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Summary

Study context, purpose and methods

It is well known that healthcare in the UK, as elsewhere, faces rising demands and downward pressure on expenditure. Bridging this gap requires innovation.

RAND Europe and the University of Manchester were commissioned to conduct a study to examine the potential of innovation to respond to the challenges the NHS faces, and to help deliver efficient and effective services. 'Innovation' in this study refers to any product, technology or service that is new to the health system, or applied in a way that is new, and is aimed at delivering improved or more efficient care. This independent research was funded by the National Institute for Health Research (Evaluation of strategies for supporting innovation in the NHS to improve quality and efficiency, PR-R7-1113-22001) through its Policy Research Programme, and was developed in close collaboration with the Department of Health and Social Care, NHS England and the Office for Life Sciences. The study draws upon and adopts an innovation systems and socio-technical regimes approach to understanding healthcare innovation, and recognises the wide range of stakeholders and complex interactions involved in establishing and sustaining an innovating health system.

The study proceeded in two stages. Stage 1 examined the implementation and outcomes of the *Innovation, Health and Wealth* strategy, and its findings have been reported by Bienkowska-Gibbs et al. (2016). Stage 2 of the study examined four interrelated research questions:

1. How do organisations working in and closely with the NHS perceive and understand innovation, and how does this influence their actions?
2. Who drives and contributes to innovation and how might successful innovation have greater scale, scope and impact?
3. What practical changes to policy, culture and behaviour can support system-wide improvements to innovation pathways?
4. How can we measure the contributions of innovation to the social and economic performance of the healthcare sector?

It is important to highlight that in our analysis, we do not assume that innovation is inherently and always beneficial, but we have chosen to focus on cases where evidence suggests likely benefit. We also recognise that what are thought to be helpful innovations may not always prove to be as beneficial as first hoped. In such cases, the policy challenge is not to understand how to drive innovation forward at all costs, but to identify likely failures, improve innovations or manage them out of the system in a timely manner.

This report focuses and reports on insights from Stage 2 (conducted from 2015 to early 2019). While it does not repeat findings that have already been reported elsewhere, the report does draw on learning from Stage 1 and from interim Stage 2 reports (Marjanovic et al. 2017a, 2017b) for its analysis, discussion and conclusions.

Stage 2 adopted a multi-method approach combining insights from 242 interviews, a literature review, a survey involving 256 individuals, 11 workshops with 172 participants across diverse stakeholder groups, 14 case vignettes covering selected health innovations, an analysis of indicators for evaluating innovation performance, and an analysis of the population-level factors associated with the uptake of innovative medicines. Data within specific work streams were coded and analysed thematically. Data were also triangulated across methods and data sources, and across stakeholders involved with the research to arrive at final conclusions.¹

Key findings: innovating for improvement in health

Our findings about the current health innovation landscape and associated recommendations are presented as they relate to:

- Six key drivers of innovation (identified in Stage 1): (1) skills, capabilities and leadership for innovation; (2) motivations and accountabilities; (3) information and evidence; (4) relationships and networks; (5) patient and public involvement and engagement with innovation; (6) funding and commissioning.

- Two cross-cutting themes (identified in Stage 2): (a) the need to align policy design with implementation and success criteria; and (b) an analysis of potential metrics that could be used to measure the outputs, outcomes and impacts of innovation across the healthcare innovation pathway.

Our recommendations for action are summarised in Table 1.

Reflecting on issues and developments in the current landscape



Strengthening skills, capabilities and leadership for innovation

Diverse social and technical skills and leadership capabilities are needed to engage with an innovating health system.

Essential social skills to help drive innovation include: leadership capabilities to manage risk and navigate innovation-related activity across professional boundaries and hierarchies; networking, brokerage and relational skills to create connected communities; and business skills related to establishing a compelling business case for innovation.

Essential technical skills include: needs assessment and problem articulation; interpreting innovation-related evidence; implementing innovations and innovation policies in organisations; economic analysis and evaluation skills that measure performance of products, technologies and services in the real world over time and at the level of the health system (rather than in organisational silos); and intellectual property literacy.

