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TECHNICAL REPORT

Funding intensive care – approaches in systems using diagnosis-related groups

Stefanie Ettelt, Ellen Nolte

Prepared for the Department of Health
within the PRP project "An 'On-call' Facility
for International Healthcare Comparisons"

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4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665
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Preface

This report reviews approaches to funding intensive care in health systems that use activity-based payment mechanisms based on diagnosis-related groups to reimburse hospital care. The report aims to inform the current debate about options for funding intensive care services for adults, children and newborns in England.

The report was prepared as part of the project "An 'On-call' Facility for International Healthcare Comparisons" funded by the Department of Health in England through its Policy Research Programme (grant no. 0510002). The project comprises a programme of work on international healthcare comparisons that provides intelligence on new developments in other countries, involving a network of experts in a range of OECD countries to inform health policy development in England. It is conducted by RAND Europe, in conjunction with the London School of Hygiene & Tropical Medicine.

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For more information about this report, please contact:

Dr Ellen Nolte
Director, Health and Healthcare
RAND Europe
Westbrook Centre,
Milton Road
Cambridge CB4 1YG
United Kingdom
Email: enolte@rand.org
Tel: +44 (0)1223 273853

Stefanie Ettelt
Research Fellow
Health Services Research Unit
London School of Hygiene & Tropical Medicine
Keppel Street
London, WC1E 7HY
Email: Stefanie.Ettelt@lshtm.ac.uk
Tel: +44 (0)207 927 2061

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This report reviews approaches to funding intensive care in health systems that use activity-based payment mechanisms based on diagnosis-related groups (DRGs) to reimburse hospital care. The report aims to inform the current debate about options for funding intensive care services for adults, children and newborns in England.

Funding mechanisms reviewed here include those in Australia (Victoria), Denmark, France, Germany, Italy, Spain, Sweden and the United States (Medicare). Approaches to organising, providing and funding hospital care vary widely among these countries/states, largely reflecting structural differences in the organisation of healthcare systems.

Mechanisms of funding intensive care services tend to fall into three broad categories:

- those that fund intensive care through DRGs as part of one episode of hospital care only (US Medicare, Germany, selected regions in Sweden and Italy)
- those that use DRGs in combination with co-payments (Victoria, France)
- those that exclude intensive care from DRG funding and use an alternative form of payment, for example global budgets (Spain) or per diems (South Australia).

Approaches to funding paediatric and neonatal intensive care largely reflect the overall funding mechanism for intensive care. Evidence reviewed here indicates a general concern of potential underfunding of intensive care. These problems may be particularly pertinent for those settings that provide neonatal and paediatric care because of the very high costs and the relatively smaller number of cases in these settings compared with adult intensive care. Similar issues apply to highly specialised services in adult intensive care, such as treatment of severe burns.

Given the variety of approaches to funding intensive care services, this review suggests that there is no obvious example of "best practice" or dominant approach used by a majority of systems. Each approach has advantages and disadvantages, particularly in relation to the financial risk involved in providing intensive care. While the risk of underfunding intensive care may be highest in systems that apply DRGs to the entire episode of hospital care, including intensive care, concerns about potential underfunding were voiced in all systems reviewed here. Arrangements for additional funding in the form of co-payments or surcharges may reduce the risk of underfunding. However, these approaches also face the difficulty of determining the appropriate level of (additional) payment and balancing the incentive effect arising from higher payment.

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Author	Country case study	Affiliation
Anders Anell*	Sweden	Institute of Economic Research, University of Lund, Sweden
Derek C. Angus	United States	Department of Critical Care Medicine, University of Pittsburgh
Saskia Drösler	Germany	University of Applied Sciences Niederrhein, Krefeld
Antonio Durán*	Spain	Técnicas de Salud, Seville, Spain
Isabelle Durand-Zaleski*	France	Hôpital Henri Mondor, Paris, France
Judith Healy*	Australia	Regulatory Institutions Network (RegNet), Research School of the Social Sciences, Australian National University, Australia
Allan Krasnik*	Denmark	Institute of Public Health, University of Copenhagen, Denmark
Walter Linde-Zwirble	United States	ZD Associates, Perkasie
Peter McNair	Australia	University of California, San Francisco
Ciaran Phibbs	United States	Centre for Health Policy/Centre for Primary Care and Outcomes Research, Stanford University
Walter Ricciardi*	Italy	Department of Hygiene and Public Health at the Catholic University of the Sacred Heart in Rome, Italy

(*)Members of the network of the "On-call" Facility for International Healthcare Comparisons project.

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CHAPTER 1 Overview

This report reviews approaches to funding intensive care in health systems that use activity-based payment mechanisms based on diagnosis-related groups (DRGs) to reimburse hospital care. The report aims to inform the current debate about options for funding intensive care services for adults, children and newborns in England. One option currently considered is to expand "payment by results" to also include intensive care for adults through Healthcare Resource Groups (HRGs) – the DRG variant used in England.

We here report on approaches to funding intensive care in eight countries or regions: Victoria (Australia), Denmark, France, Germany, Italy, Spain, Sweden and the United States (US). Countries included in this review were chosen because they use some form of activity-based payment mechanism, based on DRGs, to fund hospital care.

The report was informed by country informants participating in the network of the "On-call" Facility for International Healthcare Comparisons and additional experts in the field of activity-based funding and/or funding intensive care to provide information about specific approaches. Experts were asked to complete a detailed questionnaire (see Appendix). The questionnaire was developed in collaboration with the Department of Health, addressing specific questions identified by the Department as well as more general questions relating to the scope and nature of the activity-based funding approach, to provide relevant background to approaches of funding intensive care. In addition, the report draws on (1) a review of published and grey literature, using medical databases (e.g. Pubmed) and (2) an online information search using standard search engines (e.g. Google and Yahoo!).

The report is broadly structured into two parts. This chapter presents a summary of key observations about approaches to funding intensive care in a range of health systems that use activity-based funding based on diagnosis-related groups (DRGs). Subsequent chapters provide detailed reports on each of the eight countries or regions considered in this review, describing the general approach of funding hospital care, the characteristics of the DRG system (including approaches of grouping, costing and price setting) and the specific funding approaches as they relate to intensive care for adults, children and neonates. Because of the complexity of the US health system, which comprises a wide range of sub-systems, we here focus on the Medicare system, which covers the population aged 65 and older. However, we add a brief discussion of the challenges to using activity-based funding of neonatal care in the United States, which falls outside the Medicare system (chapter 10).

1.1 Approaches to funding hospital services through activity-based payments

1.1.1 Variation in scope and scale of activity-based funding

Countries reviewed here broadly fall into two categories: (1) countries that use activity-based funding to fund all (or almost all) hospital services (Australia, France, Germany) and (2) countries in which hospital care is only partly financed through DRGs, with, for example, DRG payments limited to certain geographic areas within countries (Italy, Spain and Sweden) and/or forming only a proportion of total public funding of hospital care (e.g. Denmark, Spain) or limited to individual payers in multi-payer systems (e.g. Medicare in the US).

In Australia, almost all states/territories fund public hospitals through DRGs; however, approaches vary substantially among states, differing for example with regard to the types of care funded through DRGs, grouping methodology and mechanism of price setting. A national project is currently under way to assess options to harmonise approaches among states. In France and Germany, public and private hospitals are funded through DRGs, and there are only few exceptions (e.g. certain specialty hospitals in Germany).

In Denmark, regions are required to fund 50 percent of all hospital care based on activity, with some regions paying up to 70 percent of care through DRGs. National governments in Spain and Sweden promote the use of DRGs to fund public hospitals; however, the use of activity-based funding is not mandatory and regional governments (autonomous communities in Spain; county councils in Sweden) may decide whether (and how) to use DRGs, thus creating substantial regional variation regarding the extent to which hospital care is paid for through DRGs. Similarly, in Italy, although regions are required to use DRGs to fund services provided in public and private accredited hospitals, the proportion and scope of DRG funding varies considerably.

In the US, Medicare is a programme managed by the Federal Government designed for financing healthcare for persons over the age of 65 years, administrated by the Centre for Medicare and Medicaid Services (CMS). Medicare constitutes only one, albeit important, source of hospital funding as services provided in hospitals are also reimbursed by a range of other public programmes and private health plans. Although most payers use some form of DRG funding, there is substantial diversity, for example, with regard to the grouping method used and/or prices.

1.1.2 Variation in components of activity-based funding systems

DRG systems are composed of three major "building blocks": (1) an algorithm that groups similar cases into DRGs (the "grouper"); (2) a mechanism to collect (patient-level) cost data from hospitals to cost DRGs and to calculate the cost weight for each DRG; and (3) a mechanism to set prices per DRG, for example by setting a "base price", which is then multiplied by the cost weight of the DRG. Some countries have introduced additional adjustments to prices/cost weights (such as the "Market Force Factor" used in England[1]).

DRG systems reviewed here vary substantially among countries, with differences in all three building blocks. Countries use different groupers, for example, Victoria (Australia) uses Australian Refined (AR-) DRGs, Germany uses G-DRGs (German diagnosis-related groups) and France HGMs (*Groupes Homogènes de Malades*). Counties in Sweden that do use DRGs use the Swedish version of NordDRGs, with the latter jointly developed by the

Scandinavian countries (although countries do modify the grouper). The grouper used in Denmark, Dk-DRGs, is also based on NordDRGs, but was subsequently developed into a separate national version. Italy and Spain largely use US groupers, such as CMS-DRGs (Centres for Medicare and Medicaid DRGs), an earlier version of Medicare Severity (MS) DRGs, the grouper currently used by Medicare.

Although countries differ with regard to groupers used, all of these approaches drew, initially, on DRG groupers developed by the US Health Care Finance Administration (HCFA), with the exception of G-DRGs, which are based on Australian DRGs. As a consequence, groupers tend to be similarly structured, with a broadly comparable list of major disease categories (e.g. MDC 22 represents the diagnosis "burns"). Grouping algorithms are also broadly similar, with patients being grouped according to diagnoses and procedures, with adjustments made for age, status at discharge and comorbidities/complications. However, while the "macro-structure" of groupers is fairly similar, the "micro-structure" – the definition of individual DRGs – varies substantially among groupers.

DRG systems also vary in their approaches to collecting costs data, calculating cost weights and setting prices/tariffs. Cost data are typically derived from a number of hospitals selected from across a given country or region. The size of the sample of hospitals (with some countries/regions including all hospitals) reporting costs and the methods used to attribute costs to DRGs however vary. In Germany, for example, prices are determined at regional level based on centrally collected cost data, using data of a sample of hospitals (supported by some additional data collected from all hospitals). Prices in Victoria are determined based on state-level data, using data from all public hospitals. Prices in Victoria, however, also reflect the amount of funding available through the overall budget for public hospitals. Thus, the projection of the public budget is used in addition to the cost weights resulting from the costing exercise.

1.2 Funding adult intensive care

In systems which use DRGs as a mechanism to fund hospital services, approaches to fund intensive care vary substantially. Overall, these tend to fall into three broad categories:

- those that fund intensive care through DRGs only as part of one episode (US Medicare, Germany, selected regions in Sweden and Italy)
- those that use DRGs in combination with co-payments (e.g. Victoria (Australia), France)
- those that exclude intensive care from DRG funding and use an alternative form of payment, for example per diems (e.g. South Australia) or budgets (e.g. as part of a hospital budget in Spain).

1.2.1 Funding adult intensive as part of one episode using DRGs

In the US Medicare system, intensive care is entirely funded through DRGs. MS-DRGs (Medicare Severity DRGs) cover the entire episode of care, from admission to discharge, with intensive care treatment typically being a part of an episode. The system does not

differentiate between locations of care, i.e. treatment in an intensive care unit does not attract additional payment. However, the grouper includes a number of DRGs that are typically associated with intensive care treatment and reflect the nature and/or severity of a condition or specific procedures or technologies used in intensive care (e.g. mechanical ventilation or tracheotomy).

MS-DRGs were introduced in 2007, replacing CMS-DRGs, an earlier grouper developed by the Centre for Medicare and Medicaid (CMS) (as were MS-DRGs). The MS-DRG system distinguishes three levels of severity, adjusting for different degrees of complexity and co-morbidity, with higher cost weights assigned to cases with higher complexity. As a result, under the MS-DRG system, hospitals with a large proportion of complex cases, including those treated in intensive care, receive higher payments as previously under the CMS-DRG system. This change was introduced in response to pressure from clinicians and research evidence showing that hospitals providing intensive care were at risk of being underfunded, although the risk varied between DRGs and between hospitals, reflecting variation in severity and variation in casemix among hospitals.[2]

Similar to US Medicare, regions in Sweden that use DRGs as the main mechanism of funding (e.g. Stockholm) also finance intensive care through assigning DRGs to the entire episode. However, the most expensive cases are likely to be treated as "outliers" and thus receive separate funding. A somewhat different approach is used in Italy, where some regions assign a separate DRG to intensive care treatment, resulting in an additional payment per episode. This payment, however, only applies if the patient dies in intensive care, is discharged or transferred to another hospital directly from the intensive care unit.

In Germany, intensive care is entirely financed using DRGs. Each DRG covers the entire episode of care in hospital, including intensive care treatment. Intensive care services are largely covered by a total of (currently) 68 DRGs, most of which are associated with mechanical ventilation, with one additional DRG reflecting "complex intensive care treatment". DRGs related to intensive care are "triggered" by a number of criteria, such as the number of hours of mechanical ventilation, certain procedures or, for some DRGs, the number of points on an intensive care activity score, such as the Simplified Acute Physiology Score (SAPS II) and the Therapeutic Intervention Scoring System (TISS). At the same time, intensive care is also associated with a high proportion of "outliers" (between 10 and 50 percent for certain DRGs). Outliers are reimbursed based on per diem surcharges although these payments do not cover the full costs associated with intensive care treatment so as to avoid incentivising hospitals to keep patients in intensive care longer than clinically necessary.

1.2.2 Funding adult intensive care using DRGs in combination with co-payments

Public hospitals in Victoria (Australia) receive funding through DRGs that are applied to the entire episode of care. However, in contrast to the MS-DRG system used in US Medicare, a case treated in intensive care attracts an additional co-payment depending on three criteria, including (1) treatment in a dedicated intensive care bed, (2) grouping into a DRG eligible for mechanical ventilation, and (3) receiving a minimum number of hours of mechanical ventilation. The co-payment comprises two components. The first component is expressed as an additional cost weight per day (a daily surcharge). The second component is referred to as an "availability payment" added once per episode to

compensate hospitals for costs associated with providing for intensive care bed capacity, irrespective of the number of cases treated.

In France, both public and private hospitals are financed through DRGs, which are applied to the entire episode of care. However, as in Victoria (Australia) intensive care treatment attracts an additional payment, here in the form of a per diem co-payment. The per diem payment reflects the level of care provided in intensive care. Three levels of intensive care are distinguished, based on a number of criteria, such as whether the patient is treated in a dedicated intensive care unit, receives at least one form of organ support and has a severity score of at least 15 points (to attract the highest possible co-payment per day). While this per diem co-payment seems generally accepted, there are concerns about the adequacy of linking the co-payment to the location of care – treatment in a dedicated intensive care bed.

1.2.3 Funding adult intensive care using approaches other than DRG payment

Funding intensive care through approaches other than DRGs is a third option, used by regions in Spain, some regions in Italy and South Australia. In Spain, it was argued that funding intensive care services through budgets has the advantage of maintaining the ability to keep expenditure stable, thus creating pressure to treat patients more efficiently. Other approaches, such as per diems, however, may create incentives to extend the average length of stay in intensive care, although this effect may be offset by other factors such as capacity constraints.

1.3 Funding specialist intensive care: the example of major burns

Approaches to funding specialist intensive care typically reflect the overall approach of funding intensive care in a given system. In most systems reviewed here, specialist intensive care services are at least partly covered through DRGs. For example, "burns" are typically represented as a major diagnostic category (MDC 22), often divided into a number of DRGs specifying different levels of severity and different types of treatment.

In the US Medicare system, the treatment of burns is entirely paid for by DRGs, distinguishing six DRGs that reflect for example surgical or medical interventions. In France, the treatment of burns is also financed through DRGs but supplemented by per diem co-payments reflecting the level of intensive care provided per case.

In Germany, in contrast, the diagnosis "burns" is coded as a DRG, but is not given a cost weight, i.e. it is not associated with a regionally set price. Instead, prices for this type of DRG are subject to negotiations between individual hospitals and the regional associations of statutory health insurance funds and private insurers (public and private payers). Individual pricing only applies to a number of DRGs, typically associated with rare conditions and expensive treatment.

