfer and firewalls) were completed in early May and patients in the region now have access to the technology. Initially it was expected that the rollout across the region would happen in December 2017, but it took longer to convince all CCGs and Trusts to use HeartFlow FFR\textsubscript{CT} Analysis.470 Several commissioners and Trust managers shared concerns that they may lose financially by doing fewer angiographies. There was also some concern that the introduction of a new system could cost more at the beginning. The argument that using the technology would be an efficient way to spend a taxpayer’s money eventually helped get all CCGs and Trusts on board. When reflecting what had supported the introduction of HeartFlow FFR\textsubscript{CT} Analysis so far, the CCG interviewee noted

466 Provider\_INT3.
467 Innovator\_INT17, Innovator\_INT19.
468 CCG\_INT11.
469 CCG\_INT11.
470 CCG\_INT11, Innovator\_INT17, Innovator\_INT19.
471 CCG\_INT11.
that the strong engagement with different stakeholders and many in-depth and ongoing discussions were particularly helpful.472

C.16.4. Diffusion, scale-up and spread

The innovation has not yet widely diffused as it is in early stages of entry into the health system in England.

C.16.5. Impact

As mentioned above, health economic analyses as well as NICE guidance on HeartFlow FFR\textsubscript{CT} Analysis suggest that the technology not only improves patient care but also reduces costs, and could save the NHS at least £9.1m a year by 2022 (National Institute for Health and Care Excellence 2017b). However, as the product has only been recently introduced in the NHS, interviewees could not provide any further evidence or thoughts on its (potential) UK- or England-specific impact. Data on the cost-effectiveness of HeartFlow FFR\textsubscript{CT} Analysis based on the study Liverpool Heart and Chest Hospital participated in are expected to be published in August 2018.473 The STP that will soon offer HeartFlow FFR\textsubscript{CT} Analysis across their CCGs and Trusts aims to continuously analyse the technology’s use and its cost-effectiveness.474

C.16.6. Enablers

The interviews with two innovators and one representative of a Trust suggest that there are several factors that have supported the development, rollout, spread and uptake of HeartFlow FFR\textsubscript{CT} Analysis so far. Their views, coupled with our reflections on the case vignette evidence, suggest that the key enablers of the development and early entry of the HeartFlow FFR\textsubscript{CT} Analysis into the health system in England were:

- **Interdisciplinary collaboration between an engineer and a vascular surgery specialist gave rise to an innovative idea** for a non-invasive technology for detecting coronary artery disease that would ultimately demonstrate improved patient outcomes.
- **Venture capital funding for early development followed by funding for later-stage development from established corporations.**475
- **A strong focus on the collection and dissemination of compelling performance evidence (clinical and costs) supported the uptake of HeartFlow FFR\textsubscript{CT} Analysis:**
  - This enabled early discussions related to adoption with provider organisations and commissioners, and helped inform a positive NICE recommendation. Publishing performance evidence from trials in academic literature seems to have supported the credibility of the evidence being shared. Looking back on their entry into the health system in England, an interviewee noted that having conducted research in and with

---

472 CCG\_INT\textsuperscript{11}.
473 Provider\_INT\textsuperscript{3}.
474 CCG\_INT\textsuperscript{11}.
475 Innovator\_INT\textsuperscript{19}.
academically oriented and widely recognised cardiovascular Trusts also helps when negotiating with potential providers.476

- All interviewees emphasised that the strong evidence base for HeartFlow FFR\textsubscript{CT} Analysis was crucial when it came to the introduction of the product into the health system.477

HeartFlow interviewees are convinced that the evidence showing the clinical effectiveness and cost-effectiveness of their product helped them to make quick progress in regulatory clearance matters and supported their negotiations with potential providers. In addition, all interviewees felt that the evidence base is a big advantage over similar products on the market, which would neither be able to prove their effectiveness nor be as accurate as the HeartFlow FFR\textsubscript{CT} Analysis. The Trust and CCG interviewees also highlighted several times how the product’s evidence base convinced them to use the technology.478

- Innovators directly approaching potential adopters to broker information and evidence, build relationships and communicate the value of the tool enabled its uptake: this included not only the technology but also support in terms of training on how to use it, and also the ability of the company to analyse anonymised data.479

- NHS RightCare data showing opportunities for improvement in the area of cardiovascular disease initiated discussions on changing the chest pain pathway and supported the idea of introducing HeartFlow FFR\textsubscript{CT} Analysis to address identified challenges.480

- Collaborative commissioning efforts in an STP region, a committed team supportive of change to the chest pain pathway, as well as close engagement with stakeholders across the health system helped achieve the support needed to introduce the technology.481

- A positive NICE assessment and recommendation was seen as a door opener for adoption discussions and had credibility in adoption circles (amongst providers and commissioners): In the specific context of England, HeartFlow interviewees found the NICE guidance to be an important enabler to increase their product’s spread in the health system and they expect that the guidance as well as the NICE clinical guideline on chest pain diagnosis will continue to help them make quick progress in England. One of the interviewees from HeartFlow noted that they were impressed by UK clinicians’ focus on and trust in evidence, which they thought is also very helpful.482 The Trust and CCG interviewee both referred several times to the importance of the NICE guidance in their decision-making process.483

---

476 Innovator\_INT19.
477 CCG\_INT11, Innovator\_INT19, Provider\_INT3.
478 CCG\_INT11, Provider\_INT3.
479 Innovator\_INT17, Innovator\_INT19.
480 CCG\_INT11.
481 CCG\_INT11.
482 Innovator\_INT19.
483 CCG\_INT11, Provider\_INT3.
• The reduction of the number of expensive and invasive tests, and the technology’s ability to work with existing data instead of introducing a new testing method requiring staff training, were also considered to be important reasons to introduce the technology. 484

In terms of what could help in adopting and spreading the HeartFlow FFR_{CT} Analysis and making quicker progress in doing so, both HeartFlow interviewees and the Trust interviewee found that funding plays a crucial role. The recently awarded funding from the ITP is seen as key to further diffusion in the health system in England, and HeartFlow will continue to work towards establishing long-term support from NHS and/or regional commissioners as well as a national tariff. 485

484 CCG_INT11, Provider_INT3.
485 Innovator_INT17, Innovator_INT19.
C.17. Appendix to Annex C: case vignette interview protocols

C.17.1. Interview protocol used for innovators

1. Why did you create the innovation? How was the idea born?

2. How did you develop the innovation?
   - Who was involved and at which stages?
   - What was the development timeline?
   - Who were the key collaborators and what did each of them contribute and in what capacity?
   - How was the development funded?

3. Were patients and the public involved in the process? How were they involved and were they involved beyond trials (e.g. input in early development phases such as need identification, design, facilitating uptake, evaluation)? When? Why?

4. Were clinicians/health and care professionals involved in the process? How were they involved and were they involved beyond trials (e.g. input in early development phases such as need identification, design, facilitating take-up, evaluation)? When? Why?

5. Were any other groups involved and how?

6. Did you do a health economics analysis? And if so, can you say a bit about that and when you did it in the timeline of development?

7. How did you approach:
   - Patenting?
   - Manufacturing?
   - Regulatory aspects?
   - Pricing aspects?

8. Have you entered the UK healthcare system? And to what extent?
   - Have you had your product piloted or commissioned, and if yes at what scale and where?
   - If you have already entered the UK health system: How did you enter it (NHS and beyond)?
     - Who was involved (e.g. organisations, CCGs, hospitals, Trusts, individuals)? How where they involved and how? Who were early adopters?
     - How did you negotiate agreements regarding pricing and entry into the NHS?
     - Do you have any thoughts on particularly progressive and effective CCGs and healthcare providers in terms of commissioning the innovation?
   - If you have not yet entered the UK health system: How do you expect the entry into the NHS/UK health system to unfold?
     - What efforts are you pursuing? Who is involved?
     - What do you expect to be some of the enablers?
     - How would you go about/address challenges?

9. What is the role of competition (e.g. competing products/technologies/services) in affecting the
   - Development of your innovation?
   - Uptake (especially) of your innovation?
10. Variation in uptake:
   o If you have already entered the UK health system:
     - Is there any significant variation in uptake nationally within the UK? Where, how and why in your opinion?
     - How would you explain or account for variation in uptake between CCGs and providers?
     - Are there any regions or CCGs that are examples of ‘good practice’ you could draw out? Why are these ‘good’?
   o If you have not yet entered the UK health system:
     - What do you expect might influence variation in uptake and how?

11. What impact did the local/regional and national policy and regulatory landscapes play on how your product/technology/service developed and entered the market?

12. What role do you now expect the policy landscape to play and how are you hoping to interact and take advantage?
   o Is there any particular initiative that you want to engage with? What are the barriers/enablers for you to get involved?
   o Do you think there is anything other stakeholder groups (or partners that you currently work with) could do to facilitate your engagement with the initiatives?
   o Do you think these initiatives are applicable across drugs, devices/medtech, digital and service innovation?

13. More generally, how do you think the current policy landscape will affect health innovation in the UK (e.g. Accelerated Access Review, Five Year Forward View, Next Steps on the NHS Five Year Forward View, Carter Review)?

14. Looking back on your journey to develop and bring your innovation to patients in the UK, is there anything in particular that, had it existed, could have helped you make quicker progress?

15. Is there anyone else that we should speak to understand uptake and diffusion in the health system, or indeed how your entry into the market happened and was facilitated/constrained or any other important factors?

C.17.2. Interview protocol used for commissioners

Commissioning decision
1. Can you just briefly tell us about your individual role and the role of your organisation as it relates to innovation (be it in products, technologies or services/service model innovation) and across the innovation pathway (so development and uptake of innovation in the system)?

2. How was the innovation commissioned or introduced in your patch?
   o Was the process of uptake led by commissioners or by healthcare providers? Who initiated the process?
   o What was the nature of your engagement?
What did you bring to the process?
 Who was involved in the process, and who approached who (e.g. provider, supplier, commissioners)?

3. Why did you choose to commission or introduce this innovation?
   - How did you find out about the innovation?
   - How did the innovation relate to your CCG’s strategic priorities or awareness of population needs?
   - What role did financial or other resource availability play in your decision making? And how did you approach these considerations?
   - Did the decision to/not to commission depend at all on the ability of providers to deliver the innovation (e.g. their skills and capabilities)?
   - Did the decision depend at all on patient engagement and how (i.e. likely uptake among potential patients)?
   - Did any of these play a role in the commissioning process, and if so, how:
     - Direct marketing from suppliers?
     - National guidance, policy and regulation, NICE recommendations?
     - Other sources of information and evidence available to you (e.g. pharmaceutical advisor involvement in the business case)?
     - Learning from the work of other CCGs (e.g. were you aware that another CCG had done something similar?)?
     - Specific individuals, networks or stakeholder groups (e.g. clinicians, patients, advocacy groups such as a local cancer network)?

4. With regards to the innovation, were there similar products/technologies/services providing a similar or comparable function that you considered? If so, what led you to choose the specific innovation over other available options?

5. How did you negotiate procurement and pricing for the innovation?
   - Who was involved in this process and how?

6. Has the commissioning or use of the innovation changed at all over time? If so, why? In other words, have you:
   - Chosen to use an alternative product or technology which meeting the same purpose over time?
   - Commissioned more or less of the innovation?
   - Chosen to de-commission the innovation?

**Implementation, diffusion and rollout**

7. What part of the pathway does the innovation use (e.g. primary, acute, emergency and urgent, community, social care, …)?
   - Did this (or other) part(s) of the pathway influence the commissioning decisions?

8. What were the enablers associated with the rollout, implementation and diffusion? Can you comment on/illustrate how these played out in practice? E.g. related to:
   - Skills, capabilities and leadership
   - Motivations and accountabilities
9. What were the barriers encountered with the rollout, implementation and diffusion? Can you comment on/illustrate how they played out in practice?

10. What uncertainties did you face with the implementation and rollout over time (e.g. uncertainty on the part of doctors)? Can you comment on/illustrate how these played out in practice?

11. Have you observed any return on investment, or any indicators or value for money? What do you do to gather this evidence? Where could we get it?

12. What role do you now expect the policy landscape to play and how are you hoping to interact and take advantage?
   - Is there any particular initiative that you want to engage with? What are the barriers/enablers for you to get involved?
   - Do you think there is anything other stakeholder groups (or partners that you currently work with) could do to facilitate your engagement with the initiatives?
   - Do you think these initiatives are applicable across drugs, devices/medtech, digital and service innovation?

13. More generally, how do you think the current policy landscape will affect health innovation in the UK (e.g. Accelerated Access Review, Five Year Forward View, Next Steps on the NHS Five Year Forward View, Carter Review)?

14. Looking back on your journey to commission or introduce the innovation, is there anything in particular that, had it existed, could have helped you make quicker progress?

15. Is there anyone else that we should speak to understand uptake and diffusion of the innovation in the health system?

C.17.3. Interview protocol used for providers

Decision to introduce the innovation

1. Can you just briefly tell us about your individual role and the role of your organisation as it relates to innovation (be it in products, technologies or services/service model innovation) and across the innovation pathway (so development and uptake of innovation in the system)?

2. Can you tell us how you got involved with the innovation, i.e.:
   - How did you (i.e. as the provider) find out about the innovation?
   - What was the nature of your engagement?
   - What did you bring to process?
   - Who was involved in the decision-making process, and who approached who?

3. We would like to further explore some of the factors which may be relevant for your experience with the innovation:
How did the innovation relate to your organisation’s strategic priorities or other improvement initiatives?

What role did financial or other resource availability play in your decision making? And how did you approach these considerations?

Did the decision to engage with this innovation depend at all on the ability of providers to deliver the innovation (e.g. their skills and capabilities)?

Did the decision depend at all on patient engagement and how (i.e. likely uptake among potential patients)?

Did any of these play a role in the decision-making process for the innovation, and if so, how:

- Direct marketing from suppliers?
- National guidance, policy and regulation, NICE recommendations?
- Other sources of information and evidence available to you?
- Learning from the work of other provider organisations (e.g. were you aware that another Trust or GP practice had done something similar)?
- Specific individuals, networks or stakeholder groups (e.g. clinicians, commissioners, patients, advocacy groups such as a local cancer network)?

4. With regards to the innovation, were there similar products/technologies/services providing a similar or comparable function that you considered? If so, what led you to choose the specific innovation over other available options?

5. If applicable, how was the innovation introduced into your organisation (e.g. did you have to go through the CCG)?

6. If applicable, how did you negotiate procurement and pricing for the innovation?
   - Who was involved in this process, and how?

7. Has the procurement or use of the innovation changed at all over time? If so, why? In other words, have you:
   - Chosen to use an alternative product or technology which meeting the same purpose over time?
   - Procured more or less of the innovation?
   - Chosen to de-commission an innovation?

**Implementation, diffusion and rollout**

8. What were the enablers associated with the rollout, implementation and diffusion? Can you comment on/illustrate how these played out in practice? E.g. related to:

   - Skills, capabilities and leadership
   - Motivations and accountabilities
   - The information and evidence environment
   - Relationships and networks
   - Patient and public involvement and engagement with innovation
   - Funding and commissioning.
9. What were the barriers encountered with the rollout, implementation and diffusion? Can you comment on/illustrate how they played out in practice?

10. What uncertainties did you face with the implementation and rollout over time (e.g. uncertainty on the part of doctors)? Can you comment on/illustrate how these played out in practice?

11. Have you observed any return on investment, or any indicators or value for money? What do you do to gather this evidence? Where could we get it?

12. What role do you now expect the policy landscape to play and how are you hoping to interact and take advantage?
   - Is there any particular initiative that you want to engage with? What are the barriers/enablers for you to get involved?
   - Do you think there is anything other stakeholder groups (or partners that you currently work with) could do to facilitate your engagement with the initiatives?
   - Do you think these initiatives are applicable across drugs, devices/medtech, digital and service innovation?

13. More generally, how do you think the current policy landscape will affect health innovation in the UK (e.g. Accelerated Access Review, Five Year Forward View, Next Steps on the NHS Five Year Forward View, Carter Review)?

14. Looking back on your journey to introduce the innovation, is there anything in particular that, had it existed, could have helped you make quicker progress?

15. Is there anyone else that we should speak to understand uptake and diffusion of the innovation in the health system?
Annex D. Workshop insights

D.1. Summary

**Aims**
- Stakeholder-specific workshops were conducted to consider stakeholder views on key areas for action that need to be addressed to support receptive and connected places for innovating in health and care delivery. They were aimed at understanding what stakeholders felt was needed to make the most of innovation opportunities in the current landscape, including in relation to evolving policy.

**Design and implementation**
- We conducted seven workshops with six stakeholder groups: innovation and improvement networks, healthcare providers and commissioners (two workshops), charity and patient and public involvement and engagement (PPIE) organisations, the private sector, academia and the research community, and policymakers.
- The workshops, lasting between four and five hours, were held between December 2017 and January 2018. Each had between 5 and 14 participants; in total, 71 individuals participated in the workshops.
- The workshops followed a structured agenda and included short presentations by the study team, plenary and smaller group discussions. Structured workshop memoranda following the agenda were analysed within and across stakeholder groups as well as within and across the six drivers of innovation in the health system identified by Marjanovic, Sim et al. (2017a, 2017b): skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning.

**Key findings**

**Overarching system considerations, key issues and necessary actions identified by workshop participants:**
- Creating a system where innovation needs are clear, agreed and stable and where expectations of what is likely to have traction are effectively managed.
- Ensuring that the design of policy interventions is considered alongside an assessment of implementation requirements and success criteria.

**Key issues and necessary actions related to skills, capabilities and leadership:**
- Identifying and joining up leadership for innovation needs to happen throughout the NHS hierarchy. In addition, there is a need to ensure that leadership in the health system is empowered to work to change attitudes to risk and that it can recognise that not engaging with innovation is also a risk. This includes supporting leaders to act as role models through the way they carry out their functions.

**Key issues and necessary actions related to motivations and accountabilities:**
- A mix of financial and non-financial incentives and both carrot (incentivising) and some more stick-like (accountability-focused) mechanisms need to be introduced into the health system, to ensure a motivated and accountable innovation culture.

**Key issues and necessary actions related to the information and evidence environment:**
- There is a need to shift towards a more learning-focused system, which includes: enriching the types of evidence and information that are provided and shared to better reflect and meet the needs of decision makers in the system; reflecting on where the burden of proof lies; considering the language used in communicating and conveying information and evidence so that it has most effect/traction; and building effective platforms for exposure to information and evidence on innovations, engaging local actors and national coordination and oversight.
Key issues and necessary actions related to relationships and networks:

- Enabling local relationships that are critical for effective innovating and health and care systems more widely, while not neglecting the equally important need to foster inter-local and local-national interactions. This requires nurturing both individual-level and institutional-level relationships.

Key issues and necessary actions related to engagement with patients and the public:

- National-level organisations as well as regional actors should work to coordinate inputs from different PPIE sources in the system better. For example, this would include closer collaboration and coordination between ‘umbrella organisations’ and national-level bodies, as well as local broker institutions.
- Local government could also have more of a role to play in connecting with local communities. However, there is a need to recognise that in all coordination efforts an existing degree of balancing collaboration versus competition for ‘engaged’ patients exists between the diversity of projects, programmes and initiatives seeking to recruit representatives of patients and the public.

Key issues and necessary actions related to funding and commissioning:

- Mobilising political will for a portfolio approach to innovation that supports cross-departmental and cross-party working to ensure a compelling business case across the innovation pathway.

D.2. Introduction

Through a three-year study commissioned by the National Institute for Health Research (NIHR) Policy Research Programme, RAND Europe and the University of Manchester have been working with regional health economies and national stakeholders to help develop specific and actionable recommendations for the NHS on how to better innovate (in service models, products and technologies) to respond to the demand for high-quality, efficient and effective care.

As part of this study, we conducted workshops with six stakeholder groups, to consider stakeholder views on key areas for action that need to be addressed to support receptive and connected places for innovating in health and care delivery. The workshops were aimed at understanding what stakeholders felt was needed to make the most of innovation opportunities in the current landscape, including in relation to evolving policy.

The workshops were unique in generating novel and nuanced insights from individual stakeholder groups, relating to a diverse range of drivers of health innovation that need to work together for the overall system of support to work. Understanding the motivations and perspectives of different stakeholders is fundamentally important, and this research is unique in considering multiple system drivers and structural and behavioural conditions – as they apply to distinct stakeholder groups.

The stakeholder groups were:

- Innovation and improvement networks (networks).
- Healthcare providers and commissioners (providers and commissioners) (two workshops).
- Charity and patient and public involvement and engagement (PPIE) organisations (charities and PPIE).
- Private sector.
- Academia and research community (academics).
- Policymakers.
Overall, we conducted seven workshops between December 2017 and January 2018, each of which lasted between four and five hours and were held. Table D.1 provides an overview of the workshops, including numbers of participants. The workshop agenda can be found in the Appendix of this Annex (Section D.11). The following sections set out the key points arising from the workshop.

**Table D.1: Overview of the stakeholder-specific workshops**

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Workshop date</th>
<th>Location</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation and improvement networks&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4 December 2017</td>
<td>London</td>
<td>10</td>
</tr>
<tr>
<td>Private sector</td>
<td>8 December 2017</td>
<td>London</td>
<td>14</td>
</tr>
<tr>
<td>Charities and patient and public involvement organisations</td>
<td>13 December 2017</td>
<td>London</td>
<td>8</td>
</tr>
<tr>
<td>Academics</td>
<td>10 January 2018</td>
<td>London</td>
<td>13</td>
</tr>
<tr>
<td>Policymakers</td>
<td>11 January 2018</td>
<td>London</td>
<td>13</td>
</tr>
<tr>
<td>Healthcare providers and commissioners based in and around London</td>
<td>16 January 2018</td>
<td>London</td>
<td>5</td>
</tr>
<tr>
<td>Healthcare providers and commissioners based in the South West</td>
<td>18 January 2018</td>
<td>St Mellion (East Cornwall)</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>

**Note:**

<sup>a</sup> Examples in this stakeholder category include individuals from institutions such as Academic Health Science Networks (AHSNs), Innovation Hubs and other regional network initiatives.

**D.3. Creating a system where innovation needs are clear, agreed and stable and where expectations of what is likely to have traction are effectively managed**

**D.3.1. Key issues and necessary actions according to workshop participants**

**What to do: investing in an improved national strategy and local processes for articulating and agreeing on needs**

In order to support effective alignment of innovation demand and innovation supply, invest in an improved national strategy and local processes for articulating and agreeing on needs. This is required so that innovation development moves to being more responsive to stable and certain demand with a greater likelihood of commissioning. The NHS needs to create a ‘pull’ for innovation into the health system that is based on greater transparency about where current ‘best practice’ is not good enough and could be improved, if innovations in needed areas were to be developed.<sup>1</sup> Better needs assessment will enable an improved alignment of investments, time and effort in relation to innovation in the health system and support innovators in having greater clarity about service and patient priorities.

---

<sup>1</sup> Networks workshop, policymakers workshop, private sector workshop, providers and commissioners workshop.
How to do it

According to workshop participants, the actions required involve the following:

- **The NHS and policymakers need to work more closely together to clearly articulate areas in need of improvement where innovations would make a difference, and to provide stability for identified and agreed-on needs.** To achieve this will require:
  - A coordinated approach between innovation policy initiatives and national programmes focusing on the quality of care, efficiencies, patient safety and on reducing unwarranted variation. This includes ensuring joint planning and needs identification between initiatives directly related to innovation (e.g. the *Accelerated Access Review* (2016), Innovation and Technology Tariff (ITT) and Innovation and Technology Payment (ITP) programmes, the NHS Innovation Accelerator and Innovation National Networks) and programmes focusing on improvement more broadly and on reducing unwarranted variation, such as NHS RightCare, *Carter Review* (Lord Carter of Coles 2016) implementation efforts and Getting It Right First Time (GIRFT).
  - Closer joint working at the national level needs to happen in coordination with local networks, which also have a role to play in identifying and articulating needs and demand (e.g. Academic Health Science Networks (AHSNs) and Innovation Exchanges, Vanguards and Sustainability and Transformation Partnership (STP) footprints). Some of these ideas are being picked up on in the evolving policy landscape – e.g. via AHSNs and Innovation Exchanges and Innovation National Networks. Ensuring this coordination in practice (as well as through design) will be critically important for effective needs identification and management.
  - Support for ensuring that a bottom-up approach is included in horizon scanning and needs identification – as not all innovation activity will require national coordination. Horizon scanning for approaches and particular interventions that do not require national policy coordination would encourage innovation to become part of the system, empowering frontline staff to change their thinking and behaviour. This would then allow for policy interventions for innovation to be focused on areas that require national coordination, thus allowing them to have higher impact for the same investment.3

- **Identifying needs in a joined-up manner needs to be accompanied by consideration of the scope for pre-commitments to specific types of innovations, provided they meet quality and cost criteria – a stronger focus on what is needed should also be accompanied by clear criteria for ‘what good looks like’.** This responds to the need for stability in areas of identified

---

2 Networks workshop, policymakers workshop, private sector workshop, providers and commissioners workshop.
3 Policymakers workshop.
need. This could include actions such as pre-commercial procurement arrangements, adoption challenge funds and prize-based mechanisms (e.g. a moon shot fund approach).

- In order to facilitate the private sector in its response to areas of identified need, the NHS and policy stakeholders should establish guiding principles for private sector engagement with the NHS and create ‘receptor roles’ in the NHS with leadership (clinical, management level and senior executive), responsibility and accountability for engaging with the private sector and an ability to bring clarity to innovators. Guiding principles need to cover what evidence the private sector needs to provide to commissioners and healthcare providers and who they need to communicate with. NHS receptor roles would reside in individuals (e.g. frontline staff, middle managers, senior executives) and networks (e.g. Medical Royal Colleges, AHSNs and other regional quality improvement or innovation networks) who are able to provide credible feedback to innovators on the utility and need for their innovations and who can help them navigate the health system.

Our workshops identified that a critical area for improvement is the communications culture between the private sector and the NHS and the processes of identifying areas of need and demand. Some private sector innovators said that it is not uncommon for them (in their view) to be led to believe that their innovation in development will be useful and needed, only to realise further down the line that it is not a reliable commissioning prospect or priority (even if it meets cost-effectiveness criteria). Private sector innovators identified cultural issues that need to be addressed through more honest dialogue around what is likely to make its way into the NHS and through a process that involves both those individuals in the NHS who can identify clinical needs for innovation and those with the authority and power to make purchasing decisions (these can be, but are often not, the same individuals). For example, we were told that NHS frontline staff on occasion simply do not want to appear uninterested in meetings with entrepreneurs, or are interested on a personal level but do not consider or communicate the commercial or hierarchical aspects involved in decisions.

Private sector workshop participants also highlighted siloed views and a lack of coordinated demand identification between frontline staff in NHS settings, middle management and senior executives and policymakers. This means that a priority articulated by a frontline staff member may not always rest easily with the priorities of a middle manager or a senior executive and that those making commissioning or procurement decisions may not agree with the priorities identified by those participating in earlier meetings with innovators. Private sector actors also do not necessarily know who to approach in NHS organisations (and in broker institutions) or how to effectively discuss commercial prospects.

---

4 Private sector workshop, policymakers workshop.
5 Private sector workshop.
6 Charities and PPIE workshop.
7 Private sector workshop.
8 Providers and commissioners workshop.
D.4. Ensuring that the design of policy interventions is considered alongside an assessment of implementation requirements and success criteria

D.4.1. Key issues and necessary actions according to workshop participants

**What to do: considering new policy initiatives in a more joined-up and timely fashion**

In order to support the effective implementation of policy developments on the ground, consider new policy initiatives (and associated areas of intervention) and their implementation requirements, design specifications and success criteria in a more joined-up and timely fashion.9

**How to do it**

According to workshop participants, the actions required involve the following:

- **When designing policy interventions, policymakers should collaborate closely with other stakeholders in the health system to specify implementation requirements upfront.** This should include implications in terms of resources required, the nature and scale of stakeholder engagement needed for implementation, implementation time frames, decommissioning needs, and areas of uncertainty. This is important because if implementation criteria cannot be met within the current systems infrastructure, policy schemes are unlikely to effectively land within the system.10 In addition, considering implementation requirements and success criteria more rigorously could influence the ultimate decisions that are made regarding rollout and how resources should be used within and across different policy schemes, to target the highest value actions. According to some private sector workshop participants, policy interventions tend to address high-level challenges (e.g. a need to coordinate between networks, a need to help SMEs, or support for efficiency-generating innovations), but do not sufficiently consider the details within them that ultimately determine whether the interventions are successful in realising their aims or not. As a result, seemingly sensible policy initiatives can end up not delivering to their full potential, because of the detail getting lost in translation in the policy design and implementation process.11

- **Each policy scheme needs to be transparent about how access to the support provided through the policy initiatives will work (e.g. selection criteria, eligibility, application processes) and this needs to be communicated to stakeholders in as timely a manner as possible.**12
  - For example, whereas private sector workshop participants in principle welcomed the £6m package of support from the Office for Life Sciences for SMEs to test their products in the real world and generate evidence of effectiveness, they could not make decisions or express views on the value of the scheme without knowing over how many SMEs and

---

9 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
10 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
11 Private sector workshop.
12 Networks workshop, private sector workshop.
over how may products the resources will be spread, nor without having clarity as to the process through which to engage with the scheme. There was a recognition that such clarifications may come with time.\textsuperscript{13}

- Workshop participants also flagged the importance of ensuring that UK productivity is not negatively impacted by some schemes (e.g. if the administrative costs of applying to, running and administering the scheme are too high – for instance if there is a very low chance of success but a very long and bureaucratic application and selection process). Staged application processes were seen as potentially helpful in this regard.\textsuperscript{14}

- **Policymakers should consider how the schemes they are rolling out relate to the incentives of different stakeholders and bring such considerations into their communication strategies. This will help communicate the value offer in a compelling manner and support stakeholder acceptance and buy-in for implementation.**\textsuperscript{15} This is a practical matter of formulating the offer according to the envisaged benefits for specific stakeholders. Doing this will also allow for reflection about the extent to which different policy initiatives in the system respond to the needs of the diverse stakeholders that need to be incentivised to make the overall system work. The design and rollout of new policy schemes needs to be based around an understanding of how policy initiatives respond to the common as well as unique incentives for specific stakeholder groups (considering what the incentive is and how the intervention responds to it) – and articulating this clearly. In doing so, policymakers should consider not only what the incentives for innovation are for specific stakeholder groups but also how they interlink and relate to each other: i.e. do they support or undermine each other? In considering stakeholder views on recent policy developments, there were some concerns that innovation policy still targets private sector incentives more than incentives for the NHS/healthcare providers.

- **In order for policies to be effectively implemented, there is a need to establish coordinated policy moves that address the matter of scale and longevity. Specifically, there is a need to go beyond pilots focused on one part of an innovation pathway, and to dedicate resources to a whole pathway approach – including through downstream implementation funding.**\textsuperscript{16} The Accelerated Access Pathway is a step in that direction, but for a small number of innovations.\textsuperscript{17} In general, according to stakeholders, policy has historically focused on resources for many pilots but not on follow-up implementation funding.

- **Align innovation, improvement and research policy more closely. To support successful implementation of innovation initiatives in the health system – and especially engagement of the provider community – national policy and local practices need to be based on closer working between those active in the improvement, innovation, research and implementation spaces.**\textsuperscript{18} The policy landscape is too fragmented and more coordination is

\textsuperscript{13} Private sector workshop.

\textsuperscript{14} Private sector workshop.

\textsuperscript{15} Academics workshop, charities and PPIE workshop, networks workshop, policymakers workshop, private sector workshop, providers and commissioners workshop.

\textsuperscript{16} Networks workshop, providers and commissioners workshop.

\textsuperscript{17} Networks workshop.

\textsuperscript{18} Academics workshop, networks workshop, policymakers workshop.
needed – it is difficult to keep up to date with current policy initiatives.\(^{19}\) Better coordination requires identifying the right individuals to engage in innovation policy efforts and creating more cross-disciplinary communities of practice in the policy sphere (e.g. joint initiatives, joint posts, via the regulatory environment).

- Improvement and innovation need to work more closely together to support successful implementation of innovation initiatives.\(^{20}\) They are slightly different concepts (e.g. innovation entails more radical change and perhaps more risk taking), but they are a connected and interrelated process and activity. In the NHS there appears to be only a partial understanding of what innovation is or should be (often focused more on high tech than wider types of innovation). There does not seem to be the same type of receptive attitude to innovation as there is to improvement, and clinical culture is not as sensitised to education on innovation issues. Policies are often very scattered and stand on their own – an alignment is needed. In bringing people/organisations together it would be possible to share collective experience and potentially identify common themes that could be built into a framework on which new innovations could be tested based on where innovations have worked in the past in certain contexts.\(^{21}\)
- The regulatory environment, which already considers quality improvement in some ways, could be a vehicle for encouraging innovation.\(^{22}\)

D.5. Creating a funding and commissioning landscape that supports a balanced portfolio strategy on innovation across the pathway, balancing short- and long-term considerations, cost and quality gains and innovation push and pull

D.5.1. Key issues and necessary actions according to workshop participants

*What to do: mobilising political will for a portfolio approach to innovation that supports cross-departmental and cross-party working to ensure a compelling business case across the innovation pathway*

Mobilise political will across government departments and across parties to secure collaborations for a longer-term perspective on innovation. In such an approach, innovations that help with today’s firefighting (and respond to the constraints of cost-neutral portfolios and short-term return requirements) can be pursued in parallel with ambitions for a portfolio of transformative innovations and widespread innovative cultures in the health system. Such dynamic innovation portfolios would provide benefits on quality of care as well as economic fronts, and allow for longer timelines for returns to investment to accrue across the system.\(^{23}\)

---

\(^{19}\) Providers and commissioners workshop.

\(^{20}\) Charities and PPIE workshop, networks workshop, policymakers workshop.

\(^{21}\) Policymakers workshop.

\(^{22}\) Networks workshop.

\(^{23}\) Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
How to do it
According to workshop participants, the actions required involve the following:

- More focus on a longer-term and bigger vision for an innovative NHS has to be mobilised across political parties and government departments, if the UK is to sustain international leadership in health innovation, if stakeholders are to remain engaged, and if the benefits from innovation on quality of care are to reach local populations. For this, according to workshop participants, innovation needs to be de-politicised. In terms of de-politicising innovation in the health system, a cross-party initiative that would outlive the term of a government (and that would help to avoid the repetition of political cycles that accentuate pressures on the NHS to deliver returns within short budgeting cycles) was suggested.

- A better case for investment needs to be made:
  - Bringing in learning from examples of longer-term orientations that already exist in the health system (e.g. Genomics England).
  - Through closer working between departments focused on healthcare improvement, innovation and industrial strategy (e.g. NHS England, Department of Health and Social Care, Department for Business, Energy & Industrial Strategy, Office for Life Sciences, NIHR). The Industrial Strategy presents an opportunity to align healthcare, research and innovation relationships so that there is a receptive environment for innovation across the system, moving away from only sets of initiatives that are designed to permeate the system. Accountable care organisations (ACOs) may be able to facilitate this to some extent, although it is not yet clear if they go far enough.
  - Establishing a more compelling value offer: Longer-term investment and vision is enabled when the potential of innovation to respond to both healthcare improvement and economic competitiveness criteria is made explicit and where there is a commitment to establishing UK leadership in a given area – such as was the case with Genomics England.
  - Establishing a portfolio strategy for investments into innovation in the health system (both in terms of investments in the supply side and in terms of demand-pull). The portfolio needs to support innovations with different cost and quality profiles, and it needs to be reviewed and evaluated to ensure an appropriate balance and spread over time.
    - A policy focus on only cost-neutral or cash-saving innovations is understandable under the short-term lens of a cash-strained NHS, but does not work to engage and incentivise the diverse stakeholders that need to support innovating for the future – and who are driven by a mix of common and unique cost and quality

---

24 Academics workshop, charities and PPIE workshop, private sector workshop.
25 Private sector workshop.
26 Charities and PPIE workshop.
27 Charities and PPIE workshop, private sector workshop, policymakers workshop.
28 Policymakers workshop.
29 Charities and PPIE workshop.
There are various methods that can support thinking about portfolio approaches and prioritisation.