¹ The research received ethical approval from the University of Manchester, where one of the study principal investigators is located, and HRA approval (IRAS 193979).

Historically, the innovating health system in England has emphasised the supply side of the innovation pathway (e.g. the Clinical Entrepreneurs Training Programme; training and mentorship provided through enterprise and Innovation Hubs; Small Business Research Initiative (SBRI) health economics skills support; and others) somewhat more than skills required for adoption, spread and scale-up on the demand side. Recently, programmes such as the NHS Innovation Accelerator and the refreshed Academic Health Science Networks (AHSNs) are seeking to address this imbalance by creating receptive and connected environments for innovation across the entire health innovation pathway – from idea generation and innovation development through to adoption, diffusion and spread.



Ensuring appropriate motivations and accountabilities

Although there has been recent progress in the evolution of policy initiatives that emphasise the uptake of health innovation, the current system of incentives and accountabilities for engaging with innovation needs strengthening.

Motivations and accountabilities shape how people engage with both the development and uptake of innovations. Motivations involve: personal beliefs about the value of innovation for improving care; leadership support and organisational values; and norms related to innovating, reputational, financial and career-related drivers.

For people working in health innovation, key incentives can influence their engagement with innovation, including: permissive environments with leadership support for such activities, as they pertain to both development and to uptake; leadership and organisational communication about the risks of **not** innovating

for patient safety and quality of care; effective organisational policies and practices for managing the risks associated with innovation; targeting incentives and accountabilities for innovation uptake; and further support for entrepreneurial activity. In the health system in England, the incentives for uptake of innovation have historically been weaker than those that influence entrepreneurial activities (e.g. funding for innovation development, programmes focused on skills for entrepreneurship) to develop new innovations. We have recently witnessed progress with the evolution in performance evaluation systems for initiatives such as AHSNs, with metrics that seek to incentivise the roles these initiatives can play in facilitating uptake.

Finding the right balance of incentives and accountabilities mixed with culture, comprehension, collaboration and leadership within any particular setting is a matter of judgement informed by the context and the requirements of the intended innovation. More specifically, identifying the anticipated benefits for patients, accruing financial and reputational benefits for individuals and organisations, finding opportunities for professional advancement, and aligning the aims of innovating with organisational norms and values can all be motivators for individuals and organisations to engage with innovation-related activities. Other motivating factors that could help change innovation-related behaviour include: releasing resources (time, funding) to incubate ideas and pursue innovation-related activity; sharing evidence about the benefits of innovations to encourage uptake; and identifying performance-related incentives associated with career development and promotion pathways. Many of these incentives and motivations seek to connect to and align individual interests with organisational objectives.

Stakeholders we engaged with during the course of this study generally did not support

mandating the uptake of innovation. However, they did express agreement that strengthened accountabilities are needed and that a mix of carrot- and stick-based mechanisms would likely be most effective.



Improving the information and evidence environment

Current sources of information and types of evidence about specific health innovations and about opportunities to engage with innovation initiatives in the health system are multiple and diverse, but also fragmented, and the communication and targeting of such information could be improved.

Decision makers across the health system have differing needs for information and evidence to inform decision making. NHS decision makers need evidence on the impact of innovation, on the business case for investing in innovation, on how to implement and support innovation, on potential decommissioning needs, on training needs and on financing innovation activities. Private sector and clinical entrepreneurs need information on health system demand – namely on innovation needs, push and pull funding schemes, points of contact for support on legal and intellectual property issues and for adoption discussions and commercial negotiations, and institutions that can help broker networks. Patients and the public need to be given the opportunity to help identify innovation needs and be alerted to information sources on innovations they could access and benefit from. In relation to information about need and demand, the quantitative analysis conducted as part of this study found that the effect of population level factors (e.g. prevalence of health conditions, age of population) and clinical commissioning group features on the uptake of innovation varies across different medicines, and indeed

throughout the qualitative work streams of our research, it is system-level factors that seem to weigh more heavily on the propensity for engaging with innovation and with uptake.