1.4 Funding paediatric and neonatal intensive care

Approaches to funding paediatric and neonatal intensive care reviewed here largely reflect the approach used to fund adult intensive care. The G-DRG system in Germany

distinguishes between adult and paediatric care through a number of "split" DRGs for patients aged below 15 years of age. A small number of DRGs cover paediatric intensive care only. A separate procedure code was introduced for paediatric patients, since standard severity measures used in adult intensive care were not considered appropriate for patients under the age of 15 years. In 2009, there were two DRGs associated with this procedure code.

In France, neonatal and paediatric intensive care attract a per diem co-payment paid in addition to the DRG payment. In both cases, the co-payment is higher than the co-payment associated with the same level of care provided to adults. In those regions in Sweden that use DRG funding, most paediatric and neonatal intensive care results in outliers, which are reimbursed separately, based on a proportion of the costs of the treatment.

Some regions in Italy fund paediatric intensive care through the same DRGs used for adult patients. This is because the grouper used in Italy is derived from an earlier US Medicare grouper that did not cover children or neonates. However, a new set of DRGs for paediatric and neonatal care has recently been developed. As the approach is yet to be implemented by the regions, it is unclear how the new grouper will affect funding for paediatric or neonatal intensive care.

In neonatal intensive care, cases are typically grouped by birth weight, as for example in the all-patient refined DRGs (APR-DRGs) in the US. Neonates in Germany are grouped by weight on admission to account for differences of weight between birth and referral. In Victoria (Australia), neonatal intensive care is funded through DRGs plus an additional cost weight for "availability", added per episode. This approach has replaced a previous per diem co-payment associated with mechanical ventilation (which is used to fund adult intensive care in addition to the "availability" payment), which was considered inappropriate following the introduction of a new ventilation technology.

1.5 Current debates about existing approaches to funding intensive care

1.5.1 Early experience of underfunding intensive care services in the US

In the 1980s, studies of the effects of DRGs on hospitals in the US provided early evidence of hospitals experiencing financial losses associated with intensive care as a result of activity-based funding.[3–5] The risk of insufficient funds for intensive care services was largely a consequence of the high complexity of cases treated so that actual costs for many (but not all) DRGs substantially exceeded the level of DRG payment, which was calculated at the level of the average costs of care per DRG. Thus, hospitals with a large proportion of complex cases requiring high-cost intensive care had an increased risk of financial loss by providing intensive care treatment.

1.5.2 Current concerns about underfunding intensive care services

More recent studies suggest that the risk of underfunding intensive care remains, but it is unevenly distributed among hospitals and differs between DRGs, with relevant concerns expressed in a number of health systems reviewed here, including systems that finance intensive care entirely through DRGs that cover the entire episode (Germany, US

Medicare), those that pay an additional co-payment (Victoria) and those that have excluded intensive care from DRG funding (Spain).[a]

DRG systems in Germany and under US Medicare appear to be associated with an increased risk of underfunding intensive care. In both systems, DRGs are assigned to the entire episode of care, thus cases attract payments that reflect the average costs of episodes, irrespective of whether these were spent, totally or in part, in an intensive care unit. A patient with pneumonia, for example, may be grouped into the same DRG whether being treated in a general ward or in an intensive care unit. Payments are thus likely to be lower than the actual costs incurred by intensive care treatment.

However, there are differences between DRGs, with higher payments for those DRGs that group conditions or procedures typically treated or administered in intensive care units (e.g. mechanical ventilation or tracheotomy). In Germany, certain DRGs are also associated with a procedure code for "complex intensive care treatment", which attracts higher payment for cases that meet specific criteria (e.g. a minimum number of points on a severity score; a minimum number of hours of mechanical ventilation). Germany, Victoria (Australia) and Medicare (US) also adjust for different levels of severity associated with a condition, with more complex cases attracting higher payments.

As noted above, in the US, severity adjustments have only recently been introduced in the form of Medicare Severity (MS) DRGs to address the risk of underfunding associated with complex high-cost treatment, which has been a long-standing concern for hospitals that provide tertiary care financed through Medicare. These adjustments aim at reducing the incentive for certain hospitals to select low-cost patients. However, since more complex cases now attract a higher payment the severity adjustment generates more funding for cases that receive intensive care treatment. Although this appears to reduce some of the imbalances in funding caused by the treatment of complex cases, the risk of underfunding intensive care is not entirely eliminated, as intensive care treatment can still incur costs above the level of reimbursement. However, in the context of the US multi-payer system, it is worth noting that hospitals tend to have several sources of income, in addition to funding from Medicare. Thus, hospitals may be able to "shift" costs between payers, for example by charging higher prices for services delivered to patients under a private insurance plan. This form of cost shifting is usually not possible in Germany, where statutory health insurance funds and private health insurers pay the same price per DRG or in single payer systems, such as the NHS in England.

In France, the current approach to funding intensive care, which involves a co-payment for intensive care treatment, appears to be well accepted by clinicians, perhaps indicating a more generous funding situation more generally. However, there appear to be concerns about linking the highest level of payment to the location of care (care provided in an

[a] Country reports used to inform this review largely draw on accounts from country experts. These accounts included reports on perceptions among actors of the advantages and disadvantages of DRG systems in place in a given system, including views on the adequacy of funding. However, it goes beyond the scope of this review to quantify the extent of actual underfunding (if any) as this would require an in-depth analysis of costs and levels of payment associated with intensive care in each country.

intensive care unit), as this may provide hospitals with an incentive to deliver more complex treatment to patients who do not require the highest level of treatment.

In contrast, adequate funding for intensive care appears to be a concern in Spain, where intensive care is largely funded through the hospital budget, with little (if any) funding channelled through DRGs. Although this report did not explore the adequacy of funding, by for example comparing actual costs to actual funding, this example highlights that perceptions of underfunding may reflect factors other than those related to the appropriateness of activity-based funding systems using DRGs per se, such as the overall level of funding available for hospitals, which may be a concern for those providing care irrespective of the funding mechanism.

1.5.3 Effect of outlier payments

As noted earlier, in Germany, intensive care services are likely to be associated with a high proportion of "outliers" (between 10 to 50 percent). Outliers are paid for through a per diem surcharge. However, the per diem is purposefully reimbursed below actual costs to avoid incentivising hospitals to inflate the number of patients treated in intensive care or expand length of stay. Thus, outlier payments are likely to exacerbate the problem of underfunding intensive care. Reports from other countries also indicate a role of outliers in funding intensive care. However, the overall effect of outlier payments on intensive care treatment is uncertain and may vary among countries, reflecting different arrangements with regard to the definition (e.g. setting of trim points[b]) and level of payment.

1.5.4 Incentives to maintain capacity through additional payments

In Victoria (Australia), mechanical ventilation that meets certain criteria attracts a co-payment, which is paid in addition to a DRG payment. Thus, the procedure of mechanical ventilation is used as a proxy for intensive care treatment. While mechanical ventilation may not account for all cases receiving intensive care treatment, the approach is reportedly widely accepted by both clinicians and policy-makers in Victoria. However, concerns have been voiced about the "availability payment" that constitutes a part of the co-payment. Critics have argued that the availability payment, which is meant to encourage hospitals to maintain a certain level of intensive care capacity, may incentivise hospitals to "fill" intensive care beds with less severe cases in times of low demand. The payment thus involves a trade-off between an (intended) incentive for hospitals to maintain capacity and an (unintended) incentive for hospitals to not reduce supply when demand is low. There are also reports about concerns from clinicians who regard the level of funding for intensive care as insufficient. However, this concern does not appear to be substantiated by the available evidence.

1.5.5 Introduction of severity adjustments

Several countries, including Italy and France, reportedly consider introducing additional adjustments for severity to better reflect the costs of highly complex cases within DRGs, in line with adjustments used in groupers in Germany and by US Medicare. In the US, however there are concerns about potential perverse incentives introduced by these

[b] Trim points are used to exclude cases that are associated with a length of stay that is substantially shorter or longer than the mean of cases for any given DRG.

adjustments as they may involve payment for the treatment of complications that have arisen as a consequence of inadequate quality of care rather than the underlying condition per se. As a consequence, in 2007 Medicare decided to reduce the payment for complications resulting from causes that are likely to reflect poor quality, such as hospital acquired infections and falls after surgery. This concern also extends to neonatal intensive care, with newborns arguably being particularly susceptible to low quality of care. Concerns about perverse incentives in relation to quality of care do not appear to be of concern in Germany, however.

1.6 Implications for policy

This review indicates that countries that use DRGs to fund hospital care apply a range of approaches to funding intensive care treatment for adults, children and neonates. Given the variety of approaches used in different countries, this review does not suggest that there is a dominant approach or obvious "best practice" model of funding intensive care services within DRG systems.

Issues around intensive care funding are poorly documented in the literature. This review is largely based on the accounts of selected country informants. It can therefore offer only limited insights into the comparative advantages or disadvantages of different funding approaches. Arguably, funding intensive care treatment as part of an entire hospital episode is most consistent with the overall approach of using DRGs (e.g. US Medicare). However, the experience suggests that this approach may insufficiently appreciate the complexity and cost of treatment provided in intensive care units. This approach may thus shift part of the financial risk of providing intensive care to providers. Systems using this approach have begun to include additional adjustments, such as adjustments for severity of conditions and complexity of care.

The risk of underfunding is likely to be smaller for approaches that combine DRGs with an additional co-payment for intensive care. Two factors will influence the appropriateness of additional funding generated through co-payments, however: (1) the size of the payment – the extent to which the co-payment reflects actual costs, and (2) the scope of the payment – whether the payment only applies to patients receiving particular procedures (e.g. mechanical ventilation in Victoria) or whether it applies to all patients treated in an intensive care unit (France).

If the size of the payment reflects the true costs of providing intensive care treatment, the financial risk for providers is greatly reduced. However, it may also create an incentive to increase the number of patients receiving intensive care treatment. Although this has not been observed in country reports presented here, relevant concerns were voiced in relation to outlier payments, which are set at a lower price in some countries to discourage providers to extent length of stay (e.g. Germany). Payments for outliers, however, are not entirely comparable to paying for intensive care treatment, as length of stay may be easier to influence through clinical decision-making than decisions about intensive care treatment. In addition, these types of decisions will be influenced by other factors, such as the use of clinical guidelines or care pathways.

If the payment is associated with certain types of procedures only, such as mechanical ventilation, this potentially creates an incentive to increase the use of such procedure. It may also be a disadvantage for hospitals that provide a larger proportion of intensive care to patients who do not require this particular procedure. On the other hand, if the payment is linked to all treatment provided in an intensive care unit this may incentivise providers to potentially move patients into intensive care units who could otherwise be treated elsewhere (e.g. in a high dependency unit or bed).

Funding intensive care through a separate budget is another option. However, country case studies selected here provide little insight on benefits and risks related to this approach (e.g. Spain). Although funding intensive care through budgets may have the advantage of reducing the financial risk for providers, the disadvantage is that reimbursement is not linked to actual activity.

Country experiences reviewed here provide only limited information about the implications of different funding approaches in relation to administrative capacity. Experience from France suggests that coding intensive care cases may be challenging and time consuming. This may be particularly relevant if coding requires additional data on, for example, treatment intensity and/or severity. However, this type of data may more accurately capture differences in the complexity (and cost) of cases, which is likely to improve the appropriateness of funding.

All systems reviewed here raise concerns about potentially underfunding hospitals that provide intensive care services, irrespective of the funding approach. However, evidence of the appropriateness of funding in relation to costs remains poorly documented; therefore this review does not allow for firm conclusions about which funding approach is most successful in appropriately capturing the costs of providing intensive care.

CHAPTER 2 Australia

2.1 Funding hospital care

Healthcare in Australia is largely funded through taxation, organised by the six states and two territories and delivered by a mix of public and private providers. Publicly funded healthcare is administered through Medicare. Medicare covers the costs of care in public hospitals and subsidises treatment in private hospitals and for patients who are treated as private patients in public hospitals (up to 75 percent of the price set through the Medical Benefits Schedule).[c]

The funding of public hospitals is shared by the states/territories and the central (federal) government (the Australian Government). The states/territories are allocated a fixed grant for healthcare from the Australian Government based on Australian Health Care Agreements, negotiated every five years.[7] In the 2003-2008 agreement, the Australian Government committed itself to allocate AUS$42 billion to the states. Government funds are capped prospective block grants, with the states bearing the risk increases in demand and costs during that period. In 2005-2006, the Australian Government provided 40.6 percent of public hospital funds, the states 40.5 percent, with the remainder paid for through private health insurance and direct payments by patients.[8]

2.2 Role of DRGs in paying for hospital activity

2.2.1 Introducing DRGs into the system

DRGs were introduced in 1985 as an approach of monitoring the activity and productivity of hospitals. Activity-based funding of hospital care was first introduced in 1993 in Victoria, in response to severe cost pressure that translated into a 10 percent decline in the public healthcare budget. In particular, the government (1992-1999) aimed to increase transparency and to introduce market-style competition. Activity-based funding aimed to deliver increase efficiency, mainly through shortening length of stay. Other states followed, including South Australia in 1994-1995, Western Australia and Tasmania in 1996-1997 and Queensland in 1997-2008.[9]

[c] Medicare, the publicly funded national health insurance system, provides free or subsidised health care to the resident population. As of June 2006, 43.5 percent of the population has private insurance for private treatment in hospitals and for some ancillary goods and services (ambulatory care is covered under Medicare).[6]

The main objectives for introducing nationwide activity-based funding are to increase productivity of hospitals and to reduce costs. As a large proportion of hospital funding is allocated by the central government, it has an interest in cost containment and has therefore strongly promoted the use of DRGs.[9]

2.2.2 Proportion of hospital activity paid for through DRGs

The Australian Government has promoted the DRG system, for example, by supporting a biannual "Casemix Conference". However, as the method of hospital payment is a responsibility of the states, the proportion of activity-based funding varies considerably among the states and no central data is available.

Most states use a combination of activity-based funding and budgets. Some states, for example, reimburse fixed and variable costs through DRGs, whereas others use DRGs mainly for variable costs and cover fixed costs through grants. Other differences among states include approaches of risk-sharing between hospitals and purchasers/states in case of very expensive cases ("outliers"),[d] the method of DRG-based purchasing (some states purchase services by grouping DRGs) and assumptions regarding economies/diseconomies of scale in large hospitals.

In Australia, the discourse on hospital funding reflects a strong concern about the fairness of funding providers. The purpose of any additional funding is thus to reduce the financial risk of hospitals associated with, for example, the costs of teaching medical students and other services, such as providing care in rural communities, that are not sufficiently reflected by DRGs. For example, in Victoria, all public hospitals receive DRG based payments for public and private patients with the exception of small rural hospitals. These hospitals receive a guaranteed annual budget based on activity in previous years to ensure the availability of services in these areas.

Additional funding can take the form of "co-payments", which are attached to selected DRGs for specific patient groups or services that are associated with higher and more variable costs, and "grants", which are given to reimburse and/or incentivise services in certain areas. A variety of funding methods is used, including one-off payments, financial payment grants and historical service grants.

Examples for co-payments are payments for patients in intensive care who receive mechanical ventilation over a specified time period, for thalassaemia patients, Aboriginal and Torres Strait Islander patients and for patients whose treatment involves certain new technologies (examples have included stents for endovascular repair of aneurysm of the

[d] Risk adjustment strategies include: (1) within DRGs, using different weights for different types of stay, and different trim points; (2) using different prices for different hospitals and patient types; (3) for complex patients: (a) ICU co-payments through cost weight (e.g. Victoria) or ICU days reimbursed separately from cost weights (e.g. NSW); (b) other loadings for patients from ethnic minorities (Aborigines and Torres Strait Islanders), paediatric patients and patients in tertiary DRGs; (c) Victoria uses cost per Weighted Inlier Equivalent Separation (WIES) as a proxy measure of complexity to allocate a complexity pool of funding across hospitals. This in part overcomes the inability of the current patient co-morbidity and complexity level (PCCL) score to define patient complexity within DRGs (PCCL scores are based on length of stay more precisely. As length of stay moves to "same-day", the score becomes less indicative of the complexity within a DRG).

aorta, atrial septal defect closure device and colonoscopy for gastroscopy patients). Co-payments for new technologies aim to ensure the adoption of new technology (often a medical prosthesis) before the costs are covered through cost weights or where the new technology is only available at a few hospitals.[e] In most cases, new technologies are initially funded through a new-technology grant for three to four years, before the additional funding is absorbed in the cost weight.