- To ensure a balanced portfolio of interventions that meet the needs of a disease area, a value of implementation framework and quality-adjusted life year (QALY) framework could be used to look at different themes/disease areas and identify the value of perfect implementation and so achieve the best combination of interventions for treatment of that disease in the commissioning region.

Innovating cannot become an integral aspect of NHS form and function until there is political will for longer-term approaches to innovation and to expecting returns from investment. Unless this happens, we will see examples of innovations making a difference but not the change in culture and attitudes to innovation that are needed for a truly innovative health system landscape. There is a need for the NHS to balance innovations for ‘firefighting’ in the here and now, with longer-term ambitions and returns associated with cultures of innovation. Innovation does not work with only a short-term perspective in mind and addressing this issue is particularly pressing for some of the current policy initiatives, as eligibility criteria for some schemes suggest that innovations must be cost-neutral within one year. Multi-year settlements need more consideration. At a micro, meso and macro level within the system, there is a propensity to focus on what needs to be done now, rather than what needs to be changed. A focus on different parts of the system than the source of the problem and with a longer payback timescale would help tackle these issues as well as open up more space for prevention-related innovation, which could perhaps have greater impact but would also require a longer payback.

- When making purchasing decisions, the ‘whole-life costs’ of innovation and ‘whole-system’ costs have to be considered – a move away from siloed, organisational-level decision making needs to be supported through policy and regulation and embedded in the evolving STPs and ultimately in ACO arrangements. New economic methods for whole-system cost-benefits analyses need to be brought into the policy community. If not, perverse incentives (i.e. your gain is my loss) will impede an effective market for innovations in the health system. In many cases, investments in innovation made in one part of a system benefit another part of the system. Unless there is joined-up responsibility and accountability for innovation decisions, there

---

50 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
51 Facilitators’ insights: e.g. STREAM methodologies, Portman models. Such prioritisation and portfolio development could consider what supply already exists in the system, as well as where demand-pull needs to be created.
52 Policymakers workshop.
53 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
54 Networks workshop, private sector workshop.
55 Networks workshop.
56 Academics workshop.
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

will be too many conflicting interests to make decisions that provide the most value at the population level.37

- **There is a need for policy to be careful not to have overly disassociated approaches across different types of innovations.** It needs to be taken into account that there are similarities, but also unique policy intervention needs.38

### What to do: focusing on a balance of push and pull instruments

Reflect on the balance between ‘innovation push’ and ‘innovation pull’ financial instruments and associated policy initiatives.39

### How to do it

According to workshop participants, the actions required involve the following:

- **Identify and map complementary funding sources for innovation across the pathway – to prevent the ‘pump prime’ then ‘valley of death’ effect that fragmented policy schemes can lead to.**40 A mapping exercise should be independent and rooted in rigorous approaches to distinguishing innovation funding and support mechanisms from research funding. This should be accompanied by accessible directories to sources of funding.41

- **Government departments need to work more closely together to offer coordinated funding and make the most of available resources for push and pull in the system to achieve a critical mass (as isolated schemes are sometimes seen as ‘a drop in the ocean’). This could be enabled through more joint programmes and shared posts between departments.** It includes leveraging opportunities for closer working between, for example, Innovate UK and the Office for Life Sciences (e.g. around funding for testing innovations), or between the Department for Business, Energy & Industrial Strategy, UK Research and Innovation, the Office for Life Sciences and NHS England (e.g. around supply funding for early-stage innovation development, or around digital innovation).42,43

- **Building on the current efforts of NHS England, the Office for Life Sciences, the Department of Health and Social Care and others, it will be important to continue to explore risk-sharing agreements (and reward sharing) to help support the upfront costs of introducing innovations into the NHS and to secure an innovation pull.**44

---

37 Academics workshop, networks workshop, private sector workshop.
38 Networks workshop, providers and commissioners workshop.
39 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
40 Charities and PPIE workshop, networks workshop.
41 Charities and PPIE workshop.
42 Other issues discussed related to a need to invest into a better evidence base on the governance and management of financial schemes in the system (private sector workshop).
43 Networks workshop, private sector workshop.
44 Policymakers workshop, private sector workshop.
This includes a package of support including tariff-based incentives for innovation (such as ITT and ITP), flexible and adaptive licensing and pricing models, and outcome-based commissioning commitments.  

However, while current initiatives are helping (albeit at a relatively small scale), private sector stakeholders also suggested that within innovation pull mechanisms, policymakers need to revisit the focus on supporting supply versus responding to demand (e.g. ITT and ITP are supply driven; pre-commercial procurement contracts would be demand driven and an important incentive for the private sector). In addition, providers and commissioners highlighted the need for innovations that are selected to these schemes to be neither overly specialised nor relevant only for a few providers.  

Revisiting and refreshing the innovation push and pull mechanisms that currently exist would help to ensure a more balanced approach – where clear and articulated healthcare needs and demand for specific healthcare solutions drive the development pipeline (i.e. what innovators work on) and where innovations in the development pipeline have a greater likelihood of achieving a receptive NHS market (should they meet required criteria). Refreshed mechanisms for funding innovation supply and supporting demand would also need to reward whole-system working, rather than successful silos.  

Private sector workshop participants also flagged a need for further clarity on how the new commercial unit in NHS England will function, including in regard to SMEs, and asked whether there might be efficiency gains in how innovations are evaluated (e.g. in evaluations across contexts, such that innovations proven in one context may not need and entirely new ‘from scratch’ evaluation in another context or could be considered for fast-track commissioning). Policymakers noted that there needs to be improved coordination of evaluations for innovations so that local evaluations do not take place when national or regional evaluations are already available. This coordination is starting to come through with the Accelerated Access Pathway chaired by Andrew Witty, with an opportunity for everyone round the table to understand what can go ‘out in the wild’ and so understand what innovations can be let loose without national-level evidence.  

According to healthcare providers and commissioners, outcome-based funding needs more incentives. Setting and reaching targets are not sufficient incentives. While there might be clear potential outcomes and targets in some cases (e.g. public health programmes on smoking, i.e. the target would be a certain number of people who stopped smoking; or the more people who get vaccinated, the more money you get), these targets are not necessarily incentives. Outcome-based funding needs to build more on ‘real’ incentives.  

- An additional point was made that outcome-based commissioning can be difficult if it is reliant on patients changing behaviour or on patients changing

---

45 Academics workshop, networks workshop, private sector workshop.
46 Providers and commissioners workshop.
47 Policymakers workshop.
48 Providers and commissioners workshop.
their perception of a service. If you have patients with complex and long-term conditions, they always use the same service and they may almost feel like customers. It is very difficult to change their behaviour and it would be dangerous to have outcome-based commissioning in such cases. A participant added that there could be something like ‘using best practice in determining the outcome’ controlled studies.\(^49\)

- The idea of a ring-fenced fund for innovation came up, but there was no stakeholder agreement on this (providers and commissioners workshop participants suggested that a ring-fenced fund – e.g. 5 per cent of all NHS/provider resources – be available for innovation; it would, however, be difficult to manage and ensure accountability for such a fund\(^50\)).

Although it is difficult to provide hard data and evidence on whether the balance between investments in innovation push versus innovation pull is appropriate or not (given that diverse innovations and adoption pathways have different cost and timeline profiles), there was a general view amongst stakeholders, including in the private sector, that there has historically been more policy focus on push over pull initiatives. This has supported a vibrant entrepreneurial sector but led to a situation where ensuring effective demand and a sustainable innovation pathway in the NHS has remained a challenge.

In the push landscape (and as also reported in our prior work/emerging insights report), workshop participants identified diverse schemes supporting the development of innovations spanning national funding programmes and regional, organisational and institutional schemes,\(^51\) but also felt that the landscape was fragmented and often unable to achieve the critical mass and scale required to support innovations across the pathway – from idea generation through to uptake and scale-up across the system. Participants identified a need for directories to sources of funding and scope for improved coordination in the system.

From a pull perspective, workshop participants highlighted the potential to streamline evaluation and commissioning requirements,\(^52\) consider financial pull that responds to demand and not only supply and ensure that financial returns from innovations (their adoption) are fed back to support further innovation in the health system (and accountability for the financial management of innovation-related cash flows).

Pull schemes that are supply-led and the ITT and ITP policy initiatives were seen to recognise real gaps in innovation, but private sector stakeholders warned that the selection of only a few winners and the ‘breakthrough designations’ on the Accelerated Access Pathway could also narrow the field through support of a very limited number of innovations into the system (stakeholders also wondered whether it would be possible to have more regular rounds than annually, which can make the process challenging for the private sector).\(^53\)

---

\(^49\) Providers and commissioners workshop.

\(^50\) Providers and commissioners workshop.

\(^51\) See Marjanovic, Sim et al. (2017b) on national funding programmes and schemes identified by stakeholders in Phase 1 of this study.

\(^52\) Networks workshop, private sector workshop.

\(^53\) Private sector workshop, providers and commissioners workshop.
D.6. Supporting skills, capabilities and leadership for innovation

D.6.1. Key issues and necessary actions according to workshop participants

What to do: leadership capacity-building

Identify and join up leadership for innovation throughout the NHS hierarchy. Ensure that leadership in the health system is empowered to work to change attitudes to risk and can recognise that not engaging with innovation is also a risk. This includes supporting leaders to act as role models through the way they carry out their functions.54

How to do it
According to workshop participants, this requires the following actions (see also Section D.7):

- **Introduce clear responsibility and accountability for innovation in provider organisations, in commissioning and procurement, and across hierarchies and clinical and managerial and executive levels (including through job roles and performance management), in terms of commissioning processes and procedures giving permission for innovation.**55 NHS chief executives need to be supported in taking risks. Mindsets need to be converted towards funding according to the potential for impact, rather than thinking negatively about risk level.56 Embedding innovation into job roles can also help mitigate the effects of short-term project- or pilot-based funding in the system.

- **Evolve the regulatory system to ensure more accountability for decisions related to taking up or deciding not to take up ‘proven’ innovations** (discussed further in Section D.7) – regulation has a key role to play.57

- **Reward innovation through financial and non-financial means.**58 For example, this includes awards for innovating that makes a difference – success should be celebrated more – and linking innovation to payment mechanisms for provider organisations.

- **Identify and mobilise trusted intermediaries and brokers – leaders with influence across multiple professional communities.**59 Clinical leads in primary and acute care were thought to have influence.60

Private sector stakeholders felt that there is some strong leadership ‘at the top of the NHS’, and that there is willingness to engage with innovation at the frontline (e.g. in the form of the NHS Innovation Accelerator and clinical entrepreneurs championing innovation), but there is a need for leadership in the middle management levels of the NHS for innovation to gain traction in the system. At present, junior

---

54 Academics workshop, networks workshop, policymakers workshop, private sector workshop, providers and commissioners workshop.
55 Charities and PPIE workshop, networks workshop, policymakers workshop, private sector workshop.
56 Policymakers workshop.
57 Private sector workshop.
58 Networks workshop, providers and commissioners workshop.
59 Academics workshop.
60 Providers and commissioners workshop.
and middle managers were seen to be unsafe in their jobs (‘rabbits in headlights’) and hence particularly averse to taking risks and ‘doing things differently’ without short-term returns. A different attitude to risk was also identified as an area where strong leadership is needed (as not improving practice and not innovating is also a risk – both in terms of service cost-effectiveness and quality and safety of care). This would need to be linked to innovative regulatory and accountability regimes related to decisions about taking up ‘proven innovations’ (discussed in Section D.7).

Stronger decision-making leadership in the procurement and commissioning of innovations is also needed to stop blockages across the pathway. AHSNs may have a role to play in this process as facilitators and advocates for proven innovations.

**What to do: building skills through training and education**

To increase receptiveness to innovating in the provider community, embed training on innovation (development, uptake, reasons for innovation, potential to contribute to quality of care and patient safety and organisational performance) in education curricula and continuing professional development (CPD) for healthcare professionals/providers. There is a need for more training for healthcare providers on innovation and how to work with innovators and early adopters, to develop an innovation-supportive culture in the health service. Healthcare providers/clinicians are not trained on innovation in education curricula nor in practice, which partially explains why they do not engage at the scale that might be possible. Training has not kept up with the times and this is an obstacle to innovative cultures.

**How to do it**

To embed training on innovation in medical education and CPD will require:

- **Closer working with bodies that have a role in medical education curricula and CPD.** This includes the General Medical Council, Medical Royal Colleges and Health Education England. According to academic workshop participants, universities could initiate innovation training in medical training, as they are responsible for some of the curriculum, within the confines of General Medical Council moderation. For example, there is a mandatory service improvement area, to which innovation perspectives could be added. Medical Royal Colleges also have a lot of online resources for clinicians, which could be another training route. Building in space early in clinical training to expose trainees to the language of innovation, engineering and improvement will ensure that it is not an alien landscape. This also applies to leadership, as there is currently a dearth of training in professional skillsets. However, workshop participants have also raised concerns about resistance amongst those with a stake in modernising the education curriculum, which would need to be overcome through investments in relationship-building and other mechanisms.

---

61 Academics workshop, charities and PPIE workshop, networks workshop.

62 Academics workshop, charities and PPIE workshop, networks workshop.

63 Academic workshop.
What to do: building the skills of the private sector

SMEs need training on better engaging with the NHS and on the skills required to do that.\(^64\)

How to do it

- Closer dialogue with the NHS on the types of business case that need to be made, coupled with mentorship and training from existing networks and expertise in the system. The capacity to make a better business case will require mentorship from those who have been successful in the past, from intermediary networks such as AHSNs and from national programmes such as the NHS Innovation Accelerator, as well as advice from NICE.\(^65\)

What to do: building implementation capacity

To enable adoption, policy initiatives need to be accompanied by:

- Implementation support for those adopting innovations, especially for healthcare providers. This includes support both in terms of hands-on practical time and in terms of ensuring a supply of implementation-related skills.\(^66\) Policymakers also recognised the need for implementation support and training on the use of new technologies (but did not necessarily highlight the need for that to be their role to secure).
- Providers also need legal support.\(^67\)

How to do it

- Learn from examples of success in the past (e.g. how innovators got their products into the NHS) and from implementation support provided outside the innovation space specifically (e.g. NHS RightCare works with delivery partners). Potential to scale-up national schemes (e.g. pathway transformation schemes).\(^68\)
  - Some initiatives in the healthcare system (e.g. NHS RightCare) work with delivery partners who work with commissioners and providers to provide implementation support as well as resources. The innovation space could learn from their experiences and bring that learning into devising implementation support mechanisms for innovations.
  - Scale-up of pathway transformation funding schemes that provide direct training to healthcare professionals on how to use innovations, how to maintain them and manage them, and how to build buy-in amongst their professional community.
- Central legal support from NHS England would be needed to tackle issues around intellectual property and patents. Lack of support may currently put off some Trusts and CCGs from adopting an innovation, through their fear of legal opposition.\(^69\)

\(^{64}\) Charities and PPIE workshop, private sector workshop.
\(^{65}\) Private sector workshop.
\(^{66}\) Charities and PPIE workshop, networks workshop, providers and commissioners workshop.
\(^{67}\) Providers and commissioners workshop.
\(^{68}\) Charities and PPIE workshop, networks workshop, providers and commissioners workshop.
\(^{69}\) Providers and commissioners workshop.
D.7. Enabling motivations and accountabilities for innovation in the health system

D.7.1. Key issues and necessary actions according to workshop participants

What to do: introducing a mix of financial and non-financial incentives

A mix of financial and non-financial incentives and both ‘carrot’ (incentivising) and some more stick-like (accountability-focused) mechanisms need to be introduced into the health system, to ensure a motivated and accountable innovation culture.\(^{70}\)

How to do it

According to workshop participants, this will require (see also Section D.6):

- **Consideration of which functions/job roles in the health system should have innovation embedded in their remits and responsibilities, and simultaneous awareness-raising of the links between innovation and achieving improvement and efficiency ambitions over time.**\(^{71}\) To achieve this will require dialogue between policymakers and regulators (Department of Health and Social Care, NHS England, Care Quality Commission) and professional representation bodies (e.g. Medical Royal Colleges).\(^{72}\)

- **Rewarding of engagement with innovation adoption by providers and commissioners, through financial and non-financial instruments (e.g. tariff-related payments, awards for individuals who set the tone and lead by example, promotion and career development pathways).**\(^{73}\) AHSNs could have a role in promoting and rewarding Innovation Champions, and perhaps also provider organisations.\(^{74}\) Incentives and cultures between the NHS frontline structures and the organisations or structures trying to effect change (push) in the NHS (e.g. AHSNs, private sector, academics) need to be better aligned in order to get the push and pull to work together through to adoption of an innovation.\(^{75}\)

- **For frontline clinicians and for provider organisations, innovations which make their jobs easier or can address staffing shortages are likely to have traction/be an incentive.**\(^{76}\) One of the biggest current problems of the NHS is shortage of staff – it is hard to recruit junior doctors and nurses. A stronger focus on technologies that could support staff in doing their job could help, although participants acknowledge that technologies cannot change and replace every task done by staff.

- **Key incentives and enablers for individuals in the NHS to engage with innovation are funding, time, headspace, supportive leadership** (see Marjanovic, Sim et al. (2017b)) as well

---

\(^{70}\) Academics workshop, networks workshop, private sector workshop.

\(^{71}\) Networks workshop.

\(^{72}\) Marjanovic, Sim et al. (2017b) identified roles currently in the system that engage with innovation.

\(^{73}\) Networks workshop, policymakers workshop, private sector workshop.

\(^{74}\) Networks workshop.

\(^{75}\) Academics workshop.

\(^{76}\) Providers and commissioners workshop.
as embedding innovation into job roles/responsibilities/contracts.  
Not all staff will be innovators, but clinical staff should be exposed to innovation opportunities (as they relate to improving care) and best practice.

- Embed accountability for innovation uptake into standard regulatory regimes and practices through more focus on robust ‘adopt or explain why not’ practices.
  
  o Greater emphasis should be placed on accountable people to explain why they are not taking up innovations to highlight the risk of not innovating, so that the risk of innovation is appropriately placed in context.
  
  o This includes building in clear expectations into audit and inspection regimes. Policymakers and regulators need to consider stricter regimes for accountability for innovation uptake, including as part of standard regulatory processes (e.g. audits, Care Quality Commission (CQC) inspections). Private sector stakeholders discussed the need to consider incentives at the interface of ‘carrot’ and ‘stick’ mechanisms – not quite mandates but, for example, ‘adopt or explain why not’ processes. NICE appraisal, although considered an important milestone in an innovation’s journey, was not always seen to help with adoption or uptake to market as much as it could. There need to be meaningful accountabilities in CCGs and Trusts for research, development and innovation. Participants at the innovation and improvement networks workshop felt that CQC regulation does not integrate enough concern for quality improvement and innovation – this needs to change if the system is to be nudged to create more connected and receptive places.
  
  o Metrics are not the ‘be all and end all’, but are needed to ensure accountability and should not be a tick-box exercise: Metrics for engaging with innovation adoption are needed, but should be carefully decided on to be meaningful. In their absence, incentives are difficult to enact in practice. In an NHS target-driven culture, metrics need to be developed that provide accountability for taking risks and drive change to support these behaviours and encourage them, otherwise – due to other incentives – these behaviours are perversely disincentivised. Test Beds and Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) have provided structures that provide a good first step towards encouraging risk taking.

- Ensure that accountability mechanisms reflect system level benefits – i.e. are not siloed benefits for one part of the system or pathway (as benefits are sometimes felt in a different part of the system to where interventions take place). Achieving this will require collecting evidence on costs and impacts across the pathway and over time, to make the business case and establish rewards in appropriate parts of the pathway (even if the financial gains are

---

77 Policymakers workshop, providers and commissioners workshop.
78 Academics workshop, networks workshop, policymakers workshop, private sector workshop.
79 Policymakers workshop.
80 Academics workshop.
81 Networks workshop.
82 Policymakers workshop.
not felt in the same part of the pathway as where the intervention takes place). One way forward could be enabled through ACOs due to more collective governance across the pathway. STPs may also help in this direction as they share features of an ACO model.83

D.8. Supporting a suitable information and evidence environment

D.8.1. Key issues and necessary actions according to workshop participants

**What to do: building a learning-focused system**

In order to realise improvements in the information and evidence environment for an innovating health system, there is a need to drive shifts towards a more learning-focused system.84 This includes:

- Enriching the types of evidence and information that are provided and shared to better reflect and meet the needs of decision makers in the system.
- Reflecting on where the burden of proof lies.
- Considering the language used in communicating and conveying information and evidence so that it has most effect/traction.
- Building effective platforms for exposure to information and evidence on innovations, engaging local actors and national coordination and oversight.

**How to do it**

According to workshop participants, this includes addressing the following:

- **Produce more diverse types of evidence on innovation performance, which is needed for more compelling business cases** – this should give more attention to including the costs of implementation and decommissioning needs/degree of disruption.
  - Decommissioning is under-considered in policy and practice and this creates major challenges to both efficiency and effectiveness.85 However, some workshop participants felt that there is fear in the system about disinvestment/decommissioning and failure – if something new eventually ends up leading to a worse situation (because of a lack of real-world experience/evidence or due to social issues).86 Some policymakers suggested that guidance for decommissioning of services and products should be released by NHS England based on evidence from NICE.87
  - Other areas to consider in the business case are type of innovation pathway and interdependencies for success (e.g. for some digital innovations, complexity of implementation, degree of disruption). NICE could be involved in providing clearer guidance to SMEs on the types of evidence they need to collect.88

---

83 Networks workshop, private sector workshop.
84 Academics workshop, charities and PPIE workshop, networks workshop, policymakers workshop, private sector workshop, providers and commissioners workshop.
85 Academics workshop, charities and PPIE workshop, networks workshop, providers and commissioners workshop.
86 Charities and PPIE workshop.
87 Policymakers workshop.
88 Policymakers workshop.
Providers and commissioners should produce clearer guidelines on what type of evidence and what criteria innovations need to meet for adoption – this would help support much more effective innovator–adopter discussions and relationships. The level of evidence required should be decided in a consultative, participatory fashion, ensuring greater predictability for innovators and easier cost planning for hospitals.89

- Clearer, standardised articulation and definition of evidence need across the system. The generation of an evidence standard that provides details on what has to be agreed nationally and what can be agreed locally; provides innovators with one set of evidence criteria to work to; and segments evidence needs and requirements by innovation characteristics and the adoption environment (e.g. type of innovation, complexity of implementation, degree of disruption).90

- Clear prioritisation of innovations that require full NICE evaluations and those that could be safely adopted without full evaluation would accelerate new innovations into the NHS. This would also allow for innovations that do not require full evaluation to receive the Kitemark approval of NICE that provides confidence for the quality of their evidence without the long and unnecessary full NICE evaluation process.91

- Ensure that incumbents and innovators ‘share the burden’ of proof, for example by ensuring that data on the performance of incumbents is ‘up-to-date’ and that performance of incumbent innovations in the real world can be considered together with evaluation data for new developments (products, technologies, services). At present the burden of proof is always on the innovators and private sector workshop participants felt that incumbents should also play a role in keeping up-to-date with evidence on the performance of their interventions. Thus, questions were raised about whether the healthcare system expects more evaluation of incumbents.92

- Frontline staff should be exposed to evidence about innovations so they can be empowered to participate more actively in decision making about the best options for cost-effective care. This means that the health system will need to find ways to ensure that evidence reaches frontline staff. At the moment, interested frontline staff access evidence from very diverse sources and through diverse mechanisms (Marjanovic, Sim et al. 2017b),93 but for cultural change in attitudes to innovation, it would help if a wider pool of health professionals were exposed to evidence about innovation and could be sensitised to its potential.94 This does not imply changing the diversity of sources that are consulted, but does call for better signposting in the system (perhaps via AHSNs and CLAHRCs).

89 Networks workshop, policymakers workshop, private sector workshop.
90 Policymakers workshop.
91 Policymakers workshop.
92 Networks workshop, private sector workshop.
93 See also results from the prioritisation survey in Annex A.
94 Private sector workshop, networks workshop.
• Identify the right type of language to use for different actors and tailor communications and dissemination accordingly and create communities of practice to share learning. The accessibility of innovation as a concept to all stakeholders is limited by the terminology and language it utilises. Individuals require education as to what innovation is, what the power of it is, what the language of it is. Part of this can be achieved through training, but it will also require repeated interactions between sectors (e.g. industry and NHS, NHS and patients, industry and patients, policymakers and patients, policy and academics, academics and NHS, etc.). There is still work to be done to bring evidence to frontline clinicians, which could be the responsibility of AHSNs and CLAHRCs if they were brought closer together. There would need to be consideration as to how these would operate within the STPs, as there is not strong alignment across the ‘catchment areas’ for each of these regional networks. Organisational memory is important for evidence, therefore the focus should be on alignment of existing structures rather than dismantling them into something bespoke.

What to do: creating an enabling data and information infrastructure

Create a system-wide infrastructure for sharing information about innovations and their performance. The system should balance national oversight and coordination assistance with local delivery and engagement in co-producing and disseminating the information and evidence required.

How to do it

In terms of national efforts to create a system-wide evidence infrastructure for innovation in the NHS, the following actions and issues could be addressed:

• Learn from the experiences and efforts of other NHS initiatives – such as in the health improvement space (e.g. NHS RightCare efforts and GIRFT were identified as examples of good practice by some workshop participants) – in terms of providing and brokering information and evidence on where improvements are needed and how they can be achieved, as well as through providing implementation support for change and transformation efforts by working with delivery partners that support local organisations. It was suggested that there may be potential to learn lessons about how NHS RightCare and GIRFT use intelligence to support decision making and help reduce unwarranted variation in quality of care (although there was some caution that these efforts should make sure not to reduce warranted variation and stifle innovativeness as well).

• Consider establishing a national library of pilots and evidence to ensure lessons from evaluations of pilots are shared in a more effective way – at the moment a coordinated...
national effort to broker evidence and information on innovation does not exist. AHSNs (at regional levels) and national thematic networks (Innovation National Networks) were seen to have potential to assume more active roles in this regard. However, the dissemination support infrastructure and curation of such a platform will require investment, so this needs consideration. While sharing of knowledge should happen at a local level, controlling the knowledge sharing is likely to occur at a national level according to some participants. Knowledge (as well as ideas) is often not shared between providers and CCGs as well as within providers and CCGs. Individual commissioners often know what is working, and are aware of innovative products and services, but they do not sufficiently share their knowledge. Developing a central process for sharing knowledge and ideas could help overcome this.

- There is a role for GIRFT to share innovations that have been trialled in other areas and that have worked for the setting, and to suggest their implementation. This is a method of peer support and can support people outside of the innovation network to integrate innovation into their organisations.

D.9. Enabling relationships and networks for an innovating health system

D.9.1. Key issues and necessary actions according to workshop participants

What to do: enabling local relationships

Enable local relationships that are critical for effective innovating and health and care systems more widely, while not neglecting the equally important need to foster inter-local and local-national interactions. This requires nurturing both individual-level and institutional-level relationships.

Supporting innovation will need a combination of a bottom-up approach driven by local organisations and top-down policy support and mandates. Most workshop participants highlighted the importance of not neglecting the local nature of how the NHS works.

Relationships and networks should serve to share evidence and learning from regions, nationally and internationally, helping avoid duplication and wasted effort. Much of innovation uptake is based on relationships and networks, more so than official guidance according to some workshop participants, who felt that NICE guidance does not always have an effect (as it is not mandated and since accountability regimes are considered weak). However, due to the length of time innovations take to travel through the system, the churn rate of senior decision makers can have a detrimental impact on implementation of innovations.

---

101 Networks workshop.
102 Networks workshop.
103 Policymakers workshop.
104 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
105 Networks workshop, private sector workshop.
106 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
innovations, as new relationships have to be built during the process. Interestingly, if the decision makers, for example in CCGs, move across regions and maintain individual-level relations, we were told that this can also help spread (but based on individual rather than institutional ties). It was suggested that building relationships with chief medical officers in hospitals may help mitigate staff churn in provider organisations, as they have a clinical role within the hospital and tend to be in more stable roles.107

- National organisations have developed multiple regional networks, such as STPs, AHSNs and ACOs, which do not easily map on to each other. Efforts to coordinate these at a national level are taking place, so that each is aware of the other actors in their region, would increase each of their individual values (at present it appears that the regional networks are each working out who is in their space).108

How to do it

- To ensure more effective and closer working between stakeholders, there should be more focus and oversight on ensuring cross-stakeholder representation on decision-making boards and committees at both local and national levels.109 This includes having stakeholders from innovation and improvement networks represented on AHSN, Vanguard or STP structures, for example, and also considering academic, charities and PPIE, provider, commissioner and private sector representatives. The challenge with private sector representation, however, would be managing conflicts of interest, so this would require careful consideration. At a national level, the need for diverse stakeholder representation on the Accelerated Access Pathway, for example, was raised.110 The relationships between AHSNs and providers and commissioners need to be strengthened – especially on issues of demand and not just supply.111 In general, private sector workshop participants strongly felt that there was a need for the NHS and health policymaking bodies to be more outward looking in terms of working with and learning from sectors outside health.112

- Similarly, joint-working mechanisms were seen to have the potential to help foster the relationships needed for receptive innovation environments. This includes joint-working mechanisms for staff in organisations across the healthcare pathway. ‘Planned serendipity’ is an interesting concept here: what can AHSNs do to create situations where serendipitous encounters can translate into innovation development or uptake opportunities (e.g. via meetings, joint working or secondments).113

---

107 Private sector workshop.
108 Policymakers workshop.
109 Networks workshop, private sector workshop.
110 Charities and PPIE workshop.
111 Providers and commissioners workshop.
112 Private sector workshop.
113 Networks workshop.
D.9.2. AHSN-specific insights

AHSN-related discussion was particularly prominent in some of the workshops and we discuss key insights here. This is not surprising, given the renewed focus on AHSNs in the innovation landscape.

As part of the government response to the *Accelerated Access Review*, £39m of funding has been made available to the 15 AHSNs to help support local assessment and promote the adoption and diffusion of innovations, which should complement NHS funding of £30m for the new licence period from 2018/2019 (Department of Health & Department for Business, Energy & Industrial Strategy 2017, 9; NHS England 2017d, 5). The funding is also intended to support AHSNs to establish Innovation Exchanges that should help facilitate improved collaboration and coordination of activities between different AHSNs, lead to greater clarity in AHSN value offers, and help strengthen links and collaboration between regional and national partners. The Innovation Exchanges will be involved in regional needs identification and articulation; support for innovators to progress and test their innovations in the real world (e.g. through information, evidence, brokering contacts, directing innovators to additional sources of support); and engagement in facilitating scaling and spread of relevant innovations for patient benefit (both locally developed and through adoption of proven innovations from elsewhere) (Department of Health & Department for Business, Energy & Industrial Strategy 2017, 9).

Workshop participants identified a series of areas where AHSNs could add value through their new roles. In general, it was felt that they needed to have not only responsibility but also authority to really enable change in the system.

AHSNs will have a key role to play in supporting the information and evidence infrastructure for innovating in the health system: they could create sources of information and evidence on the performance of innovations and of pilots, but they currently do not have the resources to do that.\footnote{Pressure on the central NHS England budget led to a reduction from approximately £50m for AHSNs for the first five years to £44.2 in 2018/2019 and £44.4m in 2019/2020 (NHS England 2017d).}

**Key messages on AHSN roles**

- **Signposting decision makers to innovators and vice versa.** Decision makers within CCGs and providers need to be more visible to innovators. AHSNs could play a role in signposting this and helping identify needs and real demand, and work as facilitators and advocates for proven innovations (including to providers, commissioners, procurement). For this to be effective, AHSNs, which already have a lot of responsibility, would need to have more authority in the system.\footnote{Networks workshop.} However, in doing so they must remain neutral and cannot support or provide preferential treatment to particular innovations/companies – all actions need to be evidence-based. As part of their brokerage roles, AHSNs should consider how they can help align the incentives of frontline clinicians/health and care staff, middle managers and senior executives in provider organisations – as adoption and diffusion will not happen if these incentives are not aligned, and if they do not agree. A strong clinical advocate can go a long way, but a finance manager also has to agree and see value. As reported back during a feedback session for group\footnote{Networks workshop, policymakers workshop, private sector workshop.}
work in the private sector workshop: ‘AHSNs need powers as well as the responsibility they currently hold for evidence gathering and support in getting to market as AHSNs will not “have teeth” until they can influence procurement’.117

- **Supporting needs identification.** AHSNs could help with the articulation and communication of NHS needs to innovators by working closely with different professions and organisations in their local NHS. They also have a role to play in communicating and shaping needs between local and national actors. AHSNs could learn from how the private sector engages the public around needs identification (e.g. sentiment analysis); Wessex AHSN is working on this approach in the digital space.118

- **Brokering information on funding sources.** The awareness of funding schemes available and brokerage of information as to what is and isn’t available to different stakeholders should be the role of AHSNs.119

- **Matching supply and demand, brokering information on existing innovations to frontline staff and helping raise awareness.** In order for innovations to be taken up in the system, the need must be clearly articulated and demonstrated to the staff. The Nuffield report discussed that if you take evidence for a problem that is known about and exists then the innovation is accepted with open arms. If the evidence is for a solution to a problem that people don’t know exists, there is resistance.120

- **AHSN awards for role models in the system could help raise the profile of innovation and help promote innovative cultures in the local health system and amongst providers, not only innovators.**121

- **AHSNs need sustainable funding and should focus on establishing strategies and sharing insights between each other about how this can be achieved – individually and as a network.** As part of this, current ways of generating revenue could be discussed and were said to include membership fees, grants, evaluation work and other means. However, beyond actions AHSNs can themselves take for sustainability, there is a need for more clarity and transparency on what the national funding support for AHSNs will be like, and ‘what strings are attached’.122 The policy initiatives need to provide some stability to be able to retain staff. This is particularly important for retention of clinical leaders, which has been highlighted as key for networks and evidence flows.123 The challenge is to ensure AHSNs link to STPs or accountable care systems (ACSs).124 Sustainability discussions and planning between AHSNs will need to happen while balancing a degree of inevitable competition (resource constraint-related mainly) between

---

117 Private sector workshop.
118 Networks workshop.
119 Academics workshop.
120 Policymakers workshop.
121 Networks workshop.
122 Networks workshop.
123 Academics workshop.
124 Charities and PPIE workshop.
them within an overarching framework and spirit of collaboration.\textsuperscript{125} It was also noted that caution needs to be exercised in terms of payments from the private sector, as these could be perceived as a conflict of interest, though a question was raised as to whether there could be a pooled fund (not specific to one company) that different local companies invest in, which companies can tap into for support from AHSNs (e.g. for brokerage). \textit{Related to this, local AHSNs need to be more connected to each other – especially to neighbouring ones.}\textsuperscript{126}

- \textbf{Partnerships between the private sector, health service providers and AHSNs should be based on more than geography and the AHSN network should establish an overview of areas of specialisation and focus.} Whereas a local AHSN may generally be the signpost place and first point of contact, companies should be encouraged to partner with the AHSN with the most appropriate network and skills to help the business, rather than only a local AHSN, where appropriate. This messaging needs to be clear from AHSNs and from national policymakers.\textsuperscript{127}

- \textbf{Representatives at the providers and commissioners workshop emphasised the idea of a lead AHSN coordinator role to ensure that companies do not have to approach each individual AHSN on every occasion.} This now exists in the landscape.\textsuperscript{128}

\section*{D.10. Evolving the patient and public involvement and engagement landscape in health innovation}

\subsection*{D.10.1. Key issues and necessary actions according to workshop participants}

\textbf{What to do: coordinating PPIE sources in the system}

National-level organisations as well as regional actors should work to better coordinate inputs from different PPIE sources in the system. For example, this would include closer collaboration and coordination between ‘umbrella organisations’ and national-level bodies (e.g. National Voices, INVOLVE, NOCRI PPIE group). It would also include local broker institutions (coordinating information about local PPIE opportunities for engagement with innovation, signposting and connecting various local organisations). Local government could have more of a role to play in connecting with local communities as well. However, there is a need to recognise in all coordination efforts an existing degree of balancing collaboration versus competition for ‘engaged’ patients among the diversity of projects, programmes, and initiatives seeking to recruit representatives of patients and the public.\textsuperscript{129}

In efforts to coordinate the PPIE landscape, consideration also needs to be paid to:

- \textbf{How PPIE can support the growing challenge of comorbidities, given that many networks are disease-specific and that people tend to engage after having been patients.}\textsuperscript{130}

\begin{flushright}
125 Networks workshop, private sector workshop.
126 Providers and commissioners workshop.
127 Private sector workshop.
128 Providers and commissioners workshop.
129 Networks workshop, charities and PPIE workshop.
130 Charities and PPIE workshop.
\end{flushright}
• **How PPIE can support prevention, which was seen as a particular challenge.** It is easier to engage patients and members of the public when people have been affected by a disease (patients or carers) – this makes it challenging to engage the general public, for example around innovations geared at prevention.\(^{131}\)

• **Hard-to-reach groups’ engagement,** which was seen as one of the biggest challenges by some workshop participants.\(^ {132}\)

Only a handful of PPIE representatives work on a full-time basis, meaning many do not have the time to fully commit to this part of their work. For example, the NIHR Clinical Research Network has approximately 200 people with PPIE in their job title, however only about 10 of them work on PPIE full time. Policy needs to consider how to build capacity for PPIE in a way that addresses the small number of PPIE representatives who work on a full-time basis. One needs to consider best use and coordination of existing capacity in the system, and incentives for scale-up of engagement.