Stakeholders use many different types of evidence and consult varied and fragmented sources for information. Key sources include institutional websites (e.g. NICE guidelines and NHS England portals such as NHS Choices), AHSNs, Knowledge Transfer Networks, Innovation Hubs, quality improvement networks, conferences, trade shows, journals, and direct communication with peer and personal networks. An improved information and evidence landscape requires better signposting of information to a range of actors. Although progress has been made in enhancing the information and evidence infrastructure on innovation and on improvement-related data in recent years (e.g. through the Innovation Scorecard, GIRFT, NHS RightCare and NHS Choices), significant gaps in awareness of, access to, and user-friendliness of information and evidence sources persist.

While there is no 'one size fits all' approach to evidence requirements, we identified a range of information priorities in the system that inform decision making and should comprise the information and evidence landscape. First among these is a national framework and infrastructure for information and evidence that focuses on shared learning for all stakeholders. This framework could substantially improve the information and evidence environment. A system focused on learning could provide a shared data and evidence platform for disseminating information and exchanging knowledge to identify successful innovations, provide evaluations of innovations to support embedded knowledge in the system, and prevent reinvention of the wheel for each innovation.



Nurturing effective relationships regionally and nationally

The diversity and gradual maturation of initiatives that promote collaboration for an innovating and improving health system create opportunities for coordination, shared learning and impact at scale. However, there is a need to improve the alignment of different initiatives with each other and across different actors.

Over the past decade, there has been an abundance of initiatives to support collaboration for an innovating health system (e.g. AHSNs, Vanguard, Test Beds, Innovation Hubs, Knowledge Transfer Networks, Catapults, Collaborations for Leadership in Applied Health Research and Care (CLAHRCs), Sustainability and Transformation Partnerships (STPs), quality improvement initiatives and various other regional networks and organisations). Many of these are governed nationally but implemented regionally. They support relationships that span multiple actors: healthcare professionals, academics, innovators in the private sector and in the NHS, patients and the public, and the third sector.

These initiatives play a role in coordinating organisations in the system; however, there is scope for strengthening their capacity to better align activity at the regional and national levels in order to support impact at pace and at scale. Strengthening the alignment between existing initiatives could also help prevent ‘initiativitis’ – i.e. introducing initiatives that duplicate effort and waste resources by ‘reinventing the wheel’ rather than developing a consistent rhythm of learning and improvement that builds on existing capacity.

In addition, although the innovating health system in England offers a range of formal and informal networks and networking opportunities, it is unclear if the system and its

actors have the capacity to take full advantage of them. There was a perception among stakeholders that NHS organisations relevant to innovation in the health system often operate in relative silos and that the system is fragmented, which can hinder effective mutual collaboration and sharing of experiences and learning across networks. Ensuring that networks support and involve actors across the system, including at local levels can help make the most of efforts across the system.



Facilitating meaningful patient and public involvement and engagement with innovation

The current landscape for patient and public involvement has evolved and is recognising the value of experiential evidence. However, a systemic and coordinated strategy for patient and public involvement and engagement (PPIE) with innovation in the health system in England is yet to be developed.

There is growing recognition that an effective innovating health system benefits from patient and public involvement and engagement throughout the innovation pathway, from idea generation through to design, feedback and evaluation. Patient input can enrich and energise the innovation process. For example, if patients experience the benefits of a particular innovation and advocate for its adoption to health professionals, those professionals are more likely to adopt it. The system therefore needs to create opportunities for PPIE across the entire pathway. Moreover, national policy and regional practice need to be based on evidence about what value PPIE can add and how it can best be mobilised.

PPIE occurs through a broad range of activities. Examples include: identifying innovation needs; providing input into design and testing; establishing educational activities and materials for patients about new

innovations; advocating for uptake; generating evidence for innovation and disseminating it; supporting implementation of innovations in hospital change programmes; participating in evaluations; and recruiting PPIE contributors from peer communities.