Funding includes:

- *state-wide specialised services grants*, provided for a number of specific services (e.g. ventilation weaning, catheters for electroconvulsive shock treatment (ECT), treatment of AIDS patients)

- *incentive grants*, allocated for activities associated with specific goals that involve the performance of a hospital as a whole, for example to improve access to emergency care and for elective patients; eligibility for these grants is based on performance measures, such as waiting list targets

- *quality funding* for activities aimed to improve the quality of care provided at a hospital; grants can be given as quality improvement funding, accreditation funding or funding for clinical risk management, safety and infection control; these grants reflect various input and performance measures

- *grants for training, development and research*, allocated to major teaching hospitals to compensate for costs related to patient complexity, which cannot easily be separated from other costs; funding is divided into several components: a component for training and teaching, workforce components based on the number of staff, and a component for complexity; this procedure involves identifying complex DRGs and the most expensive conditions within each complex DRG, as well as estimating the proportion of complex patients in the most complex DRGs for each hospital

- *non-admitted emergency service grants* to ensure the availability of emergency care services available in hospitals regardless of the level of actual attendance; these grants are provided to hospitals with a 24-hour emergency service

- a small number of specific grants for outpatient (non-admitted) services.

Some special grants apply to services associated with sub-acute care. Sub-acute care refers to care provided by specific rehabilitation units, care provided to patients receiving geriatric or palliative care. Sub-acute rehabilitation care is grouped by a separate casemix

[e] For example, a prosthesis that may only be suitable for some of the cases contributing to a given DRG and where the treatment in question is not available at all hospitals providing treatment within that DRG. Victoria uses co-payments for DRGs associated with prostheses if the following criteria are met: Prostheses are expensive; used at high volume; and the mix of prostheses is variable among hospitals and/or within certain DRGs.

system, the Casemix and Rehabilitation Funding Tree (CRAFT), applied to rehabilitation units with more than 20 beds. Smaller rehabilitation facilities are reimbursed per diem. Rehabilitation services in hospitals without a designated rehabilitation unit are funded through the general DRG funding system. In some hospitals, geriatric and palliative care is funded on the basis of bed days. Interim care for patients waiting for residential care is similarly funded, but on a lower rate per bed than sub-acute care. Hospitals receive a capitation payment for each renal dialysis patient, recognising both the extended duration and the number of treatments per year required to maintain these patients.[10]

2.2.3 Variation of DRG-funding of hospital activity by ownership and region

In Australia's publicly funded health system activity-based funding is only used to finance public hospitals and publicly reimbursed services commissioned from private hospitals.

As noted above, states use different reimbursement methods, largely using a combination of population-based resource allocation models, activity-based funding (referred to as "casemix" funding in Australia) based on DRGs and grants/budgets. Hospital budgets are principally limited by a budget ceiling resulting from central budget allocation. New South Wales has maintained global budgets as an alternative way of funding, using DRGs as a tool for managing and monitoring hospital activity only.[11] Since 2008, NSW Health has begun to phase in "episode funding", a variant of activity-based funding, within a formula for funding its eight area health services.

In November 2008, the Council of Australian Governments (COAG) formed a National Partnership Agreement for Hospital and Health Workforce Reform (NPAHHWR), outlining a plan to introduce a standard national activity-based funding model by 2014-2015. It aims to work towards a nationally consistent model of counting, costing and classifying patient activity. However, some details of the proposal, for example, some definitional issues around what constitutes an "efficient cost", are likely to be contested between the Australian Government and the states.

The plan involves the following four stages: (1) a unified patient classification system and refined casemix costing method for acute inpatient services to be developed by the end of 2009-2010; (2) a costing approach to inform funding for small or regional hospitals with community service obligations and training, research and development, to be developed by the end of 2010-2011; (3) a common casemix classification and costing method for emergency department services, sub-acute care, outpatient services and community health to be developed by the end of 2012-2013; and (4) an implementation strategy for price setting, incentives and transition arrangements, to be developed by the end of 2013-2014. The funding model is expected to be fully implemented by 2014-2015; an evaluation is scheduled for 2015-2016.[12]

2.3 Characteristics of the DRG system

2.3.1 DRG system used

Australia has developed its own DRG methodology, the Australian national diagnosis-related groups (AN-DRGs; based on ICD-9-CM coding), subsequently developed into

Australian refined diagnosis-related groups (AR-DRGs), coding in ICD-10. The latest version of the AR-DRGs (Version 6.0) was released in November 2008.[13]

AR-DRG classification is an ongoing process, led centrally by the Department of Health and Ageing, in consultation with the Clinical Casemix Committee of Australia, Clinical Classification and Coding Groups, the National Centre for Classification in Health (NCCH), state and territory health authorities, and other organisations. In principle, the grouper used in states/territories is centrally defined and maintained.

The Department of Health and Ageing AR-DRG produces and publishes definitions manuals for each version of the AR-DRG (from AR-DRG Version 4.1 onwards). The manuals describe the classification method and the DRG assignment process and are available for purchase from the NCCH for licensed countries.[14] Software for grouping patient records under the AR-DRG classification is available from a number of software developers.

The current AR-DRG classification system (version 6.0) includes 23 major diagnostic categories. Inpatient episodes of care (covering the entire episode from admission to discharge) are divided into "surgical DRG", "medical DRG" and "other DRG" partitions and then into DRG families (which include so-called adjacent DRGs).[f] These are further sub-divided, resulting in 698 AR-DRGs.

The grouping process includes the following tasks in order: (1) removal of clinical and demographic coding errors, (2) major diagnostic category (MDC) assignment, (3) pre-MDC processing[g], (4) MDC partitioning, (5) adjacent DRG (ADRG) assignment, (6) complication and co-morbidity level (CCL) and patient clinical complexity level (PCCL) assignment, and (7) DRG assignment.

2.3.2 Exclusions

The scope of the DRG system varies among states. Activity-based funding is generally used for all inpatient services provided in public acute hospitals. In Victoria, activity-based funding has been further expanded to outpatient and rehabilitation services, and separate classification systems now apply to outpatients treated in general hospitals (using Victorian Ambulatory Classification System, VACS, introduced in 2001) and to inpatients in rehabilitation units (using Casemix and Rehabilitation Funding Tree, CRAFT, introduced in 2003) (Box 1). Services provided to admitted patients in emergency departments are included in the DRG payment. Emergency care for non-admitted patients is paid through

[f] For example, the DRG B70 family includes "B70A: Stroke and other cerebrovascular disorders with catastrophic complications and/or comorbidities"; "B70B: Stroke and other cerebrovascular disorders with severe complications and/or comorbidities"; "B70C Stroke and other cerebrovascular disorders w/o catastrophic or severe complications and/or comorbidities"; and "B70D: Stroke and other cerebrovascular disorders, died or transferred <5 days".

[g] The pre-MDC process has two functions: (1) It identifies the eight very high cost DRGs that comprise the "Pre-MDC" category. (2) It changes MDC assignment in cases where MDC is not defined exclusively on the basis of principal diagnosis but on the existence of other specific data. For example, the existence of codes for tracheotomy or the transplantation of specific organs.[15]

a separate grant (non-admitted emergency service grant). However, Victoria excludes mental health from DRG funding, which is included, for example, in South Australia.

Box 1 Activity-based funding of outpatient services in Victoria

In Victoria, outpatient services provided by large hospitals are reimbursed using the Victorian Ambulatory Classification System (VACS). Smaller hospitals receive historical grants in recognition of the smaller numbers of services they provide, incurring higher costs by each service. The VACS classification incorporates 35 weighted clinical categories (paid as "encounters") and 11 unweighted allied health categories (paid as "occasions of services").[16] The system also provides components for base grants, teaching and other specified grants. Outpatient radiotherapy is separately reimbursed per unit of output, weighted according to the megavoltage courses, simulation and dosimetry and the number of consultations.

2.3.3 Setting the price/tariff

DRG tariffs are set at state level. The tariff (calculated as "cost weights" multiplied by a hospital specific price) is reviewed at least every two years; in Victoria it is updated annually. The level of payment is determined by two factors:

1. The average cost per DRG, which is determined based on costing data reported by hospitals. In Victoria, all major hospitals and many smaller hospitals contribute to an annual cost weight study. In 2005-2006, the cost weight study evaluated 83 percent of all inpatient episodes across all Victorian public hospitals (1.04 million out of 1.25 million). Based on these data, weights are calculated, thus reflecting the difference in actual cost per DRG. Different weights are given for episodes providing treatment on the same day, within one day, and for low and high outliers.
2. The amount of public funding available in any given year. Thus, the tariff per DRG is not equivalent to the average cost per DRG, but is determined in relation to the budget. Prices are higher for rural and regional hospitals to adjust for the additional costs involved in delivering services to these areas (e.g. transport).

The dependency of price on the budget is also reflected in agreements between hospitals and states on service targets and special funding arrangements if services are provided below or in excess of the agreed target. Policy-makers involved in price setting also take other sources of hospital income into account, such as the percentage of services reimbursed through private health insurance.

Methodologies for adjusting the DRG system vary among states. In Victoria, the system of activity-based funding combines activity-related funding (per patient episode) with other types of funding.[17] The funding model is based on patient episodes weighted per DRG and adjusted for length of stay. The resulting unit of payment is the "Weighted Inlier Equivalent Separation" (WIES). Victoria uses the AR-DRGs, in addition to a small number of modified DRGs (VIC-DRGs; in 2003-2004 for hysteroscopy sterilisation, peritoneal dialysis, radiotherapy, bone marrow transplant, nasopharyngeal intubation and arteriovenous fistula[17]).

Payments are made per WIES and corrected for outliers beyond certain trim points. For most DRGs, outliers are defined by a length of stay that is less than one-third or more than three times the average length of stay for any given DRG. Payment rates for outliers are set at 80 percent of the average daily inlier cost weight for medical patients. For surgical patients, the percentage for outliers is set at 70 percent of the average inlier daily cost weight (excluding surgery and prosthesis costs).

Payments through DRGs and other types of funding represent approximately 75 percent of inpatient costs. A recent study for the Victorian Department of Human Services (DHS) found that these payments accounted for 73.85 percent of costs for the 83 percent of episodes of inpatient care for which cost data was available (McNair, unpublished data).

DHS has periodically commissioned reviews of, for example, the development of costs and cost components in public hospitals, the appropriate level of adjustments for increases of non salary and wage costs, the frequency to which assessments should occur and trends affecting future finances (e.g. in 2003, 2006 and 2009). Most reviews respond to growing concerns about a potential mismatch between the costs of publicly funded hospital care and the available budget.

2.3.4 Monitoring the system

Regular administrative data of hospitals and certain specifically collected data are reviewed by state health departments each month. In Victoria, this involves a statement of priorities (SoP) negotiated annually between each health service (groups of hospitals) and the minister for health. The SoP process "ensures delivery or substantial progress towards the key shared objectives of financial stability, improves access and waiting times, and quality of service provision".[18] The SoP agreement for each provider is published online and health services' progress in reaching agreed targets is monitored monthly.

Private hospitals are required to provide state government agencies and the Private Hospitals Data Bureau within the Australian Government Department of Health and Ageing with anonymised data on all admitted patients.[h] Although not necessarily used for budgetary purposes, private hospitals use ICD-10-AM codes to allocate each episode of inpatient care to a DRG.

2.4 Funding intensive care

2.4.1 Defining intensive care

The Australian and New Zealand College of Anaesthetists, Joint Faculty of Intensive Care Medicine (JFICM) defines intensive care units for adults, children (paediatric) and neonates (distinguishing them from high dependency units) as:

> An intensive care unit (ICU) is a specially staffed and equipped, separate and self-contained section of a hospital for the management of patients with life-threatening

[h] The Commonwealth data provision is mandated under the Health Legislation (Private Health Insurance Reform) Amendment Act 1995 (Commonwealth).

> or potentially life-threatening conditions and reversible, or potentially reversible, organ failure.
>
> An ICU provides resources for the support of patients and their families, and utilises the specialised skills of medical, nursing and other staff experienced in the management of critically ill patients. These skills and resources, necessary to care for the critically ill, are most efficiently concentrated in one area of the hospital. This does not preclude the division of one ICU into a higher level (e.g. for ventilated patients) and lower or 'step down' level (e.g. for post-operative patients), nor does it preclude the siting of specific high dependency areas elsewhere in the hospital (e.g. neurosurgical, post-operative cardiothoracic area). Neonatal and paediatric intensive care units and coronary care units should preferably be separate from general ICUs. However, coronary care patients and children are effectively managed in general ICUs where necessary.[19]

These definitions are used in Victoria and are likely to be used in other states as well.

2.4.2 **Funding adult intensive care**

Approaches to funding adult intensive care vary among states. In Victoria, adult intensive care is funded through DRGs, using the Australian Refined DRGs (AR-DRGs), plus a per diem payment per case, using mechanical ventilation as a proxy for intensive care.[13] Specifically, intensive care is defined through procedures that drive episodes into an intensive care specific (pre-MDC) DRG, as hours spent in ICU and as hours of mechanical ventilation. Thus, to qualify for the mechanical ventilation co-payment patients must be treated in a designated ICU bed, must group to a DRG eligible for the mechanical ventilation co-payment and must receive a certain number of hours of ventilation. For some DRGs (generally pre-MDC DRGs), the threshold is four days of mechanical ventilation; payment for the first four days is included in the base DRG payment.

For most other DRGs, six hours of mechanical ventilation are required to be eligible for the co-payment (six hours of mechanical ventilation attract payment for a day of mechanical ventilation; a payment for two days of mechanical ventilation applies after 24 hours of mechanical ventilation). This co-payment is made in recognition of the additional costs associated with admission and discharge of a patient from an ICU facility. In 2009-2010, the per diem part of the mechanical ventilation co-payment has a cost weight of 0.7729 (about AUS$2800 or £1600 for major metropolitan hospitals) per day.

The mechanical ventilation co-payment also includes an availability payment with a cost weight of 0.6980 (about AUS$2500 or £1400). This payment applies once per episode to compensate providers for the costs of keeping a number of ICU beds available at any given time. The aim of this policy is to discourage providers to fill beds with patients who do not require intensive care.

The calculation of both the DRG cost weight and the mechanical ventilation co-payment is based on the analysis of costs provided annually to the Department of Human Services.

Other states fund ICU bed days separately, in addition to the cost-weight case payment. For example, in New South Wales, six level 5 ICUs are funded on the basis of ICU bed-days whereas rural level 4 ICUs are funded reflecting criteria relating to staffing and size.[i] Smaller units receive a co-payment for mechanical ventilation. In Queensland, designated ICUs are funded per diem in addition to the DRG payment. Three different ICU levels are distinguished. Critical care is funded through DRGs plus a per diem payment. Finally, in South Australia, ICUs are funded mainly through a per diem (fixed at 70 percent of cost). Separate per diem rates apply to paediatric, adult teaching ICUs and to patients receiving mechanical ventilation in large rural hospitals.

2.4.3 Funding neonatal and paediatric intensive care

Similar to adult intensive care, funding of neonatal and paediatric intensive care varies among states. In Victoria, paediatric intensive care is similarly to intensive care for adults, using a combination of DRGs and co-payments for mechanical ventilation and availability.

In Victoria, neonatal intensive care is funded through DRGs supplemented by an availability payment only, in recognition of the fact that hospitals have to maintain a certain level of capacity. Neonatal intensive care was previously funded through DRGs and a co-payment for mechanical ventilation. However, in neonatal care the definition of mechanical ventilation became blurred by the use of nasal prongs to facilitate both mechanical ventilation and simple oxygen delivery. In response, the co-payment for mechanical ventilation was replaced by increased cost weights for neonatal DRGs and an availability payment for maintaining NICU capacity.

In South Australia, neonatal intensive care is funded per diem, in addition to DRGs. A similar approach is taken in New South Wales and Queensland.

2.4.4 Funding specialist intensive care

Specialist intensive care services, including burns, are funded through DRGs and a mechanical ventilation co-payment.

2.4.5 Current debates about the existing funding mechanism for intensive care

In Victoria, the approach to funding intensive care through DRGs and co-payments was introduced alongside the introduction of activity-based funding and has evolved over 15 years, with the most recent modification taking place in 2005.

Overall, the current approach to funding intensive care is considered to reflect the costs of intensive care treatment adequately. The Victorian DHS, in collaboration with ICU clinicians, has recently reviewed the funding for intensive care and confirmed that the current approach of using hours of mechanical ventilation is the most adequate proxy. An advantage of using mechanical ventilation as a proxy for ICU care is that it provides an incentive for providers not to fill ICU beds with patients who do not require intensive care.

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[i] In New South Wales, five levels of intensive care are distinguished, while in Victoria, as noted earlier, intensive care is provided at three levels only.