**How to do it**

• **Establish a national strategy for PPIE with innovation (based on extensive consultation with the existing PPIE architectures for research, quality improvement and innovation PPIE locally and nationally to ensure learning from experiences in spaces outside of innovation).** \(^{133}\) See Box D.1 below for additional information on the types of engagement activity and core principles that should shape a national PPIE strategy.
  
  o The strategy should cover PPIE across the innovation pathway, support different types of engagement and be based on a set of guiding principles and values co-produced with patients and the public.\(^ {134}\)
  
  o The strategy should consider what capacity-building is needed for patients and the public to engage with innovation, and for innovators and others in the system to engage with patients and the public. A degree of training and upskilling is important for effective PPIE, but this needs to be considered in the tension between wanting lay representation versus expert patients. If a patient is over-trained, they may stop thinking like a lay patient. Sometimes this may be merited, but not always.\(^ {135}\)
  
  o The difference between public (opinion) and patient (experiential) involvement should be better articulated and understood by those engaging with it to improve the productivity of PPIE.\(^ {136}\)

• **Frame engagement strategies against a clear recognition of the motivations for engaging and sustaining engagement.** Key motivations have been a good or bad experience with service, but that on its own is not enough for sustaining engagement at scale. Implement incentives for

---

131 Charities and PPIE workshop.
132 Charities and PPIE workshop, networks workshop.
133 Academics workshop, charities and PPIE workshop, networks workshop, private sector workshop.
134 Charities and PPIE workshop.
135 Charities and PPIE workshop.
136 Policymakers workshop.
patients to be engaged in innovation. Engagement needs to be resourced, feedback should be given to patients (otherwise they become disenfranchised), opportunities to be a community with other patients who are engaged and passionate should be provided, and food/travel costs must be covered in addition to compensation for engagement activities. The brand of the NHS and the sense that it is ‘ours’ is an enormous asset in gaining future involvement but patients also need to see themselves having an impact.\textsuperscript{137} Support from management is needed for PPIE and its framing to be successful.\textsuperscript{138} There are differences in the level of engagement likely from different patient groups and so involvement and engagement expectations should be carefully managed. There is also a difference between chronic and acute illness particularly in terms of engagement: the main motivation of many acutely ill patients is to get back to their lives and so engagement levels are likely to be lower.\textsuperscript{139}

**Box D.1: Considerations for a PPIE strategy**

**Types of engagement could span:**
- Participating in and contributing to prioritisation of themes and topics.
- Involvement in design of innovation projects.
- Involvement in evaluation.
- Involvement in making the case for change and dissemination of evidence.
- Involvement in brokering further PPIE networks and as a conduit for engagement with the wider health and care community of patients, carers and the public.

**A series of core principles and values to shape the PPIE strategy:**
- Ensuring innovation in the health system is relevant for patients and the public.
- PPIE supports impact on service provision and policy.
- Patients and the public feel empowered to meaningfully engage (i.e. not a tick-box exercise).
- Patients and the public are aware of and are kept informed of the value and impact of their contribution – a feedback culture.
- PPIE strategy supports inclusiveness and diversity (to the extent that this is feasible).
- PPIE strategy recognises the need for an appropriate match between the type of PPIE representative and the nature of engagement required.
- PPIE strategy is appropriately resourced and supported through learning and development activities tailored to individual abilities and needs.
- PPIE strategy contributes to capacity-building for effective PPIE engagement and supports that amongst the patient and public and innovator, provider, policymaker and researcher community.

- **In terms of learning from research and quality improvement spaces, make sure to work within the existing national and local infrastructure, rather than reinventing the wheel.**\textsuperscript{140} Examples given included INVOLVE and NIHR i4i programmes as well as some CLAHRCs’ PPIE activities and the PPIE panel of the NHS Innovation Accelerator, and James Lind Alliance.

\textsuperscript{137} Charities and PPIE workshop.
\textsuperscript{138} Providers and commissioners workshop.
\textsuperscript{139} Policymakers workshop.
\textsuperscript{140} Charities and PPIE workshop, networks workshop.
priority setting partnerships/principles. Although there is widespread recognition of the potential benefits from PPIE (when appropriately designed and implemented – many stakeholders still saw it to be a tick-box exercise in terms of how it is addressed given the everyday reality of competing time and resource demands and the practical implementation of innovation activity). Private sector workshop participants highlighted that PPIE is particularly valuable when a patient is responsible for part of their care (and hence has more say in decisions). The role of National Voices and charities (large and small, and not only usual suspects) was also highlighted and also of local community organisations and Healthwatch. Healthcare providers can help identify patient representatives to engage. General practitioners (GPs) can be important gatekeepers to patients and could be important when it comes to finding and mobilising patients.

- Providers and commissioners felt that the NIHR making patient and public involvement obligatory for grants was helpful. If something similar is done in the innovation funding landscape, it is important to ensure it does not become a tick-box exercise and that the local and national infrastructure can support meaningful selection and engagement of patient and public representatives.

- Map the PPIE landscape locally/within STP footprints: According to charity and PPIE workshop representatives, a step in this direction would begin with mapping the PPIE landscape and the connections between networks of patient groups. There has already been some regional mapping, often conducted in well-funded areas, such as Wales and the South West, but this has not yet occurred on a national scale.

- Create platforms for signposting and connecting patients and the public with different innovation opportunities regionally and nationally (e.g. via national organisations and via regional networks). There is a need for signposting and connecting patients/the public with different innovation opportunities/needs for their engagement. No single institution will ‘house’ all this information but institutions should be able to signpost to relevant sources of information. Recognising that patients need variety of sources. Sources of information for patients will be diverse but signposting to multiple sources, a collective responsibility of institutions and networks locally and nationally, could help this.

- Social media could be a tool to promote interaction between healthcare and PPIE networks, however caution must be taken to prevent creation of echo chambers or certain groups getting left out. Some patient engagement platforms could be mobilised (e.g. Health Unlocked, Patients Like me and others).

141 Networks workshop.
142 Charities and PPIE workshop.
143 Networks workshop.
144 Providers and commissioners workshop.
145 Charities and PPIE workshop.
146 Charities and PPIE workshop.
147 Charities and PPIE workshop.
- **Regional roadshows focusing on innovation-related engagement opportunities were identified as one mechanism to bring innovation to the public** (see also Marjanovic, Sim et al. (2017b)).\(^\text{148}\)

- **The correct language and communication methods need to be used to enable PPIE involvement in health innovation policy.**\(^\text{149}\)
  - Effort should be directed at removing cultural and language barriers to patients and the public engaging with innovation policy. Consideration should be given as to the best mechanisms and forums to engage patients and the public to gain useful input. For example, patients should not be asked about what innovations they would like to see, but what was good and what could have worked better in their experience of the NHS.\(^\text{150}\)
  - The NHS has its own complex language and it is often overestimated how much the lay person can understand.\(^\text{151}\)
  - It may be useful for the NHS to develop policy drafts for both experts and the general public. This information also needs to be made available to those who may struggle to access it, such as those with disabilities or learning difficulties. To understand how it should be written for the public, focus groups or a similar method could be used to create a safe environment in which to gauge the current level of understanding and how the public want the information to be disseminated.\(^\text{152}\)

- **The selection panel on the Accelerated Access Pathway should involve patients to help in selection of breakthrough designations.** The challenge is to ensure condition neutral patient/public representation.\(^\text{153}\)

---

\(^\text{148}\) Charities and PPIE workshop.
\(^\text{149}\) Charities and PPIE workshop, policymakers workshop.
\(^\text{150}\) Policymakers workshop.
\(^\text{151}\) Charities and PPIE workshop.
\(^\text{152}\) Charities and PPIE workshop.
\(^\text{153}\) Charities and PPIE workshop.
D.11. Appendix to Annex D: workshop agenda

Innovating in the NHS: arriving at ways forward together

Workshop agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.45–10.00</td>
<td>Coffee</td>
</tr>
<tr>
<td>10.00–10.05</td>
<td>Welcome from the team</td>
</tr>
<tr>
<td></td>
<td>Overview of the day and agenda</td>
</tr>
<tr>
<td>10.05–10.25</td>
<td>Introduction and participants’ expectations of the day</td>
</tr>
<tr>
<td>10.25–11.00</td>
<td>Presentation on the project, its findings to date and Q&amp;A</td>
</tr>
<tr>
<td>11.00–13.00</td>
<td>Building a supportive innovation environment in the health system:</td>
</tr>
<tr>
<td></td>
<td>prioritising and delivering practical initiatives</td>
</tr>
<tr>
<td></td>
<td>Our work to date has considered a series of innovation drivers in the</td>
</tr>
<tr>
<td></td>
<td>health system and associated initiatives and interventions which exist</td>
</tr>
<tr>
<td></td>
<td>or are needed to facilitate impact. In this session, we will explore</td>
</tr>
<tr>
<td></td>
<td>stakeholder-specific views on key initiatives and interventions in</td>
</tr>
<tr>
<td></td>
<td>more detail, in order to understand what they mean for you as a</td>
</tr>
<tr>
<td></td>
<td>stakeholder, how they are manifested in everyday practice and how they</td>
</tr>
<tr>
<td></td>
<td>might be further strengthened. This will help us understand how</td>
</tr>
<tr>
<td></td>
<td>support mechanisms pertaining to key drivers can most effectively</td>
</tr>
<tr>
<td></td>
<td>interact with existing policy initiatives and structures that are</td>
</tr>
<tr>
<td></td>
<td>being set up in the health and care landscape (e.g. as they relate to</td>
</tr>
<tr>
<td></td>
<td>the Accelerated Access Review and the Next Steps on the NHS Five Year</td>
</tr>
<tr>
<td></td>
<td>Forward View), and how innovating can help enable an effective and</td>
</tr>
<tr>
<td></td>
<td>efficient health system.</td>
</tr>
<tr>
<td>13.00–13.30</td>
<td>Lunch</td>
</tr>
<tr>
<td>13.30–14.50</td>
<td>Policy focus: How drivers of health innovation can interact with policy</td>
</tr>
<tr>
<td></td>
<td>developments to ensure a mutually reinforcing and effective system</td>
</tr>
<tr>
<td></td>
<td>Building on discussions earlier in the day, in this session we will</td>
</tr>
<tr>
<td></td>
<td>work with you to unpack the support mechanisms and implementation</td>
</tr>
<tr>
<td></td>
<td>requirements needed if current policies and national initiatives</td>
</tr>
<tr>
<td></td>
<td>towards innovation in health and care are to be relevant and work for</td>
</tr>
<tr>
<td></td>
<td>you. Specifically, we will seek your views on how practical mechanisms</td>
</tr>
<tr>
<td></td>
<td>to support innovation can most effectively interact with policy,</td>
</tr>
<tr>
<td></td>
<td>especially in light of the Accelerated Access Review and Next Steps on</td>
</tr>
<tr>
<td></td>
<td>the NHS Five Year Forward View, as well as STPs. There will be an</td>
</tr>
<tr>
<td></td>
<td>opportunity to reflect stakeholder views on the factors required for</td>
</tr>
<tr>
<td></td>
<td>implementation feasibility and acceptability of policy developments and</td>
</tr>
<tr>
<td></td>
<td>of associated regulation. We will seek to understand what your</td>
</tr>
<tr>
<td></td>
<td>stakeholder group needs and can contribute to, and what needs to occur</td>
</tr>
<tr>
<td></td>
<td>by wider local and national actors to ensure an effective system</td>
</tr>
<tr>
<td>14.50–15.00</td>
<td>Next steps, close and reflection on the day</td>
</tr>
<tr>
<td></td>
<td>Key takeaway messages from today’s workshop</td>
</tr>
</tbody>
</table>
Annex E. Literature review

E.1. Summary

Aims
- A review of scholarly literature focusing on innovation in health was employed to help identify issues of interest for further exploration in the interview and workshop elements of the study, as well as to enable triangulation of primary data collected through the study against the existing knowledge base.

Design and implementation
- The literature review was conducted in 2017, identifying key publications focusing on innovation in health, and updated with relevant publications in 2018. Overall, 132 documents were reviewed.
- Main findings were synthesised and written up structured around the six drivers of innovation in the health system identified by Marjanovic, Sim et al. (2017a, 2017b): skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning.

Key findings
Key findings related to skills, capabilities and leadership:
- A culture of investment in training and in the development of individual skills and capabilities can help make innovations and their adoption more sustainable.
- Nurturing organisation-level capacities to be innovative is important for the sustainability of innovation – these capacities span resource-investments, governance and management arrangements and cultural features.
- Leadership across professions and across hierarchies sets out a vision for an innovative culture.

Key findings related to motivations and accountabilities:
- A number of factors motivate staff to adopt and sustain an innovation, including: attitudes to change; the extent to which staff are given a voice; alignment of innovation with individual and organisational norms and values; the perceived distribution of benefits and risks; and the presence of incentives.
- Embedding innovation in practice requires attention to organisational values and ‘fit’.

Key findings related to the information and evidence environment:
- The quality of evidence and trust in it is positively associated with adoption and sustainability of innovations.
- The nature of evidence can influence the adoption of innovations.

Key findings related to relationships and networks:
- Tapping into cross-boundary networks can be beneficial to the sustainability of innovations: innovation is a cross-disciplinary, cross-profession and cross-sectoral phenomenon.
- Networks can, and should, be formal and informal in nature and diverse in their make-up.

Key findings related to engagement with patients and the public:
- There is growing recognition that a sustainable and effective innovating health system needs to involve patients and the public throughout the innovation pathway.

Key findings related to funding and commissioning of innovations:
- Appropriate levels of funding are required to sustain innovation.
- Public procurement initiatives can help overcome funding bottlenecks, but must be strategic and long-term in nature.
E.2. Introduction

Innovation could have great potential to contribute solutions to the challenges the NHS faces, and to help deliver value-for-money, efficient and effective services. There is a great deal of literature on, and relevant to, the topic of innovation in the NHS. The difficulty lies in pulling all the various strands together to facilitate learning in a meaningful way. This literature review has been structured around the six main drivers identified in Marjanovic, Sim et al. (2017b), which contribute to successful health innovation and could help innovation to have greater scale, scope and impact. These drivers are:

- Skills, capabilities and leadership: A diverse but not infinite set of skills and capabilities are needed to deliver successful innovation in the health system
- Motivations and accountabilities: There are diverse mechanisms within health and care organisations to incentivise innovation, although at present there is little evidence on the cost-effectiveness of different approaches
- Information and evidence: The current knowledge exchange and knowledge management landscape on innovation is characterised by a plurality of efforts. There is a wealth of information and evidence on innovation available in the health system, but the sources are fragmented and the content often lacks appropriate communication and targeting.
- Relationships and networks: The value created by the innovation landscape is in part determined by diverse initiatives, relationships and networks within and between regions.
- Engagement with patients and the public: There is growing recognition that a sustainable and effective, innovating health system needs to involve patients and the public throughout the innovation pathway.
- Funding and commissioning: The funding landscape for innovation is characterised by diverse sources of funding from both national funding pots and regional and organisational resources (Marjanovic, Sim et al. 2017b).

This literature review contributes to the evidence base for the wider study and specifically explores what additional and/or new insights the wider innovation, health and health services literature provides for each of the health innovation drivers identified. Though structured around the six drivers, the overarching aim of the literature review is to address what we know about adoption, diffusion and sustainability of innovation in the health system across the entire innovation pathway. In the following pages we begin with a general review of the background context, before moving to a discussion of what the literature tells us about each driver.

E.3. Methodology

The literature review was initially conducted in 2017 and then updated in early 2018. The initial search for relevant literature was conducted on Google Scholar using the following search terms:

- ['health innovation*' OR 'healthcare innovation*'] AND [skill* OR capabil* OR competenc* OR leadership* OR incentive* OR information OR evidence OR knowledge OR (patient* OR public) AND voice] OR ((patient* OR public* OR 'service user*') AND (engagement OR
Two of the study team members assessed the publications identified through this search according to their relevance to the topic and 31 key publications were extracted using an extraction template based on the six drivers identified as part of this study. This was complemented with relevant literature on themes of interest from research areas with complementarities or blurred boundaries with the innovation space (such as health services, improvement science, research policy and implementation science), resulting in an additional 91 publications identified based on research team expertise and knowledge of the relevant literatures. This resulted in a total of 122 publications spanning peer-reviewed journals and grey literature.

While the study team followed a systematic approach to identifying literature, there was no restriction on the study team adding any publication they considered relevant.

The publications were distributed among four members of the study team who reviewed the publications against the six drivers of innovation for relevance, quality and important insights. The study team updated the reviewed literature in early 2018, with 10 additional documents added that had been published since the initial literature review was conducted and had been brought to the study team’s attention by contacts from its professional networks. In total we have thus reviewed 132 documents. Key findings from this literature review are presented below.

### E.4. General background

#### E.4.1. What do we know about sustainable health innovation?

The literature identifies many factors that are important for the sustainability of innovations in the health system – i.e. to sustain them from idea generation and development of products, technologies and services, through to their adoption and diffusion. Greenhalgh et al. (2017) state that the implementation of new innovations relies on the dynamic interactions between various drivers and barriers, not the effect of a single factor. However, we know less about the relationship between these factors. Moreover, as a systems perspective on innovation will tell us, there is a relationship between implementation and the nature of a specific innovation which makes generalisation across a health system difficult; it also tells us that adoption and spread of an innovation is not a linear process, but has effects across the local system it is implemented in, such as diagnosis, treatment and the role of staff (Collins 2018). To ensure an innovation can be implemented across different local health systems, there needs to be adaptation and evaluation of the innovation itself (Collins 2018).

Greenhalgh et al. (2004) list attributes of innovations that influence adoption and these insights are incorporated throughout this literature review. Nevertheless, the general principle that innovations are different in relevant respects and that these differences have important implications for implementation is notable. Additionally, a key point is that sustaining innovation is not solely attributable to the ingenuity and creativity of individual actors. Instead, it relies on a number of other factors. Despite the same macro-level environment in each site, the meso-level features of the organisations in each site made a significant difference to the consequences, maintaining latitude for some actors while others faced constraint (Martin, Currie & Finn 2009).
With this overarching background in mind, the following sections of this Annex will focus specifically on
the six drivers of innovation identified in Marjanovic, Sim et al. (2017b) – skills, capabilities and
leadership; the information and evidence environment; patient and public involvement and engagement;
relationships and networks; motivations and accountabilities; and funding and commissioning – and how
the literature does, or does not, address them in the context of sustainable health innovation.

E.5. Skills, capabilities and leadership

E.5.1. A culture of investment in training and the development of individual skills and capabilities can help make innovations sustainable

There is a need for a diverse set of skills and capabilities to deliver successful, and sustainable, innovation
in the health system. Indeed, the extent to which the demands of an innovation match the capabilities of
staff developing, introducing and implementing it is considered to have an impact on sustainability
2014). Moreover, a wide range of authors found effective training to be key for sustainability (Blasinsky,
Massatti et al. 2008; Rollins et al. 2010; Swain et al. 2010; Woltmann et al. 2008). The latter point about
training is particularly prominent in the literature. Several authors note that investment in sustained
training and capacity-building among staff at a number of levels is an important success factor for the
sustainability of innovative cultures and practices (Bailie et al. 2006; Brand et al. 2005; Grol & Wensing
Moreover, effective training also plays a role in the adoption of practice and service innovations
(Länsisalmi et al. 2006) and the innovation ‘readiness’ of frontline organisations (Williams 2011).

According to Hoelscher et al. (2004), Swain et al. (2010) and Ulucanlar et al. (2013), follow-up training
after initial implementation is particularly beneficial to sustainability, as is training by manufacturers of a
technology or by another external agency. Training is especially important where effective ongoing
provision relies on direct or indirect involvement of practitioners beyond an immediate project team (e.g.
implementation of guidelines or a novel care pathway) (Blasinsky, Goldman & Unützer 2006; Goetz et
al. 2009).

Training can also help to maintain the motivation and activity of staff (Goetz et al. 2009), as well as help
boost confidence. Massatti et al. (2008) found that low levels of staff confidence in their own ability to
implement a change is associated with higher rates of de-adoption of innovation. For example, embedding
new practices and guidelines in existing staff orientation and training was seen as an important way to
sustain adherence in a study of chronic obstructive pulmonary disease (COPD) clinical guidelines at an
Australian hospital two years after successful implementation (Brand et al. 2005). Another study of the
sustainability of the practices within the National Implementing Evidence Based Practices Project for
people with serious mental illness in the USA found that both training and staff stability were important
interacting success factors, as training was seen to offset staff turnover (Swain et al. 2010).

However, Fixsen et al.’s (2005) review of the innovation implementation literature asserts that while
training for knowledge and skills relevant to the innovation is important, taken alone it is an ineffective
approach to implementation. Other elements that shape the skills and knowledge of staff, such as recruitment criteria and methods and informal coaching, were also found to be key to achieving positive outcomes. The authors call for further research on the interaction of these three elements (staff training, coaching and selection) for successful implementation of innovations.

Studies show high staff turnover is negatively associated with fidelity to evidence-based practices, but there are mixed findings on staff turnover’s effect on the sustainability of evidence-based practices, i.e. if those practices are sustained after staff have left. Turnover may give leaders an opportunity to realign staff capabilities with the demands of an innovation (Rollins et al. 2010; Savaya, Elsworth & Rogers 2009; Swain et al. 2010; Woltmann et al. 2008).

E.5.2. Nurturing organisation-level capacities to be innovative is important for the sustainability of innovation – these capacities span resource-investments, governance and management arrangements and cultural features

Contexts and natures of health organisations can influence the adoption of innovations

The varying contexts and natures of health organisations and of the wider health system are important influencers of innovation adoption (Albury et al. 2018; Greenhalgh et al. 2017). Greenhalgh et al. (2017) identified the need for ‘taming’ innovations to individual organisational contexts, such as health and financial policies, the legal and regulatory status of an innovation and the acceptance among professionals. A lack of adaptation to individual contexts is often the reason for the failure of an innovation as it is unable to scale-up and spread (Greenhalgh et al. 2017). A number of studies have sought to examine and identify organisational determinants of innovation (Fleuren et al. 2004; Greenhalgh et al. 2004; Greenhalgh et al. 2017; Robert et al. 2009; Rye & Kimberly 2007; Turner et al. 2017). This has led to some consensus around these organisational determinants (Djellal & Gallouj 2007; Fitzgerald et al. 2002; Greenhalgh et al. 2004; Länsisalmi et al. 2006; Turner et al. 2017), which include factors such as structures and governance arrangements (Williams 2011), resource levels (Bate, Mendel & Robert 2008; Turner et al. 2017), organisational culture (Dopson and Fitzgerald 2005; Dopson et al. 2002; Turner et al. 2017), business modelling and a shared vision of the innovations objectives (Greenhalgh et al. 2017). For example, functionally differentiated and specialised organisations are seen as preferable to highly centralised and hierarchical structures (Rye & Kimberly 2007; Turner et al. 2017). As noted by Turner et al. (2017), low hierarchies and engagement of staff in decision-making processes can help support innovation implementation. Individual organisations may influence other organisations (Albury et al. 2018; Turner et al. 2017): innovations that are highly regarded in one organisation are more likely to be adopted subsequently by other organisations (Albury et al. 2018). However, longer-term effects have generally not been studied or evaluated systematically, with many analyses of change focusing on the ‘front end’ of the process (Fitzgerald & Buchanan 2007).

Adaptability of the innovation to the organisational context and culture is important

Our review of the literature suggests that context and organisational culture matter for an innovation-supportive health environment. A number of studies highlight organisational fit (i.e. the degree to which the innovation is compatible with existing norms and practices) as a crucial factor in the sustainability of an innovation (Albury et al. 2018; Blasinsky, Goldman & Unützer 2006; Goodson et al. 2001; Horton,
ILLINGWORTH & WARBURTON 2018; JACOBS 2002; O’LOUGHLIN ET AL. 1998; STANGE ET AL. 2003; STETLER ET AL. 2009; TIBBITS ET AL. 2010). THIS IS NOT MERELY A MATTER OF TAILORING THE INNOVATION TO THE CONTEXT (INNOVATORS NEED TO ENSURE THAT THEIR PRODUCT IS FLEXIBLE AND CAN BE ADAPTED TO DIFFERENT LOCAL ENVIRONMENTS) (ALBURY ET AL. 2018), BUT MAY REQUIRE ADAPTATION OF THE CONTEXT. FOR EXAMPLE, STETLER ET AL. (2009) FOUND WORK UNDERTAKEN TO REALIGN PROFESSIONAL PRACTICES, TO BRING MIDDLE MANAGERS ON BOARD AND TO COMMUNICATE THEIR BENEFIT, RESULTED IN MORE EMBEDDED AND SUSTAINED IMPLEMENTATION OF NEW GUIDELINES. Whilst organisational fit may increase the chances of ensuring innovations remain in use in an organisation (and are thus considered to be sustainable from a resource perspective), there may sometimes be a need to support more disruptive innovations if radical change is needed (CHRISTENSEN, BOHMER & KENAGY 2000), even if this is challenging.

While we know that context is important, it still remains poorly understood. Many authors instead talk about how social and/or cultural factors can influence the implementation of innovations (DENIS ET AL. 2002; DOPSON, FITZGERALD & FERLIE 2008; GALE ET AL. 2014). Based on a review of four case studies in healthcare settings in Canada, DENIS ET AL. (2002) determine that innovation diffusion is a confluence of two factors: the innovation, and the ‘adopting system composed of actors with a certain set of values, interests, and power dependencies’ (DENIS ET AL. 2002, 65). This position is supported by BERWICK’s (2003) summary of the diffusion of innovation (based on the work of ANDREW VAN DE VEN (see, e.g., SCHROEDER ET AL. 1986) AND EVERETT ROGERS (1995)), which recognises three points of influence: perception of innovation; characteristics of those who implement or do not implement innovations; and contextual factors including communication, leadership and management.

Though the concept of culture itself is one that has various definitions in the literature, it is usually used to describe the general climate or ‘feeling’ in an organisation (SMIRCICH (1983) and DOHERTY ET AL. (2013), as cited in GALE ET AL. 2014). In attempting to address the lack of a clear framework for measuring organisational culture, GALE ET AL. (2014) provide a review of the literature and develop a framework for conducting evaluations of organisational culture. The ‘PATIENTS-PeOPLE-PLACE’ framework focuses on three thematic areas where organisational culture plays out (patients, people and place), and three levels of cultural data that can be observed (observable behaviour and artefacts, values and habits of social actors).

Nevertheless, the findings discussed above suggest that the ability of innovation to be adapted to specific organisational norms and cultures is crucial. Indeed, authors have found that adaptability of the innovation to the organisational setting is important to ensure fit and relevance to changing practices (BRIDGES, FITZGERALD & MEYER 2007; LAPP, ZAPKA & OCKENE 2006; O’LOUGHLIN ET AL. 1998; SWAIN ET AL. 2010). But this is not always straightforward to address. A confluence of factors presented in two vignettes by DOPSON ET AL. (2008) demonstrate that highly contextual factors can influence the diffusion or uptake of an innovation. O’LOUGHLIN ET AL. (1998) found that interventions that went through iterations and modifications during implementation were more likely to be sustained than those that did not change.

WILTSEY STIRMAN ET AL. (2012) also found in their review that the interplay of contextual factors and an innovation may be important—some processes that were identified suggested a mutual adaptation between the intervention and the organisation or system. However, adaptability may be required to fit local contexts and this may be an ongoing process (BRIDGES, FITZGERALD & MEYER 2007). The literature also suggests a need for more organisational integration into the structures and processes of the setting (AUGUST
et al. 2006; Bailie et al. 2006; Brand et al. 2005; Jacobs 2002; Kotter 1995; Owen 2010; Savaya, Elsworth & Rogers 2009). New practices that fail to be integrated into routines, pathways and protocols progressively lose momentum over time (Ferlie et al. 2005; Senge, Roth & Ross 1999; Stetler et al. 2009).

In sum, examining context for the diffusion of innovations needs to take account of the fact that local contexts are multidimensional and complex (with formal frameworks, as well as relationships amongst a variety of actors), and that there are combinations of factors at different levels which can influence any given outcome. Therefore, the interdependencies between actors and context in reaching outcomes are important.

**An organisation’s ability to adopt innovations is determined by its capacity to absorb new knowledge**

Absorptive capacity refers to an organisation’s ability to acquire, assimilate, transform and exploit new knowledge. Zahra and George (2002) conceptualise absorptive capacity as a ‘set of organisational routines and strategic processes’ that determine an organisation’s ability to adopt innovations. It is therefore often seen as a predictor of readiness for innovation and indicates the extent to which new knowledge is identified, distributed and translated. Absorptive capacity has four dimensions: acquisition of knowledge; assimilation of knowledge (integration of new knowledge with pre-existing knowledge); transformation of knowledge (applying integrated knowledge to develop a service intervention); and exploitation (evaluation of the service intervention towards potential scale-up if judged successful) (Zahra & George 2002).

These concepts were developed and refined in the context of private sector entities seeking competitive advantage. A number of researchers have used the concept of absorptive capacity to explore NHS contexts. In particular, the issues preoccupying private sector research and development departments which relate to acquisition and assimilation of knowledge may differ from the NHS in some respects. Rather than thinking, for example, about tools to promote knowledge acquisition (such as a portal) it might be preferable to think about the antecedents to developing absorptive capacity for a healthcare organisation. As noted by Van den Bosch et al. (1999), three combinative capabilities are important here, which interact to enhance or limit absorptive capacity: systems capabilities, socialisation capabilities and coordination capabilities. Systems capabilities refer to those performance management and resource allocation structures from which routines are derived for the spread of evidence-based innovation within and across healthcare organisations. Socialisation capabilities relate to cultural mechanisms that promote shared ideology and collective interpretations of reality within organisations, from which professional communities and cultures derive. Coordination capabilities refer to lateral forms of communication such as education and training, job rotation, cross-functional interfaces and distinct liaison roles (Van den Bosch, Volberda & de Boer 1999).

**Organisational resources and infrastructure are essential but insufficient on their own – their availability is to a large extent influenced by institutional attitudes to innovating and by institutional leadership**

Some literature suggests that organisational attributes such as available resources are important factors for innovation (Albury et al. 2018; Castle-Clarke, Edwards & Buckingham 2017; Robert et al. 2009; Rye & Kimberly 2007). This is supported by a systematic review by Fleuren et al. (2004 in Robert et al. 2009), which demonstrated that a number of ‘facilities’ were needed for the implementation of an innovation.
These ‘facilities’ include financial resources, time to prioritise innovation, incentives to make time for innovation staff availability, individuals (health professionals) involved in developing the innovation, opinion leaders with influence within the organisation/department, reimbursement for professionals implementing innovations, and making time for the implementation of an innovation and the provision of administrative support to innovation users. The general short-term approach to innovation in the NHS has been identified as a key barrier, with the focus needing to be on the value of innovations rather than their financial costs (Albury et al. 2018; Castle-Clarke, Edwards & Buckingham 2017).

Building on this, it is clear that the nature of institutional support matters in relation to the need to adapt an innovation to specific contexts. Evashwick and Ory (2003) found that the institutional support of the parent organisation introducing the intervention was a key factor in an innovative project succeeding and being maintained over time. Institutional support meant that resources could be drawn on, including occasional personnel support. Indeed, Martin et al. (2017) found that interaction between the institution and individuals was important for sustainability; in particular they found that actors’ autonomy does not depend only on the status and creativity of those individual actors.

Another aspect of institutional support may be the ability for new programmes to evoke change in the parent organisation. Goodson et al. (2001) found that high visibility was important for a programme’s success (examples of efforts in their paper included competitions among residents, weekly conferences and rewording of the mission statement to include mention of the new programme).

In addition, West et al. (2003) show that team size can have an effect on innovation. Using data from 283 healthcare teams (primary healthcare teams (n=98), community mental health teams (n=113) and breast cancer teams (n=72)), their data indicate that larger teams provide more capacity to process and interpret information, and to support to sustain efforts to innovate. At a wider organisational level, a review of empirical meta-analysis studies draws a positive relationship between an organisation’s size and its capacity to innovate: e.g. Camisón-Zornosa (2004), focusing on organisational size and level of innovation, and Lee and Xia (2006), focusing on organisational size and IT adoption, both cited in Robert et al. (2009). However, it is worth noting that these two papers are not specific to healthcare; it is unclear what types of organisations were examined, and other criteria relating to the organisational type is generally missing, except one case in Lee et al. (2006) where no positive relationship between the size of a not-for-profit organisation and the adoption of IT systems was found.

Other supporting factors are also important for the implementation of an innovation, beyond its proven effectiveness; the literature shows that supporting infrastructure and processes are still required for the implementation of an innovation by an organisation (August et al. 2006; Jacobs 2002). Although evidence of effectiveness may be present, a failure to secure adequate support structures can impact on the sustainability of an innovation or a programme. For example, August et al. (2006) demonstrated the transfer of a programme from one provider to another, which showed that participants who attended a prevention programme consistently benefited from the initiative; however, other factors such as accountability, difficulty with transportation, limited interaction with other stakeholders, and staff turnover inhibited the successful sustainability of the programme. Therefore, infrastructural and contextual issues can be seen as necessary factors for success.
The complexity of most health organisations means that achieving organisational fit and integration requires a broad range of approaches. Effective leadership is therefore important, and we turn our attention to this issue next.

E.5.3. Leadership across professions and across hierarchies sets out a vision for an innovative organisational culture

Across the literature, strong, visible and strategic leadership at multiple levels emerged as a prominent success factor for the implementation, diffusion and sustainability of innovations (Brand et al. 2005; Bridges, Fitzgerald & Meyer 2007; Ewashwick & Ory 2003; Fitzgerald et al. 2002; Hanlin & Andersen 2016; Helfrich et al. 2007; Kotter 1995; Länsisalmi et al. 2006; Martin, Currie & Finn 2009; Owen 2010; Pettigrew, Ferlie & McKee 1992; Stetler et al. 2009; Swain et al. 2010; Turner et al. 2017; Wallin et al. 2003; Wright 2009). Leaders can engender an ‘innovative’ organisational culture of openness to change and that supports innovation adoption (Collins 2018; Savaya, Elsworth & Rogers 2009; Turner et al. 2017), which is positively associated with sustainability of adopted innovations (Glisson et al. 2008; Swain et al. 2010). Kotter (1995) states that leadership should develop a sound and sensible vision that pulls together the various plans/directives/programmes – then communicate that vision via all existing channels and behave consistently with the vision. If senior members of the NHS are not fully committed to driving innovation, allowing it to flourish and rewarding staff who promote innovation, projects are likely to fail (Castle-Clarke, Edwards & Buckingham 2017).