However, engaging patients and the public can be challenging, sometimes resulting in merely token involvement and highly variable PPIE practices. For PPIE to have value, it has to be meaningful in relation to the quality, relevance, efficiency and impact of the innovation effort. Patients and the public should have a positive experience of engagement, which comes from giving them clear engagement goals, clear roles and remits, feedback on their impact and on progress with the innovation effort, and training to support effective contributions.



Developing a funding and commissioning landscape to support innovation across the pathway

A variety of funding schemes support innovation in the health system, but there is a need to improve the coordination, sustainability and stability of funding flows.

Funding for health innovation comes from multiple sources at the national, regional and local levels with individual schemes detailed in the full report. Although some diversity helps to promote a competitive innovation landscape, the current system is too fragmented. As a result, funding efforts are often unable to achieve the critical mass required to support innovations across the pathway. While fragmentation may be the natural by-product of an accretion of separate policies over many years, it raises concerns about the sustainability of any one effort.

Historically, a greater number and variety of schemes have focused on innovation development funding (e.g. Innovate UK and

SBRI Healthcare funding; NIHR Invention for Innovation; NHS England funding including for the Clinical Entrepreneurs Programme; various accelerator, catalyst and catapult funds; philanthropic funding; Health Foundation support; medical charity funds; private sector investments; and funding via various European programmes) than on financial support to enable the adoption and diffusion of innovation in the health system. However, more balanced funding is needed across the pathway, as it is now increasingly being recognised with initiatives such as the Innovation and Technology Tariff (ITT), the Innovation and Technology Payment (ITP), the NHS Innovation Accelerator programme and outcome-based commissioning programmes.

Balancing efforts across innovation development (supply) and adoption and diffusion (demand) raises two central challenges: (1) supporting a coordinated funding approach across the entire innovation pathway; and (2) ensuring funding sustainability. We have seen a greater focus recently on coordinated funding, but there is more to be done. A key risk in the current environment is that each funding mechanism addresses a specific need, but does not affect the wider innovation system (or potentially weakens that system by confusing decision makers and distracting from strategic goals).

As a first step towards supporting a more coordinated and sustainable funding landscape, the Department of Health and Social Care, Office for Life Sciences and NHS England recently worked on mapping the innovation landscape and have identified a range of schemes supporting health and care innovation across six organisations. This effort will help stakeholders to identify and navigate funding opportunities. Further actions are needed to build on this development.



Aligning policy design with implementation and success criteria

Policies that appear sound and rooted in evidence may have limited uptake because they do not integrate implementation requirements into policy design or make their criteria for success explicit.

To support the effective rollout and uptake of policies, there is a need to consider policy design in the context of implementation requirements, design specifications and success criteria. Our stakeholders identified a need for those involved in policy design to consider the financial, skills, infrastructure and informational requirements needed for policy initiatives to get buy-in from potential adopters. For example, stakeholders identified gaps in knowledge about what funds are available, how funders select projects, and whom to contact for information. In addition, they also reported a lack of upfront notice about implementation timelines and a lack of implementation capacity, both in terms of financial and human resource skills, for innovations and innovation-related initiatives.

These challenges to uptake can be tackled through more coordinated upfront design of policy and alignment with existing infrastructure, along with proactive information dissemination and engagement of interested communities. This does not necessarily always mean building extra capacity and providing additional resources to support new

policy initiatives, but rather more thoroughly considering the capacity that exists and how it can be mobilised.



Innovation metrics: what does success look like?

Assessing the innovation process and its outputs and impacts is critically important for understanding the effect of innovation on the health service, healthcare organisations, patients and the economy, as well as assessing where future policy efforts might need to focus across the health innovation pathway and system. Better metrics are needed to understand innovation outputs and impacts.

Measuring innovation in the NHS has become an important subject in recent years and there have been some efforts to make improvements on this front. The NHS Innovation Scorecard is attempting to capture data on uptake and dedicated institutions have been set up across the NHS with the specific aim of supporting the diffusion of innovation. However, there are no standardised approaches, and there has been comparatively little consideration of metrics for digital and service innovations. Nevertheless, measuring the impacts and outputs of health innovation is critical for understanding the effect of innovation on the health service, the economy, healthcare organisations and patients.