The funding model has been repeatedly discussed with the Victorian Intensive Care Advisory Committee over recent years. More recently, there have been concerns that funding for ICU is not adequate, as stated in the 2009-2010 Policy and Funding Guidelines of the DHS in Victoria:

> There is a perception by some stakeholders that health service funding does not adequately cover the cost of intensive care services. Of particular concern is that the funding methodology has not kept pace with changes in clinical practice. Fewer patients in intensive care receive mechanical ventilation, and those that do receive it for shorter periods. This decreases the copayment in some groups of patients despite the cost of patient care being the same, or similar, to what it would have been if they had been mechanically ventilated, for example the need for vasopressors and renal replacement therapies.[11]

However, previous discussions between the Victorian DHS and intensive care physicians uncovered a lack of understanding of the funding mechanisms in intensive care among clinicians. It is thus important that the funding strategy is made transparent and is well communicated to avoid that criticism of the level of funding is based on misinformation. However, an issue that is yet to be addressed is funding for work that supports, or is performed around, ICU care.

The availability payment is a potential area for improvement. The aim of the availability payment is to allow hospitals to cover costs irrespective of whether or not an ICU bed is occupied. However, the payment does not prevent hospitals from oversupplying intensive care. It also does not provide an incentive for hospitals to reduce the number of ICU beds in times of low demand (e.g. during summer).

At the national level, different approaches to funding intensive care used by states are currently reviewed as part of the current COAG activity-based funding scoping project.

CHAPTER 3 Denmark

3.1 Funding hospital care

Healthcare in Denmark is predominantly funded through taxation, collected at national and municipal level, organised by regions and municipalities and delivered through a mix of public and private providers.[20]

Most secondary and tertiary care is provided by public hospitals, owned and operated by the five regions.[21] Regions receive funding from the central government and constituent municipalities to finance the provision of hospital care. Decisions about the allocation of funds from the government to the regions are partly based on measures of hospital activity, using DRGs.

Regions fund public hospitals through a combination of global budgets and activity-based funding. Private hospitals receive public funding from the regions for providing services under the extended choice programme. This funding is usually based on fee for services, with the fees set through negotiations between private hospitals and the regions (with some earlier agreements also using a fixed percentage of the payment per DRG).[22] The programme reimburses the costs of care provided in private hospitals if a patient does not receive treatment in a public hospital within a month from referral. Public funding for private hospitals also covers certain specialist care provided in some non-profit hospitals (e.g. treatment of patients with sclerosis, arthritis or muscular atrophy).[23] All other services provided by private hospitals are paid for by patients through voluntary private health insurance or direct payments. However, the share of privately provided hospital care in the Danish system is comparatively small.

3.2 Role of DRGs in paying for hospital activity

3.2.1 Introducing DRGs into the system

Activity-based funding has been gradually phased in, beginning voluntarily in the early 1990s. In 1993, national legislation introduced free choice of (public) hospital, allowing patients to be referred by their GP to treatment in public hospitals outside their county.[23] In 1997, the government allocated additional funds to encourage county councils to use DRG-based funding. In 1998 funding through DRGs was introduced for reimbursing

hospitals for treating patients from other counties. Since 1999, counties (now regions) have been required to finance an increasing proportion of hospital budgets through DRGs.

The primary objective of introducing activity-based funding was to provide hospitals with an incentive to promote patients' exercise of free choice of hospital and to increase production and productivity. There was an expectation that proxy markets are better suited to secure sufficient hospital capacity, and that activity-based funding could increase capacity in the short run and drive down waiting times. Competition between public hospitals was not an initial objective; however, by using activity-based funding to reimburse hospitals for treating patients from other regions, hospitals were given some incentive to compete for patients.

3.2.2 Proportion of hospital activity financed through DRGs

Regions are required to use DRGs to reimburse hospitals in other regions for services delivered to residents outside their home regions, and they are required to distribute at least 50 percent of their budgets for hospitals based on activity.

Regions use DRGs in two ways: (1) to calculate annual hospital budgets, which hospitals receive upfront, and (2) to calculate a share of funding based on activity. Since 1999, the proportion of activity-based funding has gradually increased from 10 percent initially to over 50 percent in 2007. The proportion of activity-based funding is stipulated by the government. However, some regions exceed the nationally defined proportion, distributing about 70 percent of hospital funds through DRGs. The "baseline" budget (100 percent) is annually negotiated between the hospitals and the regions, in addition to activity targets set for each hospital.[21]

3.2.3 Variation of DRG-funding of hospital activity by ownership and region

Activity-based funding applies to all public hospitals, using a nationally uniform approach of grouping, costing and pricing services.

The DRG system has also been used to reimburse a number of private hospitals for services delivered under the publicly funded free choice scheme, but currently the prices for most services provided by private hospitals are agreed through negotiation. Prices per DRG are typically set at 90 percent of the national price for public hospitals.[22]

The national DRG system is applied across regions, but the share of funding distributed through activity-based funding differs, and there are some minor differences between the regions regarding technical aspects of the distribution mechanism.

3.3 Characteristics of the DRG system

3.3.1 DRG system used

Initially, Denmark used a version of DRGs developed by the Health Care Funding Administration (HCFA) in the US, combined with Norwegian cost weights. This system was replaced by NordDRGs, the joint grouper developed and used in Scandinavian countries, in combination with Danish cost weights. Since 2002, the National Board of Health has developed its own grouper, DkDRGs, by adjusting NordDRGs to clinical practice in Denmark.[23]

DkDRGs are used throughout the system. In its 2006 version, the DkDRG system comprises 25 major diagnostic categories (MDCs) with a total of about 600 groups (the number changes slightly annually) and a number of additional groups, largely relating to cancer therapy, including radiotherapy and chemotherapy (inpatient care only).[23] The grouping is based on patient characteristics, including diagnosis, surgical procedure, other procedures (e.g. mechanical ventilation), certain diagnostic procedures, status at discharge, sex and age.[23]

There are approximately 100 groups referred to as "greyzone" groups included in the total of 600 groups. These groups cover diagnoses and treatments that can be provided both within hospital and ambulatory care.[24]

A separate grouper applies to ambulatory care, called Danish Ambulatory Grouping System (DAGS), comprising about 140 groups.[24]

3.3.2 Exclusions

DkDRGs only apply to somatic hospital care, which for example excludes mental health inpatient services.

3.3.3 Setting the price/tariff

The tariff for each DkDRG is nationally determined and reviewed annually. Tariffs are determined on the basis of the costs reported by all public hospitals. The costing process is a responsibility of the National Board of Health (*Sundhetsstyrelsen*). The Board also issues costing guidelines for hospitals.

Relative cost weights are derived through a combination of "bottom up" and "top down" approaches. The Danish Hospital Cost Database includes information about the total cost of service delivery at hospital level for all public acute hospitals. Direct costs can be related directly to the patient through a bottom up approach including the calculation of number of staff involved in providing a service, duration of procedure or attendance per staff, wage level, costs of medical devices and pharmaceuticals. Top down approaches are those where indirect costs are allocated to cost centres, divided by the number of the patients.[22] The aggregate data of direct and indirect costs per DRG are then used to derive the average cost per DRG at national level.

However, there is debate about the extent to which reported costs reflect the true costs of hospitals, due to problems of data quality resulting from variation in hospital information systems (not all hospital use "feeder systems" that record resource consumption at the patient level); the cost database has evolved over years to improve the quality and accuracy of the data used to inform relative cost weights.[23] At the most extreme, some hospitals identify costs only in relation to bed days per patient (or number of ambulatory visits).[22] Tariffs do not include the costs of capital, depreciation and research, which are separately funded.[23]

For a number of DRGs, costs per single unit of service are determined based on relative cost weights (or points). Relative cost weights per service are developed at national level, initiated by the National Board of Health. Some of the larger hospitals have developed their own cost weights for ancillary services, such as intensive care.[22]

Prices for "greyzone" groups that cover diagnoses and interventions that can be provided both within hospital and ambulatory care are based on an average of cost incurred for each group in both ambulatory and inpatient care. This mechanism is aimed at preventing hospitals from treating patients as in-patients if they could be treated in out-patient clinics that are integrated in the public hospital departments.

The annual tariff is based on costs reported two years earlier, adjusted for general increases in prices and wages (based on data provided by the Ministry of Finance).[23]

3.3.4 Monitoring the system

The centre assumes the system to be the best possible, objective measure of performance. There is no specific system in place for monitoring the impact of activity-based funding on hospital care.

3.4 Funding intensive care

3.4.1 Defining intensive care

The Danish National Health Board defines intensive care as the observation, diagnosis, treatment and care of patients with potentially reversible organ failure or multiple organ failure, which is so severe that the patient cannot be treated in an ordinary department.

Intensive care units are usually part of the department of anaesthesiology.

3.4.2 Funding adult intensive care

Adult intensive care is funded through a combination of global budgets and activity-based funding, in line with the overall funding approach. However, intensive care typically does not directly attract activity-based funding, since DRGs are attributed to the hospital department from which a patient is discharged, which usually is not the intensive care unit. Thus, costs of intensive care are allocated to other departments (e.g. surgery, otorhinolaryngology and gynaecology/obstetrics) based on an allocation key developed for each hospital. The variables in the allocation key are specific for each hospital and each hospital department, often reflecting negotiations between the management of the hospital and the heads of the department of anaesthesiology.

There are, however, a number of specific DRGs associated with intensive care, including for palliative care, pain treatment and anaesthesiology.

3.4.3 Funding neonatal and paediatric intensive care

Neonatal and paediatric intensive care units typically constitute part of the department of paediatrics. Thus, the cost of neonatal and paediatric intensive care are attributed to the paediatrics department. As noted above, the funding arrangement reflects the overall approach of combining global budgets and activity-based funding.

3.4.4 Funding specialist intensive care

Treatment of burns and other specialist intensive care services are grouped into DRGs and funded as an integral part of the hospital funding system.

3.4.5 Current debates about the existing funding mechanism for intensive care

Overall, the existing funding arrangement for intensive care has always been an accepted part of the DRG-system. Discussion about the advantages and disadvantages of the system tend to relate to the overall approach rather than being particularly focused on intensive care.

Although there are no changes to the current approach of paying for intensive care being considered, intensive care is one of the areas that are likely to be developed further in the coming years. The National Board of Health is currently collecting data on the costs involved in providing intensive care, which are expected to be used in future to improve the accuracy of price setting for these services.

CHAPTER 4 France

4.1 Funding hospital care

Healthcare is largely funded through statutory health insurance (SHI), with some additional co-payments made by patients.[25] SHI is organised centrally, with regional hospital authorities (*agences régionales de l'hospitalisation*) purchasing hospital care on behalf of patients. Secondary and tertiary care is provided by a mix of public (including private non-for-profit[j]) and private for-profit hospitals. There is an annual ceiling on SHI spending on hospital care, approved by the parliament.

Hospital care is financed through an activity-based funding system using DRGs, which has become fully operational in 2008. The system is used to reimburse both public/private not-for-profit and private for-profit hospitals. Private for-profit hospitals have been paid entirely through DRGs since 2005. To facilitate the transition from the previously used system of negotiated fees to activity-based funding, private for-profit hospitals receive a higher payment per DRG than public and private not-for-profit hospitals until 2012.

4.2 Role of DRGs in paying for hospital activity

4.2.1 Introducing DRGs into the system

The DRG funding system has been gradually introduced since 2004. It was initially planned to phase in DRGs gradually until 2012, by increasing the share of hospital budgets paid through DRGs. However, the date for full implementation of the system was brought forward to 2008 after President Sarkozy assumed office in May 2007.

The key objectives for introducing a DRG-based funding system were to incentivise increased hospital efficiency, to improve the transparency of the funding system and to harmonise the mechanisms of hospital funding. Prior to the introduction of DRGs, public and private hospitals were funded through separate mechanisms and at different rates, with public hospitals largely funded through an annual budget and reimbursement of private hospitals being based on negotiated fees.

[j] In France, private not-for-profit hospitals are treated in the same way as public hospitals. About one-third of all hospitals are private not-for-profit.

4.2.2 Proportion of hospital activity financed through DRGs

The system is mandatory throughout the health system. All health services in public and non-for-profit hospitals are financed through activity-based funding using DRGs. Activity-based funding is supplemented by a number of additional payments, however. These are partly paid as a surcharge per DRG or as an additional payment for a service or area of activity. The additional payments are as follows:[26]

- An envelope of supplementary funds called MIGAC (*missions d'intérêt general et aide à la contractualisation*) to cover "public missions" such as public health activities, emergency services, care for persons who are homeless or receive social assistance, organ procurement and transplantation, teaching and research. These funds are allocated by the Ministry of Health based on a range of indicators such as the number of students, the number and quality of publications, the level of deprivation in the area, and the number of transplantations. In 2008, the MIGAC fund represented 12.7 percent of the revenue of public hospitals. Only public and private not-for-profit hospitals are eligible for these funds.[27]
- Specific additional funding for expensive drugs and devices. Hospitals can claim full reimbursement for corresponding drugs and devices provided that these are prescribed in accordance with guidelines published by the National Health Authority and, for cancer drugs, the National Cancer Institute. Additional funding for expensive drugs and devices is granted to public and private hospitals.
- Some regions receive an additional percentage of payment per DRG to compensate for costs associated with remoteness (e.g. islands) or the level of urbanisation (Ile de France). This adjustment applies to public and private not-for-profit hospitals only.
- Per diem supplements for specific types of care, such as intensive care or neonatology. Both public and private hospitals are eligible for these supplements.

4.2.3 Variation of DRG-funding of hospital activity by ownership and region

In principle, public and private hospitals are paid through the same mechanism, using DRGs. However, as noted above, there is a system of additional payments covering public missions for public and private not-for-profit hospitals. At the same time, private for-profit hospitals receive an additional adjustment during a transition period until 2012, when the system will converge with the system for public hospitals.

The system is used in all regions of France, with specific adjustments, which are an additional percentage weight per DRG in some regions. Regional adjustments apply to the islands Corsica (5 percent), Guadeloupe (25 percent) and La Réunion (30 percent); certain postcode areas in Ile de France receive a surcharge of 7 percent per DRG.

4.3 Characteristics of the DRG system

4.3.1 DRG system used

The French system of *groupes homogènes de malades* (GHM) is derived from the DRG system developed by the US Health Care Financing Administration (HCFA). The 11th version of GHMs was introduced in 2008.

This version has added a new category of groups called *groups homogènes de séjours* ("admission related groups", GHS). GHS represent the funding claims made by hospitals to the SHI. GHS are largely identical with GHM. However, in a few cases, a GHS is added to the GHM, for example to pay for additional costs associated with palliative care. In this case, the payment per GHM is raised by 30 percent if the patient is admitted to a dedicated palliative care bed or 40 percent if she or he is admitted to a dedicated palliative care unit. Thus, the GHS operates as a percentage add-on payment. An extra GHS is also added for treatment in neonatal intensive care (in addition to the GHM/GHS covering the delivery) or for radiotherapy or dialysis.[26]

The system comprises 2346 DRGs, grouped into 28 major disease categories. The grouper distinguishes factors such as diagnosis, secondary diagnosis, procedures, age, gender, status at discharge and co-morbidities/level of severity.

4.3.2 Exclusions

Psychiatric care is excluded from DRG funding. Although the applicability of GHM has been tested in psychiatric settings there are currently no plans to expand the DRG system to psychiatric care.

4.3.3 Setting the price/tariff

The Ministry of Health determines the price, which is reviewed annually. The tariff is adjusted based on the results of an annual costing exercise (*étude nationale de coûts*, ENC). This micro-costing exercise was introduced in 1993 and is based on a sample of 52 public hospitals (out of 668 public hospitals). Hospitals participate voluntarily and are chosen to represent the main groups of hospitals across the regions of France, including teaching hospitals, specific hospital departments, private not-for-profit hospitals and cancer centres.[28] The results of the exercise are published on the website of the Technical Agency for Information on Hospitalisation (*Agence technique de l'information sur l'hospitalisation*, ATIH), which oversees the design and revision of DRG categories as well as the collection and analysis of corresponding data.

Tariffs are generally lower than actual costs as public hospitals receive additional funding through the MIGAC budgets. Private for-profit hospitals receive a higher tariff during a transition period to facilitate adjustment to the new system.

The Ministry also publishes the list of drugs and devices that are reimbursed in addition to DRGs.

4.3.4 Monitoring the system

The ATIH was established as an independent agency to collect and analyse DRG data, design new grouping software and revise DRG categories.

The Ministry of Health has created a division "mission T2A" (*tarification analytique à l'activité*) charged with the development of policies on the basis of information and analyses generated by the ATIH. For example it analyses the variation in cost within DRGs between patients and between hospitals. The division also identifies, in co-operation with medical professionals of the relevant specialty, adjustments of the tariff to ensure that patients in all regions are treated equitably. The Ministry's policy is to use DRGs as an incentive for providers to meet the needs of a population of a given region, rather than to stimulate competition, for example, between public and private hospitals.

4.4 Funding intensive care

4.4.1 Defining intensive care

Intensive care comprises three levels of care defined by the intensity of treatment and surveillance required for treating severely ill patients: (1) continuous monitoring (*surveillance continue*), (2) intensive care (*soins intensifs*) and (3) resuscitation (*réanimation*). Each level exists for neonates, children and adults.