Many authors have found that support and buy-in from high-level executive leadership is important in healthcare organisations for articulating an organisational mandate and allocating necessary resources (e.g. technical, financial and human resources) (Helfrich et al. 2007; Länsisalmi et al. 2006; Owen 2010; Stetler et al. 2009; Swain et al. 2010; Wallin et al. 2003). High-level leaders can be the deciding factor in whether or not an innovation is adopted. If leaders perceive an innovation to be outside their organisation’s responsibility, this can mean it is not adopted (Collins describes this as the “that’s not our job” mentality’ (Collins 2018, 28)). Wallin et al.’s (2003) survey examining the relationship between sustained work with quality improvement (QI) and research utilisation in Sweden found that nurses who undertook QI work were more likely to have obtained support from their chief executive (P=0.001). Stetler et al. (2009) also highlight the value of high-level, strategic leadership to protect the implementation of new evidence-based practices from external pressures, as well as the need for formal and informal change leaders at all levels to embed practice. Thus, while ‘leadership’ often involves executive directors and influential professionals, there is also leadership from those directly involved in promoting the innovation, as well as leadership distributed amongst multiple stakeholders who can work to improve fit across organisational, professional and clinical boundaries (Neath 2007).

There are many different forms and functions of leadership to support innovation, but there is also a clear message from the literature that successful leadership is distributed throughout an organisation; it does not just come from the top down. Indeed, top-down, coercive leadership is negatively associated with adoption of innovation as it damages relationships, blocking the flow of information (Plsek 2003).

To support the spread of innovation, effective leadership should be distributed amongst myriad professionals and managers at different levels, across, as well as within, organisations (Denis et al. 2002; Ferlie et al. 2005; Fitzgerald & Buchanan 2007; Martin et al. 2012; Pettigrew, Ferlie & McKee 1992).
particular, Fitzgerald et al.’s (2002) analysis emphasises the importance of leadership at different levels, defining three types of leaders necessary for innovation diffusion and implementation in health: a ‘focal point’ for information sharing, who may act as a link between research and practice; an expert with local credibility; and a strategic leader with management and political skills. This, again, is consistent with ideas about distributed leadership and we might even conceptualise distributed leadership as involving professional champions and opinion leaders (Dopson, Fitzgerald & Ferlie 2008; Dopson et al. 2002). Incorporating experienced teams with expertise in innovation implementation and later evaluation is also important (Collins 2018). These teams should have a diverse set of skills, which could include marketing knowledge, change management experience and service improvement experience (Collins 2018). For example, the NHS Innovation Accelerator programme includes mentors who provide technical advice and support, as well as support for frontline staff to connect to appropriate and useful stakeholders (Cox et al. 2018).

Martin et al. (2009) explored the establishment of organisational innovations concerning genetics services, as well as initial efforts, successful and unsuccessful, in making them sustainable, and their study affirms this suggestion to some extent. The authors highlight the importance of effective, dispersed leadership in ensuring that a critical mass of powerful actors in the local network of organisations is aware of the advantages of the new model of service delivery. They found that despite similar NHS contexts (in terms of the NHS as a professional bureaucracy and a market system of commissioners and providers), there were differences between sites in terms of the sustainability of the innovation. In a 2017 article, Martin et al. note that attempts to hire or create ‘blended hybrids’ of staff groups to manage some aspects of context (e.g. the centrality of professional power and/or the need to sell services in the market) are likely to be ‘forlorn or counterproductive’ (Martin et al. 2017, 121). Instead they suggest that developing cordial, mutually beneficial relationships outside the organisation facilitated sustainability by helping to secure latitude for the actors attempting to sustain the innovation. A key point is that sustaining innovation is not solely attributable to the ingenuity and creativity of individual actors. Despite the same macro-level environment at each site, the meso-level features made a significant difference to outcomes, maintaining latitude for some actors while others faced constraint.

Jarvis et al. (2017) outline how leadership training can support promotion and adoption of innovation within healthcare. They explored the effects of a leadership programme for NHS managers which focused on four key themes: ‘re-connecting with purpose, innovating live for patient improvement, improving the team climate for high discretionary effort and using power and authority to engage the team’ (Jarvis, Kars-Unluoglu & Sheffield 2017, 3). Leadership programme participants were exposed to frequently occurring leadership challenges in a safe environment. When asked about the impact of the programme on their leadership abilities, participants self-reported that innovation implementation increased within their team and were more likely to take appropriate risks (Jarvis, Kars-Unluoglu & Sheffield 2017), which is important when deciding to adopt an innovation. In particular, participants commented that the time put aside to be able to think about innovations and their leadership was highly beneficial (Jarvis, Kars-Unluoglu & Sheffield 2017). However, when looking beyond self-reported outcomes to measure impact directly, only nine of the 24 teams showed an improved innovation environment, whereas 11 showed no change. Four teams actually showed a reduction in the quality of their innovation environment. Those teams whose innovation culture improved had leaders who paid close attention to managing and
supporting a positive innovation environment, delegated greater responsibility to their team members and built strong relationships with a range of stakeholders. In teams that showed a reduction in the quality of their innovation environment, there was an organisation-wide lack of support for innovation (Jarvis, Kars-Unluoglu & Sheffield 2017).

E.5.4. The presence of Innovation Champions can be an effective leadership strategy for innovation

The presence of a respected ‘Champion’ making the case for an innovation is positively associated with adoption and sustainability. Local Champions can drive innovation in a range of ways, including by clearly articulating the goals of their organisations, encouraging staff to come up with new ideas and to make new connections, supporting frontline staff to access tools, offering funding and support, encouraging innovative thinking and leading innovation development (Collins 2018; The Policy Institute at King’s College London 2018).

Various studies have highlighted the role of Champions and opinion leaders in influencing innovation implementation and sustainability. Kotter (1995) in particular refers to a critical minimum mass, which he calls the ‘guiding coalition’, that needs to be achieved early in any change programme. Several authors note that such a guiding coalition – in the form of Programme Champions or Innovation Leads – needs to have a certain level of power and clout, as well as negotiation skills and a sense of compromise, in order for their programme or innovation to be successfully implemented (Goodson et al. 2001; Kotter 1995; Martin et al. 2012). For instance, senior leaders should be able to take action to remove major obstacles to the new vision (Kotter 1995). On the other hand, Fitzgerald and Buchanan (2007) highlight the role of unorthodox leaders such as administrative, secretarial, clerical and nursing staff who can act as change agents. The people occupying these roles typically have long service, deep organisational knowledge, established relationships with power brokers, personal credibility and are politically sensitive. The authors suggest that more support should be given to supporting these leaders (Fitzgerald & Buchanan 2007).

Champions who visibly promote innovations among practitioners as well as role models and advocates among clinical staff have been mentioned as key drivers of innovation sustainability in a number of studies (Brand et al. 2005; Collins 2018; Helfrich et al. 2007; Swain et al. 2010; Wright 2009; The Policy Institute at King’s College London 2018). Brand et al.’s (2005) study on the sustained adherence to new COPD clinical practice guidelines in an Australian acute hospital identified inadequate senior clinician role models and a lack of culture of using guidelines in wards as possible factors causing a lack of buy-in among junior staff. In this sense, Champions serve as so-called ‘boundary spanners’ or knowledge brokers. Llewellyn (2001) finds that ‘two-way’ roles that connect staff at different levels or in different functional areas (e.g. clinical/management) are beneficial for the adoption of evidence-based practice; however, the literature also shows that clinical staff taking on two-way roles may lose credibility among the group they seek to influence (Bisset & Potvin 2007; Llewellyn 2001). In his report for the King’s Fund, Collins (2018) highlights the importance of putting ‘boots on the ground’ by providing senior clinicians with the time to promote innovations to their staff and encourage uptake. Moreover, Collins notes that this was more successful if the clinician had greater experience, a strong reputation and a large clinical network to tap into.
However, there is some evidence that the effects of Champions may be relatively short-lived (Hendy & Barlow 2012; Kislov, Hyde & McDonald 2017) and that influential individuals can act to promote or block change (Dopson & Fitzgerald 2005). Indeed, it has been suggested that a plurality and heterogeneity of Champions is apt in the NHS context, where multiple professional groups are involved in often ‘tribal’ relationships (Martin et al. 2013). Wisdom et al. (2014) point out that care should be taken in formalising the status of a Champion/opinion leader, as this can be perceived by staff as top-down leadership, which they found to be negatively associated with adoption.

In addition, Hendy and Barlow (2012) found that while organisational Champions were highly effective in the first phase of adoption, their long-term effectiveness was variable. The authors therefore argued that change should not be positioned only within the remit of a few individuals, as Champions may be initially beneficial but may impede later stages of implementation. This is illustrated by the findings of Bridges et al.’s (2007) action research study, which followed four newly created inter-professional care coordinator roles in a London teaching hospital. The study emphasised the importance of innovation-savvy management providing oversight over time for the safe adaptation of service innovations. The study found that after two years the roles had shifted from clerical support responsibilities towards more enhanced support of nurses, which had created potential clinical governance issues. Moreover, the authors note that a turbulent, pressurised external context and a lack of in-depth understanding of innovation or change processes may have disrupted managers’ abilities to deal with these unintended consequences of innovation (Bridges, Fitzgerald & Meyer 2007). This is also consistent with the finding that appropriate managerial support and supervision is needed in order to implement innovations (Swain et al. 2010).

### E.6. Motivation and accountabilities

#### E.6.1. A number of factors motivate staff to adopt and sustain an innovation

Individuals’ attitudes towards change and quality improvement affect motivation to adopt and sustain innovations (Castle-Clarke, Edwards & Buckingham 2017; Savaya, Elsworth & Rogers 2009; Wisdom et al. 2014). Savaya et al. (2009) find that clinical staff are more likely than administrators and managers to resist change. However, resistance to change and perceived alignment with values can be positively affected by engagement with staff: allowing staff to have a voice encourages reflection and improvement of practices (Black & Lynch 2004; Plsek 2003). Giving frontline staff greater decision-making abilities, for example, can act as a driver for innovation (Collins 2018). Although staff may be resistant to change and to the adoption of innovations, there are other reasons why staff choose not to adopt, such as the innovation not being user-friendly, or being seen as a threat to their employment or a perceived risk to patients (Greenhalgh et al. 2017).

Several studies highlight alignment of an innovation’s aims and outcomes with implementing staff’s norms and values as a motivator for sustainability (Bisset & Potvin 2007; Massatti et al. 2008; Wisdom et al. 2014). However, Grol and Wensing (2004) find little evidence of tailoring programme goals as a motivator. Adaptability of an innovation’s aims can help to ensure sustainability given a shifting set of implementing actors (Bisset & Potvin 2007). Differences in norms, values or goals between management and frontline staff have also been found to negatively impact staff motivation (Savaya, Elsworth & Rogers 2009).
It is worth noting the role of perceived distribution of benefits and risk in the adoption of innovations. The extent to which implementing staff expect themselves to benefit from an innovation (in terms of working conditions, job satisfaction, etc.) is associated with adoption and sustainability (Aitaoto, Tsark & Braun 2009; Karsh, Beasley & Hagenauer 2004; Savaya, Elsworth & Rogers 2009). Innovations perceived as low-risk are more likely to be adopted (Wisdom et al. 2014), and adoption is most likely where the distribution of benefits and risks maps onto power dynamics within organisations – i.e. benefits accrue to most influential decision makers, and risks to the least influential (Denis et al. 2002).

Within the innovation space, the focus has often been on supply of innovation rather than creating demand and incentivising it (Albury et al. 2018). Incentives are found to contribute to high levels of attainment of quality targets, an increase in incentivised activities, an increase in activities involving higher pay relative to level of effort, and a decrease in some activities not linked to incentives (McDonald et al. 2010; Swain et al. 2010; Wisdom et al. 2014). Incentives can also be beneficial when clinicians do not see an innovation (e.g. in administration) as beneficial to patients (Liddell, Adshead & Burgess 2008). Incentives can be at both the individual level, such as those related to professional or financial factors, or more system-wide, such as waiting time targets set for CCGs (Albury et al. 2018). Although system-wide incentives such as targets can initiate compliance and focus on a specific area, they may not always lead to the culture shift of staff personally supporting these innovations (Albury et al. 2018). These targets are also often short term, which reduces the incentives for CCGs to invest in long-term innovation projects (Collins 2018). Commissioners can support creation of useful incentives that prioritise sustainability of innovations over their immediate impacts and outcomes (Albury et al. 2018).

In their study of incentives in primary care, McDonald et al. (2010) propose a broad categorisation of factors found to impact on the motivation of primary care professionals (PCPs). They are: internal factors, e.g. goals, values, expectations, perception of ability to perform required tasks; organisational factors, e.g. adequacy of resources, relationships with colleagues, feedback and support, distribution of workload and rewards, scrutiny, organisational culture; community factors, e.g. expectations of patients, PCPs’ expectations of relationships with patient community; professional factors, e.g. professional status/reputation and how these fit with incentivised activities; and wider health system factors, e.g. impact of system-level reforms on organisational goals/incentives, how reforms fit with PCPs’ goals/values.

E.6.2. Embedding innovation in practice requires attention to organisational values and ‘fit’

Grol and Wensing (2004) hypothesise that when it comes to change in professional behaviour that supports the adoption of innovation, this occurs in five phases, each of which consists of two steps. These are:

- **Orientation**: promote awareness of innovation; stimulate interest in innovation.
- **Insight**: create understanding; individuals develop insight into their own practices.
- **Acceptance**: develop positive attitude to change; create intention/decision to change.
- **Change**: try out change in practice; confirm value of change.
- **Maintenance**: integrate new practice into routines; embed new practice in organisation.
Regarding the final point – embedding new practices – Fitzgerald and Buchanan (2007) argue that new practices are more compelling when they are ‘advantageous, compatible, understandable, observable, trialable, and adaptable’ (cf. Rogers 1995, 35, in Fitzgerald & Buchanan 2007, 229), and a few of these points resonate more broadly in wider literature. For compatibility, being able to integrate new programmes or interventions into existing programmes and services (e.g. training, allocating existing staff to the programme), policies, and collaboration among stakeholders were also found to be crucial for sustainability (Goodson et al. 2001; Wiltsey Stirman et al. 2012). Services that are not embedded may be seen as supplementary and are more likely to be decommissioned, and innovation is often viewed as a luxury rather than as a day-to-day improvement activity (Castle-Clarke, Edwards & Buckingham 2017; The Policy Institute at King’s College London 2018; Martin et al. 2012). Evashwick and Ory (2003) found that pilot projects which ‘matured’ into becoming a core programme, and thus accessed core support, were more likely to be sustained.

So how can we use these insights in practice? A number of studies have highlighted organisational fit (i.e. the degree to which the innovation is compatible with existing norms and practices) as a crucial factor in the sustainability of innovations (Blasinsky, Goldman & Unützer 2006; Goodson et al. 2001; Jacobs 2002; O’Loughlin et al. 1998; Stange et al. 2003; Stetler et al. 2009; Tibbits et al. 2010). This is not merely a matter of tailoring the innovation to the context, but may require adaptation of the context. In order to increase organisational fit, Webster (n.d.) postulates that innovations may have to be accompanied by administrative innovation or changes. The author states that innovations are not simply adopted; instead, they have to be ‘dynamically and creatively worked into’ their context by professionals.

In order to motivate individuals within organisations to support and cooperate with a change effort, Kotter (1995) argues that there is a need to start with communication to the organisation about the relevant issues and problems to create a sense of urgency – especially with regard to crises, potential crises or timely opportunities. Kotter (1995) also argued that during the change effort, it is important to create (potentially manufacture) short-term wins that can be celebrated in order to maintain momentum for the transformation process. This could help to keep the urgency levels up, and could help the change team gain credibility and tackle even larger problems.

In addition, Fitzgerald and Buchanan (2007) found that in order for new practices to be accepted, changes to policies and practices may be necessary. Where new practices required change from clinical practitioners (away from traditional or trained behaviours), these were often met with scepticism and resistance, especially when they were viewed as clinically unproven, thinly veiled criticisms of current practice, and potential threats to professional boundaries and autonomy. Sustainability of these new practices was aided by changes in policies and practices that contributed to staff continuity and security (Fitzgerald & Buchanan 2007).
E.7. Information and evidence

E.7.1. The quality of evidence and trust in it is positively associated with the adoption and sustainability of innovations

The literature highlights several ways in which the characteristics of evidence and information related to an innovation can influence its adoption/non-adoption, including: the strength and quality of the evidence, the source of the evidence, the presence of observable improvements, the evidence around testing of the innovation, and the ability to evaluate and monitor the innovation in the long term.

When it comes to supporting innovation in the health system, the quality of evidence is positively associated with adoption (Albury et al. 2018; Collins 2018; Grol & Wensing 2004; Wisdom et al. 2014); for example, quantitative evidence is needed to achieve National Institute for Health and Care Excellence (NICE) approval or NIHR funding (Albury et al. 2018) – although Fitzgerald and Buchanan (2007) note that for the sustainability of new working practices, the nature and credibility of the information source can be as important as the quality of the evidence. Different sources matter more to different actors – clinicians are less interested in NICE evidence than commissioners or industry representatives (Ulucanlar et al. 2013) and adoption is more likely where decision makers receive information from a health-related authoritative source (Scheirer 1990). For example, NIHR prioritises funding of randomised controlled trials (RCTs), and high-quality publications are considered to be key in academia, which results in health professionals holding this type of evidence in higher esteem (Castle-Clarke, Edwards & Buckingham 2017). In addition, different NHS organisations can follow differing approaches to what they deem to be a good quality evidence base (Collins 2018), which makes it difficult for innovators to know what evidence they should be collecting. However, it is often hard to gauge the full impact of an innovation on a whole system during an RCT and it can be easier to collect evidence of impact within a local system instead (Castle-Clarke, Edwards & Buckingham 2017; Collins 2018). It has been argued in the literature that evidence for an innovation should go beyond quantitative RCTs, and include interdisciplinary studies to assess the relationship between behaviour and the health system, anecdotal evidence and qualitative evidence; evidence should balance both statistics and stories (Albury et al. 2018; Greenhalgh et al. 2017).

Economic analyses are also an important source of information when developing a business case for an innovation. The literature highlights some limitations, however. These include a lack of information on input costs, making large assumptions about particular attributions, using evidence collected from a limited number of sources and using evidence from other countries (Cox et al. 2018).

It is worth bearing in mind that the current knowledge exchange and knowledge management landscape on innovation is characterised by a plurality of efforts. There is a wealth of information and evidence on innovation available in the health system, but the sources are fragmented and the content often lacks appropriate communication and targeting. Indeed, Hwang and Christensen (2008) argue that in a fragmented healthcare system, in particular, interoperable health information technology is vital for coordination, coherence and continuity of care.

Webster (n.d.) argues that knowledge of innovation and the ability or capacity to capture innovation by third parties is crucial, but not always present. The author points out that innovation knowledge may
occur in a strategic process (citing Greenhalgh et al. 2004) or may be more ad hoc. In both cases, central support and consolidation of knowledge and evidence will be necessary at some point. NHS England’s Test Beds are an example of a planned intervention/central support, with information and evidence brought together to try and support the uptake of innovations.

E.7.2. The nature of evidence can influence the adoption of innovations

Evaluation and measurement of outcomes is positively associated with fidelity and sustainability of implementation (Ruch-Ross et al. 2008; Savaya, Elsworth & Rogers 2009; Swain et al. 2010; Wisdom et al. 2014). Several authors suggest that evidence of efficacy of an innovation is important in relation to its adoption and sustainability, with rigorous evaluation data associated with sustained service provision (Blasinsky, Goldman & Unützer 2006; Evashwick & Ory 2003; Ruch-Ross et al. 2008). For instance, Kotter (1995) notes that in order to normalise new behaviours and values, it is important to show people how the new approaches, behaviours and attitudes are linked to improved performance. Evashwick and Ory (2003) found that evidence and data (e.g. outcomes and process evaluation measures of effectiveness) were important for securing external recognition and further funding, and therefore ensuring sustainability. Blasinsky et al. (2006) indicate that the most important factor for the sustainability of a new project is its documented success in improving client outcomes.

Turner et al. (2017) conducted a systematic review of 24 studies on the use of evidence in decision making in relation to the introduction of innovations and found that evidence use was influenced by multiple processes, at multiple levels (professional, organisational and local system level), and by interactions across these levels:

- **Professional level**: preferences for evidence, professional interests and power dynamics.
- **Organisational level**: organisational roles, organisational facilitators, organisational barriers and organisational politics.
- **Local system level**: external pressures, pan-regional organisations and widening stakeholder involvement.

At the professional level, preferences for evidence use as well as perceptions of what kind of evidence is sufficient and whether it is or is not of good quality vary by professional group and health service setting. For example, across the studies reviewed it has been found that commissioners draw on a range of evidence, including non-traditional sources such as patient stories, and tend to prioritise local need for innovation over research evidence. Nurses in the acute sector combine practical knowledge with scientific knowledge, while medical professionals in the same setting rely more heavily on scientific knowledge. In the primary care setting, general practitioners (GPs) did not give the same weight to scientific knowledge as they balance findings from research studies against their knowledge of patient need. Turner et al. (2017) note that the development and adoption of innovation as well as individuals’ perception of what evidence is sufficient is associated with professional interests. For example, studies have found that doctors and managers push innovations responding to their need, even though they lack access to supporting data. Power dynamics were also found to influence the use of evidence, with studies finding that primary care managers tend to place scientific knowledge over GPs practical experience, while a study of committee decision making found that clinicians with powerful personalities were able to wield influence.
At the organisational level, Turner et al. (2017) note that organisational roles, organisational facilitators (e.g. strong leadership), organisational barriers (e.g. lack of time and resources) as well as organisational politics (e.g. alignment of innovations with organisational needs) may have an impact on evidence use and innovation uptake (see Section E.5 for more details on Turner et al.’s (2017) findings relating to the organisational level and leadership).

At the local system level, Turner et al. (2017) found a few factors impacting on the evidence use in decision-making processes: external pressures such as system restructuring; targets set by policy or budgetary constraints (see Section E.10 for more details); pan-regional organisations (see Section E.8 for Turner et al.’s (2017) insights on the impact of relationships and networks); and widening stakeholder involvement in decision making (see Section E.5 for more information on this factor).

Adoption is less likely where clinicians do not perceive problems with current practice or a clear improvement through an innovation (Karsh, Beasley & Hagenauer 2004; Wisdom et al. 2014). Fitzgerald and Buchanan (2007) found that sceptics can be won over if they understand the resultant benefits of change (which in this case was healthcare modernisation). However, support from sceptics is fragile and may require constant attention and reinforcement.

In cases where it is difficult to prove cost-effectiveness, evidence plays a less important role (e.g. in genetics services because of their long-term, preventative function, as well as their small-scale nature, with low throughput and lack of managerial, accountancy or evaluation capacity) (Martin et al. 2012). In these cases, the ability to try out and test an innovation in practice is positively associated with adoption (Wisdom et al. 2014). Though the argument of greater evidence being linked to sustainability makes intuitive sense, it is worth noting that one review (Wiltsey Stirman et al. 2012) found that evidence of benefits was linked to sustainability in only nine of 66 studies reviewed. Given the evidence summarised above, however, it does seem that the greater the evidence and information provided, the more likely it is that an innovation will be sustainable in practice.

Also important is the information provided to innovators regarding what evidence they need to be collecting; the route into the NHS market is often unclear for innovators (Castle-Clarke, Edwards & Buckingham 2017). There is a difference between how innovators view the role of evidence and how this is viewed by those working in the health system (Castle-Clarke, Edwards & Buckingham 2017). For example, developers may believe that NICE approval for their innovation is enough for widespread adoption, but this may not be the case (Castle-Clarke, Edwards & Buckingham 2017). Clinicians and other health professionals need to ensure they clearly articulate their and their organisations needs to innovators so they are able to fill a pre-existing gap (Albury et al. 2018).

E.8. Relationships and networks

E.8.1. Innovation is a cross-disciplinary, cross-profession and cross-sectoral phenomenon

The value created by the innovation landscape is in part determined by diverse initiatives, relationships and networks within and between regions. This is a prominent feature in both the innovation literature more widely, and in relation to the healthcare system in particular. Indeed few organisational innovations
are so simple that they can be introduced without affecting the practice of multiple professional groups (Gollop & Ketley 2007; Greenhalgh et al. 2004; Nancarrow & Borthwick 2005). Consequently, tying into networks that cross disciplinary, clinical, professional and organisational boundaries can be hugely influential in introducing and sustaining innovation (Bisset & Potvin 2007; Ferlie et al. 2005; Jones 2007; Martin, Currie & Finn 2009; Scheirer 1990). However, this can be difficult due to the increased silo working of the NHS (Castle-Clarke, Edwards & Buckingham 2017). The types of networks that are most beneficial for an innovation often vary across the pathway. For example, at early development stages personal and professional networks are often most important in connecting innovators to potential buyers (Albury et al. 2018). Various commentators note the importance of inter-professional and intra-professional networks for introducing, sustaining and spreading innovation (Berwick 2003; Ferlie et al. 2005; Martin, Currie & Finn 2009). Webster (n.d.) suggests that innovation spread needs to be considered as patterns of overlapping networks – ideas take root, are shared across a network and translated/adjusted to fit local contexts. Importantly, these networks can and should take place across, between and within organisations and institutions. Castle-Clarke et al. (2017) highlight that industry innovators could focus on growing the whole innovation market, rather than prioritising their own market share. The authors also note that SMEs could focus on the smaller contracts often offered by the NHS, as they are unable to develop and implement very large technologies across NHS systems (Castle-Clarke, Edwards & Buckingham 2017).

At the organisational level, the literature identifies various determining features of relationships between organisations involved in innovation and what makes the networks successful. These include:

- **Permeability**: Ease of movement and exchange between different institutions (e.g. universities and industry) facilitates exchange of knowledge – examples of permeability include ‘Professors of Practice’, whose dual role between a university and a private enterprise can help attract venture capital and the expertise required for commercialisation (Etzkowitz 2012).
- **Diversity/number of interacting units**: Collaborative networks involving innovation developers, consultants, professional associations and potential users are positively associated with pre-adoption phases of innovation (Wisdom et al. 2014).
- **Enterprising attitudes**: Support for entrepreneurship within universities (e.g. professional technology transfer units) is positively associated with commercialisation and adoption (Cooke 2001). Conversely, Lawton-Smith et al. (2013) find that potential biotechnology clusters of academic and biotech excellence can be held back by universities’ lack of productive engagement with private enterprise.

In addition, there is a stream of literature that conceptualises organisational networks around the idea of ‘complex adaptive systems’ (Begun, Zimmerman & Dooley 2003; Plsek 2003). According to Begun et al. (2003), complex adaptive systems have four features. They are: (1) dynamic – where connections among agents and the influence of external forces mean constant change; (2) entangled – through interactions, actors in complex adaptive systems shape each other, e.g. through feedback loops; (3) emergent – where communication within networks spreads norms and self-ordering structures; and (4) robust – having the ability to adapt themselves in response to feedback and therefore resilient to external shocks.
Albury et al. (2018) highlight how tapping into existing networks may be more effective than establishing new ones. As successful innovation often relies on early face-to-face interactions with influential stakeholders, accessing a pre-existing network of these individuals can allow for a wider reach and wider audience to drive early development and adoption (Albury et al. 2018). Similarly, in their systematic review, Turner et al. (2017) suggest that a network’s close relationship to organisations as well as strong embeddedness at the local level can have an impact on local decision making and innovation uptake.

E.8.2. Networks can, and should, be both formal and informal in nature and diverse in their make-up

It is not just the presence of cross-boundary networks that play a role in innovation, but the way they are composed and the nature of the interactions within them are important as well. Evashwick and Ory (2003), in their analysis of 20 programmes for health and social services for older adults, found that networks of formal (e.g. with funders and partners) and informal relationships (e.g. community partners serving on advisory boards, sharing in decision making, sharing resources) could be significant for the sustainability of innovations, in particular when all partners and organisations involved are committed to the same goal and share a vision.

Evashwick and Ory (2003) also suggest that it is important to involve community stakeholders, for instance through inclusion in an advisory committee. Martin et al. (2012) found that when Innovation Leads did not have sufficient influence, extensive networks of clinical and managerial ‘Champions’ could aid sustainability despite challenging contexts. Without such networks, it was difficult to make a strong case for sustainability (Martin et al. 2012). In an extension of the original study comparing four sites, Martin et al. (2017) found that sustainability can be achieved by developing cordial, mutually beneficial relationships outside the organisation. Indeed, Addicott et al. (2006) note that a wider context that does not value horizontal networks as a way of managing change may undermine sustainability. Martin et al. (2017) suggest that attempts to hire or create blended hybrid staff to manage some aspects of the context (e.g. the centrality of professional power and/or the need to sell services in the market) are likely to be ‘forlorn or counterproductive’ (Martin et al. 2017, 121).

This is similar to findings from the network analysis literature on the role of ‘strong’ and ‘weak’ ties. The importance of weak/strong ties depends on the nature of the network, its purpose, the nature of the information exchanged and the nature of the innovation undertaken within the network (Granovetter 1973). Strong ties are considered to be important for the exchange of tacit knowledge, which is thought to require repeated face-to-face interaction and considerable trust between nodes (which is built up through repeated face-to-face interaction). However, the number of strong ties in any network will always be limited by the fact that maintaining them is resource intensive. Weak ties, on the other hand, are excellent for diffusing discrete pieces of knowledge that are often codified in nature. Decoding this information (making it into ‘knowledge’) does not require frequent face-to-face interaction in the way that the exchange of tacit knowledge does. Weak ties are lower maintenance. Very complex innovations, in which there is a great deal of interaction between components, are alleged to require more tacit than codified knowledge, and therefore require more ties that are strong (Granovetter 1973).

Provan and Milward's (1995) study of inter-organisational networks of mental health delivery in four US cities found that a stable system (i.e. with established, long-term directors with long-standing relationships
with one another) was associated with network effectiveness as assessed by clients and their families. In cases involving system restructuring, there was considerable confusion, which impeded effective integration and coordination. However, the authors note that stability alone was not enough for effectiveness (Provan & Milward 1995). Their findings led them to conclude that ‘networks integrated and coordinated centrally, through a single core agency, are likely to be more effective than dense, cohesive networks integrated in a decentralized way among the organizational providers that make up the system’ (Provan & Milward 1995, 24). This may have implications for how we think about the structure of networks and organisations in the NHS.

Albury et al. (2018) suggest that NHS relationships with the private and third sector should be slightly different as they work outside the constraints of the NHS. Private companies also often have experience of scaling up innovations and have a large network of various stakeholders to contact to support spread (Albury et al. 2018). This was partly the aim of the NHS Innovation Accelerator, which aimed to connect innovators to build connections with useful stakeholders (Cox et al. 2018). Some initiatives have already addressed this, such as initiatives established responding to the Accelerated Access Review (2016) and the creation of Academic Health Science Networks (AHSNs); however, it is important to consider issues such as risk management and intellectual property (Albury et al. 2018).

E.9. Engaging and involving patients and the public in innovation

There is growing recognition that a sustainable and effective innovating health system needs to involve patients and the public throughout the innovation pathway, including in design, testing, feedback and advocacy (Cox et al. 2018) – but to do so in a relevant way that benefits the development and adoption of innovations and that is meaningful for patients themselves (Facey et al. 2010; Lehoux et al. 2009; Magnusson, Matthing & Kristensson 2003). This does not mean an insistence on patient and public involvement and engagement in every single innovation project or aspect of it, but rather a dedication to ensuring that areas where patients and the public could add value are explored and identified, and engaging them accordingly. For example, although providing patients with data from innovations can provide them with useful and helpful information to empower them in their care, these data could also be misinterpreted, leading to unnecessary emotional harm (Greenhalgh et al. 2017).

The literature identifies a number of ways in which public/patient involvement can affect adoption/non-adoption of innovations. These extend beyond the health innovation space to the wider literature. Teece (1992) cites research conducted by von Hippel (1977, 1988) in the US, who found that in some industries, products that were deemed by users to offer a significant improvement were in fact often conceived and developed by users, not manufacturers. Teece (1992) highlights that it is thus important for manufacturers to be aware of user innovation and its potential value, and that the relationship between users and manufacturers may be symbiotic and could be influenced by social and physical proximity.

Involving patients in research and innovation is considered to be meaningful as patients and members of the public have extensive expertise in specific areas, despite not having ‘formal’ education or training in these areas. Several Science and Technology Studies scholars and medical sociologists have highlighted that drawing a boundary between ‘lay’ patients/people and experts (e.g. healthcare professionals) is often not possible, and patients are often more experienced and have more knowledge about a particular health
aspect or disease than healthcare professionals (see, e.g., Epstein 1995; Prior 2003; Rabeharisoa & Callon 2004; Wynne 1992).

More recent studies have taken this point even further and current thinking posits that we are entering a third frame of innovation studies, where there is much more of an emphasis on the co-production of innovation with stakeholders and research users. The challenge is to make sure that research links to innovation in such a way that the underlying dynamics associated with social and technical systems that perpetuate social, economic and environmental challenges are addressed (Schot & Steinmueller 2017). This means engagement of a wider range of stakeholders across all stages of research and innovation pathways and, potentially, reorienting health research and innovation systems to revisit the iterative relationships between supply and demand. AHSNs are one such move in that direction. They seek to align education research, innovation and service delivery and are characterised by more variability and experimentation than other NIHR initiatives. They are concerned with creating the structural, behavioural and network conditions to support progression of research and innovation across the entire pathway, and recognise the importance of links between regions and ‘the centre’ and of links between health, voluntary and social care actors. They try to inform and match supply and demand in more stakeholder-inclusive ways.

For health innovation specifically, there is also evidence that more inclusive engagement can help to support successful adoption and diffusion of new ways of doing things. Grol and Wensing (2004) found that convincing patients of the value of an innovation shapes patient expectations of care, which in turn shapes healthcare professionals’ attitudes towards adopting the innovation. Engagement can also help to ‘legitimise’ decisions. Facey et al. (2010) note that public/patient involvement in health technology assessment (HTA) processes can enhance the ‘social legitimacy’ of adopted innovations; while managerial groups are found to instrumentalise patient/public opinion to legitimise their decisions (Harrison & Mort 1998). Finally, through a comparative case study, Martin et al. (2012) found that patient voice might be a method of sustaining service innovations even in the face of lack of funding – specifically, by getting patients to act as advocates for the innovation (through demonstrating to patients the impact and effectiveness of the innovation).

However, the literature also identifies factors that limit the extent to which decision making in health innovation is influenced by patient care. It can be difficult to identify the right group of users or patients to include in the innovation pathway, and choosing the ‘wrong’ individuals could act as a barrier (Cox et al. 2018). Callaghan and Wistow (2006) argue that NHS decision making values scientific rationalism, to the exclusion/marginalisation of patient experience as an outcome measure. This can lead to managers questioning the legitimacy of patient/public views, and the representativeness of those involved (Callaghan & Wistow 2006; Harrison & Mort 1998).

Facey et al. (2010) argue that a more productive form of patient/public involvement can be achieved by making engagement more systematic, in order to produce a legitimate counterweight to medical/bureaucratic predominance. However, this must be counterbalanced with an insistence on patient and public involvement and engagement (PPIE) on all fronts and in all projects, as doing otherwise risks disenfranchising patients and the public and can lead to tokenism in practice.
E.10. Funding and commissioning of innovation

E.10.1. Appropriate levels of funding are required to sustain innovation

The funding landscape for innovation is characterised by diverse sources of funding from both national funding pots and regional and organisational resources. While the need for funding of innovation is not contentious (Albury et al. 2018; Blasinsky, Goldman & Unützer 2006; Evashwick & Ory 2003; Goodson et al. 2001; O’Loughlin et al. 1998; Turner et al. 2017), the need for more focus on funding continuity across the innovation pathway, and for both development and uptake of innovations, is critical for sustainability. Goodson et al. (2001) found that it is important for innovations funded by grants to plan for the future and prepare for the termination of the initial funding. This is supported by Evashwick and Ory (2003), who found that financial self-sufficiency (e.g. converting from initial grants to permanent funding) was essential to sustainability and stability. This was also reported by Collins (2018), who comment that short, time-limited funding means innovators need to simultaneously develop their innovation and create a sustainable business plan after the funding has ended, which can be challenging.