Recommendations: key areas for action

Table 1: Recommendations

Area for action	Recommendations
 <p data-bbox="225 689 414 824">Strengthening skills, capabilities and leadership</p>	<ol data-bbox="480 544 1353 1189" style="list-style-type: none"> 1. Policymakers and NHS leadership should identify, mobilise and embed innovation champions and brokers into the health system more widely than is currently the case. To prevent these being tick-box roles, individuals need to be trusted leaders across professions, and have clear responsibilities and accountabilities for supporting innovation (including for developing innovation-relevant social and technical skills amongst staff through formal and informal training, mentoring and knowledge exchange opportunities). 2. To change attitudes towards innovation (and highlight the risks of not innovating, when appropriate) policymakers should work with: (1) professional communities to embed innovation-related training into continual professional development; and (2) Medical Royal Colleges and Health Education England to introduce innovation-related skills training into medical education. 3. Policymakers, medical education communities, innovation practitioners and healthcare service providers should work together to establish programmes for the private sector on effective engagement with the NHS and on developing compelling business cases.
 <p data-bbox="225 1373 414 1507">Ensuring appropriate motivations and accountabilities</p>	<ol data-bbox="480 1227 1353 1771" style="list-style-type: none"> 4. Executive leadership, middle management and clinical leaders in healthcare provider organisations need to assume more responsibility for raising awareness and disseminating information about innovation. 5. Support the buy-out of programmed activities for health professionals to engage with innovating (where feasible). 6. Stronger monitoring of accountabilities is justified and can help tackle unwarranted variation (e.g. through requiring more compelling evidence of why proven innovations are not taken up in some contexts). Accountability for innovation could be embedded into national regulatory and improvement schemes. Individual accountability can be promoted through clear role specifications and performance management initiatives. 7. NHS leadership and policymakers could reward innovation by establishing 'innovating with impact'-type awards (for entrepreneurial activity or uptake) for individuals and organisations.

Area for action	Recommendations
 <p data-bbox="225 539 389 667">Improving the information and evidence environment</p>	<ol style="list-style-type: none"> <li data-bbox="480 389 1353 819">8. Create a national framework and infrastructure for overseeing and coordinating information and evidence flows. Support for this effort could entail: <ul style="list-style-type: none"> <li data-bbox="539 501 1353 562">• Appointing national data leads and evidence and information flow champions at regional and organisational levels. <li data-bbox="539 577 1353 705">• Collating and structuring evidence from diverse sources on a national integrated data platform that would serve as central repository of key analytics and a signposting platform to other information sources. <li data-bbox="539 721 1353 819">• Supporting national initiatives and bodies across innovation and improvement spaces to collaborate, share and signpost information. <li data-bbox="480 842 1353 969">9. Create a framework for evaluating innovations both to inform adoption decisions and establish clearly defined principles for good evaluation practice and clear evidence standards. Apply evaluation to both innovations and incumbent offerings. <li data-bbox="480 992 1353 1120">10. Invest in consensus processes amongst regional and national stakeholders to identify priority innovation needs for the NHS so that innovators can respond to more stable and clear demand, in consideration of finite resources.
 <p data-bbox="225 1296 389 1496">Nurturing effective relationships and networks regionally and nationally</p>	<ol style="list-style-type: none"> <li data-bbox="480 1146 1353 1783">11. Improve the design of the innovating health system to align and better coordinate existing innovation-relevant initiatives, organisations and relationships. To achieve this, policymakers could work with wider stakeholders to: <ul style="list-style-type: none"> <li data-bbox="539 1294 1353 1355">• Ensure that organisations and initiatives understand their roles and remits and the scale and timing of funding commitments. <li data-bbox="539 1370 1353 1469">• Ensure that wider actors in the health system are more aware of the skills, capabilities and services on offer related to the remits of specific organisations. <li data-bbox="539 1485 1353 1545">• Evaluate initiatives against progress and delivery on clear remits and roles. <li data-bbox="539 1561 1353 1585">• Pursue cross-organisational representation on committees. <li data-bbox="539 1601 1353 1662">• Support collaborative projects and tasks to help create a shared vision of success. <li data-bbox="539 1677 1353 1738">• Consider prospects for shared posts, secondments and placements. <li data-bbox="539 1753 1353 1783">• Appoint individuals with broker roles into initiative structures. <li data-bbox="480 1805 1353 1930">12. Develop guiding principles for private sector innovators on effective engagement with the NHS, and establish receptor roles in the NHS at clinical, managerial and executive levels with responsibility for engaging with innovators and decision-making authorities.