Réanimation constitutes the highest level of intensive care, indicated by the level of life support a patient receives, typically, but not necessarily in conjunction with some form of ventilation. *Réanimation* also includes services provided in intensive care including cardiac-respiratory resuscitation, haemodialysis and haemofiltration or emergency electro-shock therapy.

4.4.2 Funding adult intensive care

The approach to funding intensive care using a combination of DRGs and supplements was introduced as part of the creation of the DRG system in 2004.

The DRG grouper identifies the location of care/type of ward ("unit of admission"), diagnosis and procedures. Some GHMs are specific to intensive care, although some conditions may also be treated in the ward, depending on severity. The location of care is typically identified with a particular unit, such as an intensive care unit, or a dedicated bed. A dedicated bed may be a stroke unit bed located in an intensive care unit or in a neurology ward, for example, which on any given day is used to treat a stroke patient, in line with stroke unit guidelines.

In addition, there are intensive care supplements which are defined by a combination of type of procedure, severity of disease and location of care (in the case of *réanimation*).

Cost data are derived through a combination of bottom-up costing approaches in the context of the national cost study (hospital departments report cost data to the ATIH) and top-down approaches (by attributing a share of total costs to operating an intensive care unit).

The software CUB-REA was developed to generate data on intensive care, initially for the purpose of quality control. The data are also used to update the tariffs and supplements associated with intensive care to supplement the data from the annual micro-costing exercise, with the latter, on their own, deemed to be insufficient in relation to intensive

care. This is because the costs of intensive care tend to be underrepresented in the sample of hospitals participating in the exercise.

4.4.3 Funding adult intensive care

Intensive care is funded through a combination of DRGs and per diem supplements. The DRG is applied according to the treatment the patient receives in intensive care (e.g. treatment of severe sepsis). In addition, the hospital receives a payment for each day a patient spends in an intensive care unit. The level of payment corresponds with the level of care provided (Table 1).

Table 1 Per diem supplements in adult intensive care

Code	Description	Tariff in 2007 (€)
REA	Supplement for *réanimation*	838,16
STF	Supplement for intensive care	419,58
SRC	Supplement for continuous surveillance	279,39

Source: La tarification des établissements de santé[26]

The supplement for *réanimation* is paid if the following three criteria are met: (1) the patient is hospitalised in a dedicated unit, (2) receives at least one form of organ support and (3) scores more than 15 points on the IGS severity of disease score (a form of SAPS II). The severity score only applies to adults and adolescents over the age of 15 years.

The supplement for intensive care (*soins intensifs*) applies to patients treated in a dedicated intensive care unit who do not meet the other two conditions. Finally, the supplement for continuous monitoring does not require that patients be treated in a dedicated unit. However, only a limited number of DRGs can be combined with this supplement.

4.4.4 Funding neonatal and paediatric intensive care

Neonatal and paediatric intensive care is also funded through a combination of DRGs and per diems. As with adult intensive care, supplements vary, reflecting differences in intensity of treatment (Table 2). The per diem for neonatal and paediatric intensive care is higher than the supplement for same level of care provided to adults.

Table 2 Per diem charges for paediatric and neonatal intensive care

Code	Description	Tariff in 2007 (€)
REP	Per diem for paediatric *réanimation*	950,00
NN3	Per diem for neonatal *réanimation*	950,00
NN2	Per diem for neonatal intensive care	475,00
NN1	Per diem for neonatal care	316,67

Source: La tarification des établissements de santé[26]

4.4.5 Funding specialist intensive care

The treatment of burns is reflected in the DRG system as a major disease category (MDC 22 "*brûlures*"). If the severity of the condition requires treatment in an intensive care unit, the DRG associated with burns is supplemented by a per diem in line with the level of treatment received.

4.4.6 Current debates about the existing funding mechanism for intensive care

There is some concern about the quality of coding. In France, clinical coding is usually undertaken by clinicians rather than by administrative staff. Clinicians, however, typically

do not receive much training in coding as part of their medical education and/or they choose not to participate in additional training. The complexities of the coding system poses a challenge for clinicians involved in coding and for analysts trying to interpret the data.

In addition, there is concern about the system creating incentives for hospitals to "upcode" ("DRG creep"). The SHI administration carries out checks on hospitals' coding practice, undertaken by clinicians employed by the SHI. However, these problems are not specific to intensive care, where supplements are determined by location of care in addition to procedure.

Furthermore, some hospitals claim that the annual uplift of the tariff does not sufficiently reflect the increases in costs. Private for-profit hospitals also criticise the system for not sufficiently recognising activities they undertake (and for which they would like to claim higher prices).

The 11th revision of the DRG system introduced four levels of severity, attributing higher payments to DRGs associated with more severely ill patients. Previous versions of the DRG system only distinguished between age and co-morbidities. The new approach therefore should reimburse hospitals that provide a large proportion of complex care more fairly.

There is currently a debate about whether supplements for intensive care should continue to reflect the location of care in addition to the type of procedures performed and a new set of supplements is currently being developed, for example to adjust for costs of care provided in stroke units.

The Ministry of Health is considering opportunities to support innovation in hospitals, within the limits of the budget ceiling for hospital care approved by parliament.

CHAPTER 5 Germany

5.1 Funding hospital care

Hospital services are funded by statutory health insurance funds, insuring about 90 percent of the population, and substitutive private health insurers, covering the remaining 10 percent. A small proportion of funding is also generated through complementary private health insurance (e.g. for single room accommodation) and direct payments from patients.

In 2007, 32 percent of hospitals were public and owned by states, districts or cities; 38 percent were private not-for-profit (typically run by church-affiliated organisations). The share of private for-profit hospitals has increased substantially in recent years, from 19 percent in 1997 to 30 percent in 2007.[29]

Hospitals and statutory health insurance funds negotiate service volumes to ensure that local demand is met while at the same time controlling overall costs. Service volumes are negotiated annually between individual hospitals and regional associations of statutory health insurance funds and of private insurers, resulting in a detailed plan that prospectively sets out the number of DRGs and service performed by a hospital during a year. This plan covers the entire range of services a hospital provides. Hospitals are financially penalised if they provide services in excess of or below the level agreed in the plan.

Activity-based funding only covers the costs of services provided in hospital. Larger capital investments for public or private not-for-profit hospitals are covered by separate grants funded by state governments; private for-profit hospitals are expected to be able to make investments through their own resources.

5.2 Role of DRGs in paying for hospital activity

5.2.1 Introducing DRGs into the system

The DRG-based funding system was introduced on a voluntary basis in 2003. The system became mandatory for acute hospitals in 2004.

The principal objective of introducing DRGs was to provide a financial mechanism to increase hospital efficiency. The previous system of reimbursing hospitals based on per diems provided an incentive to extend patients' stay in hospital. Therefore, length of stay remained high by international comparison. Policy-makers also intended to increase the

transparency of service delivery and costs in hospital, to better be able to compare between hospitals and to identify potential for further efficiency gains. A further objective was to strengthen hospital competition.

5.2.2 Proportion of hospital activity financed through DRGs

Both statutory health insurance funds and private health insurers reimburse services provided in acute hospitals through activity-based funding using DRGs.

Federal legislation on hospital funding provides that the entire costs associated with the provision of acute hospital services have to be financed through DRGs.[k] A small number of exclusions have been defined:

- certain expensive services, for example dialysis, extensive blood transfusions, high-cost chemotherapeutic medicines
- a small number of hospitals (about 50 out of 1700), classified as "special institutions" that provide specialised care, characterised by high levels of complexity that require long inpatient stays, such as palliative care or specialised paediatric care
- interventions delivered by hospitals within the context of an integrated care arrangement.[l]

5.2.3 Variation of DRG-funding of hospital activity by ownership and region

DRG-funding is mandatory for all types of acute hospitals, including public, private not-for profit and private for-profit. National legislation stipulates that DRGs are to be used uniformly across all states, thus there is no regional variation with regard to the grouping methodology used. However, DRG prices are set regionally, with plans being discussed to converge to a national price in the future (see below).

5.3 Characteristics of the DRG system

5.3.1 DRG system used

The German system uses G-DRGs. The system initially built on Australian AR-DRGs (Version 4.1), but has since been adjusted to hospital care in Germany.

G-DRGs comprise 23 major disease categories (MDCs) and one pre-MDC. The pre-MDC refers to specialised services such as transplants or intensive care. Each MDC is divided into medical, surgical and procedural sub-groups (partitions).

The 2009 (2010) grouper includes 1192 (1200) DRGs, of which 1147 (1154) DRGs have nationally uniform cost weights. For 45 (46) DRGs, typically relating to conditions that

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[k] *Gesetz zur wirtschaftlichen Sicherung der Krankenhäuser und zur Regelung der Krankenhauspflegesätze* (KHG).

[l] The 2004 Social Health Insurance Modernisation Act (*Gesetz zur Modernisierung der Gesetzlichen Krankenversicherung*, GMG) enabled health insurance funds to designate up to 1 percent of financial resources for selective contracting with single providers to facilitate better coordination between the ambulatory and hospital sector so effectively establishing integrated care as a separate sector in the German health care system.[30]

are rare and expensive, prices are negotiated individually, between individual hospitals and regional associations of statutory health insurance funds or private insurers.

In addition, there are 127 (143) supplementary fees, 74 (81) of which are nationally determined by the Institute for the Funding of Hospitals (*Institut für das Entgeltsystem im Krankenhaus*, InEK) during the annual DRG calculation; 53 (62) are negotiated between regional payers and individual hospitals.

5.3.2 Exclusions

The DRG system only applies to inpatient care delivered in acute hospitals. The extent to which ambulatory/outpatient care is provided by hospitals is limited as most ambulatory care is provided through practice-based doctors and reimbursed by fees paid for particular services. The exception is dialysis treatment provided in hospital outpatient departments, which is financed through DRGs.

Psychiatric hospitals are excluded from DRG funding. These hospitals receive a per diem payment per patient. However, MDC 19 (mental disease and disorder) covers short-term psychiatric cases treated in acute hospitals. The 2008 Hospital Financing Reform Act stipulates a funding system based on fixed per diem rates will be introduced for psychiatric and psychosomatic hospitals in 2013.[m] Per diems will be determined by criteria such as diagnosis, procedures and care intensity.

Certain expensive treatments (e.g. dialysis, extensive blood transfusions and high-cost chemotherapeutic medicines) are separately funded. This particularly benefits highly specialised institutions, which provide a high proportion of expensive treatments. For these interventions, a supplementary fee is added per episode.

5.3.3 Setting the price/tariff

For the vast majority of DRG (1147 out of 1192 in 2009; 1154 out of 1200 in 2010) cost weights are nationally set by InEK. The institute manages the grouper, monitors and analyses hospital costs and calculates national cost weights.

InEK collects patient specific data (e.g. demographics, diagnoses, procedures) and cost data per patient from a sample of hospitals (so-called "calculation hospitals"). Participation in the sample is voluntary for hospitals.[31]

Hospitals included in the sample are required to report data on all costs incurred and data of all cases admitted during the calculation period, according to detailed calculation guidelines. The data set distinguishes between different types of costs and different cost centres (e.g. ward, intensive care unit, operating theatre, anaesthesia, radiology, laboratory). InEK routinely checks the data for plausibility, excluding hospitals providing low quality data (e.g. missing costs of a procedure performed). All data are included in the calculation of cost weights by InEK. To define the cost weights of the DRGs in the 2009 catalogue, InEK analysed the costs of a sample of about 220 hospitals, comprising 16 percent of all hospital cases and about 13 percent of acute hospitals.[31]

[m] *Gesetz zum ordnungspolitischen Rahmen der Krankenhausfinanzierung* (KHRG).

In addition, all other hospitals are required to submit patient-related data to InEK annually, including data on diagnoses, procedures and demographics. These data are used to support the calculation of cost weights and to inform annual revisions of the DRG grouper.[n] The dataset for 2007 included data based on 19 million admissions.[31]

Some specialised services (e.g. burns, pancreas transplant) are not assigned a cost weight, as the number of cases reported per year is regarded as insufficient for the calculation of robust cost weights.

Prices are set regionally, following annual negotiations between the regional associations of hospitals, statutory health insurance funds and private insurers. These parties agree a regional base rate, which is then multiplied by an individual cost weight for each DRG.

This system was introduced in 2009, following a transition period of five years, during which rates negotiated per hospital were gradually adapted to the regional base rate. This convergence period was intended to give less efficient hospitals time to adjust to the new payment system.

It was initially anticipated that regional base rates will eventually converge on a national rate, determined by InEK. This idea was however rejected by state governments during negotiations in preparation of the 2008 act. Instead, the act determines that regional base rates have to adjust gradually to a federal rate between 2010 and 2014, within a defined range (+2.5 percent to −1.25 percent of the federal rate). The decision about complete convergence was postponed to after 2015, to take account of findings from ongoing research into the causes of the variation of base rates between states.[o32]

5.3.4 Monitoring the system

The DRG system is monitored by InEK. The institute is jointly financed by the associations of hospitals, statutory health insurance funds and private insurers and thus jointly "owned" by the corporatist sector.

All stakeholders, including payers, hospitals and individual clinicians, are entitled to submit suggestions of changes to the DRG system, both in relation to the grouping algorithm and the calculation of cost weights. This way, the system is continuously adjusted to clinical developments, which helps to reduce potential tensions between different groups of stakeholders.

5.4 Funding intensive care

5.4.1 Defining intensive care

There is no clinical definition of intensive care. The following definition sets out the criteria that have to be met for procedures to qualify for funding associated with procedure codes for intensive care: "Continuous 24-hour-monitoring and constant presence of a therapeutic team of nurses and doctors who are experienced in intensive care and who are

[n] *Gesetz über die Entgelte für voll- und teilstationäre Krankenhausleistungen* (KHEntgG), § 21.

[o] KHEntG, § 9/10.

familiar with the medical conditions of their patients. A continuous attendance of a medical doctor must be provided in the intensive care unit."[33]

DRG codes do not differentiate between care provided in an intensive care unit or a general ward. However, the level of care associated with procedure codes for intensive care typically demands that care is provided in an intensive care unit.

5.4.2 Funding adult intensive care

Intensive care for adults has been funded through DRGs since the introduction of the DRG-system in 2003.

In 2009, there are 68 DRGs related to intensive care, mostly associated with mechanical ventilation plus one DRG for "complex intensive care treatment" (A36Z).[34] DRGs associated with intensive care are specified based on a number of characteristics, for example hours of mechanical ventilation or, for certain procedures, ICU activity points using the Simplified Acute Physiology Score (SAPS II) or the Therapeutic Intervention Scoring System (TISS). Cases are coded by inserting these data into a computer programme, which then generates the specific DRG.

Given the complexity of cases treated in intensive care, DRGs associated with this type of cases typically produce a high proportion of "outliers" – cases within a DRG with unusually long or costly hospital stays compared with the case group mean. This proportion of outliers tends to vary between 10 percent to one-third within each DRG, and up to 50 percent for certain ventilation procedures. Per diem surcharges for outliers do not fully capture the entire costs for these outliers. This discrepancy is intentional to avoid incentivising providers to keep patients in hospital longer than clinically necessary.[31]

In line with the overall approach to regulating the volume of services, hospitals have to specify in advance the number of patients to be treated in a given year.

5.4.3 Funding neonatal and paediatric intensive care

Intensive care for neonates and children has been funded through DRGs since 2003.

Intensive care for children is covered by a number of DRGs. Initially, costs of complex paediatric ICU treatments were not adequately represented in the DRG system.[35] InEK introduced additional split criteria (age splits) to improve the accuracy of DRGs for these services. In addition, a separate procedure code for classifying paediatric intensive care was introduced, since the scoring systems in use in adult intensive care (TISS and SAPS II) only apply to patients aged 15 years and older. The 2009 DRG catalogue includes two DRGs for paediatric intensive care treatment associated with this procedure code (three in 2010).[34] Several DRGs apply to mechanical ventilation for children (e.g. A07B and A09A).

Pre-term neonates are grouped based on weight on admission (this typically corresponds with birth weight unless the infant is being transferred from another hospital). There are 10 DRGs that apply to pre-term neonates weighing less than 1000 grams.

5.4.4 Funding specialist intensive care

While DRGs apply to most services associated with intensive care, some specialist services, such as burns, are separately funded based on prices negotiated between individual hospitals and regional associations of statutory health insurance funds and private insurers.

These services are typically grouped into DRGs, but are not assigned a cost weight, thus not given a regionally fixed price.

5.4.5 Current debates about the existing funding mechanism for intensive care

The approach of funding intensive care through DRGs has greatly increased the transparency of costs and the accuracy of reimbursement for intensive care.