However, as a note of caution, Martin et al. (2012) found that short-term funding or fixed levels of income (e.g. block grants) offered medium-term sustainability, but in the longer term, such agreements could ‘ultimately result in stagnations, as opportunities to expand and respond flexibly to new needs were squandered’ (Martin et al. 2012, 196). In addition, ‘leapfrogging’ between smaller funds can act as a barrier by causing delays in the development and spread of innovations (Collins 2018).

Making sustainable funding more difficult to achieve is the fact that the costs of innovations are often underestimated. The lack of available data makes estimation of costs highly complex and difficult, and actual costs are often higher than predicted (Greenhalgh et al. 2017). In addition, continual costs related to maintenance and further development are often not included in cost estimations (Greenhalgh et al. 2017). Actual or perceived availability and continuity of funding is found to be an important determinant of sustainability, and the lack of funding for adoption can be an important barrier (Aitaoto, Tsark & Braun 2009; Massatti et al. 2008; Scheirer 1990; Swain et al. 2010) – and indeed, if funding resources are not needed, innovations may be more likely to be adopted. For instance, O’Loughlin et al. (1998) found that interventions that did not require the use of paid staff were four times more likely to be sustained.

In the NHS specifically, Liddell et al. (2008) and Castle-Clarke et al. (2017) identify various barriers to uptake of innovation in relation to funding and commissioning, including: scarce financial resources; focus on innovations that cost the least rather than those that provide most value; focus on short-term returns preventing uptake of technologies with longer-term payback; multiple points of sale preventing economies of scale and making technologies more expensive for local NHS buyers; extended and complex procurement processes making the NHS unattractive to vendors; clinicians lacking guidance on making a business case for technologies to commissioners; and healthcare budgets being siloed in a way that results in some areas of the health system not wishing to invest money that would result in another area benefiting. Castle-Clarke et al. (2017) also highlight that the budget spent on research on and innovation development, and implementation and spread activities is disproportionate, noting that the NHS spends significantly more on the former, while adoption and spread only receives a small fraction of the spent budget.
Alongside these barriers, though, sit many opportunities for funding and commissioning to help support innovation uptake and diffusion. Malby and Crilly (2016) highlight a potentially wide-ranging role for finance and commissioning functions within the NHS, including:

- **Providing resources** (time, processes, people, funding) for reflection and testing of ideas.
- **Providing data/intelligence** highlighting potential for change and new ways of working.
- **Enabling adaptability** within the NHS by considering long- as well as short-term needs.
- Developing more productive relationships with clinical professions – establishing common goals to promote risk-sharing between commissioners and providers.
- **Identifying Champions** of innovation who can highlight successes and motivate innovation.
- Ensuring a focus on generating and demonstrating value from innovations.

While Castle-Clarke et al. (2017) argue that budgets for research and development are significantly higher than for adoption, Liddell et al. (2008) also highlight barriers specific to innovation development, noting that funding for health innovation depends on its perceived potential to add value to the NHS. Complex NHS selling processes are also seen as potential barriers to innovators developing products or services able to address NHS needs. In addition, authors have highlighted that small and medium-sized enterprises (SMEs) often struggle with finding investors for early-stage innovations (Flowerday 2007, quoted in Liddell et al. 2008).

**E.10.2. Public procurement initiatives can help overcome funding bottlenecks, but must be strategic and long-term in nature**

Policy initiatives and public procurement can influence the adoption and spread of innovation. As highlighted in several studies reviewed by Turner et al. (2017), external factors and pressures such as restructuring of the system, targets set by policies, and in particular the available funding and support are key. Public procurement can thus be a major driver of innovation, but it must be approached strategically, for instance with support for existing organisational frameworks, building capabilities needed for procurement and supporting existing capabilities, and clear communication of health system needs and provide incentives (Edler & Yeow 2016; Georghiou et al. 2014). However, the complex commissioning environment in England at the moment may act as a barrier for innovators wishing to enter the NHS market (Cox et al. 2018). In addition, delays in commissioning and initiatives subsequently delay entry of innovations into the health system, such as that seen with the NHS Innovation and Technology Tariff (ITT) announcements (Cox et al. 2018).

Glasby (2012) cites Knapp, Hardy and Forder’s (2001) statement that in order for health and social care markets to function effectively, commissioners need to be able to write service specifications and contracts to avoid provider dominance. Christensen et al. (2000) state that the resistance to low-cost alternatives or innovations in the health economy (e.g. from incumbent companies providing services or equipment, staff trained to use that service/equipment) is understandable but is not in the best interest of the industry or of the patients it serves. Indeed, commissioners have an opportunity to change this (Christensen, Bohmer & Kenagy 2000). Glasby (2012) cites a review of the evidence on healthcare commissioning, which found that ‘given a sustained opportunity to innovate, highly determined managers and clinicians are able to use
their commissioning role to change long-standing practices in the local health system’ (Smith et al. 2004, 2).

In their survey of 800 public sector suppliers in the UK, Georghiou et al. (2014) found that public procurement leads to innovation, and, after market changes, was the second most important source for innovation. However, a major obstacle related to public procurement was the lack of signalling of readiness and willingness to buy an innovation. Suppliers surveyed reported that another barrier is that public procurement is organised and based on price rather than quality. They felt that public procurement can be too prescriptive and not open to unsolicited ideas – both of which hinder innovation. In this regard, long-lasting buyer–supplier relationships still do not support innovation activity; instead, it is fostered by interaction and communication of need. The study also found that the procurement practices that suppliers valued most (e.g. innovation requirements in tenders, early interaction with procurers, outcome-based specifications, advanced communication of needs) were some of the ones least frequently used by buyers.

The authors concluded that innovation procurement policies could be usefully reviewed and described four areas in which policy interventions for the public procurement of innovation could focus:

- Supporting organisational frameworks so that there is a broad awareness and commitment of public organisations to innovation procurement, alongside supporting public employees to have the capability to execute an innovation procurement strategy.
- Building capabilities needed for procurement processes/procurement expertise/procurement strategies specifically related to innovation.
- Communicating needs for innovation from buyers to suppliers.
- Incentivising innovation and/or providing a means to offset risks (Georghiou et al. 2014; The Policy Institute at King’s College London 2018).

In their study on the role of intermediation in public procurement of innovation, Edler and Yeow (2016) highlight the specific functions of intermediation in different procurement situations and its corresponding roles. The authors’ review – referring to Uyarra et al. (2014) – found that problems in the actual conduct of public procurement of innovation may be due to ‘a lack of organisational capabilities of all kinds (e.g. technological, managerial), counter-productive incentives and organisational structures and a lack of transparency and appropriate interaction between demand and supply’ (Edler & Yeow 2016, 415). Examples of successful public procurement of innovation emphasised the ability to link up complementary skills and interest within the organisation and with external actors. Specifically, learning and adaptation costs, and thus the nature of the concrete intermediation needs, are strongly influenced by two conditions: (1) the degree of internal organisational disruption and (2) the need to specify internal needs and interact with the market to find new, tailored solutions. On this basis, the authors identify four intermediation roles. Firstly, intermediaries can actually perform the procurement process, partly or entirely. Secondly, intermediaries as brokers provide linkages as the classic ‘middleman’ (Howells 2006) between the buyer and the (potential) suppliers and – often neglected – between organisational units within the organisation. Thirdly, the intermediary as content expert would not link actors, but provide the necessary intelligence especially for the buying organisation to define needs, to assess options, and to inform their business case and the internal and external interactions. Fourthly, the intermediary can be a
trainer, empowering the organisation that is supported to build up the process capacities that subsequently allow the buying organisation to learn and to link more independently (Edler & Yeow 2016).

Given all of this, one set of solutions is proposed by Georghiou et al. (2014). They argue that as the NHS in England uses intermediary organisations to establish demonstration procurement procedures (such as the National Technical Assistance Centre (NTAC), which is no longer operational) or quality certificates and business cases (NICE), the NHS is in a position to offset risks and transaction costs for NHS Trusts and hospitals. They offer the Small Business Research Initiative (SBRI) as an example of pre-commercial procurement of innovation to develop solutions, as a way of addressing the barrier of lack of signalling of needs between buyers and suppliers. In addition, the UK has Innovation Platforms that bring buyers and suppliers together – again to address the barrier of lack of signalling of needs. Moreover, the UK’s Forward Commitment Procurement initiative allows buyers to make the market aware of needs and requirements, and to commit to buying solutions that meet these needs at a price commensurate with their benefits. More recently, NHS England has introduced the ITT and the Innovation and Technology Payment, which may help overcome procurement-related issues (Cox et al. 2018; Seres 2018).
Annex F. Impact metrics – capacity-building indicators

This Annex provides a supplementary set of indicators around capacity-building that could be considered alongside the impact indicators discussed in Chapter 11 of the main report, and based on research conducted by the team throughout the study (2015 – early 2019). Indicators of capacity for innovating in the healthcare innovation system capture the existing capacity in the system to engage with innovation. This capacity can be both a pre-requisite for innovation activity (i.e. it will support successful uptake) as well as an indirect consequence of it (i.e. with capacity-building resulting from the act of developing and adopting innovations). Capacity-building relates to the diverse drivers of innovation that we have identified through our study (including skills, leadership, information and evidence, funding and commissioning, motivations and accountabilities, patient and public involvement and engagement (PPIE), and relationships and networks), as well as wider issues relating to governance, the regulatory environment and social, organisational and physical infrastructures.

The capacity to innovate refers to the capability and potential of healthcare organisations to generate innovation as well as their organisational readiness to adopt new innovation. The varying contexts and nature of health organisations and the wider health system are important influencers of innovation adoption (Albury et al. 2018). A number of studies have sought to examine and identify organisational determinants of innovation (Fleuren, Wiefferink & Paulussen 2004; Greenhalgh et al. 2004; Robert et al. 2009; Rye & Kimberly 2007; Turner et al. 2017). This has led to some consensus around these organisational determinants (Djellal & Gallouj 2007; Fitzgerald et al. 2002; Greenhalgh et al. 2004; Länsisalmi et al. 2006; Turner et al. 2017), which include factors such as structures and governance arrangements (Williams 2011), resource levels (Bate, Mendel & Robert 2008; Turner et al. 2017) and organisational culture (Dopson & Fitzgerald 2005; Dopson et al. 2002; Turner et al. 2017).

There is growing recognition of the need to build systems-level capacity for health innovation activities to be conducted, translated, absorbed and assimilated into wider impacts. The capacity to innovate in a health system is needed to support innovation initiatives, and can result from engagement with them, as a direct or indirect consequence. Indicators and metrics of innovation capacity-building will span areas related to human resource capacity (e.g. skills and leadership), physical and information infrastructure capacity, management and governance capacity for innovation, and capacity-building around engaging citizens and patients in innovation agendas. Illustrative types of impact and associated metrics in these areas are summarised in Table F.1.
### Table F.1: Types of impact and associated metrics for system readiness and capability for innovation

<table>
<thead>
<tr>
<th>Type of impact</th>
<th>Associated metrics (qualitative and quantitative)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human resource capacity (people, skills and programmes) for innovation</strong></td>
<td></td>
</tr>
<tr>
<td>Improved leadership capacity for innovation</td>
<td>Senior leadership attitudes to innovation activities and their prioritisation in organisational strategies (e.g. existence of formal innovation policies, other incentives for innovation such as buy-out of clinician time)</td>
</tr>
<tr>
<td></td>
<td>Nature of formal leadership roles for innovation in the system across different seniority levels (e.g. Innovation Leads in Trusts, Directors of Innovation and Improvement, Innovation Scouts, Innovation Champions)</td>
</tr>
<tr>
<td></td>
<td>Number of new positions with an innovation remit</td>
</tr>
<tr>
<td></td>
<td>Number of new positions</td>
</tr>
<tr>
<td></td>
<td>Positions have an effect on contributing to a change in uptake of new innovations</td>
</tr>
<tr>
<td><strong>Resources and infrastructure for innovation (physical, information and communication technology (ICT))</strong></td>
<td></td>
</tr>
<tr>
<td>Existence of innovation facilities in the system</td>
<td>Labs, hubs, equipment, spaces for exchanges</td>
</tr>
<tr>
<td>Existence of relevant information and communication infrastructure for innovation in the system</td>
<td>Virtual – digital exchange platforms for communities of innovations</td>
</tr>
<tr>
<td></td>
<td>Real world (e.g. hackathons, networking communities of practice)</td>
</tr>
<tr>
<td>Effects on the establishment of direct funding programmes or institutions spanning the individual, organisational and system levels</td>
<td>Number of new funding programmes for innovation established</td>
</tr>
<tr>
<td></td>
<td>Timespan commitment for funding programme</td>
</tr>
<tr>
<td></td>
<td>Amount of funding committed</td>
</tr>
<tr>
<td></td>
<td>Sources of funding</td>
</tr>
<tr>
<td></td>
<td>Type of innovation-related body established/evolved/improved and how (e.g. a research council, research centre/institute)</td>
</tr>
<tr>
<td>Type of impact</td>
<td>Associated metrics (qualitative and quantitative)</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Governance and management capacity for innovation in the system</td>
<td></td>
</tr>
<tr>
<td>Management and governance of innovation</td>
<td>Existence of organisational innovation policies&lt;br&gt;Alignment of innovation objectives to performance priorities (e.g. organisational performance metrics reflective of innovation)&lt;br&gt;Inclusion of innovation in career development and promotion pathways&lt;br&gt;Development of innovation-related management information</td>
</tr>
<tr>
<td>Incentives and rewards</td>
<td>Buy out of PA time from clinicians to engage with innovation&lt;br&gt;Funding for innovative activities&lt;br&gt;Rewards and recognition</td>
</tr>
<tr>
<td>Effects on the establishment/adaptation of regulatory policies and practices</td>
<td>Types of research and innovation policy affected&lt;br&gt;At regional/national/international level&lt;br&gt;Nature of impact&lt;br&gt;Availability of improved evidence bases (e.g. publications, other types of dissemination)</td>
</tr>
<tr>
<td>Capacity for patient and public involvement and engagement with innovation</td>
<td></td>
</tr>
<tr>
<td>Increased engagement and meaningful involvement of patients and the public</td>
<td>Increased number of innovation fora and boards with active participation&lt;br&gt;Initiatives to involve communities (e.g. those affected by PRNDs) in clinical trials and number of people engaging with innovations at community events&lt;br&gt;Improved coordination of PPIE activities across organisations, charities and disease areas&lt;br&gt;Improved self-reporting of patients and the public playing a meaningful role in the design of innovations&lt;br&gt;Greater number of innovations that reflect patient and public design inputs</td>
</tr>
<tr>
<td>Improved innovation ‘literacy’</td>
<td>Dedicated, tailored and meaningful communication and dissemination campaigns to specific populations&lt;br&gt;Contributions to increased ‘health and innovation literacy’ through public awareness campaigns targeting activities that could impact the uptake of future innovation activities or opportunities, including through increased engagement with affected populations</td>
</tr>
<tr>
<td>Networks and relationships that support the capacity to innovate</td>
<td></td>
</tr>
<tr>
<td>Creation of networks connecting innovation actors across the health system</td>
<td>Types of networks (e.g. research, advocacy, dissemination, funder, etc.)&lt;br&gt;Types of partners&lt;br&gt;Number and diversity of partners</td>
</tr>
<tr>
<td>Effects on international or regional collaboration/knowledge-sharing initiatives</td>
<td>Nature of agreements (type, geographical reach, coverage, duration, etc.)&lt;br&gt;Perceived link between the initiative and improved innovation activities/innovation adoption and diffusion</td>
</tr>
</tbody>
</table>

353
Collecting data across all of these areas would likely require new efforts to standardise and harmonise data at individual, organisational and system levels. For example, human resource capacity-strengthening activities focused on the capacity to identify innovation opportunities, conduct innovation-related activities, disseminate and interpret the evidence for innovation and its potential impact on quality and effectiveness of care, and strengthen the skills base and career pathway for innovation will span efforts including embedding innovations skills in training programmes, institutionalising innovation remits in formal job descriptions and roles, and improved leadership capacity for innovation. Metrics for these types of impact would focus on tracking the number, nature and remit of training programmes, as well as participation and the perceived effects of these programmes. A clear framework would need to be agreed at a national level to track this type of information and learn from it.

Equally, resource and infrastructure capacity-strengthening activities would support individual-, organisational- and system-level capacities to innovate, including physical and information and communication technology (ICT) infrastructure (e.g. surveillance systems investments, clinical trials infrastructure, equipment). Funding for innovation programmes could be easier to quantitatively gain data on, but connecting these indicators to the areas of impact for innovation will need careful qualitative analysis.

Capacity-building at the system level – for example effects on the establishment of networks, dedicated innovation councils, funding bodies, capacity-building within national regulatory authorities, as well as on governance and management of innovation – will likely require more detailed and bespoke data collection mechanisms. Initiatives that enhance opportunities for interaction between clinical staff, patient organisations and policymakers will be important here and tracking these connections and opportunities may require innovative methods of data collection such as social network analysis or similar tools. Capacity-building targeted at patients and the public through innovation literacy and awareness-raising campaigns, or patient recruitment-focused public engagement efforts, will likewise need to build in monitoring and evaluation efforts to collect data in real time, with the capacity to follow up after activities to gauge longer-term effects.
G.1. Summary

The quantitative analysis of population-level factors associated with the uptake of innovative medicines was undertaken by researchers at the University of Manchester. RAND Europe researchers were not involved in this work stream. Insights were considered together with the results of the other work streams and are discussed in Chapter 12 of the main report.

Aims

- Researchers at the University of Manchester sought to identify whether variation in uptake of innovative medicines is determined by population characteristics or clinical commissioning group (CCG) attributes.

Design and implementation

- The study team analysed the determinants of uptake for individual and grouped medicines as measured in the July 2017 release of the NHS Innovation Scorecard, using four models for identifying variations in partaking in innovative prescribing and in the uptake of individual and grouped medicines.
- The associations between the following CCG characteristics and innovation uptake were examined: CCG quality, net expenditure, financial performance, number of employees and CCG assurance ratings (CCG assurance ratings were taken from the NHS England CCG Assurance Framework: ‘Assured’, which is the best rating, ‘Assured with support’, and ‘Not assured, intervention required’, which is the worst rating).

Key findings

- We found that net expenditure by a CCG, being in the North of England and the average number of employees in a CCG, are all positively related with the probability that a CCG will participate in the prescription of innovative medicines. Deprivation is negatively associated with the probability of participating in innovative prescribing. When examining the levels of prescribing of innovative individual medicines amongst CCGs prescribing these medicines, whilst no factors we examine are related to the raw levels of prescribing, skewness in the raw levels data may mask potential patterns. Taking the log transformation of prescribing levels, we detected higher prescribing levels in CCGs that receive ratings of ‘Assured’ and CCGs with a larger proportion of the population reporting long-standing health conditions. The levels of prescribing are found to be negatively related to the total population size and the number of full-time employees in a CCG, after accounting for other factors. The growth in uptake between the first and last quarter of data cannot be explained by any of the factors considered in our analysis. However, due to data constraints, only 12 of the individual medicines tracked by the Innovation Scorecard could be included in the analysis, and so the results should be interpreted with caution.
- When examining the grouped medicines, we found that the factors associated with prescribing differ across the three grouped medicines. For the acute coronary syndrome medicines, the age composition of the population was found to be associated with a growth in prescribing volumes over time, but not the absolute levels of prescribing. We found that the absolute levels of prescribing of the acute coronary syndrome medicines are positively related to the proportion of a CCG’s population that reports a long-standing health condition, but the growth in prescribing over time is negatively related to the proportion of the population reporting a long-standing health condition at baseline. The net expenditure of a CCG at baseline is positively related to its level of prescribing of acute coronary syndrome medicines, whilst CCGs with a larger number of employees have slightly lower levels of...
prescribing per 100,000 registered patients.

- For the diabetes group medicines, we detected higher prescribing in CCGs with a larger proportion of patients under the age of 18. We also found prescribing volumes per 100,000 registered patients to be negatively related to total net expenditure.
- When examining novel oral anticoagulants (NOACs), we detected lower levels of prescribing in CCGs receiving a rating of ‘Not assured, intervention required’ compared to CCGs receiving a rating of ‘Assured with support’. We also found prescribing levels to be higher for CCGs with a larger proportion of registered patients aged over 65. This is to be expected given the use of NOACs to reduce the risk of stroke and systemic embolism.
- Amongst all three of the grouped medicines we detected significant increasing trends in prescribing volumes, over and above levels that can be explained by the baseline characteristics included in our models. This indicates that the use of these innovative medicines was spreading in the NHS over time.
- The proportion of a CCG’s patients residing in nursing homes was not found to be related to prescribing in any of our models. Our models also indicate that whilst there were differences in innovative prescribing in the North of England, and to a lesser extent the South of England, there was no difference in prescribing between CCGs in the Midlands or the East of England as compared to CCGs in the South of England.

G.2. Introduction

In December 2011 the Department of Health (now the Department of Health and Social Care) set out plans to support the development, adoption and spread of innovation in the NHS through the Innovation, Health and Wealth (IHW) programme (Department of Health 2011). One aim of IHW was to drive implementation of National Institute for Health and Care Excellence (NICE) technology appraisals. Part of the strategy sought to reduce variation in the uptake of products recommended following technology appraisal by publishing information relating to levels of variation and compliance with NICE technology appraisals. This information was produced as an Innovation Scorecard (NHS England n.d.-b).

The level of uptake of new products depends on a range of local health system characteristics. Some of these may be beyond the control of providers, such as population demographics and socio-economic circumstances. Others might include the financial position of health providers and managerial quality. In this work stream, we identified the characteristics that determine adoption and uptake of the innovative medicines tracked by the Innovation Scorecard at Clinical Commissioning Group (CCG) level, examining both individual and grouped medicines.¹

The Innovation Scorecard reports uptake levels of medicines per 100,000 people, but does not adjust these figures for any population characteristics. Variation in uptake may be warranted, for example, if the prevalence of health conditions is higher in some CCGs. Conversely, variation may raise concern about the efficiency and equity of service delivery (Ferguson et al. 2002). Regression analysis can provide a

---

¹ ‘Grouped medicines’ were developed and introduced to the NHS Innovation Scorecard in 2016. Medicines were grouped in order ‘to show the combined use of medicines where: There are a number of medicines as options for treatment of a specific condition; One [Technology Appraisal] covers more than one medicine for the same indication; Two or more [Technology Appraisals] cover the same specific condition’ (NHS Digital 2018, 4).
systematic means of comparing like with like and thus help to distinguish warranted from unwarranted variation.

Through this analysis we sought to identify whether variation in uptake of innovative medicines is determined by population characteristics or CCG attributes.

G.3. Data

G.3.1. Innovation Scorecard

The Innovation Scorecard reports on the use of medicines and medical technologies in the NHS in England that have been positively appraised by NICE since 2012. The Innovation Scorecard is produced on a quarterly basis by NHS Digital on behalf of the Office for Life Sciences (NHS Digital 2017).

We used data from the July 2017 release of the Innovation Scorecard (NHS Digital 2017). This covered a period of eight financial quarters, from quarter 4 of the 2014/2015 financial year to quarter 3 of 2016/2017. The uptake of 111 medicines, five medical technologies and six groups of medicines used to treat major conditions was measured and data were reported at CCG and/or regional level.

Our analysis required CCG-level data on uptake, and so we were not able to analyse all innovations tracked by the Innovation Scorecard. Medical technologies were only reported at regional level, and so have been excluded from this analysis.

We were only able to analyse 54 of the 111 individual medicines tracked by the Innovation Scorecard due to missing data; we could not analyse individual medicines with no reported uptake. Similarly, we were only able to examine three of the grouped medicines, covering acute coronary syndrome, diabetes and novel oral anticoagulants (NOACs). The grouped medicines for hepatitis C and multiple sclerosis (MS) are rarely prescribed and thus were excluded from our analysis due to sample size limitations.

For the individual medicines, levels of uptake are standardised and reported as defined daily dose (DDD), actual daily dose (ADD), milligrams (mg), vials, tablets, units, implants or pens/syringes per 100,000 of the resident population in the CCG. The data are reported per CCG, product and quarter. Given that no zero uptake values were reported in the data and that some CCG/medicine/quarter combinations were missing, we assumed that CCGs with missing data in a particular quarter had zero uptake of that medicine in that period.

For the grouped medicines, the value of prescribing for each disease is the aggregated level across all the relevant medicines in that group. The variable indicates the sum of all DDDs per 100,000 of resident population in CCG for the medicines in each group. The data are reported per CCG, treatment and quarter.

G.3.2. Population and CCG characteristics

We examined the association of the uptake of innovative products with the characteristics of the population served by a CCG and the characteristics of the CCG itself. The relevant population and CCG characteristics were not reported quarterly, and so we examined the association between baseline levels of these characteristics and future uptake. Baseline characteristics relate to either the calendar year 2014 or financial year 2014/2015, depending upon data availability.
Population characteristics

We included information on the age structure of the population served by each CCG, the proportion of the population residing in nursing homes, the proportion of the population with a long-standing health condition, area-level socio-economic deprivation, and indicators for geographical region, rurality and the size of the population served by each CCG.

The age structure of the population served by each CCG was taken from National General Practice Profiles (NGPP) data (Public Health England 2014). This was categorised as: percentage of the population aged under 18 years, percentage of population aged 18 to 64 years, and percentage of the population aged over 65.

Deprivation was measured using the Index of Multiple Deprivation. This is a relative rather than absolute measure of deprivation, comprised of seven domains: income, employment, education, crime, barriers to housing and services, and living environment (Gill 2015). Data used were recorded in 2014/2015. The measure is continuous, with higher values indicating higher levels of deprivation.

There is evidence that the South of England has better health than the Northern regions, with individuals in the north 20 per cent more likely to die early than in the south (Buchan et al. 2017). In order to control for this and other regional disparities, binary variables were included to indicate the region in which a CCG lies, defined as: North of England, Midlands and East of England, or London, with the South of England as the reference category. To further control for geographical differences in access to healthcare, a measure of the proportion of individuals that live in rural areas for each CCG was included in the analysis. Data were taken from the 2011 census (Office for National Statistics et al. 2017).

CCG characteristics

We examined the association between the following CCG characteristics and innovation uptake: CCG quality, net expenditure, financial performance, number of employees and CCG assurance ratings.

CCG quality was proxied using scores from the Quality and Outcomes Framework (QOF), which is a financial incentive programme for all general practitioner (GP) surgeries in England, detailing practice achievement and aiming to reward high-quality care provision (Health & Social Care Information Centre 2015). The data indicated the proportion of the maximum possible QOF points that has been achieved, with higher QOF scores indicating higher quality of care.

The net expenditure of each CCG was measured in £1,000s, and relates to the financial year 2014/2015. Given that we controlled for the size of the population served by the CCG, this captured variations in net expenditure after accounting for population size. Further financial data were collected on financial performance duties (see NHS England n.d.-c). These data captured whether each CCG had met their expenditure targets, where successfully meeting the target required that expenditure does not exceed income. This was included as a binary variable equal to 1 if a CCG had met the target, and zero if they had failed.

From this same dataset we used information on the average number of employees of each CCG. This count included doctors, nurses and administrative staff. A full-time employee was recorded as one staff member and part-time staff were counted depending on average hours worked.
CCG assurance ratings were taken from the NHS England CCG Assurance Framework, which contains six assurance domains reflecting the elements of an effective CCG: quality of service, patient engagement, plans for outcome improvement, robust governance, working in partnership and strong leadership. From these domains a CCG was given one of three ratings: ‘Assured’, ‘Assured with support’ or ‘Not assured, intervention required’. The best rating is ‘Assured’, and the worst rating is ‘Not assured, intervention required’, with NHS England then intervening to prevent risk to patients. We examined the association between innovation uptake and these ratings, where ‘Assured with support’ is the baseline category. The NHS England guidelines from the CCG Assurance Framework (NHS England 2014b) are shown in Table G.1.

### Table G.1: NHS England CCG Assurance Framework categorisation

<table>
<thead>
<tr>
<th>Assured</th>
<th>Assured with support</th>
<th>Not assured, intervention required</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CCG is open and honest regarding key areas of development needs and challenge and provides insight into the root cause of these.</td>
<td>• CCG does not yet understand key challenges, or have an action plan in place to identify root causes, and mitigate challenges and the role of NHS England is to support resolving that challenge.</td>
<td>• CCG does not yet understand key challenges, does not have an action plan, and requires NHS England to intervene.</td>
</tr>
<tr>
<td>• CCG can demonstrate there is a clear action plan in place to mitigate any challenges identified, with measurable outcomes.</td>
<td>• CCG could benefit from additional expertise from relevant organisations/teams.</td>
<td>• CCG will benefit from additional expertise from relevant organisations/teams.</td>
</tr>
<tr>
<td>• CCG actively manages against agreed plans and takes action when timescales are not met to support progress.</td>
<td>• CCG does not manage against plans to ensure improvement trajectories are met.</td>
<td>• CCG does not manage against plans to ensure improvement trajectories are met.</td>
</tr>
<tr>
<td>• Level of risk is being actively managed by CCG.</td>
<td>• Level of risk associated with CCG is higher than could be managed by the CCG acting without an additional support package agreed with NHS England.</td>
<td>• Level of risk associated with CCG, is high and not being managed by the CCG and intervention is required from NHS England.</td>
</tr>
</tbody>
</table>


### G.4. Methods

We analysed the determinants of uptake for individual medicines and for grouped medicines as measured in the July 2017 release of the Innovation Scorecard.

The determinants of whether or not a CCG prescribes an innovative medicine at all may differ from the determinants of the level of prescribing amongst CCGs that have made the decision to prescribe. The analysis of individual medicines examined the determinants of these two decisions separately. Given that many CCGs reported zero uptake of some of the individual medicines, the study team examined uptake in two ways. Firstly, the determinants of the decision to partake in innovative prescribing were analysed using a binary indicator of whether the CCG prescribes any quantity of each innovative medicine.
Secondly, the determinants of the level and speed of uptake of innovative prescribing amongst CCGs prescribing non-zero quantities of each innovative medicine were analysed.

The data on uptake of grouped medicines were richer, and all CCGs report prescribing non-zero quantities of the three grouped medicines we analysed. We therefore examined the determinants of the level of uptake of innovative group medicines.

G.4.1. Individual medicines

**Model 1: Determinants of the decision to partake in innovative prescribing**

As the depended variable is binary, we used a probit regression to model the relationship between the potential determinants with the probability of partaking in innovative prescribing, and include fixed effects for each of the products.

\[
P(y_t = 1|x_t) = G(\text{determinants}_t \beta + \text{treatments}_t \pi)
\]

The model was run twice, first where \(y_t = 1\) if a CCG prescribed a non-zero quantity of medicine \(i\) in the final quarter of the data (quarter 8), and secondly where \(y_t = 1\) if a CCG prescribed a non-zero quantity of medicine \(i\) in any of the eight quarters.

For ease of interpretation, marginal effects were reported. These can be interpreted as the change in the probability of partaking in innovative prescribing for a one unit change in the explanatory variable, holding all else constant. To allow for repeated observations on the same products, the standard errors in these models were clustered for each individual medicine.

**Model 2: Determinants of the extent of uptake in innovative prescribing**

The second model assessed if potential determinants were related to the level and speed of uptake, among CCGs that decided to partake in innovative prescribing among all combinations of treatment.

Firstly, the level of uptake in the final quarter of the Innovation Scorecard data (quarter 3 2016/2017) was regressed on potential determinants, where a CCG had a positive level of prescribing in the last quarter. We included fixed effects for each individual medicine, which would to some extent control for inherent differences in the absolute magnitude of uptake between treatments due to the size of the eligible population. The standard errors in these models were clustered for each individual medicine to allow for repeated observations on the same medicines.

To fully control for differences in the magnitude of uptake across treatments, which would be largely driven by the differing sizes of the eligible populations, we then generated a relative measure of volume by taking the log of uptake levels. We regressed the natural logarithmic value of uptake in the final quarter of data on potential determinants, again for CCGs that had a positive level of prescribing in the last quarter.

While these models analysed the relationship between the volume of uptake and potential determinants, it was also important to assess whether CCG characteristics are related to the speed of adoption of innovative medicines. To investigate this we calculated growth rates in levels of uptake from the first to the last quarter of data. Due to missing data we included only medicines where at least 50 CCGs reported uptake in the last period and there was a consistent series of uptake across all periods, e.g. the treatment
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes

was not approved by NICE part-way through the series. This analysis was therefore limited to 12 individual medicines.

G.4.2. Grouped medicines
As all CCGs prescribed positive values of the three grouped medicines, we focused on analysing the characteristics that determined variations in the levels of uptake across CCGs.

Model 3: Determinants of the growth in uptake of grouped medicines over time
The growth in uptake of each group medicine within each CCG was modelled in two ways. We modelled the absolute growth in uptake between the first and last quarter of the data, calculated as the level of uptake in the last quarter minus the level of uptake in the first quarter. We then modelled the relative growth in uptake over time, calculated as the value of uptake in the last quarter divided by the value in the first quarter. Each of the three grouped medicines was analysed separately, meaning that six models were run in total. The following model was estimated:

\[ \text{growth}_{it} = \beta_0 + \text{determinants}_{it} + \pi_i + u_{it} \]

Robust standard errors were used to account for the non-constant variance across observations. This was due to heterogeneity between CCGs; this would not affect the coefficients in the model but the standard errors, hence the significance level of coefficients.

Model 4: Determinants of the extent of uptake in grouped innovative prescribing
We modelled the level of uptake in each of the eight quarters as a function of the population and CCG characteristics, including fixed effects for observation quarter. Each of the three grouped medicines was analysed separately using the following model:

\[ \text{value}_{it} = \beta_0 + \text{determinants}_{it} + \pi_i + \text{time}_{it} + \alpha + u_{it} \]

In this model standard errors were clustered around CCGs. While uptake levels were observed at eight time points, the explanatory variables were only available at one point in time (corresponding to either the financial year 2014/2015 or the calendar year 2014). We controlled for the increasing trend in uptake over time by including fixed effects for each quarter of observation. Furthermore, since the absolute values of DDDs of medicines would be large, we then ran further models with the value of uptake transformed to the logarithmic scale to reduce the skew in the data.

G.5. Results

G.5.1. Summary statistics
Table G.2 describes the CCG-level uptake of individual medicines. Columns one and two show the proportion of CCGs that prescribe non-zero quantities of each individual medicine by the last quarter of our data, or in any period of our data, respectively. There was wide variation across medicines in terms of the proportion of CCGs that partake in prescribing in the last quarter, ranging from medicines that were not prescribed by any CCG (Alteplase) to those that were prescribed by all (e.g., Ezetimibe). This was, to some extent, expected due to the different types of medicines approved and included in the Innovation Scorecard. Some treatments are highly specialised and used to treat very specific and rarer conditions...
whilst others treat more common conditions. For example, Ezetimibe is used to treat high cholesterol, and it was therefore expected that this medicine would be prescribed by all CCGs.