Area for action	Recommendations
 <p data-bbox="220 533 408 801">Facilitating meaningful patient and public involvement and engagement with innovation</p>	<p data-bbox="480 387 1358 483">13. The innovating health system needs to create opportunities for PPIE across the entire innovation pathway while mitigating the unintentional risks of tokenistic involvement that mandatory engagement can create.</p> <p data-bbox="480 506 1358 602">14. Build on current developments with a national strategy and implementation plan for PPIE in innovation, with a clearly defined set of principles (detailed in the full report).</p> <p data-bbox="480 624 1283 721">15. Invest in coordinating PPIE activities and resources among local, regional and national stakeholders and across improvement, innovation and research efforts.</p> <p data-bbox="480 743 1342 1012">16. Signpost information that is important for patients and the public (e.g. on opportunities to engage with innovation and on available innovations and their impact), and make use of information sources that patients and the public consult (e.g. social media platforms, peer support groups and websites, charities, NHS websites such as NHS Choices, and health professionals). These information sources should feed a national information platform and inform the PPIE activities of AHSNs, healthcare provider organisations and charities.</p>
 <p data-bbox="220 1182 408 1451">Developing a funding and commissioning landscape to support innovation across the pathway</p>	<p data-bbox="480 1037 1350 1133">17. Policymakers should support a whole-systems approach to an innovation funding portfolio to achieve scale and complementarities and to ensure promising innovations progress through the entire pathway. Specifically:</p> <ul data-bbox="536 1144 1358 1962" style="list-style-type: none"> <li data-bbox="536 1144 1358 1240">• Enhance collaborative working between government departments, arms-length bodies and other funders (e.g. through joint funding programmes, shared posts for individuals). <li data-bbox="536 1256 1358 1458">• Take stock of existing funding schemes, their roles, remits, complementarities or overlap and where they sit in relation to NHS innovation needs and priorities. Efforts to better coordinate the allocation of innovation funding will need to recognise that different types of innovations, and different activities along the innovation pathway, may be associated with different costs. <li data-bbox="536 1473 1358 1570">• Raise awareness and provide clarity to stakeholders about available funding schemes and how funding schemes are related and/or complementary. <li data-bbox="536 1585 1358 1749">• Revisit and refresh the push and pull funding mechanisms in the system to ensure that they support the development and uptake of innovations with diverse cost and quality benefit profiles over time. A policy focus on cost-neutral or cash-saving innovations alone will not incentivise or sustain an innovating NHS. <li data-bbox="536 1765 1358 1962">• Enable an innovation portfolio strategy that balances short- and long-term considerations about upfront investments, short-term returns and longer-term cost and quality gains through a de-politicised structure (cross-party and cross-departmental committee). Portfolio management techniques can support transparent and robust decision making on portfolio investments.