Initially, the approach encountered a number of problems associated with the adequacy of funding generated through DRGs, as the costs of intensive care were not sufficiently captured both in the grouper and associated cost weights. However, these problems could be addressed through the continuous refinement process of the system organised by InEK.[35] The participative nature of this process, in which all stakeholders are allowed to suggest changes to the grouper and the calculation of cost weights, is a major factor in reducing tensions between stakeholders.[34, 36]

The support of stakeholders groups is also important in the light of the substantial financial effects of the transition to DRG funding on hospital and its political acceptability. Hospitals unable to reduce costs accumulated growing deficits, with some going bankrupt, while others, typically smaller public hospitals, were sold to private hospital chains. To cushion the effect on less efficient hospitals, a transition period of five years was negotiated, including other mechanisms to prevent drastic economic losses of these hospitals (e.g. during the transition period financial losses of hospital incurred through the DRG system were limited by a percentage ceiling).

A problem specific to intensive care is that DRGs relating to highly complex cases are frequently not homogenous and thus produce a fairly high number of "outliers". These outliers are typically paid at a lower rate than the costs incurred by providers, thus increasing the risk of providers to incur a financial loss.[31]

Another disadvantage is that the coding of ICU cases is complex and time-consuming. Coding of ICD codes is undertaken by clinicians and clinical coders, and coding of severity scores by ICU nurses, supported by an electronic data system, based on the Therapeutic Intervention Scoring System (TISS) and/or the Simplified Acute Physiology Score (SAPS).

The TISS scoring system was recently simplified, reducing the number of items per day from 28 to 10, following recommendations by the Scientific Association of Intensive Care Medicine. There is, however, ongoing concern about the use of the SAPS (version II), which has been shown to produce problematic results in relation to laboratory tests. For example, more positive test results may trigger a lower level of reimbursement than less positive results. As a consequence, hospitals may receive less funding for cases that are treated successfully than those cases where therapeutic intervention has not been successful. Recent work on scoring systems to assess the match between disease severity and the level of reimbursement by funders in Germany found that there was no positive correlation between the different scoring systems and reimbursement, suggesting that current systems may not appropriately capture disease severity in paediatric intensive care and so may lead to underfunding this sector.[37]

CHAPTER 6 Italy

6.1 Funding hospital care

Healthcare in Italy is largely funded through national and regional taxation and provided through the National Health Service (*Servizio Sanitario Nazionale*, SSN), organised by the 21 regions, within a national framework set by the Ministry of Health.

Hospital care is provided by public and private hospitals, contracted by the SSN. There are two types of public hospitals: those owned and organised by local health authorities (*Aziende Sanitarie Locali*), the local arm of the SSN; and those that operate at arm's length from regional health authorities, with a larger degree of autonomy. Both types are funded by the regions through a mix of methods, including activity-based payments. Private hospitals must be accredited to qualify for reimbursement by regional health authorities.[38]

6.2 Role of DRGs in paying for hospital activity

6.2.1 Introducing DRGs into the system

Activity-based funding using DRGs was introduced by the central government in 1995. Sixteen regions introduced DRG tariffs in 1995, with another five regions following in 1996 and 1997. Regions originally were allowed to use different groupers; a national grouper was made mandatory in 2006.

The introduction of activity-based funding aimed to promote the efficiency of funding, delivering and administrating hospital care; to stimulate competition among public and private hospitals; and to facilitate the planning and resource allocation at local, regional and national level by introducing a systematic and transparent mechanism for the classification of hospital activity.[39]

6.2.2 Proportion of hospital activity financed through DRGs

The proportion of activity-based funding varies substantially among regions. On average, about 70 percent of hospital funding is based on activity. The remainder is funded through capitation and/or grants for a number of specific services.[38–40]

6.2.3 Variation of DRG-funding of hospital activity by ownership and region

Activity-based funding is used to finance both public and accredited private hospitals.

Regions are required to use DRGs to pay for hospital activity. A national set of tariffs was proposed in 1994. However, the regions have been granted substantial autonomy in determining regional tariffs, using their own cost studies. Regions are allowed to decide in which ways and how often they want to modify the tariff below a nationally price ceiling (the national tariff).

6.3 Characteristics of the DRG system

6.3.1 DRG system used

Italy uses version 24.0 of the CMS DRGs Grouper 19 (developed by the Centre of Medicare and Medicaid Services), based on the ICD-9-CM (2007). The grouper came into effect in January 2009, replacing version 19.0, which was based on ICD-9-CM (2002). As of 2009, the grouper will be updated every two years.[41, 42]

The current grouper includes 25 major disease categories, divided into 538 DRGs.[43]

There is some regional variation of the grouper. On two occasions, Lombardy introduced an updated version of the ICD classification system before it was implemented at national level. Regions can also modify individual DRGs. In Lombardy, the DRG for bone marrow transplant was split into four subgroups (in contrast to the grouper used nationally) and different costs were attributed to a number of surgical DRGs, for example reflecting the use of prostheses.

6.3.2 Exclusions

There is substantial regional variation in the range of services funded through DRGs.

Ten regions have excluded a number of "care functions" from DRG funding, such as intensive care, emergency services and organ transplants, as well as teaching and training. These services are financed through block grants. National legislation introducing DRGs has made provisions for regions to exempt these types of care from DRGs, reflecting concerns at the Ministry of Health about the appropriateness of funding these services through DRGs.

Inpatient services and day surgery provided by contracted private hospitals or semi-autonomous public hospitals are typically paid for through DRGs. These services are excluded from DRG funding if they are provided in a public hospital.[39]

6.3.3 Setting the price/tariff

The national tariff was first developed in 1993, following a feasibility study. Updates in 1997 and 2002 were based on additional studies taking account of observed inconsistencies between costs and resource use, and the rate of inflation as reported by the Italian National Institute of Statistics (ISTAT).

As noted above, the national tariff constitutes a ceiling, below which regions can set tariffs as they choose (Box 2). The national tariff is calculated using cost data based on a sample of public hospitals, originally using relative weights developed by the US Centre for Medicare and Medicaid Services (CMS). Costs are divided into "daily costs" and "costs per

service"; both cost components are attributed to each DRG and compared to the respective DRG tariff.

Since 1995, cost weights, used for the "costs per service" component, have been calculated based on a sample of hospitals in Italy. Several studies showed that these cost weights more consistently reflected the pattern of length of stay of hospitals in Italy, which is different from US cost weights.[44–48]

Regions are allowed to determine how frequently regional tariffs are reviewed and updated. The frequency of tariff updates thus varies among regions. Only a small number of regions have mechanisms in place for regular adjustments of DRG tariffs. Friuli Venezia-Giulia region, for example, regularly adjusts the tariffs for inflation.[39, 49]

Regions conduct their own cost surveys, which inform regional DRG tariffs, largely based on the same costing method used nationally (although with some variation).[44]

Most regions also use different prices for patients who live within or outside their territory. In 2003, a single national tariff (*Tariffa Unica Convenzionale*, TUC) was created to finance services delivered to patients from other regions. The grouping approach is generally similar to the national grouper. However, as of 2009, the TUC has become more complex, introducing a number of additional tariff setting criteria, for example for prosthetic implants, rehabilitation and highly specialised services.

In addition, regions can form bilateral agreements (e.g. between Emilia Romagna and Marche) with a particular local health authority or hospital for another regions to arrange for the provision and reimbursement of services (e.g. Umbria and the Bambin Gesù Pediatric Hospital in Rome).

Box 2 Regional variation in DRG tariffs[39, 43]

When the system was introduced in 1995, five of 21 regions – Piedmont, Lombardy, Veneto, Emilia Romagna and Tuscany – decided not to use the national tariffs proposed by the Ministry of Health. Instead, they developed regional tariffs based on cost estimates using cost data from hospitals in their territory. The remaining 16 regions initially kept the national tariffs with only minor changes, for example in relation to the funding of highly specialised services, interventional cardiology or long-term care. Later these regions also increasingly diverted from the national tariff.

Most regions have modified tariffs for DRGs, which were classified by national legislation as "at high risk of inappropriateness", especially for hospital day care and primary care. Regions frequently adjust tariffs for hospital day care and day surgery in line with regional health policy goals.

Thirteen regions have introduced different tariffs for different types of hospitals, partly reflecting variation in the complexity of services. For example, hospitals with an emergency department, intensive care unit and/or hospitals involved in teaching and training receive higher tariffs per DRG. Lazio, for example, has used different tariffs for different providers since 1999 to reflect differences in resource consumption between different types of hospitals.

6.3.4 Monitoring the system

Regions are responsible for monitoring and evaluating the impact of the funding system on the financial performance and efficiency of individual hospitals. In most cases, regions have formed teams of public health specialists to review the quality of hospital care, with parameters that also assess financial performance, including the use of DRGs.[44, 50]

The main objectives of monitoring and control are: (1) to ensure appropriate documentation of care and DRG assignment, (2) to compare indicators between hospitals and over time (e.g. number of admissions, average length of stay), (3) to promote quality of care, and (4) to evaluate appropriate levels of care and of resources used per case.

However, approaches to monitoring vary among regions. In Lombardy, the DRG system is monitored through the Control Operating Groups (*Nuclei Operativi di Controllo*). Emilia Romagna region established two ad hoc technical committees in 1999 to review the appropriateness of the tariff for a number of medical and surgical DRGs. In Friuli-Venezia Giulia, monitoring involves several levels: the regional health authority calculates the efficiency of hospitals every six months, using DRG data. A percentage of payment to providers also depends on results from a Protocol for Review of Hospital Utilisation (PRUO), which compares actual data to pre-defined thresholds of utilisation for certain DRGs. DRG data are routinely checked for errors and irregularities that may involve penalties.[49]

At national level, the Ministry of Health and the Conference of the Regions created a joint programme (the "Mattoni" programme) aimed at improving routine updates of the DRG groupers and of adjustments to the DRG tariffs (based on regular cost surveys and adjustments for inflation), introducing an information system (NSIS, *Nuovo Sistema Informativo Sanitario*), and new criteria for grouping DRGs, such as severity of disease and

care intensity. These goals were supported by a technical group formed by the Ministry of Health in 2000. The adaptation of these aims by regions is still ongoing.[51–53]

6.4 Funding intensive care

6.4.1 Defining intensive care

Intensive care is defined as the branch of medicine aimed at diagnosing and treating patients with acute life-threatening conditions resulting from changes to organ or vital functions. Intensive care is characterised by (1) continuous monitoring and supervision, and (2) continuous adjustment of treatments, based on observation of their effects on the patient.

Patients treated in intensive care are typically at high risk of sudden failure of vital functions, and have a single moderately unstable vital function or failure of one or more vital functions, which are progressively affecting other vital functions.

Intensive care is provided at three levels: (1) intensive, non-invasive monitoring and/or cardiopulmonary reanimation; (2) invasive hemodynamic monitoring and/or artificial ventilation; (3) invasive monitoring, artificial multiple organ care and/or titrated therapy.[44, 50, 54, 55]

6.4.2 Funding adult intensive care

In line with the overall approach to funding hospital activity, funding intensive care varies considerably among regions.

As noted above, 10 regions fund ICU services entirely through block grants. In other regions, services to intensive care patients are reimbursed through DRGs only if the patient dies in ICU or is directly discharged or transferred to another hospital from the ICU. However, if the patient is transferred to another ward within the same hospital the payment only reflects the costs of treatment received in the unit immediately before discharge (the unit in which the episode of care was concluded). Some regions use a combination of block grants and DRG tariffs for different types of hospitals.

In all other regions, intensive care services are reimbursed through DRGs (using the CMS DRG grouper 19). In those regions that assign different tariffs to different types of hospitals, hospitals providing intensive care usually receive a higher tariff than hospitals without an intensive care unit, reflecting the higher level of complexity of the treatment they provide.

6.4.3 Funding neonatal and paediatric intensive care

The national grouper does not differentiate between neonatal, paediatric and adult intensive care or between general and specialist intensive care services.

However, selected DRGs specifically relate to neonatal care, grouped under MDC 15 (newborns and other neonates with conditions originating in the perinatal period, Table 3).[43, 44] These DRGs cover intensive care as well as non-intensive care treatment; yet they do not reflect the entire spectrum of neonatal care.

Table 3 DRGs relating to neonatal care

DRG	*Description*
385	Neonates, died or transferred to another acute care facility
386	Extreme immaturity or respiratory distress syndrome, neonate
387	Prematurity with major problems
388	Prematurity without major problems
389	Full term neonate with major problems
390	Neonate with other significant problems
391	Normal newborn

Source: Nonis and Lorenzoni (2006).[43]

A study published in 2003 showed that among the 10 most common DRGs used in neonatal and paediatric care in 2001 only two were DRGs that specifically related to newborns (Table 4).[56]

Table 4 DRGs used in neonatal and paediatric care in 2001

DRG	*Description*	*Percentage*
184	Esophagitis, gastroenteritis and miscellanea gastro-intestinal system	10.8
389	Newborns on term with major affections	6.3
60	Tonsillectomy	6.0
70	Otitis media and other infections of upper respiratory tract	5.6
390	Newborns with other significant affections	5.4
98	Bronchitis and asthma	5.0
26	Headache and convulsions	3.5
91	Simple pneumonia and pleuritis	2.8
467	Other factors influencing health status	2.7
167	Uncomplicated appendectomy	2.1

Source: Siani and Cirillo (2003).[56]

Against this background, the "Mattoni" programme, promoted by the Ministry of Health, developed a new set of paediatric diagnostic groups (NCP, *Nuova Classificazione pediatrica*). The groups were calculated based on the costs per patient, using a sample of 16 hospitals providing paediatric services and considering 41,000 cases.

The proposed paediatric grouper can be integrated in the current DRG grouper. The grouper distinguishes 412 groups covering all patients under the age of 18 years. The grouper applies to paediatric care in general, but also specifies a number of "additional procedures" relating to surgery and intensive care, including, for example, mechanical ventilation or extracorporeal membrane oxygenation (ECMO). A software, named "Grou-Ped", has been developed to facilitate the use of the paediatric grouper. The grouper was first presented in 2007 and is currently tested by several regions.[52, 53]

6.4.4 Funding specialist intensive care

Regions that finance intensive care through DRGs also fund specialist intensive care using DRG payments. Burns, for example, are covered under the MDC 22 ("burns").[43]

6.4.5 Current debates about the existing funding mechanism for intensive care

At present, many intensive care clinicians strongly advise against DRG funding, arguing that the ability of DRG-based tariffs to reflect the actual costs per patient treated is questionable as tariffs need to be based on cost data from a large number of patients, which is difficult to generate in intensive care.

It is also argued that the use of intensive care is often determined by the severity of a condition or the level of treatment required rather than the type of condition, with the latter only typically reflected by DRGs. The only exception is a number of specific interventions, such as mechanical ventilation that are always delivered in ICUs. As a consequence, patients with the same condition may or may not be treated in an intensive care unit and thus may account for very different levels of resource use.[43, 44, 57]

A particular concern about the adequacy of funding is voiced in regions where ICU treatment attracts additional payment only when the patient dies in ICU, or is directly discharged from or transferred to a different hospital from the ICU. In Lombardy, for example, only about 30 percent of patients who are treated in ICU either die or are directly discharged or transferred to another hospital. In contrast, in some regions in the south of Italy this proportion can go up to 70 percent of patients as fewer hospitals in the southern regions have ICUs and thus patients are more likely to be transferred between hospitals for intensive care treatment. Thus, hospitals with a small proportion of cases that fulfil these criteria attract less funding for intensive care than hospitals with a larger proportion of cases meeting these criteria, irrespective of their case load or the complexity of these cases. Given the structural differences of hospital provision among regions, the funding approach may be more appropriate in some regions than in others.[44, 58, 59]

Concern about the appropriateness of funding intensive care through DRGs is currently shared by clinicians and policy-makers. It is thus unlikely that national policy will make the use of DRGs in intensive care mandatory across regions.

However, there is debate about exploring new options for funding intensive care that would allow for a better match between funding and resource utilisation. New classification systems have been proposed to adjust for severity. At the national level, the "Mattoni" project developed a proposal for adjusting the DRG tariff by "severity by outcome". As of 2009, however, regions have yet to implement this approach.[52, 53] Regions such as Emilia Romagna and Abruzzo also experiment with classification systems based on disease staging.[49, 60, 61]

CHAPTER 7 Spain

7.1 Funding hospital care

Healthcare in Spain is largely funded through national taxation, organised by the 17 regions (autonomous communities) and delivered through the National Health System (*Sistema Nacional de Salud*, SNS). The SNS is responsible for organising and delivering the entire spectrum of publicly funded health services, including hospital care. National taxation accounts for about three-quarters of healthcare expenditure.