Table G.2: Uptake of individual medicines – summary statistics

<table>
<thead>
<tr>
<th>Medicine name</th>
<th>Proportion of CCGs prescribing in last quarter</th>
<th>Proportion of CCGs to prescribe in any period</th>
<th>Last quarter value of uptake</th>
<th>Growth rate from first to last quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abatacept</td>
<td>0.014</td>
<td>0.033</td>
<td>106.562</td>
<td>-</td>
</tr>
<tr>
<td>Abiraterone acetate</td>
<td>0.029</td>
<td>0.115</td>
<td>10.636</td>
<td>-</td>
</tr>
<tr>
<td>Adalimumab</td>
<td>0.053</td>
<td>0.268</td>
<td>77.359</td>
<td>-</td>
</tr>
<tr>
<td>Alirocumab</td>
<td>0.014</td>
<td>0.019</td>
<td>67.069</td>
<td>-</td>
</tr>
<tr>
<td>Alteplase</td>
<td>0.000</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Apremilast</td>
<td>0.048</td>
<td>0.100</td>
<td>18.229</td>
<td>-</td>
</tr>
<tr>
<td>Axitinib</td>
<td>0.000</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Botulinum toxin type a</td>
<td>0.072</td>
<td>0.124</td>
<td>233.183</td>
<td>-</td>
</tr>
<tr>
<td>Certolizumab pegol</td>
<td>0.014</td>
<td>0.100</td>
<td>39.065</td>
<td>-</td>
</tr>
<tr>
<td>Ciclosporin (0.1% eye drops only)</td>
<td>0.919</td>
<td>0.967</td>
<td>216.570</td>
<td>-</td>
</tr>
<tr>
<td>Colistimethate sodium (dpi only)</td>
<td>0.024</td>
<td>0.110</td>
<td>16.126</td>
<td>-</td>
</tr>
<tr>
<td>Darbepoetin alfa</td>
<td>0.703</td>
<td>0.919</td>
<td>180.868</td>
<td>156.986</td>
</tr>
<tr>
<td>Dasabuvir</td>
<td>0.000</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dasatinib</td>
<td>0.000</td>
<td>0.029</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Degarelix</td>
<td>0.550</td>
<td>0.718</td>
<td>350.108</td>
<td>84.058</td>
</tr>
<tr>
<td>Denosumab 70 mg</td>
<td>0.263</td>
<td>0.464</td>
<td>872.176</td>
<td>101.427</td>
</tr>
<tr>
<td>Doxorubicin hydrochloride</td>
<td>0.005</td>
<td>0.014</td>
<td>20.893</td>
<td>-</td>
</tr>
<tr>
<td>Dronedarone hydrochloride</td>
<td>0.938</td>
<td>0.976</td>
<td>404.167</td>
<td>10.310</td>
</tr>
<tr>
<td>Eltrombopag</td>
<td>0.029</td>
<td>0.115</td>
<td>14.395</td>
<td>-</td>
</tr>
<tr>
<td>Enzalutamide</td>
<td>0.067</td>
<td>0.268</td>
<td>12.911</td>
<td>-</td>
</tr>
<tr>
<td>Epoetin alfa</td>
<td>0.301</td>
<td>0.617</td>
<td>99.359</td>
<td>65.569</td>
</tr>
<tr>
<td>Epoetin beta</td>
<td>0.359</td>
<td>0.641</td>
<td>74.203</td>
<td>1.135</td>
</tr>
<tr>
<td>Epoetin zeta</td>
<td>0.005</td>
<td>0.091</td>
<td>9.887</td>
<td>-</td>
</tr>
<tr>
<td>Erlotinib</td>
<td>0.000</td>
<td>0.019</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Etanercept</td>
<td>0.096</td>
<td>0.378</td>
<td>60.493</td>
<td>-</td>
</tr>
<tr>
<td>Everolimus (Afinitor and generic only)</td>
<td>0.000</td>
<td>0.029</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medicine name</td>
<td>Proportion of CCGs prescribing in last quarter</td>
<td>Proportion of CCGs to prescribe in any period</td>
<td>Last quarter value of uptake</td>
<td>Growth rate from first to last quarter</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Evolocumab</td>
<td>0.019</td>
<td>0.029</td>
<td>414.204</td>
<td>-</td>
</tr>
<tr>
<td>Ezetimibe</td>
<td>1.000</td>
<td>1.000</td>
<td>26623.760</td>
<td>3.530</td>
</tr>
<tr>
<td>Gefitinib</td>
<td>0.000</td>
<td>0.014</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Golimumab</td>
<td>0.010</td>
<td>0.043</td>
<td>272.690</td>
<td>-</td>
</tr>
<tr>
<td>Imatinib mesilate</td>
<td>0.062</td>
<td>0.278</td>
<td>3043.509</td>
<td>-</td>
</tr>
<tr>
<td>Infliximab</td>
<td>0.005</td>
<td>0.010</td>
<td>8.239</td>
<td>-</td>
</tr>
<tr>
<td>Ivabradine</td>
<td>1.000</td>
<td>1.000</td>
<td>5155.225</td>
<td>26.426</td>
</tr>
<tr>
<td>Lenalidomide</td>
<td>0.005</td>
<td>0.062</td>
<td>1.893</td>
<td>-</td>
</tr>
<tr>
<td>Lubiprostone</td>
<td>0.742</td>
<td>0.952</td>
<td>3.286</td>
<td>193.775</td>
</tr>
<tr>
<td>Mannitol (dpi only)</td>
<td>0.024</td>
<td>0.072</td>
<td>7.218</td>
<td>-</td>
</tr>
<tr>
<td>Mirabegron</td>
<td>1.000</td>
<td>1.000</td>
<td>10528.330</td>
<td>121.419</td>
</tr>
<tr>
<td>Nalmefene</td>
<td>0.512</td>
<td>0.943</td>
<td>38.331</td>
<td>25.316</td>
</tr>
<tr>
<td>Nilotinib</td>
<td>0.010</td>
<td>0.029</td>
<td>5583.276</td>
<td>-</td>
</tr>
<tr>
<td>Nintedanib</td>
<td>0.000</td>
<td>0.019</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Omalizumab</td>
<td>0.014</td>
<td>0.072</td>
<td>9.748</td>
<td>-</td>
</tr>
<tr>
<td>Pazopanib</td>
<td>0.005</td>
<td>0.048</td>
<td>3499.809</td>
<td>-</td>
</tr>
<tr>
<td>Pirfenidone</td>
<td>0.014</td>
<td>0.086</td>
<td>0.974</td>
<td>-</td>
</tr>
<tr>
<td>Ranibizumab</td>
<td>0.005</td>
<td>0.024</td>
<td>0.223</td>
<td>-</td>
</tr>
<tr>
<td>Rifaximin (550 mg tabs only)</td>
<td>0.990</td>
<td>0.995</td>
<td>372053.800</td>
<td>285.955</td>
</tr>
<tr>
<td>Rituximab</td>
<td>0.005</td>
<td>0.062</td>
<td>11.228</td>
<td>-</td>
</tr>
<tr>
<td>Romiplostim</td>
<td>0.000</td>
<td>0.010</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ruxolitinib</td>
<td>0.010</td>
<td>0.053</td>
<td>531.624</td>
<td>-</td>
</tr>
<tr>
<td>Sacubitril-valsartan</td>
<td>0.789</td>
<td>0.809</td>
<td>385.723</td>
<td>-</td>
</tr>
<tr>
<td>Ticagrelor (60 mg tabs only)</td>
<td>0.469</td>
<td>0.560</td>
<td>27.395</td>
<td>-</td>
</tr>
<tr>
<td>Tobramycin (dpi only)</td>
<td>0.067</td>
<td>0.225</td>
<td>34.073</td>
<td>-</td>
</tr>
<tr>
<td>Tocilizumab</td>
<td>0.010</td>
<td>0.019</td>
<td>194.044</td>
<td>-</td>
</tr>
<tr>
<td>Tolvaptan</td>
<td>0.048</td>
<td>0.206</td>
<td>8.637</td>
<td>-</td>
</tr>
<tr>
<td>Ustekinumab</td>
<td>0.005</td>
<td>0.005</td>
<td>149.632</td>
<td>-</td>
</tr>
</tbody>
</table>

Table G.3 reports summary statistics on the population and CCG characteristics. On average the population distribution of CCGs consisted of 20.72 per cent aged under 18, 62.20 per cent aged 18 to 64 years, and those over 65 years old accounting for 17.08 per cent of the population. Performance on the
QOF was high, with CCGs on average achieving 95 per cent of the 559 QOF points available. On average over half of a CCG’s population reportedly had a long-standing health condition in the GP Patient Survey, and 16.82 per cent lived in rural areas. A third of CCGs (33 per cent) were in the North of England, 29 per cent in the Midlands and East of England, 15 per cent in London and the remainder in the South of England (excluding London). Within individual CCGs, the average number of employees was 68 full-time equivalents (FTEs). Across CCGs, 13 per cent passed the CCG Assurance Framework with a score of ‘Assured’, 10 per cent passed with ‘Not assured, intervention required’, and the remaining passed with ‘Assured with support’. Across the financial performance measures, 82 per cent of CCGs met their expenditure target, meaning expenditure was less than income. The net annual expenditure for each CCG was £323m on average, with an average total population in a CCG of 254,000 people.

Table G.3: CCG and population characteristics – summary statistics (n=209 CCGs)

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>20.72</td>
<td>1.96</td>
</tr>
<tr>
<td>% aged 18–64 years</td>
<td>62.20</td>
<td>3.67</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>17.08</td>
<td>4.35</td>
</tr>
<tr>
<td>Deprivation score (IMD 2010)</td>
<td>21.98</td>
<td>8.70</td>
</tr>
<tr>
<td>Proportion of total QOF points achieved (%)</td>
<td>95.10</td>
<td>2.39</td>
</tr>
<tr>
<td>Percentage of patients in nursing homes</td>
<td>0.48</td>
<td>0.25</td>
</tr>
<tr>
<td>% reporting long-standing health condition in the GP Patient Survey</td>
<td>54.19</td>
<td>3.91</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>16.82</td>
<td>18.45</td>
</tr>
<tr>
<td>Total population</td>
<td>254,000</td>
<td>135,000</td>
</tr>
<tr>
<td>Log of total population</td>
<td>12.33</td>
<td>0.47</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>67.97</td>
<td>51.33</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>0.82</td>
<td>0.38</td>
</tr>
<tr>
<td>Net expenditure in £’000s</td>
<td>323,000</td>
<td>167,000</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>12.57</td>
<td>0.47</td>
</tr>
<tr>
<td>Assured</td>
<td>0.13</td>
<td>0.34</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>0.10</td>
<td>0.29</td>
</tr>
<tr>
<td>CCG in the North of England</td>
<td>0.33</td>
<td>0.47</td>
</tr>
<tr>
<td>CCG in the Midlands or East of England</td>
<td>0.29</td>
<td>0.45</td>
</tr>
<tr>
<td>CCG in London</td>
<td>0.15</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Table G.4 contains the summary statistics for the grouped medicines. The first column shows the probability of a CCG prescribing in the last quarter of the data, with the second column showing the
probability of prescribing in any of the eight quarters covered by the data. All 209 CCGs had positive values of prescribing for medicines to treat acute coronary syndrome, diabetes and NOACs. Only 13.9 per cent of CCGs were prescribing innovative multiple sclerosis medicines in any quarter, and 3.8 per cent of CCGs prescribed the innovative hepatitis C medicines in any quarter. The multiple sclerosis and hepatitis C group medicines were therefore excluded from our analysis, due to the small number of CCGs that prescribed these medicines.

For the group of diabetes medicines, on average the uptake from quarter 1 to quarter 8 increased by 289 per cent. The rate of uptake for NOACs exhibited a similar rise with, on average, uptake increasing by 270 per cent across CCGs. Uptake of the acute coronary syndrome medicines rose by 46 per cent over the period.

Table G.4: Uptake of groups of medicines – summary statistics (n=209 CCGs)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Proportion of CCGs prescribing in last quarter</th>
<th>Proportion of CCGs to prescribe in any period</th>
<th>Last quarter value of uptake</th>
<th>Growth rate from first to last quarter</th>
<th>Absolute value</th>
<th>Relative value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute coronary syndrome group</td>
<td>1</td>
<td>1</td>
<td>7350.54</td>
<td>46.17</td>
<td>1843.66</td>
<td>1.46</td>
</tr>
<tr>
<td>Prasugrel</td>
<td>1</td>
<td>1</td>
<td>1139.37</td>
<td>9.74</td>
<td>-166.42</td>
<td>0.90</td>
</tr>
<tr>
<td>Rivaroxaban (2.5 mg tabs only)</td>
<td>0.689</td>
<td>0.90</td>
<td>59.16</td>
<td>270.69</td>
<td>32.15</td>
<td>3.71</td>
</tr>
<tr>
<td>Ticagrelor (90 mg tabs only)</td>
<td>1</td>
<td>1</td>
<td>6170.41</td>
<td>91.55</td>
<td>1974.56</td>
<td>1.92</td>
</tr>
<tr>
<td>Diabetes group</td>
<td>1</td>
<td>1</td>
<td>384648.1</td>
<td>288.59</td>
<td>257990.80</td>
<td>3.89</td>
</tr>
<tr>
<td>Canagliflozin</td>
<td>1</td>
<td>1</td>
<td>99571.03</td>
<td>876.33</td>
<td>85813.77</td>
<td>9.76</td>
</tr>
<tr>
<td>Dapagliflozin</td>
<td>1</td>
<td>1</td>
<td>213031.70</td>
<td>145.09</td>
<td>104810.70</td>
<td>2.45</td>
</tr>
<tr>
<td>Empagliflozin</td>
<td>1</td>
<td>1</td>
<td>72045.38</td>
<td>11935.80</td>
<td>88260.26</td>
<td>120.36</td>
</tr>
<tr>
<td>Hepatitis C group</td>
<td>0.005</td>
<td>0.038</td>
<td>0.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Boceprevir</td>
<td>0</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Daclatasvir</td>
<td>0</td>
<td>0.014</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ledipasvir- sofosbuvir</td>
<td>0.005</td>
<td>0.010</td>
<td>0.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ombitasvir-paritaprevir- ritonavir</td>
<td>0</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Simeprevir</td>
<td>0</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sofosbuvir</td>
<td>0</td>
<td>0.014</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MS group</td>
<td>0.062</td>
<td>0.139</td>
<td>8.48</td>
<td>-1.16</td>
<td>-0.12</td>
<td>0.99</td>
</tr>
<tr>
<td>Treatment</td>
<td>Proportion of CCGs prescribing in last quarter</td>
<td>Proportion of CCGs to prescribe in any period</td>
<td>Last quarter value of uptake</td>
<td>Growth rate from first to last quarter</td>
<td>Absolute value</td>
<td>Relative value</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------</td>
<td>---------------------------------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Dimethyl fumarate</td>
<td>0.033</td>
<td>0.057</td>
<td>7.31</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fingolimod</td>
<td>0.024</td>
<td>0.077</td>
<td>11.76</td>
<td>-1.16</td>
<td>-0.12</td>
<td>0.99</td>
</tr>
<tr>
<td>Natalizumab</td>
<td>0</td>
<td>0.005</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Teriflunomide</td>
<td>0.005</td>
<td>0.010</td>
<td>0.21</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NOAC primary care group</td>
<td>1</td>
<td>1</td>
<td>62628.48</td>
<td>269.53</td>
<td>42785.28</td>
<td>3.70</td>
</tr>
<tr>
<td>Apixaban</td>
<td>1</td>
<td>1</td>
<td>26032.47</td>
<td>691.66</td>
<td>21395.08</td>
<td>7.92</td>
</tr>
<tr>
<td>Dabigatran etexilate (110 mg and 150 mg caps only)</td>
<td>1</td>
<td>1</td>
<td>5789.62</td>
<td>52.91</td>
<td>1564.12</td>
<td>1.53</td>
</tr>
<tr>
<td>Edoxaban</td>
<td>0.837</td>
<td>0.871</td>
<td>365.66</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rivaroxaban (2.5 mg, 15 mg and 20 mg tabs only)</td>
<td>1</td>
<td>1</td>
<td>30500.21</td>
<td>231.19</td>
<td>19519.91</td>
<td>3.31</td>
</tr>
</tbody>
</table>

Table G.5 contains the summary statistics for the uptake of the three grouped medicines analysed, and shows the mean and standard deviations of prescribing levels overall and by quarter. For acute coronary syndrome, the overall mean level of prescribing is 6,559 DDD per 100,000 people in each CCG, with an overall increasing trend of prescribing levels from quarter 1 to 8. Similarly, for diabetes grouped medicines, the overall mean level of uptake is 255,757 DDD per 100,000 people in each CCG, with the level of uptake increasing each quarter. For NOACs the overall mean level of uptake is 39,924 DDD per 100,000 people in a CCG, with the level of uptake again increasing each quarter. The trends in the levels of uptake of these grouped medicines are depicted visually in Figure G.1.
### Table G.5: Means and standard deviation of grouped medicines across quarters (DDD per 100,000 resident population)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Overall</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
<td>(SD)</td>
</tr>
<tr>
<td>Acute coronary syndrome group</td>
<td>6559</td>
<td>5507</td>
<td>5917</td>
<td>6276</td>
<td>6644</td>
<td>6543</td>
<td>7039</td>
<td>7196</td>
<td>7351</td>
</tr>
<tr>
<td></td>
<td>(3033)</td>
<td>(2808)</td>
<td>(2878)</td>
<td>(3000)</td>
<td>(3042)</td>
<td>(2879)</td>
<td>(3044)</td>
<td>(3071)</td>
<td>(3100)</td>
</tr>
<tr>
<td>Diabetes group</td>
<td>255757</td>
<td>126657</td>
<td>161499</td>
<td>197633</td>
<td>241694</td>
<td>267693</td>
<td>317142</td>
<td>349089</td>
<td>384648</td>
</tr>
<tr>
<td></td>
<td>(156780)</td>
<td>(84521)</td>
<td>(98167)</td>
<td>(111080)</td>
<td>(128142)</td>
<td>(133808)</td>
<td>(150244)</td>
<td>(159009)</td>
<td>(165899)</td>
</tr>
<tr>
<td>NOAC primary care group</td>
<td>39924</td>
<td>19843</td>
<td>24804</td>
<td>30496</td>
<td>36791</td>
<td>40924</td>
<td>48549</td>
<td>55353</td>
<td>62628</td>
</tr>
<tr>
<td></td>
<td>(22655)</td>
<td>(12050)</td>
<td>(13802)</td>
<td>(15657)</td>
<td>(17370)</td>
<td>(17831)</td>
<td>(19801)</td>
<td>(21132)</td>
<td>(22738)</td>
</tr>
<tr>
<td>n</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
<td>209</td>
</tr>
</tbody>
</table>
**Figure G.1: Trends in the levels of uptake of grouped medicines**

Source: University of Manchester analysis

### G.5.2. Individual medicines

**Model 1: Determinants of the decision to partake in innovative prescribing**

Regression coefficients for the probability of partaking in innovative prescribing in (a) the last period of our data (quarter 3 2016/2017) and (b) in any period are reported in Table G.6. These results are also presented graphically in Figure G.2 and Figure G.3 respectively. The average marginal effects and the associated 95% confidence intervals are presented. Any confidence interval crossing zero on the x axis indicates that the marginal effect is not statistically significantly different to zero, i.e. the probability of a CCG partaking in innovative prescribing is not significantly affected.

For the probability of partaking in innovative prescribing of individual medicines in the last period, most coefficients are not statistically significantly different from zero. Net expenditure, which is statistically significant at the 1% level, is one exception. CGGs with higher net expenditure are more likely to participate in innovative prescribing, controlling for all other factors. A one percentage point increase in the net expenditure of a CCG is associated with a 5.72 percentage point increase in the probability of participating in innovative prescribing. CGGs in the North of England are 1.44 percentage points more likely to participate in innovative prescribing than CGGs in the South of England, and this effect is significant at the 5% level. Weaker associations only significant at the 10% level are observed for
deprivation and the average number of employees in a CCG. An increase of one FTE in a CCG is associated with a 0.0123 percentage point increase in the probability of participating in innovative prescribing. The coefficient on the deprivation score is negative, meaning that CCGs in areas where relative deprivation is higher are less likely to participate in innovative prescribing.

The second column of Table G.6 presents the results of the analysis examining the probability of partaking in innovative prescribing in any period that the data cover. As in the previous model, we found that CCGs in the North of England and those with higher net expenditures are significantly more likely to participate in innovative prescribing. We also observed the same relationships in terms of deprivation and average number of employees, although these relationships became stronger when examining the probability of participating in innovative prescribing in any period of the data compared to the probability of participating in the last data period only. CCGs in areas where relative deprivation was higher were less likely to participate in innovative prescribing, and this was now significant at the 1% level. CCGs with more FTEs were more likely to participate in innovative prescribing, and this was also now significant at the 1% level. The magnitude of the effect was still very small though, with an increase of one FTE associated with a 0.02 percentage point increase in the probability of innovative prescribing.

We found that the proportion of a CCGs population that live in a rural area was negatively associated with participation in innovative prescribing, although the size of the effect as small. A one percentage point increase in the proportion of the registered population living in a rural area is associated with a 0.03 percentage point reduction in the probability of participating in innovative prescribing, significant at the 5% level. CCGs receiving an assurance rating of ‘Not assured, intervention required’ were 1.87 percentage points more likely to have participated in innovative prescribing than those receiving a rating of ‘Assured with support’. We also detected a weak negative relationship with quality as proxied by QOF points and the likelihood of participating in innovative prescribing. The results suggest that an increase in QOF points (indicating increased quality) is associated with a reduction in the probability of participating in innovative prescribing. This relationship is, however, small in magnitude and only significant at the 10% level.

Table G.6: Relationship between CCG and population characteristics, and the decision to partake in innovative prescribing

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Probability that a CCG partakes in innovative prescribing in the last period</th>
<th>Probability that a CCG partakes in innovative prescribing in any period</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>0.00195</td>
<td>0.00237</td>
</tr>
<tr>
<td></td>
<td>[0.00291, 0.00681]</td>
<td>[0.00137, 0.00610]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>0.000599</td>
<td>-0.00063</td>
</tr>
<tr>
<td></td>
<td>[0.00337, 0.00457]</td>
<td>[0.00406, 0.00280]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>-0.00119*</td>
<td>-0.00170***</td>
</tr>
<tr>
<td></td>
<td>[0.00241, 0.0000283]</td>
<td>[0.00280, 0.000596]</td>
</tr>
<tr>
<td>Determinant</td>
<td>Probability that a CCG partakes in innovative prescribing in the last period</td>
<td>Probability that a CCG partakes in innovative prescribing in any period</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>QOF score</td>
<td>-0.00118</td>
<td>-0.00220</td>
</tr>
<tr>
<td></td>
<td>[0.00386, 0.00150]</td>
<td>[0.00459, 0.000186]</td>
</tr>
<tr>
<td>% in nursing home</td>
<td>0.0212</td>
<td>0.0114</td>
</tr>
<tr>
<td></td>
<td>[0.00795, 0.0504]</td>
<td>[0.0217, 0.0445]</td>
</tr>
<tr>
<td>% with long-standing health condition</td>
<td>-0.000358</td>
<td>0.000394</td>
</tr>
<tr>
<td></td>
<td>[0.00350, 0.00278]</td>
<td>[0.00267, 0.00346]</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>0.0000702</td>
<td>-0.00344**</td>
</tr>
<tr>
<td></td>
<td>[0.000216, 0.000356]</td>
<td>[0.000651, 0.0000375]</td>
</tr>
<tr>
<td>Log of total population</td>
<td>-0.00512</td>
<td>0.0026</td>
</tr>
<tr>
<td></td>
<td>[0.0153, 0.00501]</td>
<td>[0.00839, 0.0136]</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>0.000123*</td>
<td>0.000203***</td>
</tr>
<tr>
<td></td>
<td>[0.0000938, 0.000256]</td>
<td>[0.0000524, 0.000353]</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>-0.00442</td>
<td>0.00621</td>
</tr>
<tr>
<td></td>
<td>[0.0208, 0.0120]</td>
<td>[0.00799, 0.0204]</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>0.0572***</td>
<td>0.0647**</td>
</tr>
<tr>
<td></td>
<td>[0.0389, 0.0756]</td>
<td>[0.0464, 0.0830]</td>
</tr>
<tr>
<td>Assured</td>
<td>0.00223</td>
<td>0.00579</td>
</tr>
<tr>
<td></td>
<td>[0.0172, 0.0216]</td>
<td>[0.0142, 0.0258]</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>-0.0086</td>
<td>0.0187**</td>
</tr>
<tr>
<td></td>
<td>[0.0235, 0.00632]</td>
<td>[0.00140, 0.0359]</td>
</tr>
<tr>
<td>CCG in the North of England</td>
<td>0.0144**</td>
<td>0.0206***</td>
</tr>
<tr>
<td></td>
<td>[0.00120, 0.0275]</td>
<td>[0.00651, 0.0347]</td>
</tr>
<tr>
<td>CCG in the Midlands or East of England</td>
<td>-0.00248</td>
<td>-0.000438</td>
</tr>
<tr>
<td></td>
<td>[0.0165, 0.0115]</td>
<td>[0.0162, 0.0154]</td>
</tr>
<tr>
<td>CCG in London</td>
<td>0.00563</td>
<td>0.00586</td>
</tr>
<tr>
<td></td>
<td>[0.0119, 0.0232]</td>
<td>[0.0149, 0.0266]</td>
</tr>
<tr>
<td>n</td>
<td>8,736</td>
<td>10,608</td>
</tr>
</tbody>
</table>

Notes: 95% confidence interval in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. 12 treatments were excluded as they predict success or failure perfectly (all CCGs partake or no CCGs partake) for probability in prescribing in the last period and 3 treatments were excluded in prescribing in any period.
**Figure G.2: Average marginal effects with 95% confidence intervals (quarter 8)**

Source: University of Manchester analysis

**Figure G.3: Average marginal effects with 95% confidence intervals (any period)**

Source: University of Manchester analysis
The first column of Table G.7 reports results from the analysis of the determinants of the level of uptake of innovative medicines in CCGs that participated in innovative prescribing in the final quarter of the data. None of the coefficients is statistically significantly different from zero, meaning that none of the factors we examined is significantly associated with the level of prescribing amongst CCGs that participated in innovative prescribing of individual medicines in the final quarter of the data.

The second column of Table G.7 reports the same analysis, but this time the log of uptake levels is used as the dependent variable. This better allows for the vast differences in uptake levels across the different medicines determined by the differences in the size of the eligible populations. Transforming the dependent variable into natural logarithmic format addressed the skewness of the raw distribution. A change in logarithmic value can be interpreted as approximately a percentage point change.

We found that uptake levels are higher in CCGs with a greater proportion of the registered population reporting a long-standing health condition and in CCGs receiving a rating of ‘Assured’, both of which are significant at the 5% level. A one percentage point increase in the proportion of the registered population reporting a long-standing health condition is associated with a 3.92 per cent increase in prescribing volumes. CCGs with a rating of ‘Assured’ had prescribing volumes 13.5 per cent higher than those rated as ‘Assured with support’. We detected a negative relationship between the size of the registered population and uptake levels, although this may reflect omitted population characteristics associated with larger CCGs, which we are unable to control for. There is also a negative relationship between the number of employees in a CCG and prescribing volumes, significant at the 5% level. This effect is small in magnitude though, with one additional FTE associated with a 0.18 per cent reduction in prescribing volumes. We also detected weak relationships between prescribing volumes and whether CCGs had met their expenditure targets and if they were located in the North of England, significant only at the 10% level. CCGs that met their expenditure target prescribed 11.3 per cent lower volumes than CCGs that failed to meet their expenditure target. CCGs in the North of England had 6.9 per cent higher prescription volumes than those in the South of England.

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Value of uptake in quarter 8</th>
<th>Log of value of uptake in any period</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>-2061.9</td>
<td>-0.0105</td>
</tr>
<tr>
<td></td>
<td>[-6093.5,1969.7]</td>
<td>[0.0493,0.0283]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>-2257.9</td>
<td>0.00503</td>
</tr>
<tr>
<td></td>
<td>[6737.4,2221.7]</td>
<td>[0.0275,0.0376]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>529.8</td>
<td>0.0043</td>
</tr>
<tr>
<td></td>
<td>[462.6,1522.2]</td>
<td>[0.00717,0.0158]</td>
</tr>
<tr>
<td>QOF score</td>
<td>610.2</td>
<td>-0.00674</td>
</tr>
<tr>
<td></td>
<td>[672.4,1892.9]</td>
<td>[0.0250,0.0115]</td>
</tr>
</tbody>
</table>
Determinant | Value of uptake in quarter 8 | Log of value of uptake in any period
--- | --- | ---
% in nursing home | 17792.1 | -0.0338
[15582.3,51166.4] | [0.488,0.420]
% with long-standing health condition | 3149.9 | 0.0392**
[2786.9,9086.8] | [0.00969,0.0687]
% living in a rural area | 47.9 | -0.0000195
[-36.73,132.5] | [0.00254,0.00250]
Log of total population | 346.8 | -0.112**
[435.1,1128.7] | [0.200,-0.0237]
Average number of employees in CCG | -61.78 | -0.00177**
[-179.2,55.65] | [-0.00325,-0.000293]
Expenditure target met | -6149.9 | -0.113*
[17720.9,5421.1] | [0.243,0.0175]
Log of net expenditure | 8649.7 | -0.116
[8343.2,25642.6] | [0.316,0.0848]
Assured | -2123 | 0.135**
[-6665.4,2419.4] | [0.00470,0.265]
Not assured, intervention required | 334.2 | 0.0097
[580.5,1249.0] | [0.154,0.173]
CCG in the North of England | 1128.8 | 0.0690*
[897.7,3155.3] | [0.0126,0.151]
CCG in the Midlands or East of England | 2075.4 | 0.0169
[2151.9,6302.7] | [0.129,0.163]
CCG in London | -6894.9 | -0.0604
[20147.1,6357.3] | [-0.171,0.0505]
Constant | -272686.5 | 5.686***
[795490.1,250117.0] | [2.530,8.842]
**n** | 2,352 (54 treatments) | 2,353 (54 treatments)
R² | 0.646 | 0.918

Notes: 95% confidence interval in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table G.8 reports results from the analysis of the determinants of the growth in uptake over the data period. No factors included in the analysis had a statistically significant relationship with the growth in uptake at the 5% level. We detected weak relationships, only significant at the 10% level, between the growth in uptake and CCGs located in London and CCGs receiving a rating of ‘Not assured,
intervention required’. CCGs located in London experienced slower growth in prescribing levels over the period compared to CCGs in the South of England. CCGs receiving a rating of ‘Not assured, intervention required’ also experienced slower growth in prescribing volumes that those rated as ‘Assured with support’. These results must be interpreted with caution, however, as rates of growth in prescription volumes could only be calculated for 12 of the individual medicines tracked by the Innovation Scorecard, due to issues with data coverage.

Table G.8: Relationship between CCG and population characteristics, and growth in uptake

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Growth in uptake</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>12.87</td>
</tr>
<tr>
<td></td>
<td>[-6.972, 32.71]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>11.64</td>
</tr>
<tr>
<td></td>
<td>[-3.499, 26.77]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>1.218</td>
</tr>
<tr>
<td></td>
<td>[-1.337, 3.774]</td>
</tr>
<tr>
<td>QOF score</td>
<td>1.845</td>
</tr>
<tr>
<td></td>
<td>[-3.088, 6.779]</td>
</tr>
<tr>
<td>% in nursing home</td>
<td>17.3</td>
</tr>
<tr>
<td></td>
<td>[-31.48, 66.07]</td>
</tr>
<tr>
<td>% with long-standing health condition</td>
<td>-10.28</td>
</tr>
<tr>
<td></td>
<td>[-26.56, 5.992]</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>-0.303</td>
</tr>
<tr>
<td></td>
<td>[-1.337, 0.731]</td>
</tr>
<tr>
<td>Log of total population</td>
<td>-2.265</td>
</tr>
<tr>
<td></td>
<td>[-34.07, 29.54]</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>-0.13</td>
</tr>
<tr>
<td></td>
<td>[0.842, 0.581]</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>17.01</td>
</tr>
<tr>
<td></td>
<td>[-13.80, 47.83]</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>49.89</td>
</tr>
<tr>
<td></td>
<td>[-55.20, 155.0]</td>
</tr>
<tr>
<td>Assured</td>
<td>-12.83</td>
</tr>
<tr>
<td></td>
<td>[-78.21, 52.54]</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>-41.45*</td>
</tr>
</tbody>
</table>
Determinant | Growth in uptake
---|---
CCG in the North of England | [-84.28,1.391]
CCG in Midlands or East of England | [108.2,38.85]
CCG in London | [-107.5,10.27]

Notes: 95% confidence interval in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. Only 12 treatments used in analysis.

G.5.3. Grouped medicines – value of uptake

**Model 3: Determinants of the relative and absolute growth in uptake of grouped medicines**

The analysis of the determinants of the relative growth in uptake of innovative grouped medicines over the data period is presented in Table G.9, with separate models presented for each of the grouped medicines.

For the acute coronary syndrome group, the age composition of a CCG’s population, quality as proxied by QOF scores, and the proportion of the population with long-standing health conditions are all significantly associated with the relative growth in prescribing over time. Prescribing volumes had grown faster in relative terms in CCGs with a larger proportion of patients aged both under 18 years and over 65 years. Relative growth in prescribing volumes had been slower in higher-quality CCGs, measured as higher QOF achievement. Relative growth in prescribing volumes had also been slower in CCGs with a greater proportion of the population recorded as having a long-standing health condition.

For the diabetes medicines, no factors included in our models were found to be significantly related to the relative growth in prescribing volumes over time. This is reflected in the low R squared value for the models, with just 4.9 per cent of the variance in the relative growth between CCGs explained by the factors included in the model. This indicates that the relative growth in the prescribing levels of the diabetes group medicines is caused by external factors that we were not able to measure.

For the NOAC primary care group, only a CCG’s assurance rating and location in London were significantly associated with the relative growth in prescribing volumes over the period. There was higher growth amongst CCGs with a rating of ‘Not assured, intervention required’ than CCGs receiving a rating of ‘Assured with support’. There was also higher relative growth over time in CCGs in London compared to those in the South of England.
### Table G.9: Relationship between CCG and population characteristics, and relative growth in uptake in grouped medicines

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Acute coronary syndrome</th>
<th>Diabetes</th>
<th>NOAC primary care</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>0.123**</td>
<td>-0.0283</td>
<td>0.0684</td>
</tr>
<tr>
<td></td>
<td>[0.0287,0.217]</td>
<td>[-0.194,0.137]</td>
<td>[-0.0634,0.200]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>0.0601**</td>
<td>-0.0514</td>
<td>-0.0191</td>
</tr>
<tr>
<td></td>
<td>[0.00750,0.113]</td>
<td>[-0.357,0.255]</td>
<td>[-0.129,0.0912]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>0.0109</td>
<td>-0.00383</td>
<td>0.0104</td>
</tr>
<tr>
<td></td>
<td>[-0.00805,0.0299]</td>
<td>[0.0887,0.0811]</td>
<td>[-0.0260,0.0469]</td>
</tr>
<tr>
<td>QOF score</td>
<td>-0.0420**</td>
<td>-0.0042</td>
<td>-0.0417</td>
</tr>
<tr>
<td></td>
<td>[-0.0785,-0.00539]</td>
<td>[-0.0935,0.0851]</td>
<td>[-0.138,0.0544]</td>
</tr>
<tr>
<td>% in nursing home</td>
<td>0.0231</td>
<td>0.154</td>
<td>-0.549</td>
</tr>
<tr>
<td></td>
<td>[-0.257,0.303]</td>
<td>[1.105,1.143]</td>
<td>[-1.428,0.329]</td>
</tr>
<tr>
<td>% with long-standing health condition</td>
<td>-0.0534**</td>
<td>0.0731</td>
<td>0.0147</td>
</tr>
<tr>
<td></td>
<td>[-0.101,-0.00626]</td>
<td>[0.141,0.287]</td>
<td>[0.0804,0.110]</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>-0.00319</td>
<td>0.00846</td>
<td>0.00797</td>
</tr>
<tr>
<td></td>
<td>[-0.00747, 0.00108]</td>
<td>[0.00744,0.0243]</td>
<td>[0.00380,0.0197]</td>
</tr>
<tr>
<td>Log of total population</td>
<td>-0.0435</td>
<td>0.0187</td>
<td>0.281</td>
</tr>
<tr>
<td></td>
<td>[-0.230,0.143]</td>
<td>[0.468,0.506]</td>
<td>[0.105,0.668]</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>0.000844</td>
<td>-0.000586</td>
<td>-0.00144</td>
</tr>
<tr>
<td></td>
<td>[-0.00112, 0.00280]</td>
<td>[0.00665,0.00653]</td>
<td>[-0.00663,0.00375]</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>0.0961</td>
<td>-0.123</td>
<td>0.00345</td>
</tr>
<tr>
<td></td>
<td>[-0.0436,0.236]</td>
<td>[-0.983,0.736]</td>
<td>[-0.562,0.569]</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>-0.226</td>
<td>0.532</td>
<td>-0.0747</td>
</tr>
<tr>
<td></td>
<td>[-0.534,0.0824]</td>
<td>[0.260,1.324]</td>
<td>[0.664,0.514]</td>
</tr>
<tr>
<td>Assured</td>
<td>0.149</td>
<td>0.311</td>
<td>0.00615</td>
</tr>
<tr>
<td></td>
<td>[-0.148,0.446]</td>
<td>[-0.541,1.163]</td>
<td>[-0.581,0.594]</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>-0.076</td>
<td>-0.314</td>
<td>0.708**</td>
</tr>
<tr>
<td></td>
<td>[-0.276,0.124]</td>
<td>[-1.389,0.760]</td>
<td>[0.0949,1.320]</td>
</tr>
<tr>
<td>CCG in the North of England</td>
<td>-0.117</td>
<td>-0.953</td>
<td>0.142</td>
</tr>
<tr>
<td></td>
<td>[-0.327,0.0923]</td>
<td>[-2.239,0.332]</td>
<td>[0.281,0.564]</td>
</tr>
<tr>
<td>CCG in the Midlands or East of England</td>
<td>-0.019</td>
<td>-0.88</td>
<td>0.376</td>
</tr>
<tr>
<td></td>
<td>[-0.232,0.194]</td>
<td>[-2.137,0.377]</td>
<td>[0.110,0.863]</td>
</tr>
</tbody>
</table>
The analysis of the determinants of the absolute growth in uptake of innovative grouped medicines over the data period is presented in Table G.10, again with separate models presented for each of the grouped medicines.