Area for action	Recommendations
	<ul style="list-style-type: none"> • Complement pull mechanisms that respond to the supply of existing innovations (e.g. ITT and ITP) with new pull mechanisms that are more responsive to demand (e.g. pre-commercial procurement commitments for innovations that respond to an articulated demand or meet quality and cost criteria; scalable and sustainable outcome-based commissioning; and adaptive commissioning models). • Explore and evaluate the effectiveness and scalability of adaptive risk-sharing agreements between private sector innovators and the NHS (e.g. agreements that cover the upfront costs of testing products for small and medium-sized enterprises (SMEs), flexible and adaptive pricing arrangements dependent on real-world performance or guaranteed market access and price-volume agreements, conditional reimbursement, and deferred payments).
 <p>Aligning policy design with implementation and success criteria</p>	<ol style="list-style-type: none"> 18. When designing new policy interventions, assess how they relate to the existing policy infrastructure to avoid unnecessary duplication, in order to identify opportunities for coordination and for harnessing complementarities. 19. Ensure that innovation, improvement and research policy bodies collaborate more closely around deciding on the needs for and design of new policy initiatives. 20. Place greater focus on identifying areas where joint funding of innovation efforts can mitigate against piecemeal and fragmented investments and support scale. 21. Specify what financial and human resources will be required for implementation. 22. Identify and communicate the relationships that are needed for successful implementation (e.g. between individuals, professions, stakeholders and parts of the health system). 23. Be clear about the physical and informational infrastructure required for implementation. 24. Specify key metrics for evaluating success upfront. 25. Identify sources of implementation support that stakeholders could access and contact. 26. Communicate and raise awareness about innovation policies and associated schemes by considering the information needs, incentives and accountabilities of stakeholders. 27. Provide sufficient notice for stakeholders to be able to engage.

Area for action	Recommendations
 <p data-bbox="225 535 352 600">Measuring innovation</p>	<p data-bbox="480 387 1362 658">28. We propose four types of indicators to consider when measuring innovation performance (elaborated on in full report): (1) indicators of the progression of an innovation across different stages of health innovation pathways; (2) indicators of the adoption and diffusion of innovations through the healthcare system; (3) indicators that track the impact on patients, the population, the health system and the wider economy; and (4) indicators of capacity for innovation in the healthcare system.</p> <p data-bbox="480 678 1305 846">29. Indicators should reflect concerns for assessing health innovation relevance, efficiency, effectiveness, impact and sustainability. Stakeholders evaluating health innovation performance need to balance concerns for the relevance of specific indicators with data availability and feasibility.</p> <p data-bbox="480 866 1326 996">30. The establishment of appropriate indicators may need to happen in parallel with capacity-building in the health system, in particular as it relates to data and evidence infrastructure, as indicators are only as useful as the quality of the data that supports them.</p>

Conclusions

The innovation system to support the NHS has been substantially strengthened in recent years but more needs to be done to maximise potential benefits. It is evident from our research it is evident that further actions to strengthen the innovating health system should be premised on four core principles.

Firstly, innovation strategies and innovation policy should be rooted in a whole care-pathway approach, rather than focused exclusively on solutions for a siloed part of the pathway. This means identifying needs across care pathway(s) and supporting the development and uptake of combinations of solutions (be they high- or low-tech products, technologies or service models) that can yield the required improvement in quality and cost. Care pathway thinking is already part of the *Five Year Forward View* (NHS England 2014), but is not always connected to innovation strategies. The Prime Minister's funding

settlement for the NHS announced on 18 June 2018 (Prime Minister's Office 2018) and the associated *NHS Long Term Plan* (NHS England 2019) create an opportunity for embedding innovation into the culture, structure and function of the health system.

Secondly, success requires balancing shorter-term, 'quick-win' actions with longer-term transformational interventions.

Thirdly, it is critical to assess how new policies and interventions relate to the existing policy infrastructure to avoid wasteful duplication, enable coordination and exploit existing capacity and complementarities in the system.

Finally, transformative change in healthcare requires targeting both the structures and funding that support innovation, as well as cultural and behavioural change. The need for cultural and behavioural change is critical if innovating is to happen at scale and sustainably. In practical terms, this means health innovation policy needs to

simultaneously address the diverse and interdependent drivers of an innovating health system.

Policymaking has a crucial role to play in realising a vision for a health system where innovating contributes to the quality and efficiency of delivering care and to improved patient outcomes. But policymakers can neither make innovations nor spread them, nor is compliance with mandates guaranteed. A balanced and 'hybrid' model of governance and leadership for innovating in the health system – which supports both top-down and bottom-up actions – is already emerging and the possibility of a truly innovative health and care system is achievable. We hope that the research evidence and recommendations set out in this report can help deliver this.

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