The public healthcare budget is negotiated annually between the Ministry of Health, the Ministry of Economy and regional governments, through the Council of Fiscal and Financial Policy (*Consejo de Política Fiscal y Financiera*, CPFF), and approved by parliament. The allocation of budgets to regions is largely calculated using a formula that weighs a number of factors such as the number of people covered, the proportion of people over the age of 65 years and insularity (for the Balearic and Canary Islands).[62–65] In each region, regional executive health agencies of the SNS allocate budgets to publicly funded hospitals. The methods and mechanisms of hospital funding vary among regions.

7.2 Role of DRGs in paying for hospital activity

7.2.1 Introducing DRGs into the system

The history of DRGs in Spain dates back to the late 1990s when, in 1996, a DRG project was launched, involving the measuring of activity at a number of hospitals with the aim to develop the first set of cost weights and tariffs. In 1997, 18 public hospitals across Spain were selected to pilot a DRG-based funding scheme. Hospitals participating in the scheme had to have an established cost accounting system and demonstrable capacity to code a minimum of 90 percent of discharges, using a minimum data set (*Conjunto Mínimo Básico de Datos*, CMBD) for registering and coding hospital discharges that had been introduced in 1991.[66]

At national level, the process of introducing DRGs began in 2002 when the use of DRGs officially became mandatory with the creation of the Health System Cohesion Enhancing Fund.

The objectives for introducing DRGs were:

- To improve hospital budgeting and contracting by creating the possibility to measure hospital activity and to compare them against the objectives set out in contracts.[66, 67]
- To create tariffs used by the Healthcare Cohesion Fund (*Fondo de Cohesión Sanitaria*) to reimburse care provided to patients across regional borders.[68–70]
- To reimburse hospital services contracted out to the private sector.[71]

7.2.2 Proportion of hospital activity financed through DRGs

Overall, only a small proportion of hospital activity is paid through DRGs. DRGs are not mandatory as a funding mechanism in public sector hospitals, and regions use different approaches of hospital funding.

However, DRGs are mandatory as the funding mechanism at the national level to compensate costs for patients receiving hospital services outside their usual region ("cross-border care"), for example highly specialised care. A large proportion of these costs are reimbursed through the centrally run Health System Cohesion Enhancing Fund. DRGs are also used to establish prices for services outsourced to the private sector.[72]

At regional level, the use of DRGs as a funding mechanism varies substantially (Box 3). For example, in Andalusia, hospitals are funded through a global budget, adjusted by a casemix index, using DRGs. However, this only affects a small proportion of hospital budgets (1.5 to 4.5 percent).[73] A similar system is used in Catalonia although the proportion of DRG funding within the total budget is higher, with hospital budgets calculated by adding a weighted casemix factor and a weighted structure factor (based on for example the total number of beds, the number of outpatient visits and availability of certain types of technology, such as radiotherapy), multiplied by the number of discharges.[74]

Box 3 Funding of public hospitals in Andalucia and Catalonia

In Andalucía, hospital funding combines "basic expenditure funding" with a variable "growth factor" – a budgetary envelope allocated by the regional executive agency reflecting the relative efficiency of a hospital (measured as the difference between a hospital's true expenditure and the expenditure a hospital is expected to have to be able to reach its objectives).[73] Each year, the budget is calculated by adjusting the expenditure of the previous year by a certain factor; this factor cannot exceed the projected average growth factor for all hospitals within a region.

In Catalonia, hospital funding is allocated by CatSalud and, since 1998, is based on casemix (using DRGs). Additional payments reflect regional healthcare goals, such as the reduction of waiting lists.[p] Hospital funding is calculated based on the number of discharged patients, a casemix adjustment factor (RRI) and a structure adjustment factor (SRI). A casemix index (ARW) is generated from the weighted average of discharges adjusted for DRG weights (using US (Medicare) weights). The casemix adjustment factor

[p] Dr Artigas Raventós, Head of Intensive Medicine Services at the Hospital of Sabadel, Catalonia (personal communication).

(RRI) is derived by dividing the casemix index of a hospital by the casemix index of all publicly funded hospitals in the region. Casemix adjusted discharges are calculated for every hospital by multiplying the discharges of a hospital by its casemix adjustment factor. This results in the total number of casemix adjusted discharges. The tariff for the average casemix adjusted factor is determined by dividing the total budget for hospital care by the number of casemix adjusted discharges.[75]

In contrast, in some regions, such as Galicia, hospitals are mainly funded through global budgets although the introduction of casemix adjustment is currently being considered. It was argued that public hospitals in regions such as Galicia are not (yet) equipped to be funded through DRGs due to limited accounting capacity.[76]

All other regions lie on a spectrum between funding approaches in Catalonia/Andalusia and Galicia. Most regions in which public health services had been centrally managed before responsibility for health services was devolved entirely in 2002 have maintained the system of global budgets.[74]

National legislation does not require private sector hospitals to use DRGs; it only requires them to complete a discharge report per patient. However, regional law (e.g. in Madrid) or the terms of conditions set out by public purchasers can provide that contracted private hospitals are only paid the DRG tariff of the public sector.[77] Indeed, some regions have made DRGs compulsory for services provided in private hospitals that are contracted by the public sector ("concerted centres", such as the Alzira hospital in Valencia).[72]

7.2.3 Variation of DRG-funding of hospital activity by ownership and region

DRGs – to the extent they are used in the SNS – are applied to all hospitals that receive public funding, including public hospitals and private hospitals delivering services within the SNS ("concerted centres" and private hospitals belonging to a "public utilisation network"). In Ceuta and Melilla,[q] private hospitals providing publicly funded services are funded through the National Institute of Health Management (INGESA), using DRGs.

In 2003, an agreement between some private insurance companies and private hospitals made it compulsory for private hospitals to submit patient-specific CMBD data to insurers, primarily to enable comparison of activity between hospitals, but with the view of creating a DRG system at a later stage. These private hospitals use weights, revised annually by the Ministry of Health, to calculate their budgets, to manage their finances and to measure the cost per patient and per service.

As noted above, regions use different cost accounting systems and have developed their own systems of setting prices for publicly funded services delivered by the private sector, using DRGs. The extent to which hospital budgets account for casemix varies substantially among regions. However, DRGs are mandatory for payments of hospital services across regional borders.

[q] Ceuta and Melilla are autonomous Spanish cities located at the coast of North Africa at the Strait of Gibraltar.

7.3 Characteristics of the DRG system

7.3.1 DRG system used

The grouper used at national level is based on All Patient Refined DRGs (AP-DRGs) versions 21.0 and 23.0, grouping cases based on the entire hospital episode from admission to discharge.

The AP-DRG grouper has been used since 1996 when it was introduced by the national project. However, Catalonia, Valencia and Canary Islands had already begun to use HCFA-DRG in 1994, developed by the Health Care Financing Administration in the US, and only later moved to AP-DRGs (the Canary Islands in 2004, Valencia in 2006 and Catalonia in 2007). Some regions use other groupers, such as CMS-DRG (version 22.0), used by the Centres for Medicare and Medicare (US).

The AP-DRG grouper was chosen due to its greater clinical precision in grouping patients. As the minimum data set was only used by few organisations before being rolled out in 1997 national data were sparse. The use of the grouper in hospitals in Spain was validated in several studies.

In 2006, the AP-DRG grouper comprised 886 DRGs, including 215 DRGs relating to co-morbidities.[71] The grouper was last updated in May 2009. Groups are organised into major disease categories and then further sub-divided according to diagnosis, secondary diagnosis, age, complications and other criteria.

7.3.2 Exclusions

Activity-based funding (to the extent it is used) is restricted to inpatient care and major surgery in outpatient care provided in acute hospitals. Excluded are: outpatient visits, primary care support, domiciliary hospitalisation, non-hospitalised emergencies, inter-medical centres transfers, teaching and research, organ extraction units, special external medication, ambulatory treatments and minor ambulatory surgery.[66] Costs associated with these services are considered to be not directly related with the production of core services in hospital.

7.3.3 Setting the price/tariff

National tariffs and DRG weights are determined by the Ministry of Health, in co-operation with regional governments and the National Institute of Health Management (responsible for managing health services in Ceuta and Melilla). The tariff is published by the Ministry. The latest version was published in 2007.

Since 1997, tariffs and weights have been calculated based on the costs of a sample of hospitals from all regions, using length of stay as proxy of general costs (including salaries). Weights are calculated using a method called "vertical cost accounting". Weights are reviewed and updated annually, as follows:

- preparation and validation of medical information, including removal of duplicates, review and removal of incorrect DRGs and a statistical correction of stays
- preparation and validation of costs information, based on a costs assignment methodology, a review of the costs per patient and an allocation of costs to cost

centres (e.g. nursery, medical expenses, daily usual care, therapies, radiology and pharmacy)

- integration of medical and economic activity data, based on a top-down assignment of costs. Based on US data, the method analyses each stay per hospital by attributing partial costs and assigning costs weights to each case. Data are statistically validated and analysed (e.g. analysis of average stay, DRGs of low representativeness and sample variability).

Cost information is generated through the cost accounting system associated with the patient registry that manages the minimum data set. Data of the minimum data set are considered as accurate and precise. Cost data reflect both the level of utilisation of the available capacity and the structure (and inefficiencies) of service delivery.

As mentioned above, hospitals in some regions do not have fully developed accounting systems, with some using different systems (e.g. Andalusia, Catalonia and the Basque Country).[78] Thus, the degree to which the tariff reflects actual hospital costs is difficult to determine. Hospital costs are not monitored (or compared) at central level.

7.3.4 Monitoring the system

There is no system in place at national level for measuring the impact of DRGs on service provision or the financial performance of individual hospitals. Monitoring the effects of DRGs on the elements that are compulsory at national level (cross-regional transfers) is a joint responsibility of the Ministry of Health, regional governments and the National Institute of Health Management.

7.4 Financing intensive care

7.4.1 Defining intensive care

Intensive medicine is officially defined as "the part of medicine responsible for treating patients with severe medical conditions representing an actual or potential threat to their lives and who are likely to recover".[79]

7.4.2 Funding adult intensive care

The funding arrangement for intensive care tends to reflect the overall funding approach for hospital services in each region (e.g. services in wards or emergency services). Given the limited use of DRGs, the extent to which intensive care is funded through DRGs is small. Generally, intensive care units are financed through the budget a hospital is allocated by a regional health executive.

For the calculation of DRG weights and tariffs at national level, intensive care units are considered to be an auxiliary, intermediate cost centre. This has caused controversy among intensive care clinicians and managers arguing that this approach does not appropriately account for the complexity of and case load in intensive care.

7.4.3 Funding neonatal and paediatric intensive care

Similar to adult intensive care, neonatal and paediatric intensive care is funded mainly through budgets, with a small degree of DRG adjustment (if at all).

7.4.4 Funding specialist intensive care

Until recently, specialist intensive care services received no additional funding. Only a small number of hospitals provide for example a coronary unit or an intensive care unit specialised in burns. In 2006, a number of reference units and centres were established by the Ministry of Health. These units/centres provide highly specialist healthcare for a number of (relatively rare) conditions to the entire population and are funded through the Cohesion Fund, based on the nationally set DRG tariff.[70]

7.4.5 Current debates about the funding mechanism for intensive care

The main reason for keeping intensive care funding within a global, partially prospective hospital budget is the difficulty in defining reliable DRGs. Some intensive care clinicians argue that DRGs potentially underestimate intensive care output as the system does not consider ICU as a separate cost centre as patients are usually not discharged directly from ICU, but are transferred to other departments.[80]

Others warn that the public funding system may collapse if DRGs are used to fund a larger proportion of care, as DRGs tend to incentivise increases in activity that could exceed the available funding. Others argue that a fully activity-based system would underestimate the costs of long stay patients, who form a heterogeneous group with often critical conditions, for which progress is difficult to predict.[81] The concern is that the cost centre approach associated with the current DRG system would disguise the number of patients admitted to ICU.[82]

Another concern is that DRGs do not sufficiently account for differences in severity and complexity of conditions treated in ICU and that the range of procedures performed makes it difficult to calculate the costs for different patient groups.[83]

At the same time, clinicians argue that intensive care should be separately valorised to adequately reflect its complexity and volume of patients. The current system underestimates the level of activity in ICU, the complexity and range of its services, volume of patients and costs of equipment. It also does not provide an incentive to clinicians to increase productivity, potentially leading to a loss of efficiency and quality.

Some clinicians promote the idea of introducing an activity-based funding system using DRGs in combination with severity scores (APACHE II) or therapeutic activity indexes (NEMS), which are considered to capture the complexity of intensive care more accurately.[83]

Initiatives to move to new funding system for ICU have so far both been resisted by hospital managers and not given priority by policy-makers. From a policy perspective, the main advantages of the current system is that it (1) gives hospitals autonomy to distribute global budgets as they see fit, (2) allows central control of regional health budgets, and (3) stimulates costs savings through the setting of objectives for each hospital.

CHAPTER 8 Sweden

8.1 Funding hospital care

Healthcare in Sweden is largely funded through regional and local taxation, supplemented by state grants, organised by the 21 counties and delivered predominantly by public providers.

Counties also organise secondary and tertiary healthcare, within a policy framework set by the central government. Most hospitals are owned and financed by county councils. There is a small number of private hospitals, particularly in major cities and urban centres, including three private for-profit hospitals.[84] Private hospitals mainly provide day surgery and outpatient services and are often contracted by the counties.

8.2 Role of DRGs in paying for hospital activity

8.2.1 Introducing DRGs into the system

Stockholm was the first county to roll out activity-based funding at county level in 1992. However, a few counties had begun experimenting with DRGs as early as 1991, for example Helsingborg hospital in the Skane region.

Activity-based funding was introduced alongside a number of healthcare reforms promoting competition and patient choice (including a purchaser and provider split). The main objectives of these reforms were to increase productivity and to reduce waiting lists.[85] Further objectives were to increase the transparency of hospital costs and to introduce information systems for benchmarking and monitoring.

Following the Swedish economic difficulties in the early 1990s, cost containment became a major motivation for county councils to re-introduce capped budgets (used in combination with DRGs) and to return to increased "top-down" management to control costs.

8.2.2 Proportion of hospital activity financed through DRGs

Activity-based funding of hospital care is not mandatory. County councils decide whether they use DRGs for funding hospital activity and define the rules for the system within their territory (such as exclusions and inclusions or spending ceilings). Consequently, the proportion of hospital care funded through DRGs varies substantially among counties.

Nationally, about 90 percent of inpatient cases are grouped under DRGs, with 65 percent of cases being paid for through DRGs. About 30 percent of outpatient visits are funded using DRGs.[85]

In Stockholm, about 70 percent of acute hospital expenditure is paid for through DRGs,[86, 87] with the remainder being funded through a combination of grants, for example for research, development and education (10 percent), patient user charges and payments from other providers (20 percent).[87]

8.2.3 Variation of DRG-funding of hospital activity by ownership and region

Activity-based funding is primarily used to reimburse public hospitals.[85] Private hospitals contracted by county councils are typically funded to provide elective services (as a means to reduce waiting lists) using cost and volume contracts for selected services.

As noted above, approaches to funding hospital care vary among counties. Most counties use DRGs to monitor activity. Ten counties use DRGs to fund hospital care, although to a varying degree, with only five using DRGs to finance a substantial proportion of care including Stockholm and the regions of Skane, Västra Götaland, Halland and Östergötland (the more densely populated counties).[85]

DRGs are also used as a mechanism for arranging payments between counties, for example for highly specialised services provided in university hospitals. County councils form six regions, within which highly specialised (tertiary) care is organised. Within these regions, county councils agree on a price list for each tertiary service.

Some counties use DRGs to fund a single hospital or to reimburse hospitals for care provided to patients from other regions only.[85] The remainder fund hospitals through global budgets, with DRGs mainly being used for monitoring purposes.

8.3 Characteristics of the DRG system

8.3.1 DRG system used

Counties use the Swedish version of NordDRGs. The grouper is developed and annually updated by the Nordic Centre for Classifications in Health Care, Helsinki, on behalf of all Scandinavian countries, including Denmark, Finland, Iceland, Norway and Sweden (and more recently Estonia).[87] The Centre also provides nationally adjusted versions of the grouper for each country. The grouper was originally based on the US HCFA grouper (version 12).

The development of the classification system for Sweden is co-ordinated centrally, by the Centre for Patient Classification (CPK), established in 1999. However, counties decide which version of the grouper to use and adapt the grouper to local circumstances. DRG weights are mainly determined at the national level, with most counties using national weights.[88]

Diagnostic codes are grouped according to ICD-10. Grouping of surgical procedures is based on the Nordic Medico-Statistical Committee (NOMESCO) Classification of Surgical Procedures (NCSP).[89] A new national system for non-surgical procedures was

introduced in 2006. A separate DRG classification system is used for paediatric care, based on AP-DRG.