For the acute coronary syndrome group, the age composition of a CCG’s population was again significantly associated with the absolute growth in prescribing volumes over the period. Growth was higher in absolute terms in CCGs with a larger proportion of patients aged both under 18 years and over 65 years. We also detected weak associations with deprivation and the proportion of registered patients living in rural areas, significant only at the 10% level. Growth was higher in absolute terms in areas of higher deprivation and lower in areas with a greater proportion of patients living in rural areas. The coefficients in these models represent the increase in the DDD associated with a one unit increase in the independent variables. A one percentage point increase in the proportion of patients aged over 65 was therefore related to a growth in prescribing of 342 DDD over the period examined.

For the diabetes medicines, population age composition and QOF scores are significantly associated with the absolute growth in prescribing levels over the period at the 5% level. CCGs with a higher proportion of patients aged under 18 exhibited higher absolute growth, whilst quality as proxied by the QOF was negatively related to absolute growth in prescribing levels. This means that growth was lower in absolute terms in higher-quality CCGs. We also detected weak regional differences, with CCGs in the North of England exhibiting higher absolute growth.

For the NOAC primary care group, the age composition of patients, deprivation, the proportion of patients with a long-standing health condition, and a CCG’s assurance rating were all significantly related to the absolute growth in uptake over the period. The proportion of patients aged over 65 and the proportion of patients with a long-standing health condition were both positively associated with growth in prescribing in absolute terms. CCGs in areas of higher deprivation exhibited lower absolute growth in prescribing volumes. CCGs rated as ‘Not assured, intervention required’ exhibited lower absolute growth than CCGs rated as ‘ Assured with support’. Of the three grouped medicines examined, the factors included in our models best explained the variation in the absolute growth in uptake for NOACs, with 55 per cent of the variation in absolute growth observed across CCGs explained by the factors we were able to control for.
### Table G.10: Relationship between CCG and population characteristics, and absolute growth in uptake in grouped medicines

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Acute coronary syndrome</th>
<th>Diabetes</th>
<th>NOAC primary care</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>341.6**</td>
<td>17187.0***</td>
<td>319.3</td>
</tr>
<tr>
<td></td>
<td>[82.49,600.8]</td>
<td>[8508.7,25865.3]</td>
<td>[321.8,960.4]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>192.5**</td>
<td>1997.5</td>
<td>1536.2***</td>
</tr>
<tr>
<td></td>
<td>[20.57,364.4]</td>
<td>[-7247.7,11242.7]</td>
<td>[627.9,2444.5]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>55.52*</td>
<td>155.2</td>
<td>-267.1**</td>
</tr>
<tr>
<td></td>
<td>[-3.625,114.7]</td>
<td>[2604.2,2914.6]</td>
<td>[-526.4,-7.883]</td>
</tr>
<tr>
<td>QOF score</td>
<td>-91.64</td>
<td>-6282.8**</td>
<td>-70.3</td>
</tr>
<tr>
<td></td>
<td>[-210.7,27.44]</td>
<td>[-12071.8,493.9]</td>
<td>[-544.8,404.2]</td>
</tr>
<tr>
<td>% in nursing home</td>
<td>628.1</td>
<td>56779.8</td>
<td>-2025</td>
</tr>
<tr>
<td></td>
<td>[-524.8,1781.1]</td>
<td>[-17055.7,130615.3]</td>
<td>[9576.4,5526.4]</td>
</tr>
<tr>
<td>% with long-standing health condition</td>
<td>-103.8</td>
<td>-718.6</td>
<td>934.7**</td>
</tr>
<tr>
<td></td>
<td>[-256.1,148.50]</td>
<td>[9459.3,8022.0]</td>
<td>[170.3,1699.1]</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>-11.90*</td>
<td>-318</td>
<td>-12.36</td>
</tr>
<tr>
<td></td>
<td>[-25.46,1.650]</td>
<td>[-1121.3,485.3]</td>
<td>[-82.35,57.62]</td>
</tr>
<tr>
<td>Log of total population</td>
<td>-33.19</td>
<td>4168.1</td>
<td>-2842.6**</td>
</tr>
<tr>
<td></td>
<td>[-604.8,538.4]</td>
<td>[-27714.5,36050.7]</td>
<td>[5568.9,-116.3]</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>-0.5</td>
<td>101.8</td>
<td>4.664</td>
</tr>
<tr>
<td></td>
<td>[-5.807,4.807]</td>
<td>[250.0,453.6]</td>
<td>[28.54,37.87]</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>103</td>
<td>21417.5</td>
<td>-1360.9</td>
</tr>
<tr>
<td></td>
<td>[-354.2,560.2]</td>
<td>[-11824.0,54659.0]</td>
<td>[4383.8,1662.0]</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>-430.7</td>
<td>-31364.1</td>
<td>2340.3</td>
</tr>
<tr>
<td></td>
<td>[-1231.9,370.5]</td>
<td>[-77275.4,14547.3]</td>
<td>[-1809.2,6489.7]</td>
</tr>
<tr>
<td>Assured</td>
<td>502.3</td>
<td>14647.1</td>
<td>1816.3</td>
</tr>
<tr>
<td></td>
<td>[415.6,1420.2]</td>
<td>[30506.6,59800.8]</td>
<td>[2309.2,5941.8]</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>-119.3</td>
<td>11659.6</td>
<td>-6441.6**</td>
</tr>
<tr>
<td></td>
<td>[-848.5,610.0]</td>
<td>[34741.1,58060.3]</td>
<td>[-11689.1,1194.1]</td>
</tr>
<tr>
<td>CCG in the North of England</td>
<td>-43.38</td>
<td>34229.0'</td>
<td>-1784.1</td>
</tr>
<tr>
<td></td>
<td>[-645.5,558.8]</td>
<td>[-6584.1,75042.0]</td>
<td>[-5712.2,2144.0]</td>
</tr>
<tr>
<td>CCG in the Midlands or East of England</td>
<td>145.3</td>
<td>-722.3</td>
<td>-1710.7</td>
</tr>
<tr>
<td></td>
<td>[417.3,707.9]</td>
<td>[40112.9,38668.4]</td>
<td>[5577.0,2155.5]</td>
</tr>
</tbody>
</table>
Determinant | Acute coronary syndrome | Diabetes | NOAC primary care |
--- | --- | --- | --- |
CCG in London | -117.5 | -9990.6 | -298.6 |
 | [690.8, 455.8] | [-56840.5, 36859.2] | [4700.3, 4103.0] |
__cons | 10199.2 | 784929.9 | -18969.3 |
 | [6545.2, 26943.6] | [-139802.4, 170966.2] | [92059.9, 54121.3] |
| n | 208 | 208 | 208 |
| R² | 0.176 | 0.168 | 0.548 |

Notes: 95% confidence interval in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

**Model 4: The value of uptake of prescribing innovative medicines on the CCG and population characteristics for the three groups of diseases**

Table G.11 presents the analysis of the determinants of the level of uptake of the grouped medicines, using all eight quarters of data from the Innovation Scorecard. For the acute coronary syndrome group, the proportion of the population reporting a long-standing health condition, the average number of employees in a CCG, and net expenditure all show a significant relationship with prescribing levels. CCGs with a larger proportion of the registered population reporting a long-standing health condition have higher prescribing levels, with a one percentage point increase in the proportion of a CCG’s population who reported a long-standing health condition related to an increase of 334 DDD per 100,000 registered population. There is a negative relationship between prescribing levels and the number of employees in a CCG, meaning that after controlling for other factors, CCGs with a larger number of employees had lower prescribing levels. Net expenditure is positively related to prescribing levels, with a one percent increase in net expenditure associated with an increase in prescribing of nine DDD per 100,000 residents. We also detected weak relationships with deprivation and CCGs in the North of England, significant only at the 10% level. Prescribing volumes were higher in more deprived areas and CCGs in the North of England. All of the quarter dummies are positive and significant at the 1% level, and showing a general trend of increasing magnitude over time, indicating that prescribing volumes were increasing over time.

For the diabetes group, the proportion of a CCG’s registered population that is under 18 years old is positively related to prescribing volumes. Net expenditure is negatively related to prescribing volumes for the diabetes group medicines, meaning that CCGs with higher net expenditure had lower prescribing volumes. Again, all of the quarter dummies are positive and significant at the 1% level. The magnitude of these coefficients shows an increasing trend over time, indicating that prescribing volumes were constantly increasing over the period analysed.

For NOACs, the proportion of a CCG’s population aged over 65 is positively related to prescribing volumes. A one percentage point increase in the proportion of the population aged over 65 is associated with an increase in prescribing volumes of 1,740 DDD per 100,000 residents. CCGs that received a rating of ‘Not assured, intervention required’ had significantly lower prescription volumes than those receiving a rating of ‘Assured with support’. Again, all of the quarter dummies are positive and significant.
at the 1% level. The magnitude of these coefficients shows an increasing trend over time, indicating that prescribing volumes were constantly increasing over the period analysed.

**Table G.11: Relationship between CCG and population characteristics, and uptake in grouped medicines**

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Acute coronary syndrome</th>
<th>Diabetes</th>
<th>NOAC primary care</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>57.34</td>
<td>13919.9***</td>
<td>-124.5</td>
</tr>
<tr>
<td></td>
<td>[108.7,223.4]</td>
<td>[4206.4,23633.5]</td>
<td>[-1054.5,805.6]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>1.356</td>
<td>4483.4</td>
<td>1739.7***</td>
</tr>
<tr>
<td></td>
<td>[-209.6,212.3]</td>
<td>[-6688.7,15655.4]</td>
<td>[459.9,3019.5]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>61.09*</td>
<td>954.9</td>
<td>-224.6</td>
</tr>
<tr>
<td></td>
<td>[1.805,124.0]</td>
<td>[2471.7,4381.4]</td>
<td>[583.5,134.4]</td>
</tr>
<tr>
<td>QOF score</td>
<td>56.64</td>
<td>-4952.6</td>
<td>213.7</td>
</tr>
<tr>
<td>% in nursing home</td>
<td>1353.8</td>
<td>68389.1</td>
<td>1660.2</td>
</tr>
<tr>
<td></td>
<td>[273.3,2981.0]</td>
<td>[25278.7,162057.0]</td>
<td>[9025.2,12345.6]</td>
</tr>
<tr>
<td>% with long-standing health condition</td>
<td>333.6***</td>
<td>-2658.6</td>
<td>587.7</td>
</tr>
<tr>
<td></td>
<td>[161.4,505.8]</td>
<td>[-12909.7,7592.6]</td>
<td>[419.9,1595.2]</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>-0.558</td>
<td>-195.4</td>
<td>-1.7</td>
</tr>
<tr>
<td></td>
<td>[-18.86,17.74]</td>
<td>[-1134.9,7442.4]</td>
<td>[-119.9,85.90]</td>
</tr>
<tr>
<td>Log of total population</td>
<td>-.9033</td>
<td>7782.2</td>
<td>-4418.9**</td>
</tr>
<tr>
<td></td>
<td>[-746.1,565.4]</td>
<td>[26364.3,41928.6]</td>
<td>[8057.8,780.0]</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>-7.760**</td>
<td>128.3</td>
<td>-5.081</td>
</tr>
<tr>
<td></td>
<td>[-15.50,-0.0251]</td>
<td>[245.0,501.7]</td>
<td>[-53.62,43.45]</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>462.3</td>
<td>22839</td>
<td>-2920.4</td>
</tr>
<tr>
<td></td>
<td>[182.9,1107.6]</td>
<td>[18756.4,64434.3]</td>
<td>[7497.6,1656.7]</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>896.5**</td>
<td>-68865.7***</td>
<td>3572.3</td>
</tr>
<tr>
<td></td>
<td>[13.58,1779.4]</td>
<td>[-121062.7,-16668.7]</td>
<td>[2363.1,9507.7]</td>
</tr>
<tr>
<td>Assured</td>
<td>697.3</td>
<td>8881.5</td>
<td>3152.7</td>
</tr>
<tr>
<td></td>
<td>[442.4,1837.0]</td>
<td>[44277.8,62040.8]</td>
<td>[2670.4,8975.8]</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>-30.7</td>
<td>29737.4</td>
<td>-8907.0**</td>
</tr>
<tr>
<td></td>
<td>[-1212.5,1151.1]</td>
<td>[30408.9,89883.6]</td>
<td>[-16140.7,-1673.3]</td>
</tr>
<tr>
<td>CCG in the North of England</td>
<td>789.5*</td>
<td>29349.6</td>
<td>-2797.4</td>
</tr>
<tr>
<td></td>
<td>[77.49,1656.4]</td>
<td>[19638.4,78337.6]</td>
<td>[8159.6,2564.9]</td>
</tr>
</tbody>
</table>
Determinant | Acute coronary syndrome | Diabetes | NOAC primary care |
--- | --- | --- | --- |
CCG in the Midlands or East of England | -13.08 | -3768.4 | -3453.5 |
[850.8,824.6] | [51538.0,44001.2] | [9242.0,2335.1] |
CCG in London | 534.6 | -25582.6 | -4775 |
[469.5,1538.6] | [75532.4,24367.3] | [-10507.6,9597.6] |
Quarter 2 | 411.0*** | 34964.5*** | 4966.6*** |
[346.2,475.8] | [32293.1,37635.9] | [4647.3,5285.9] |
Quarter 3 | 771.3*** | 71221.7*** | 10665.8*** |
[670.7,872.0] | [66293.7,76149.7] | [10040.2,11291.5] |
Quarter 4 | 1141.2*** | 115428.6*** | 16966.5*** |
[1019.6,1262.9] | [107835.1,123022.1] | [16061.6,17871.5] |
Quarter 5 | 1040.5*** | 141476.0*** | 21105.7*** |
[898.4,1182.6] | [132526.8,150425.3] | [20063.9,22147.5] |
Quarter 6 | 1537.2*** | 191049.2*** | 28743.1*** |
[1362.4,1711.9] | [179555.7,202542.7] | [27401.6,30084.6] |
Quarter 7 | 1694.2*** | 223054.1*** | 35551.5*** |
[1480.6,1907.7] | [210010.3,236097.8] | [33974.1,37129.0] |
Quarter 8 | 1849.4*** | 258663.2*** | 42837.9*** |
[1611.1,2087.8] | [244247.9,273078.5] | [40996.6,44679.2] |
[^cons] | -31575.2*** | 1059467.1** | -39613.7 |
[50365.9,-12784.5] | [29316.3,2089617.9] | [-165405.8,86178.4] |
_n | 1664 | 1664 | 1664 |
R^2 | 0.396 | 0.386 | 0.618 |

**Notes:** 95% confidence interval in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table G.12 presents the results of the analysis of the determinants of the logged level of uptake of the grouped medicines, using all eight quarters of data from the Innovation Scorecard. Transforming prescription volumes onto the logarithmic scale for this analysis reduces the skewness observed in the raw data. For the acute coronary syndrome medicines, prescribing volumes are significantly related to the proportion of a CCG’s population with a long-standing health condition, the average number of employees in a CCG and net expenditure. Prescription volumes are positively related to the proportion of the population reporting a long-standing health condition, with a one percentage point increase in the proportion of a CCG’s population who reported a long-standing health condition associated with a 5.6 per cent increase in prescribing volumes. Net expenditure is also positively related to prescribing volumes, with a 1 per cent increase in net expenditure associated with a 0.189 per cent increase in the volume of prescriptions of diabetes group medicines. Prescribing volumes are negatively related to the number of
employees in a CCG. The quarter dummies are all positive and statistically significant, indicating that prescription volumes steadily increased over the time period analysed.

For the diabetes group medicines, the proportion of a CCG’s population that is under the age of 18 is again positively related to prescribing volumes. Net expenditure is also found to have a negative relationship with prescribing volumes. QOF scores are found to have a weak negative relationship with prescribing volumes, significant only at the 10% level. The quarter dummies are all positive and statistically significant. The magnitude of these dummies increases over time, indicating again that prescription volumes consistently increased over the period analysed.

For the NOACs, population age structure, deprivation, the proportion of the population with a long-standing health condition and CCGs’ assurance ratings were all found to be significantly related to prescription volumes. Prescription volumes were higher in CCGs with a larger proportion of the registered population aged over 65, with prescription volumes increasing by 3.5 per cent for every one percentage point increase in the proportion of the population falling in that age bracket. We detected a negative relationship with deprivation, meaning that CCGs in more deprived areas had lower prescribing rates. Prescription volumes were found to rise with the proportion of the population reporting a long-standing health condition, with NOAC prescribing volumes increasing by 3.5 per cent for every one percentage point increase in the proportion of a CCG’s registered population who reported a long-standing health condition. CCGs with a rating of ‘Not assured, intervention required’ were found to have significantly lower levels of NOACs prescribing than those receiving a rating of ‘Assured with support’. Once more, we detected a positive time trend in prescription volumes, with the quarter dummies indicating that prescription volumes consistently increased over the period.

Table G.12: Relationship between CCG and population characteristics, and logarithmic value of uptake in grouped medicines

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Acute coronary syndrome</th>
<th>Diabetes</th>
<th>NOAC primary care</th>
</tr>
</thead>
<tbody>
<tr>
<td>% aged under 18 years</td>
<td>0.022</td>
<td>0.0812***</td>
<td>0.00089</td>
</tr>
<tr>
<td></td>
<td>[0.00965, 0.0536]</td>
<td>[0.0274, 0.135]</td>
<td>[0.0333, 0.0351]</td>
</tr>
<tr>
<td>% aged over 65 years</td>
<td>0.00574</td>
<td>0.0247</td>
<td>0.0350**</td>
</tr>
<tr>
<td></td>
<td>[0.0308, 0.0423]</td>
<td>[0.0471, 0.0965]</td>
<td>[0.000567, 0.0693]</td>
</tr>
<tr>
<td>Index of Multiple Deprivation Score</td>
<td>0.00886</td>
<td>0.00317</td>
<td>-0.0134**</td>
</tr>
<tr>
<td></td>
<td>[0.00233, 0.0201]</td>
<td>[0.0175, 0.0238]</td>
<td>[0.0241, 0.00276]</td>
</tr>
<tr>
<td>QOF score</td>
<td>0.0132</td>
<td>-0.0350*</td>
<td>0.00416</td>
</tr>
<tr>
<td></td>
<td>[0.00820, 0.0346]</td>
<td>[0.0721, 0.00208]</td>
<td>[0.0174, 0.0257]</td>
</tr>
<tr>
<td>% in nursing home</td>
<td>0.173</td>
<td>0.321</td>
<td>0.0871</td>
</tr>
<tr>
<td></td>
<td>[0.104, 0.449]</td>
<td>[0.169, 0.812]</td>
<td>[0.178, 0.352]</td>
</tr>
<tr>
<td>% with long-standing health condition</td>
<td>0.0564***</td>
<td>-0.0146</td>
<td>0.0351**</td>
</tr>
<tr>
<td></td>
<td>[0.0278, 0.0851]</td>
<td>[0.0797, 0.0506]</td>
<td>[0.00587, 0.0644]</td>
</tr>
<tr>
<td>Determinant</td>
<td>Acute coronary syndrome</td>
<td>Diabetes</td>
<td>NOAC primary care</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>% living in a rural area</td>
<td>0.000439</td>
<td>-0.00263</td>
<td>-0.000921</td>
</tr>
<tr>
<td></td>
<td>[0.00277,0.00365]</td>
<td>[0.00805,0.00280]</td>
<td>[0.00370,0.00186]</td>
</tr>
<tr>
<td>Log of total population</td>
<td>-0.000725</td>
<td>0.0364</td>
<td>-0.0914*</td>
</tr>
<tr>
<td></td>
<td>[0.116,0.115]</td>
<td>[0.154,0.227]</td>
<td>[0.195,0.0123]</td>
</tr>
<tr>
<td>Average number of employees in CCG</td>
<td>-0.00147**</td>
<td>0.00141</td>
<td>0.000169</td>
</tr>
<tr>
<td></td>
<td>[0.00270,0.000248]</td>
<td>[0.00105,0.00387]</td>
<td>[0.00113,0.00146]</td>
</tr>
<tr>
<td>Expenditure target met</td>
<td>0.0181</td>
<td>0.104</td>
<td>-0.0668</td>
</tr>
<tr>
<td></td>
<td>[0.0934,0.130]</td>
<td>[0.186,0.394]</td>
<td>[0.196,0.0624]</td>
</tr>
<tr>
<td>Log of net expenditure</td>
<td>0.189**</td>
<td>-0.335**</td>
<td>0.0683</td>
</tr>
<tr>
<td></td>
<td>[0.0356,0.343]</td>
<td>[0.657,0.0120]</td>
<td>[0.0854,0.222]</td>
</tr>
<tr>
<td>Assured</td>
<td>0.104</td>
<td>0.0682</td>
<td>0.0176</td>
</tr>
<tr>
<td></td>
<td>[0.0668,0.274]</td>
<td>[0.191,0.327]</td>
<td>[0.148,0.184]</td>
</tr>
<tr>
<td>Not assured, intervention required</td>
<td>-0.00747</td>
<td>0.141</td>
<td>-0.291***</td>
</tr>
<tr>
<td></td>
<td>[0.200,0.186]</td>
<td>[0.184,0.466]</td>
<td>[0.479,0.102]</td>
</tr>
<tr>
<td>CCG in the North of England</td>
<td>0.111</td>
<td>0.222</td>
<td>-0.0293</td>
</tr>
<tr>
<td></td>
<td>[0.0477,0.269]</td>
<td>[0.0681,0.511]</td>
<td>[0.176,0.117]</td>
</tr>
<tr>
<td>CCG in the Midlands or East of England</td>
<td>0.00617</td>
<td>0.0645</td>
<td>-0.0736</td>
</tr>
<tr>
<td></td>
<td>[0.145,0.158]</td>
<td>[0.244,0.373]</td>
<td>[0.223,0.0758]</td>
</tr>
<tr>
<td>CCG in London</td>
<td>0.0368</td>
<td>-0.0156</td>
<td>-0.135</td>
</tr>
<tr>
<td></td>
<td>[0.145,0.219]</td>
<td>[0.314,0.283]</td>
<td>[0.305,0.0342]</td>
</tr>
<tr>
<td>Quarter 2</td>
<td>0.0829***</td>
<td>0.284***</td>
<td>0.246***</td>
</tr>
<tr>
<td></td>
<td>[0.0693,0.0965]</td>
<td>[0.263,0.305]</td>
<td>[0.235,0.257]</td>
</tr>
<tr>
<td>Quarter 3</td>
<td>0.148***</td>
<td>0.514***</td>
<td>0.473***</td>
</tr>
<tr>
<td></td>
<td>[0.128,0.169]</td>
<td>[0.481,0.546]</td>
<td>[0.455,0.492]</td>
</tr>
<tr>
<td>Quarter 4</td>
<td>0.216***</td>
<td>0.729***</td>
<td>0.680***</td>
</tr>
<tr>
<td></td>
<td>[0.192,0.241]</td>
<td>[0.689,0.769]</td>
<td>[0.655,0.704]</td>
</tr>
<tr>
<td>Quarter 5</td>
<td>0.208***</td>
<td>0.844***</td>
<td>0.802***</td>
</tr>
<tr>
<td></td>
<td>[0.178,0.237]</td>
<td>[0.800,0.888]</td>
<td>[0.771,0.832]</td>
</tr>
<tr>
<td>Quarter 6</td>
<td>0.284***</td>
<td>1.029***</td>
<td>0.984***</td>
</tr>
<tr>
<td></td>
<td>[0.252,0.317]</td>
<td>[0.980,1.078]</td>
<td>[0.949,1.020]</td>
</tr>
<tr>
<td>Quarter 7</td>
<td>0.309***</td>
<td>1.138***</td>
<td>1.126***</td>
</tr>
<tr>
<td></td>
<td>[0.273,0.345]</td>
<td>[1.084,1.193]</td>
<td>[1.086,1.166]</td>
</tr>
<tr>
<td>Determinant</td>
<td>Acute coronary syndrome</td>
<td>Diabetes</td>
<td>NOAC primary care</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Quarter 8</td>
<td>0.333***</td>
<td>1.249***</td>
<td>1.257***</td>
</tr>
<tr>
<td></td>
<td>[0.294,0.373]</td>
<td>[1.191,1.308]</td>
<td>[1.213,1.300]</td>
</tr>
<tr>
<td>_cons</td>
<td>0.979</td>
<td>16.78***</td>
<td>7.457***</td>
</tr>
<tr>
<td></td>
<td>[2.417,4.374]</td>
<td>[10.73,22.83]</td>
<td>[3.760,11.15]</td>
</tr>
<tr>
<td>n</td>
<td>1664</td>
<td>1664</td>
<td>1664</td>
</tr>
<tr>
<td>R²</td>
<td>0.387</td>
<td>0.333</td>
<td>0.666</td>
</tr>
</tbody>
</table>

Notes: 95% confidence interval in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.
Annex H. Methodological approach and work streams

Annex H elaborates on the work streams and associated methods adopted in this study. It discusses the aim of each work stream, the method used, the participant breakdown, how data were analysed and associated caveats (where applicable). Figure H.1 summarises work streams for Phase 1 and Phase 2 of the study.

**Figure H.1: Overview of work streams and methods used in Phase 1 and Phase 2 of this study**

### Phase 1

**Work stream 1:** Six workshops across four regions engaging 101 individuals

**Work stream 2:** In-depth key informant interviews with 120 individuals across four regional health economies

**Work stream 3:** A review of the Small Business Research Initiative (SBRI) Healthcare programme

### Phase 2

**Work stream 1:** A survey to explore priority interventions for an innovative health system, involving 256 individuals

**Work stream 2:** 77 semi-structured thematic interviews with different stakeholders in the health system

**Work stream 3:** 14 case vignettes of selected health innovations

**Work stream 4:** Seven stakeholder-specific workshops with 71 individuals

**Work stream 5:** A review of scholarly literature and policy-related documents

**Work stream 6:** An analysis of indicators for evaluating innovation performance

**Work stream 7:** A quantitative analysis of population-level factors associated with the uptake of innovative medicines

**Work stream 8:** Continual engagement with policymakers and wider stakeholders to ensure timely learning and exchange

### Cross-analysis and synthesis

The research received ethical approval from the Alliance Manchester Business School at the University of Manchester, where one of the study principal investigators is located, and HRA approval (IRAS 193979).
Across Phase 1 and Phase 2 of the study, through the various methods employed there were 670 contributions from a wide range of different stakeholders. Table H.1 provides the breakdown of individual contributions by stakeholder group.¹

Table H.1: Breakdown of contributions by stakeholder group (Phase 1 and Phase 2)

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Total number of individual contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation and improvement networksᵃ</td>
<td>169</td>
</tr>
<tr>
<td>Healthcare providers and commissioners</td>
<td>232</td>
</tr>
<tr>
<td>Charities and patient and public involvement organisations</td>
<td>62</td>
</tr>
<tr>
<td>Private sector</td>
<td>77</td>
</tr>
<tr>
<td>Academics</td>
<td>67</td>
</tr>
<tr>
<td>Policymakers</td>
<td>39</td>
</tr>
<tr>
<td>Otherᵇ</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>670</strong></td>
</tr>
</tbody>
</table>

**Notes:**

ᵃ Examples in this stakeholder category include individuals from institutions such as Academic Health Science Networks (AHSNs), Vanguards, Innovation Hubs, Test Beds, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) and other regional network initiatives.

ᵇ Examples in this stakeholder category include individuals from local organisations (e.g. local councils), NHS Innovation Accelerator fellows, individuals matching more than one of the mentioned categories or interviewees who wished to remain anonymous.

H.1. Phase 1

The methods used in Phase 1 are described in detail in Lichten et al. (2017) and Marjanovic, Sim et al. (2017b). A brief overview of the three work streams of Phase 1 is provided in the following sections.

H.1.1. Work stream 1: Regional workshops

**Aim**

In four workshops in selected regional health economies – the East of England, Greater Manchester and the North West Coast, South West of England and University College London Partners (UCLP) – we aimed to:

- ‘Explore a shared understanding of how innovation (development, adoption, diffusion) works in practice in participants’ professional contexts and region.'

¹ In both Phase 1 and Phase 2, some individual stakeholders contributed to several work streams of the study.
• Reflect participants’ experiences and views on ‘big ticket’ issues that affect healthcare innovation and its impact on patients and on the productivity and quality of NHS care. These included issues related to:
  o Different aspects of healthcare pathways (primary, acute, community healthcare)
  o Different types of innovation (drugs, devices and technology, service innovation).

• Share participants’ perspectives on best practice for supporting innovation activity in each region:
  o What works well, where scale-up is needed, what the gaps are.
  o Practical actions individuals and organisations can take to improve the innovation environment.
  o Implications for regional and national policy.

• Refine the questions/issues to examine in our research, based on participants’ experiences and needs for evidence’ (Marjanovic, Sim et al. 2017b, 10).

**Approach, timeline and participants**
Through desk research, document review and consultation with representatives from the Department of Health and Social Care, the Office for Life Sciences, NHS England and experts from our own networks, the study team identified the four regional health economies to be studied in depth. Between March and June 2016, six workshops were held across the four regions (one each in the East of England and UCLP, and two workshops each in Greater Manchester/North West Coast and in the South West of England). In total, 101 individuals from a wide range of stakeholder groups – commissioners, healthcare providers (acute, primary and community care), private sector representatives, academics and researchers, patient representatives, stakeholders from charity and patient and public involvement (PPI) bodies and groups, and local authority representatives – participated in the workshops.

The workshops explored the key aims outlined above. Study team members produced detailed memoranda for each workshop. The documents and the data from the stakeholder interviews (see Section H.1.2) were analysed within and across regions and stakeholder groups, as well as within and across the six drivers of innovation identified as part of the study (skills, capabilities and leadership; motivations and accountabilities; the information and evidence environment; relationships and networks; patient and public involvement and engagement; and funding and commissioning) (Marjanovic, Sim et al. 2017b).

**Caveats**
The selection of workshop participants was largely based on inviting stakeholders who were in some way engaged with innovation and supportive of it. We are aware that other stakeholders – in and around the NHS – may not be enthusiastic or even cynical when it comes to health innovation. However, the focus of this work stream was on understanding the enablers of innovative practice in the health system, and thus we prioritised gaining insights from innovation-supportive individuals. Nonetheless, workshop participants shared a wide range of insights on barriers and needs in the health system they have observed or learned from others, which were further followed up in other work streams.

We also acknowledge that some interviewees’ views may have been influenced by their professional roles and organisations, and that the views and experiences shared are not necessarily representative of all actors in the innovating health system in England.
However, the diversity and number of stakeholders we have consulted with in other work streams provided rich sources of evidence and depth to the overall findings.

H.1.2. Work stream 2: Key informant interviews

Aim
The study team conducted interviews with stakeholders from the four regional health economies to explore different regional dynamics in more depth (Marjanovic, Sim et al. 2017b, 11).

Approach, timeline and participants
The interviews followed semi-structured interview protocols exploring stakeholders’ perspectives on the available and needed skills, capabilities and relationships for innovation; incentives and accountabilities; information and resources; funding, commissioning and procurement; the role of patient and public involvement and engagement; and examples of innovation efforts’ impact. The interviews aimed to discover the associated challenges and opportunities related to innovation as well as stakeholders’ views on what is needed to enable health innovation and on potential solutions.

Interviewees were selected based on learning from the regional workshops and through consultation with AHSNs and other networks in the regions. The selection aimed to ensure a balance of different stakeholder groups and organisations (representatives of commissioning, providers, charity and PPI, academics and researchers, networks and other innovation institutions, and the private sector). Overall, we conducted 120 interviews (30 for each regional health economy) by telephone, lasting between 40 and 70 minutes. The interviews were fully transcribed and thematically analysed using NVivo 10. The study team developed a coding framework based on the main research questions of the study and the interview protocols, which was regularly adapted, refined and reflected upon. In a further step, the interview data and the workshop memoranda (see Section H.1.1) were cross-analysed within and across regions and stakeholder groups, as well as within and across the six drivers of innovation (Marjanovic, Sim et al. 2017b, 11–12).

Caveats
Similar to the workshops discussed in Section H.1.1, a caveat of this work stream is the nature of individuals interviewed, who were selected on the basis of their engagement with innovation and their support thereof. Interviewees may have been influenced by their professional identities and their views are not necessarily representative of all actors in the health system. However, given the wide diversity and number of stakeholders we have engaged with across all work streams, overall we have provided rich sources of evidence and depth to the overall findings.


Aim
This work stream focused on reviewing the aims and activities of the SBRI Healthcare programme, its outcomes and impacts as well as the opportunities and challenges it faces. Moreover, the review aimed to
explore how the programme contributes to innovation processes and how this could be improved in the future (Lichten et al. 2017, 3).

**Approach, timeline and participants**

The review was conducted between May and November 2016, and it built on semi-structured interviews and two surveys (for more details see Lichten et al. 2017, 4–6):

- Telephone interviews with 16 representatives of Academic Health Science Networks (AHSNs), the healthcare and technology industry, stakeholders from innovation networking organisations as well as the delivery team of the SBRI Healthcare programme.
- Telephone interviews with five representatives of companies that had received SBRI Healthcare funding.
- A survey of unsuccessful applicants for SBRI Healthcare funding from 2009 to 2015 (177 responses).
- A survey of successful applicants for SBRI Healthcare funding from 2009 to 2015 (45 responses).

**Caveats**

All survey data were self-reported, and it was beyond the scope of the evaluation to validate information provided by survey respondents. In addition, while the study could provide insights into the unique value and contribution to the health system, the counterfactual – i.e. what the health system would have looked like in the absence of the programme – could not be assessed. The study team aimed to mitigate this caveat by engaging with unsuccessful applicants for SBRI Healthcare funding. Finally, although the surveys had response rates of 45 per cent (survey of successful applicants) and 22 per cent (survey of unsuccessful applicants), any survey findings cannot be generalised beyond the sample (Lichten et al. 2017, 5–6).

**H.2. Phase 2**

**H.2.1. Work stream 1: Prioritisation survey**

**Aim**

An online survey sent to representatives across different stakeholder groups in the health system should enable us to identify what stakeholders consider to be the most impactful and priority interventions to support the development and uptake of innovation in the NHS. The results were used to help identify highest impact and priority actions for enhancing health system performance through innovation, as well as recommendations to be considered in future policy developments.

**Approach and timeline**

The online survey was split into six sections, each of them focusing on the six key drivers of innovation identified in Phase 1 of this study (Marjanovic, Sim et al. 2017b):

- Skills, capabilities and leadership
- Motivations and accountabilities
- The information and evidence environment
• Relationships and networks
• Patient and public involvement and engagement
• Funding and commissioning.

For each of the six drivers we presented a series of activities and initiatives identified during Phase 1 of this study that are taking place in the health system both nationally and regionally, to support receptive and connected places for innovation development and uptake. We asked respondents to select those that they felt were most likely to lead to impact as well as to rank the sustainability and the scalability of the selected initiatives. Respondents could also provide examples of initiatives they thought worked particularly well or not as well as intended. The survey also included additional questions about the sources of information respondents use as well as where they think patients go to obtain information on innovation.

The survey was implemented using the online survey tool SurveyMonkey\(^2\) and distributed by email to approximately 955 individuals spanning healthcare professionals and providers, members of innovation and improvement networks, commissioners, academics, private sector representatives and policymakers.

The survey was open for 7.5 weeks. It was launched on 13 June 2017 and closed on 4 August 2017. Reminders were sent to invitees every two to three weeks. When piloted, the full survey covering all six themes took approximately 30 minutes to complete. In order to maximise the response rate, we therefore made two separate surveys, which each asked questions from three of the six themes, thus decreasing the time needed to complete the survey to 15 minutes. In addition, we gave an option to answer the questions on the other three themes if desired. The two surveys asked the two sets of questions in the opposite order. This approach led to different numbers of responses to each section (between 135 and 137 responses), and potentially a different breakdown of stakeholders. To minimise the effects of this, with one exception we split each stakeholder type randomly into two groups when sending out the survey, so roughly half from each stakeholder type received the first version of the survey, and roughly half received the second version. Invitees from the stakeholder group involved in patient and public involvement and engagement all received the version of the survey that had the section on patient and public involvement and engagement in the first half of the survey.

The survey was analysed quantitatively and qualitatively. Quantitative analysis of the survey data was conducted in R.\(^3\) For the qualitative analysis, broad analytical categories were developed for each question and responses were mapped into these categories and then analysed.

**Participants**

Overall, 256 people responded to the survey. The stakeholder groups and numbers of respondents in each group are presented in Table H.2. Survey invitees were identified using contacts from Phase 1 of this study, using publicly available resources to add members of key innovation, quality improvement and health research networks (such as AHSNs, Vanguards, CLAHRCs, Test Beds, Innovation Hubs), snowballing approaches and suggestions from our project working group.

\(^2\) https://www.surveymonkey.com/

\(^3\) R is a statistical programming language (see https://cran.r-project.org/ for more information).
Table H.2: Breakdown of stakeholder groups for all survey respondents

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Number of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation and improvement networks(a)</td>
<td>69</td>
<td>27.0%</td>
</tr>
<tr>
<td>Healthcare professionals and providers</td>
<td>66</td>
<td>25.8%</td>
</tr>
<tr>
<td>Commissioning</td>
<td>32</td>
<td>12.5%</td>
</tr>
<tr>
<td>Charity and public and patient voice</td>
<td>23</td>
<td>9.0%</td>
</tr>
<tr>
<td>Private sector</td>
<td>25</td>
<td>9.8%</td>
</tr>
<tr>
<td>Academics</td>
<td>24</td>
<td>9.4%</td>
</tr>
<tr>
<td>Policymakers</td>
<td>15</td>
<td>5.9%</td>
</tr>
<tr>
<td>Other(b)</td>
<td>2</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>256</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Notes:
\(a\) Examples in this stakeholder category include individuals from institutions such as AHSNs, Vanguards, Innovation Hubs, Test Beds, CLAHRCs and other regional network initiatives.
\(b\) The ‘Other’ category represents individuals who indicated that they matched more than one category as well as those who did not give a response that was mappable to our categories.

Caveats
The survey was sent to a list of individuals known to be involved in innovation activities in the NHS. While we attempted to include contacts from national innovation activities (e.g. AHSNs, Vanguards), and also allowed the survey to be distributed by recipients to other individuals who may be interested, the list as well as the overall sample of respondents is not representative of all types of individuals involved in innovation activities.

Individuals were asked to identify their primary stakeholder group and this grouping is used throughout the analysis. It should be noted that respondents may have been influenced by their individual or organisations’ role. Moreover, as some of the groups are very small (private sector representatives (n=25), academics and researchers (n=24), charity and public and patient voice representatives (n=23), and policymakers (n=15)), caution should be taken when interpreting the results.

For each driver we gave individuals the opportunity to identify initiatives they thought had gone particularly well or particularly poorly. While respondents were also asked for reasons for the reported performance of the initiatives, the majority of respondents only identified the initiative and did not provide an explanation.

In each section respondents were asked to select three out of a number of options that they think have the greatest potential for impact.\(^4\) It is important to note that if it is assumed that each option has equal potential for impact (and therefore each respondent chooses from the options randomly) then each answer would be expected to be chosen by a certain percentage of respondents. For example, if there were seven

\(^4\) Each section listed between seven and ten options.
options, and each person selected three initiatives randomly, then each answer would be selected 43 per cent of the time. For this reason we commented in our analysis particularly on options that had been selected more, or less, than if initiatives were selected randomly.

H.2.2. Work stream 2: Thematic stakeholder interviews

Aim
The aim of the semi-structured interviews with different stakeholders in the health system (representatives of innovation and improvement networks, healthcare providers and commissioners, charities and patient and public involvement organisations, the private sector, academics and policymakers) was to:

- Better understand how distinct stakeholder groups can engage with health innovation (covering the entire pathway – from development to uptake and spread) most effectively, given their interests, roles and capacities in the health system, including in relation to current policy developments and initiatives in the field of health innovation.
- Learn how the evolving policy landscape may be improved to contribute more effectively to an innovative health system.
- Identify areas for policy intervention and associated practical actions.
- Explore how common or unique the perspectives and experiences of distinct stakeholder groups are.

Approach and timeline
The interviews in this study followed semi-structured protocols that contained a core set of questions that were asked in all interviews as well as more tailored questions related to the stakeholder affiliation of the interviewees (see Section B.8 for the protocols).

Interviews were conducted by telephone between September 2017 and March 2018. The majority lasted between 40 and 60 minutes and were conducted with one individual each, except for one interview that involved two individuals. All interviews were audio recorded and transcribed to allow an in-depth analysis of the data obtained.

Each interviewee provided informed consent prior to the interviewee using an online consent form. In line with the Data Protection Act 1998 as well as conformant with ISO 27001 to protect personal data, interviewees consented before the interview to audio recording and gave a preference regarding how their data should be attributed in any resulting publications (i.e. anonymity, full or partial attribution).

Overall, the analysis of the interviews was thematic (Braun & Clarke 2006). The study team developed an initial analysis template that followed the protocol questions, but also included space for other emerging themes. The template was regularly refined during the analysis process. In a first step, responses relating to each of the sections in the analysis template were analysed, followed by a higher-level analysis across sections during a study team workshop. Data were analysed for each stakeholder group to identify

---

5 All of the interviews conducted for this study were completed in April 2018 and thus before the EU General Data Protection Regulation (GDPR) 2018 was fully implemented in the UK.
stakeholder-specific themes, and then cross-analysed to facilitate cross-sector learning. The cross-analysis followed the same template as used for the stakeholder-specific analysis.

**Participants**
The stakeholder groups and numbers of interviewees in each group are presented in Table H.3. They were identified through a combination of mechanisms, including: Phase 1 insights, snowballing approaches, our own professional networks, leads from the literature and discussions with our project working group.

**Table H.3: Breakdown of stakeholder groups for thematic interviews**

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Number of interviews</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation and improvement networks</td>
<td>10</td>
<td>13.0%</td>
</tr>
<tr>
<td>Healthcare providers and commissioners</td>
<td>21</td>
<td>27.3%</td>
</tr>
<tr>
<td>Charities and patient and public involvement organisations</td>
<td>14</td>
<td>18.2%</td>
</tr>
<tr>
<td>Private sector</td>
<td>8</td>
<td>10.4%</td>
</tr>
<tr>
<td>Academics</td>
<td>13</td>
<td>16.9%</td>
</tr>
<tr>
<td>Policymakers</td>
<td>11</td>
<td>14.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Note:
* Examples in this stakeholder category include individuals from institutions such as AHSNs, Vanguards, Innovation Hubs, Test Beds, CLAHRCs and other regional network initiatives.

**Caveats**
A considerable effort was made to ensure a balanced geographical spread of interviewees, in order to reflect region-specific ideas, experiences, problems and approaches. However, this proved difficult in some cases (e.g. with healthcare providers). Although we were not looking for statistical representativeness, but rather for diversity of perspectives, we considered this limitation in the analysis of our data, particularly in light of the regional differences that may have an impact on the innovation landscape (described in more detail in Marjanovic, Sim et al. (2017b)).

Although we involved a wide range of different stakeholders, the views and experiences expressed in the interviews are not necessarily representative of all actors in the innovating health system in England. However, the diversity and number of stakeholders we have consulted provided a rich source of evidence and depth to the findings, especially in combination with the other work streams and methods.

The selection of interviewees relied on a combination of our own very extensive and diverse contacts with the health and innovation landscape and the recommendations of our project working group, which includes representatives from diverse national bodies (such as NHS England, the Office for Life Sciences, and the Department of Health and Social Care). This was complemented with a snowballing approach. Our network contacts often helped us identify individuals in roles we were targeting (rather than suggesting individuals based only on their personal knowledge of them). To limit bias in conducting the
interviews as well as in interpretation of the data, all interviewers followed a consistent protocol and data were analysed using a standardised coding template. At analysis stages, individuals discussed the way they coded and interpreted data (including at meetings and workshops) to add an additional layer of consistency in the data analysis.

**H.2.3. Work stream 3: Case vignettes**

**Aim**

Qualitative case vignettes on 14 health innovations (selected in collaboration with the project working group) were conducted to help explore the enablers of innovating in the health system, with a particular interest in the whole pathway approach from development to uptake and spread. The case vignettes served to complement the workshop, interviews, survey and literature review packages and add further life to the thematic insights gained in prior work streams. The focus on particular innovations enabled us to identify the often subtle processes, dynamics and contextual influences of how and why an innovation is developed, taken up and spread as well as to better understand why there are variations in the uptake of innovations.

**Approach and timeline**

We initially aimed to explore the uptake of specific innovations across the four regional economies selected in Phase 1 of this study (East of England, Greater Manchester and the North West Coast, South West of England and University College London Partners (UCLP)). The aim of this approach was to enable an examination of regional variation in uptake of the same set of innovations. Our focus was on five types of NHS Innovation Scorecard and NICE-approved innovations, which were selected in collaboration with the Department of Health and Social Care, NHS England and the Office for Life Sciences, based on the project working group’s interest in exploring Innovation Scorecard innovations of different types and the request to avoid studying innovations being covered by other evaluative work taking place (e.g. NHS Innovation Accelerator programme evaluation). However, following repeated efforts to secure interviewees (through direct and repeated approaches via telephone and email over time, through support letters from senior officials, through mobilising personal networks and via intermediary institutions), this approach was adapted as we could not secure requisite participation. The reasons for this ranged from individuals not having time to engage with these case studies, individuals having moved on to other posts and the datedness of innovations for which scorecard data were available not making them top of the agenda.

In discussion with the Department of Health and Social Care, NHS England and the Office for Life Sciences, we adapted our case vignette approach in November 2017: we included two innovations from the original set, but focused on newer innovations for which there was at present more policy support and greater interest amongst stakeholders. This new approach still followed the same overarching aim to

---

6 Denosumab, a monoclonal antibody used for the treatment of osteoporosis and other osseous diseases; Debrisol wound pad; Implantable cardioverter defibrillators and cardiac resynchronisation therapies for arrhythmias and heart failure; drug-eluting stents for the treatment of coronary artery disease; and digital mental health apps using computerised cognitive behaviour therapy (cCBT) approaches.
develop an improved understanding of effective practices and enablers of innovations in the health system as well as to identify practical future actions. However, given the challenges of ensuring participation from providers and commissioners in specific regions, we pursued case vignettes with a more flexible approach to the region from which those who could speak to the core issues of interest came from. This meant that we were less able to consider regional differences and variation through the case studies, but that we were able to obtain sufficiently detailed accounts of the key processes, enablers and challenges associated with the pathway innovators took to enter the health system in the UK, and specifically England, and to focus attention on particular challenges to adoption and spread as well as to explore the influence of current policy initiatives.

In total, we produced 14 case vignettes on innovations selected in discussion with the Department of Health and Social Care, NHS England and the Office for Life Sciences. The selection was based on: (1) an effort to consider a mix of innovation types; (2) a focus on innovations considered to be of particular policy relevance at the time of the research; (3) an effort not to duplicate research on innovations covered in other reports and case studies; and (4) a focus on innovations where we could secure participation from stakeholders in the innovator and NHS adopter communities. They include innovations with a positive NICE approval. Based on suggestions by workshop participants, we included additional promising innovations.

The interviews were conducted following semi-structured protocols, which enabled us to ask follow-up questions and tailor the questions to the individual. Overall, we developed three different protocols, one each for innovators, commissioners and provider representatives (see Section C.17 for the protocols). The interviews explored the timelines of the development of the innovation as well as their entry into the health system; the reasons behind the development, commissioning or introduction into a Trust; any barriers and enablers observed along the pathway of the innovations; the role of potential drivers such as national guidance, policy initiatives, NICE recommendations, available evidence, funding, recommendations, etc., for the uptake and rollout; approaches to pricing and funding; return on investments and health economy analyses; and the impact of the policy landscape in England on development, uptake and spread.

The interviews were conducted by telephone between September 2017 and April 2018. Most lasted between 30 and 65 minutes and were conducted with one individual each, except for four interviews that involved two individuals. Similar to the thematic stakeholder interviews, interviewees provided informed consent prior to the interviewee using an online consent form, in line with the Data Protection Act 19987 as well as conformant with ISO 27001 to protect personal data. All interviews were audio recorded and transcribed by the study team.

The write-up of the case vignettes followed the structure of the interview protocols. Information obtained through the interviews was supplemented by additional desk research on the innovations and disease areas they are addressing as well as by any references and data (e.g. information on return on investment) given in the interviews.

---

7 All of the interviews conducted for this study were completed in April 2018 and thus before the EU General Data Protection Regulation (GDPR) 2018 was fully implemented in the UK.
Participants
The stakeholder groups and numbers of interviews for each case vignette are presented in Table H.4.

Table H.4: Breakdown of interviews per stakeholder group for the case vignettes

<table>
<thead>
<tr>
<th>Innovation</th>
<th>Innovators</th>
<th>Commissioners</th>
<th>Providers</th>
<th>Others*</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-sensitivity troponin assays</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote cardiac monitoring devices</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-step nucleic acid amplification (OSNA) for sentinel lymph node intra-operative molecular analysis</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostatic urethral lift for treating benign prostatic hyperplasia (UroLift®)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug-eluting stents</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kooth</td>
<td>3*</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sleepio</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MoodGYM</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHS Blood Donor Chair</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cascade model for genetic testing of Familial Hypercholesterolemia</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>ENDOCUFF VISION™</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuing Healthcare Checklist and the Decision Support Toolkit (CHC2DST)</td>
<td>1</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SecurAcath</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>HeartFlow FFRcT Analysis</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>8</strong></td>
<td><strong>11</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

Note:
* This category includes interviewees who wished to remain anonymous and those who were neither innovators, commissioners nor providers, but, for example, networkers or private sector representatives.

Interviewees were identified using publicly available sources (e.g. websites of innovators or Trusts), suggestions made by AHSN contacts as well as by workshop participants, snowballing approaches, our own professional networks, leads from the literature and in discussion with our project working group. Each case vignette includes insights from one to seven interviews. We used several methods to find interviewees from each stakeholder group as well as additional interviewees for each case vignette, including asking interviewees to suggest other potential interviewees or to establish contact with them.

---

* One person redacted their interview; the interview was thus not included in the analysis.
contacting potential interviewees using publicly available contact details (e.g. from websites of Trusts), reaching out to Trust and CCG representatives via AHSN representatives, and using our own networks.

Caveats
Although we tried to engage with as many individuals as possible for each of the case vignettes and attempted to ensure a balance between innovators, commissioners and providers, some case vignettes only include information from the innovators’ perspective. We have considered this limitation in the analysis and the write-up (see Table H.4 for an overview of interviewees for each case vignette).

In addition, as individuals’ involvement with an innovation dates back several years in some cases, the information shared was based on recollection. To overcome this limitation, we have conducted additional desk research to confirm some of the information (e.g. timelines) provided.

H.2.4. Work stream 4: Stakeholder-specific workshops

Aim
We conducted stakeholder-specific workshops with representatives of six different stakeholders in the health system (representatives of innovation and improvement networks, healthcare providers and commissioners, charities and patient and public involvement organisations, the private sector, academics and policymakers), mobilising their unique expertise and experiences in order to explore solutions and practical actions to be taken to strengthen innovation in health and care delivery.

Approach and timeline
The workshops were held with individual stakeholder groups to allow for in-depth discussions and to identify stakeholder-specific needs and practical actions. The seven workshops took place in December 2017 and January 2018 and lasted between four and a half and five hours each. They followed a structured agenda and included short presentations by the study team and both plenary and smaller group discussions. A detailed indicative workshop agenda is provided in Section D.11. The sessions of the workshop explored the following areas:

- Presentation on the project and its findings at the time of the workshop.
- Prioritising and delivering practical initiatives to build a supportive innovation environment in the health system.
- A policy-focused discussion to explore how drivers of health innovation can interact with policy developments to ensure a mutually reinforcing and effective system.

Members of the study team took detailed notes during the workshops. The agenda sessions served as a guiding structure for analysing the workshop insights and writing workshop memoranda. The documents were analysed within and across stakeholder groups as well as within and across the six drivers of innovation identified in Phase 1 of this study (Marjanovic, Sim et al. 2017b). Insights were coded in terms of areas of action, and within them what needs to be done and how, with reference to which stakeholder groups the insights applied. The key insights were circulated to the study team and then discussed in a series of internal workshops, where they were refined and further developed.
Participants
Overall, we conducted seven workshops. A further eighth workshop was planned to engage with CCG, provider and healthcare professional representatives from the northern regions of England, but despite our efforts we could not recruit a sufficient number of participants.

Each of the workshops involved five to 14 individuals. Overall, 596 people were invited, of which 71 attended a workshop. Participants were identified using multiple sources, including contacting individuals involved in Phase 1 of this study, snowballing approaches, our own professional networks, leads from literature and in discussion with our project working group.

Table H.5 provides an overview of the workshops as well as the numbers of participants.

Table H.5: Overview of the stakeholder-specific workshops

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Workshop date</th>
<th>Location</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation and improvement networks*</td>
<td>4 December 2017</td>
<td>London</td>
<td>10</td>
</tr>
<tr>
<td>Private sector</td>
<td>8 December 2017</td>
<td>London</td>
<td>14</td>
</tr>
<tr>
<td>Charities and patient and public involvement organisations</td>
<td>13 December 2017</td>
<td>London</td>
<td>8</td>
</tr>
<tr>
<td>Academics</td>
<td>10 January 2018</td>
<td>London</td>
<td>13</td>
</tr>
<tr>
<td>Policymakers</td>
<td>11 January 2018</td>
<td>London</td>
<td>13</td>
</tr>
<tr>
<td>Healthcare providers and commissioners based in and around London</td>
<td>16 January 2018</td>
<td>London</td>
<td>5</td>
</tr>
<tr>
<td>Healthcare providers and commissioners based in the South West</td>
<td>18 January 2018</td>
<td>St Mellion (East Cornwall)</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>

Note:
*a Examples in this stakeholder category include individuals from institutions such as AHSNs, Innovation Hubs and other regional network initiatives.*

Caveats
Similar to the caveat described for the semi-structured interviews (see Section H.2.2), despite our attempts to engage with stakeholders from across England, we could not ensure a balanced geographical spread of participants, and we could not engage any CCG and healthcare providers from the northern regions of England. This limitation has been reflected in the analysis of this study.

While we were able to collect views and experiences from a wide range of stakeholders, we acknowledge that workshop participants’ views may also have been influenced by their individual roles and organisations, and thus the outcomes of the workshops are neither representative of the respective stakeholder groups nor of all actors in the innovating health system in England. Moreover, we are aware that some individuals might be unwilling to speak in front of others about sensitive topics, and that some individuals may be more ‘dominant’ than others in group discussions. To ensure that all workshop participants have the opportunity to contribute to the discussions, members of the study team led smaller
group and plenary discussions and encouraged all individuals to share their insights. We also invited all participants to an interview to follow up on the workshop discussions and to gain more in-depth insights on their views.

However, the diversity and number of individuals across the stakeholder types we have engaged with provided valuable insights, which provide especially rich evidence in combination with the other work streams and methods.

H.2.5. Work stream 5: Review of scholarly literature and policy-related documents

Aim

A review of scholarly literature and recent policy-related documents focusing on innovation in health was used to help identify issues of interest for further exploration in the interview and workshop elements of the study, as well as to enable triangulation of primary data collected through this study against the existing knowledge base.

Approach and timeline

This work stream was an ongoing task to enable mapping of the current health policy landscape in England as well as to reflect the most recent academic literature on health innovation thinking. While we considered more general health policies not specifically or only partly addressing health innovation, we focused our in-depth review on selected recent policies with most relevance to health innovation, as informed by the stakeholders we consulted and our project working group. The selection of these initiatives was based on the policies’ currency (i.e. only active or future initiatives), suggestions made by participants in Phase 1 of the study as well as on priorities identified by the Department of Health and Social Care and the Office for Life Sciences.

The study team conducted an initial literature review in 2017 and updated it with relevant publications in early 2018. We restricted our search to literature published in English, using selected search terms. The initial search was conducted on Google Scholar using the following search terms:

- ‘health innovation’ AND ('skill*' OR 'capabilit*' OR 'competence*')
- ‘health innovation’ AND 'leadership*
- ‘health innovation’ AND 'incentive*
- ‘health innovation’ AND ('information' OR 'evidence' OR 'knowledge')
- ‘health innovation’ AND ([('patient*' OR 'public*) AND 'voice')] OR [(patient** OR 'public*' OR 'service user*') AND (engagement OR 'involvement')])
- ‘health innovation’ AND 'relationship*' 'cooperation*' OR 'collaboration*' OR 'linkage*
- ‘health innovation’ AND 'network*' OR 'exchange*
- ‘health innovation’ AND ('commissioning' OR 'procurement')
- ‘health innovation’ AND ‘adoption’ AND ‘healthcare’

Two of the study team members (MS and SM) assessed the publications identified through this search according to their relevance to the topic, and 31 key publications were extracted using an extraction template based on the six drivers identified as part of this study. This was complemented with relevant literature on themes of interest from research areas with complementarities or blurred boundaries with the
innovation space (such as health services, improvement science, research policy and implementation science), resulting in an additional 91 publications identified based on research team expertise and knowledge of the relevant literatures. This resulted in a total of 122 sources, spanning publications from peer-reviewed journals and grey literature. These publications were distributed among four members of the study team (CM, EH, JC, MS) who reviewed them against the six drivers of innovation for relevance, quality and important insights. The study team produced summary documents of the reviewed literature, which were updated with ten relevant documents in early 2018 (published after the initial literature review was conducted and brought to the study team’s attention by contacts from its professional networks, resulting in a total of 132 reviewed documents), and merged to a full literature review document. Key insights from the literature review are provided in Annex E, and a summary of key health innovation policies is presented in Section 2.1 of the main report.

Caveats
Given the constantly changing national policy landscape and the evolution of academic literature and the scope of this work, we could not consider all current policies focusing on health innovation in this study. The reviewed policies as well as initiatives are thus limited to a selection of those considered to be most relevant.

Although the literature review followed a systematic approach, searches for literature were constrained compared to a systematic review (for example only including literature published in English), meaning that relevant literature may have not been identified and included. In order to mitigate this caveat, the study team engaged with individuals from its professional networks to identify potentially missed studies.

H.2.6. Work stream 6: Analysis of indicators for evaluating innovation performance

Aim
This part of the study focused on developing a better understanding of how we could measure the impact of innovation on the health system and the types of metrics that are needed.

Approach and timeline
This work stream drew on literature about ways to measure health innovation as well as on RAND Europe’s prior research and expertise in evaluating health innovation programmes (e.g. Lichten et al. 2017; Marjanovic et al. 2015; Marjanovic, Garrod et al. 2017; Marjanovic, Sim et al. 2017b) and wider research and innovation systems (Cochrane et al. 2017; Marjanovic, Cochrane et al. 2017). We provided a more robust conceptual approach to measuring innovation performance (including metrics of uptake and impact) and considered the feasibility of the metrics in light of the evolving data infrastructure. We combined desk-based research of key literature with internal team meetings and workshops to discuss the existing evidence base and bring our thought leadership and experience to the topic of health innovation metrics.

Caveats
The set of indicators is limited in the extent to which we were able to draw on and synthesise from wider published literature and our own insights. We were not able to develop, test and validate the indicators,
nor are we able to comment in detail on issues that would normally be considered in the development of indicators, including feasibility of data collection. The indicators are intended to provide a first step towards a broader, evidence-based discussion about how to measure the impact of innovation on the health system and which is reflective of the broader health innovation pathway.

**H.2.7. Work stream 7: Quantitative analysis of population-level factors associated with the uptake of innovative medicines**

**Aim**

As part of the *Innovation, Health and Wealth* strategy, the Department of Health (now the Department of Health and Social Care) aimed to drive implementation of NICE technology appraisals, and reduce variation in the uptake of recommended products. The NHS Innovation Scorecard, which provides information on the levels of variation and compliance with NICE technology appraisals, was set up to support this aim (NHS England n.d.-b). While the Innovation Scorecard reports uptake levels of medicines per 100,000 people, it does not adjust these figures for any population characteristics. This work stream aimed to analyse whether variation in uptake of innovative medicine is determined by population characteristics or CCG attributes.

The quantitative analysis of population-level factors associated with the uptake of innovative medicines was undertaken by researchers at the University of Manchester (RAND Europe researchers were not involved). Insights from this work stream were considered together with the results of the other work streams and are discussed in Chapter 12 of the main report.

**Approach and timeline**

The study team at the University of Manchester analysed the determinants of uptake for individual and grouped medicines as measured in the July 2017 release of the Innovation Scorecard.

The determinants of whether or not a CCG prescribes an innovative medicine at all may differ from the determinants of the level of prescribing amongst CCGs that have decided to prescribe innovative medicines. The analysis of individual medicines examined the determinants of these two decisions separately. Given that many CCGs reported zero uptake of some of the individual medicines, the study team examined uptake in two ways. Firstly, the determinants of the decision to partake in innovative prescribing were analysed using a binary indicator of whether the CCG prescribes any quantity of each innovative medicine. Secondly, the determinants of the level and speed of uptake of innovative prescribing amongst CCGs prescribing non-zero quantities of each innovative medicine were analysed.

The data on uptake of grouped medicines were richer, and all CCGs report prescribing non-zero quantities of the three grouped medicines we analysed. We therefore examined the determinants of the level of uptake of innovative group medicines.

**Individual medicines**

*Model 1: Determinants of the decision to partake in innovative prescribing*

As the depended variable is binary, a probit regression was used to model the relationship between the potential determinants on the probability of partaking in innovative prescribing, and include fixed effects for each of the products.
The model was run twice, first where \( y_t = 1 \) if a CCG prescribed a non-zero quantity of medicine \( i \) in the final quarter of the data (quarter 8), and secondly where \( y_t = 1 \) if a CCG prescribed a non-zero quantity of medicine \( i \) in any of the eight quarters of the data.

For ease of interpretation, marginal effects were reported. These can be interpreted as the change in the probability of partaking in innovative prescribing for a one unit change in the explanatory variable, holding all else constant. To allow for repeated observations on the same products, the standard errors in these models were clustered for each individual medicine.

**Model 2: Determinants of the extent of uptake in innovative prescribing**

The second model assessed if potential determinants were related to the level and speed of uptake, among CCGs that decided to partake in innovative prescribing among all combinations of treatment.

Firstly, the level of uptake in the final quarter of the Innovation Scorecard data (quarter 3 2016/2017) was regressed on potential determinants, where a CCG had a positive level of prescribing in the last quarter. We included fixed effects for each individual medicine, which would to some extent control for inherent differences in the absolute magnitude of uptake between treatments due to the size of the eligible population. The standard errors in these models were clustered for each individual medicine to allow for repeated observations on the same medicines.

To fully control for differences in the magnitude of uptake across treatments, which would be largely driven by the differing sizes of the eligible populations, we then generated a relative measure of volume by taking the log of uptake levels. We regressed the natural logarithmic value of uptake in the final quarter of data on potential determinants, again for CCGs that had a positive level of prescribing in the last quarter.

While these models analysed the relationship between the volume of uptake and potential determinants, it was also important to assess whether CCG characteristics are related to the speed of adoption of innovative medicines. To investigate this we calculated growth rates in levels of uptake from the first to the last quarter of data. Due to data issues we included only medicines where at least 50 CCGs reported uptake in the last period and there was a consistent series of uptake across all periods, e.g. the treatment was not approved by NICE part-way through the series. This analysis was therefore limited to 12 individual medicines.

**Grouped medicines**

As all CCGs prescribed positive values of the three grouped medicines that we examined in all quarters, we focused on analysing the characteristics which determined variations in the levels of uptake across CCGs. We focused on the following grouped medicines: acute coronary syndrome, diabetes and novel oral anticoagulants (NOACs). Given the nature of the conditions, the grouped medicines for hepatitis C and multiple sclerosis were too rarely prescribed to be included in our analysis.

**Model 3: Determinants of the growth in uptake of grouped medicines over time**

The growth in uptake of each group medicine within each CCG was modelled in two ways. Firstly, we modelled the absolute growth in uptake between the first and last quarter of the data, calculated as the level of uptake in the last quarter minus the level of uptake in the first quarter. Secondly, we modelled the
relative growth in uptake over time, calculated as the value of uptake in the last quarter divided by the value in the first quarter. Each of the three grouped medicines was analysed separately, meaning that six models were run in total. The following model was estimated:

\[ \text{growth}_i = \beta_0 + \text{determinants}_i \pi + u_i \]

Robust standard errors were used to account for the non-constant variance across observations. This was due to heterogeneity between CCGs; this would not affect the coefficients in the model but the standard errors, hence the significance level of coefficients.

**Model 4: Determinants of the extent of uptake in grouped innovative prescribing**

We modelled the level of uptake in each of the eight quarters as a function of the population and CCG characteristics, including fixed effects for observation quarter. Each of the three grouped medicines were analysed separately using the following model:

\[ \text{value}_{it} = \beta_0 + \text{determinants}_{it} \pi + \text{time}_{it} \alpha + u_{it} \]

In this model standard errors were clustered around CCGs. While uptake levels were observed at eight time points, the explanatory variables were only available at one point in time (corresponding to either the financial year 2014/2015 or the calendar year 2014). We controlled for the increasing trend in uptake over time by including fixed effects for each quarter of observation. Furthermore, since the absolute values of defined daily doses (DDDs) of medicines would be large, we then ran further models with the value of uptake transformed to the logarithmic scale to reduce the skew in the data.

**Caveats**

To identify the influences on uptake of innovative products, data that were available consistently over time and across the country were used. This had the advantage of providing representative results, but limited the analysis to the outcomes and factors that have been measured. It is possible that the significant influences on uptake identified by the analysis reflect the omission of other unmeasured factors with which they are correlated and we would therefore advise caution in their interpretation as causal influences on uptake. Nonetheless, these are factors that are associated with uptake and should therefore be taken into account when comparing uptake of innovations across areas and organisations. They may also help to identify potential barriers and enablers for further investigations.

**H.2.8. Work stream 8: Continual engagement with policymakers and wider stakeholders**

Throughout the study (Phase 1 and Phase 2), the study team engaged with and received ongoing input from a project working group with representatives from the National Institute for Health Research (NIHR) Policy Research Programme, the Department of Health and Social Care, the Office for Life Sciences and NHS England, on a formal monthly basis and through additional communications when needed. In addition, the research team engaged with academic advisors and other experts from policymaking and research bodies, for example by attending and contributing to events (e.g. ministerial roundtables, workshops organised by policymaking bodies and update meetings). Close engagement with key stakeholders throughout the study helped us ensure a relevant and adaptable study design, and a focus on ensuring the relevance of findings to the evolving policy landscape.
H.2.9. Cross-analysis and synthesis

Aim
The findings from the above described methods were analysed both within work streams as well as across them. This approach enabled us to arrive at the most relevant, feasible, sustainable and likely highest-impact actions to improve the development, uptake and spread of innovation in the health system as well as to develop pragmatic and actionable recommendations for future national and regional policy and its implementation.

Approach to Phase 2 analysis
The analysis approach for Phase 1 is described in Marjanovic, Sim et al. (2017b) and is not repeated here. The analysis of the data collected in Phase 2 followed a multi-layered approach within and across work streams. Firstly, the data were analysed within the individual work streams. The research team created an initial coding framework, drawing on the core themes that were explored in the interviews, survey and workshops, allowing also for emerging themes to capture important points that came from the interviews, but which may not necessarily have been deliberately enquired about in the core questions. The analytical approaches for each work stream are discussed in the respective Annex section (H.2.1 to H.2.7).

Secondly, we triangulated the data across work streams (all work streams for Phase 2, and key insights from Phase 1). The triangulation of the evidence from different work streams should help to test key messages and hypotheses of each work stream against available data, to identify key insights across work stream and across stakeholder groups, and to ensure that all evidence was captured and analysed appropriately. This iterative process involved all members of the study team, who worked individually, in teams of two to three people and in a series of team workshops, and allowed for a continuous refinement and assessment of the key findings as well as ensured that these are fully supported by the evidence across work streams. The cross-analysis allowed us to arrive at priority recommendations for an innovative health system, to determine what needs to be done and how, as well as to identify issues of particular relevance for specific stakeholder groups outlined in Chapter 12 of the main report.
References


Antman, Elliott, Jean-Pierre Bassand, Werner Klein, Magnus Ohman, Jose Luis Lopez Sendon, Lars Rydén, Maarten Simoons & Michal Tendera. 2000. 'Myocardial Infarction Redefined – a Consensus Document of The Joint European Society of Cardiology/American College of Cardiology Committee for the Redefinition of Myocardial Infarction: The Joint European Society of Cardiology/American College of Cardiology Committee'. *Journal of the American College of Cardiology* 36(3):959–69. doi:10.1016/S0735-1097(00)00804-4


Bray Leino. n.d. ‘BroadCare’. As of 24 March 2019: https://brayleinosoftware.co.uk/broadcare-system/


Callaghan, Gillian, & Gerald Wistow. 2006. ‘Governance and Public Involvement in the British National Health Service: Understanding Difficulties and Developments’. Social Science & Medicine 63(9):2289–300. doi:10.1016/j.socscimed.2006.05.023


408
Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes


Kerr, Marion, Robert Pears, Zofia Miedzybrodzka, Kate Haralambos, Moyra Cather, Melanie Watson & Steve E. Humphries. 2017. ‘Cost Effectiveness of Cascade Testing for Familial Hypercholesterolaemia, Based on Data from Familial Hypercholesterolaemia Services in the UK’. European Heart Journal 38(23):1832–39. doi:10.1093/eurheartj/ehx111


Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes


Innovating for improved healthcare: policy and practice for a thriving NHS – Annexes


———. 2016a. ‘Cognitive Behavioural Therapy (CBT)’. As of 24 March 2019: https://www.nhs.uk/conditions/cognitive-behavioural-therapy-cbt/


Perry, Sam V. 2008. ‘Background to the Discovery of Troponin and Setsuro Ebashi’s Contribution to Our Knowledge of the Mechanism of Relaxation in Striated Muscle’. Biochemical and


Slack, Joan. 1969. ‘Risks of Ischæmic Heart-Disease in Familial Hyperlipoproteinæmic States’. Lancet 294(7635):1380–82. doi:10.1016/S0140-6736(69)90930-1