The NordDRG Swedish version 2009 comprises 983 DRGs, including 216 for day surgery and 190 for outpatient care visits.[85]

8.3.2 Exclusions

The scope of services covered by DRGs varies between counties. Counties that fund most hospital care based on activity use DRGs mostly in inpatient acute care, day surgery and outpatient care.[89] DRGs for rehabilitation were introduced in 2008. At present, two counties use DRGs for psychiatric care.[85]

Exclusions from activity-based funding vary among counties. Outliers are normally not reimbursed through DRGs. In some counties, specific regional care is excluded. Severe burns are typically excluded.[85]

Teaching hospitals are typically paid in addition to DRGs to reflect higher costs associated with unusual or specialist treatment. These are paid through fee-for-service or per diem payments, for example.[85]

New technologies are typically reimbursed separately for the first two years, after which they are included in the DRG grouper.[85]

8.3.3 Setting the price/tariff

Prices are generally set by the county councils and counties use different methods to determine price. Prices can also vary among hospitals, reflecting negotiations between individual hospitals and county councils. Prices for services provided across county boundaries are set at national level, based on an agreement between the 21 county councils, represented in the Swedish Association of Local Authorities and Regions (*Sveriges Kommuner och Landsting*), stipulating the use of a national tariff in the absence of bilateral or regional agreements.

Sweden has a well established system of monitoring hospital production costs and data are reportedly of very high quality.[89] A national project was launched in 1999 by the Swedish Association of Local Authorities and Regions aiming to co-ordinate and support the system of data collection for each patient.[87] Costs are determined on the basis of a national sample of hospitals covering approximately 30 percent of all hospitals nationwide.[89]

Counties that use activity-based funding usually combine DRGs with other types of payment, including grants, budgets and per diem payments. Per diems are often used to compensate for high-cost outliers for highly complex cases that greatly exceed average cost per case.[88]

Research, development and education are usually covered by special grants in line with national guidelines. However, it has been noted that the calculation of these costs has remained a "grey zone".[89]

8.3.4 Monitoring the system

The Swedish Institute for Planning and Rationalisation (*Sjukvårdens Planerings- och Rationaliseringsinstitut*, SPRI) was initially involved in developing and evaluating the DRG

system; the institute was abolished in 2000.[87] The Centre for Patient Classification (*Centrum för Patientklassificering*, CPK) was established in 1999 with the mandate to monitor and further develop the classification system.[87]

8.4 Funding intensive care

8.4.1 Defining intensive care

The Swedish Association of Anaesthesiology and Intensive Care defines intensive care as "care to prevent and treat failure in one or multiple organ systems to maintain a meaningful life for the patient".

8.4.2 Funding adult intensive care

The funding of intensive care varies among counties, reflecting different degrees of using (or not using) activity-based funding. Counties that fund hospital care through DRGs typically use DRG to fund some proportion of intensive care. High cost outliers are paid separately, usually through per diems adjusted for different types of intensive care, limited by a cost ceiling. The same applies for hospitals that provide specialist tertiary care for patients from different counties, such as large university hospitals.

Where activity-based funding is used to finance intensive care, this was introduced as part of the introduction of DRGs as the overall approach to fund hospital care in the corresponding county. Approaches use the Swedish version of NordDRGs, which defines intensive care as part of an episode, with one DRG covering one episode. There are a number of DRGs that are typically associated with treatment in an intensive care unit, such as DRG 475 (Diagnosis of a condition relating to the respiratory system, with ventilator support), DRG 482 (Tracheostomy for diagnoses relating to conditions of the face, mouth and neck) and DRG 483 (Tracheostomy for diagnoses other than conditions of the face, mouth or neck).

In counties in which hospitals are funded through global budgets, the budget for intensive care is allocated to the department of anaesthesiology. The size of the budget is determined through a combination of the number and severity (using the Apache score) of cases treated in previous years and negotiations between the hospital and the county council and between the hospital management and department managers. Increasingly, comparisons of activity between hospitals are used to distribute funds more fairly between hospitals.

8.4.3 Funding neonatal and paediatric intensive care

In counties that use DRGs, neonatal and paediatric intensive care is partly funded through DRGs in combination with per diems for highly specialised (high cost) cases. Paediatric care is grouped based on age thresholds (as 0 to 17 years). DRGs relating to neonatal care also distinguish between different levels of weight at birth. Outliers (typically associated with high complexity and high costs) are funded separately.

In counties that use global budgets hospitals receive a budget component for neonatal and paediatric intensive care.

8.4.4 Funding specialist intensive care

The treatment of burns is grouped under MDC 22. However, treatment of the most severe cases is typically excluded from DRG funding, representing high cost outliers.[85] The cases are separately funded through per diems based on actual costs.

8.4.5 Current debates about the existing funding mechanism for intensive care

There appears to be no major debate about activity-based funding of intensive care although most intensive care clinicians regard their budget for intensive care services as insufficient.

The approach of funding intensive care through budgets does not adjust for changes in the workload of intensive care units, for changes in casemix or the number of cases in any given year.

There are currently no plans for major changes of the current funding approach, with current work concentrating on developing a methodology to distinguish different levels of severity per DRGs, in view of recent changes in the grouper used by Medicare in the US (MS-DRGs).

CHAPTER 9 United States – Medicare

9.1 Funding hospital care

In the US, healthcare, including hospital care, is financed by a variety of private and public payers, including public programmes such as Medicaid, Medicare or the Veteran Health Administration and private health insurance plans, as well as patients' direct payments.[r]

Medicare provides healthcare coverage for people aged 65 years and over.[s] Acute inpatient hospital care is covered under Medicare Part A (Hospital Insurance), Part B (Medical Insurance) covers doctors' services and outpatient care (Part B).[t] Those covered by Part A and Part B may join Part C (Medicare Advantage plans) if they wish to receive all of their healthcare services through provider organisations. These plans are approved by Medicare and offered by private insurance companies; they include managed care plans, health maintenance organisations, preferred provider plans and private fee-for-service plans. Part D (Medicare prescription drug plans) offers additional coverage for prescription drugs (Part D).

Medicare is organised by the Centres for Medicare and Medicaid Services (CMS), which is part of the Department of Health and Human Services. Medicare (Part A) is funded through general taxation, mainly comprising payroll taxes paid by employees and employers, as well as self-employed taxes.[90]

Most people aged 65 years or over are eligible for premium-free enrolment if they or their spouse have paid Medicare taxes during most of their working life; those who are not eligible can chose to buy Plan A coverage by paying monthly premiums. In 2009, Medicare patients were also required to pay a deductible of US$1068 for the first 60 days of an episode of care, a daily co-payment of US$267 from day 61 and/or co-insurance, for example, for treatment in a skilled nursing facility .[91] Separate charges apply for Medicare Parts B, C and D.

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[r] Payers other than Medicare may also use DRGs, although they may use different groupers and apply different payment rules.

[s] Medicare also covers people under the age of 65 years with certain disabilities and people of any age with end-stage renal disease requiring dialysis or a kidney transplant.

[t] Fees for physician consultations during hospitalisation are thus not included in the payment for hospital services paid for through DRGs.

Under Medicare (Plan A), acute inpatient hospital care is reimbursed under the Inpatient Prospective Payment Scheme (IPPS). In 2006, spending under IPPS totalled US$105 billion, accounting for about 25 percent of Medicare expenditure.[91]

9.2 Role of DRGs in paying for hospital activity

9.2.1 Introducing DRGs into the system

Following a trial period in New Jersey from 1980 to 1983, DRGs were subsequently rolled out across the entire US, except Maryland.

The objective for introducing activity-based funding using DRGs for inpatient acute care under Medicare was to slow the growth of government spending on healthcare by incentivising hospitals to increase the efficiency of service delivery. A second objective was to separate the funding mechanism from the prices charged by hospitals under fee-for-service.[92]

9.2.2 Variation of DRG-funding of hospital activity by ownership and region

All hospitals that treat patients under Medicare are required to use DRGs (Medicare Severity (MS-) DRGs). Given the constituency of Medicare, namely mainly those aged 65 and over, the system is limited to DRGs corresponding with diagnoses and treatments relating to this age group only.

Medicare is a federal programme, thus the DRG system applies equally in all states. Maryland is the only state in which DRGs are not used to pay for hospital services for Medicare patients and is used as an ongoing demonstration project to compare the changes in the cost of care under different payment systems.

9.3 Characteristics of the DRG system

9.3.1 DRG system used

Medicare uses MS-DRGs as a grouper to fund inpatient care in acute hospitals under the Inpatient Prospective Payment System (IPPS). MS-DRGs have been introduced in October 2007, replacing the previous system of CMS-DRGs (named after the Centres for Medicare and Medicaid).

Compared with previous versions, MS-DRGs expand the number of severity levels available from two (with and without complications/co-morbidities) to three (no complications/co-morbidities, with complications/co-morbidities and major complications/co-morbidities). The new system was phased in over a period of two years, and was fully operational from October 2008 (the beginning of the financial year 2009).[93]

The MS-DRG grouper distinguishes 25 major diagnostic categories (MDCs) representing different body systems plus a number of DRGs that are not associated with a body system. This includes pre-DRGs that relate to particularly severe conditions, such as heart, liver and bone marrow transplants, and DRGs associated with procedures unrelated to principal diagnoses. Within each MDC, a distinction is made between surgical and medical (non-

surgical) groups. Surgical groups are further grouped by procedure, medical groups by diagnosis.

In 2009, the MS-DRG grouper comprised 746 DRGs; 335 of them are "base" DRGs, which are typically subdivided according to severity as measured by level of co-morbidities and complications (CCs and MCCs).

DRGs are assigned on the basis of patients' clinical conditions (principal diagnosis and up to eight secondary diagnoses) and the procedures the hospital applies during the patient's stay (up to six procedures).[93]

9.3.2 Exclusions

The IPPS Medicare schedule only reimburses acute inpatient hospital services delivered to patients under Medicare. CMS uses separate prospective payment systems for reimbursing services provided by home health agencies, hospices, inpatient psychiatric facilities, inpatient rehabilitation facilities, long-term care hospitals and skilled nursing facilities.

By definition, IPPS does not cover outpatient care (which is covered under Medicare Plan B), unless an outpatient service directly precedes an inpatient stay (72-hour rule). In these cases, hospitals are not allowed to charge for outpatient treatment separately, as the costs of treatment are covered by the DRG associated with the inpatient episode.

Hospitals receive additional funding for graduate medical education and the costs of organ acquisition.[93] Hospital-based research is typically funded through research grants.

9.3.3 Setting the price/tariff

Under IPPS, prices are set nationally and updated annually to reflect changes in the costs of labour, technology and other costs.

Prices are composed of an operating base payment and a capital base payment. The operating base payment is adjusted annually in line with the projected increase in the market basket index. Annual adjustment of the capital base payment is determined by the Secretary of the Department of Health and Human Services.[93]

Prices per DRG are derived by adding both base payment rates, adjusted for specific hospital factors, multiplied by the relative weight associated with each DRG.

The operating base payment covers the costs of labour and supplies; the capital base payment covers the costs for depreciation, interest, rent, property-related insurance and taxes.[93] In 2009, the operating base rate was US$5125 (£3154). The capital base rate was US$421 (£259).[91]

Both rates are adjusted by an area wage index, reflecting variation in the local costs of labour (set by the CMS). The wage index is updated annually based on wage data reported by hospitals. An occupational mix adjustment was introduced in 2007.[91] Hospitals in Hawaii and Alaska are also eligible for a cost-of-living adjustment which compensates for the higher costs of supplies and other non-labour resources in those states, and which is applied to both the operating and capital base rate.

Approved teaching hospitals receive percentage add-on for each case paid through IPPS to adjust for indirect costs associated with medical education; the direct costs of teaching are

funded through direct medical education payments. The level of IME adjustment is determined based on the ratio of the number of residents to the number of beds.[93]

Hospitals that treat a high percentage of people on low income receive a percentage add-on payment applied to the DRG-adjusted base payment rate (disproportionate share hospital adjustment). The level of this add-on is determined based on a percentage of inpatient days of low-income patients to Medicare patients, adjusted for large urban hospital status and other factors.

Sole community hospitals (which are characterised by certain geographical and/or topographical specifics impacting on accessibility of services) receive an (adjusted) base payment rate or hospital specific base rate per DRG.

Hospitals also receive higher IPPS payments for cases that are unusually expensive (outlier payments), namely cases that exceed a threshold amount of the average costs associated with each DRG (fixed loss threshold). Above this threshold, hospitals receive 80 percent of the costs of treatment; for burns the percentage is 90 percent.

DRG payments are reduced if the duration of stay is shorter than a minimum stay, if the patient is transferred to another hospital or if the patient is discharged to a post-acute care setting.[91]

Hospitals receive compensation for bad debts resulting from patients' failure to pay co-insurance or deductible charges of 70 percent of the outstanding payment. Hospitals are required to provide evidence that reasonable efforts have been made to recover the payment.[93]

9.3.4 Monitoring the system

The system is monitored nationally by CMS. Hospitals are required to provide the CMS with an annual cost report. Cost reporting is guided by a set of reporting rules, developed by CMS, to ensure that hospitals do not inflate costs. Cost data are analysed by CMS and inform the further development of the DRG grouper and cost weights (e.g. a DRG "split" if costs vary systematically).

9.4 Funding intensive care

9.4.1 Defining intensive care

Intensive care is delivered in a range of settings such as intensive care units, mobile intensive care units (MICUs), intermediate critical care units, coronary care units and intermediary coronary care units. There is no formal definition of what constitutes intensive care or an intensive care unit. Administrative and organisational practices vary between hospitals.

The MS-DRG grouper does not distinguish between different locations of care provision, and therefore does not rely on a definition of intensive care to pay for services provided in intensive care units. However, cost reporting identifies intensive care units as hospital costs are reported per cost centre, which is typically associated with a hospital department. Thus, the organisation of intensive care units/beds, which attributes the costs of intensive care to a specific department, influences the cost estimates that inform changes of DRG weights.

Research by Wunsch and colleagues suggests that patients treated in intensive care units tend, on average, to be less severely ill in the US than those in these units in England, reflecting the availability of a larger number of intensive care beds per patient in the US.[94]

9.4.2 Funding adult intensive care

Medicare adult intensive care is funded through IPPS/MS-DRGs. As mentioned earlier, the MS-DRG grouper does not distinguish between different locations of care. Thus, DRGs apply to the entire episode of care, irrespective of whether a given episode involved treatment in a general ward or in a dedicated intensive care unit (e.g. patients with pneumonia). However, more severely ill patients are likely to be treated in intensive care units and are likely to use more resources, resulting in higher costs.

As noted above, the MS-DRG system distinguishes three levels of severity: (1) major complication/co-morbidity (MCC), (2) complication/co-morbidity (CC) and (3) non-complication/co-morbidity (non-CC). This three-tier system does not adjust for differences in location of care, for example whether the patient has been treated in a dedicated intensive care unit. However, in practice, it serves as a proxy for intensive care use since more severely ill patients attract higher funding, determined through the average costs of care reported by hospitals. Thus, payment for a DRG with a major complication and/or co-morbidity is more likely to reflect the costs incurred by the higher resource use associated with intensive care.

9.4.3 Funding specialist intensive care

Specialist intensive care services tend to be associated with specific DRGs, which typically attract a high cost weight.

The 2010 MS-DRG grouper comprises six DRGs relating to the treatment of burns, three of which are surgical (DRG 927–929) and three are medical (DRG 933–935). Each DRG is given a different weight, reflecting variation in average costs associated with different degrees of severity of diagnosis and treatment (Table 5).

Table 5 MS-DRGs relating to the treatment of burns

DRG	MDC	Type	Title	Cost weight
927	22	SURG	Extensive burns or full thickness burn w MV 96+ hrs w skin graft	13.7351
928	22	SURG	Full thickness burn w skin graft or inhal inj w cc/mcc	5.3052
929	22	SURG	Full thickness burn w skin graft or inhal inj w/o cc/mcc	2.0086
933	22	MED	Extensive burns or full thickness burns w MV 96+ hrs w/o skin graft	2.3081
934	22	MED	Full thickness burn w/o skin graft or inhal inj	1.3403
935	22	MED	Non-extensive burns	1.2507

Source: CMS: List of MS-DRGs for 2010.[95]

9.4.4 Current debates about the existing funding mechanism for intensive care

Despite continued debate about the future of prospective funding, there is no indication that Medicare will abolish DRGs as the mechanism of paying for hospital care. No plans for major changes have been reported; however, given the relative newness of MS-DRGs, smaller adjustments can be expected.

There is evidence that some intensive care units have experienced underfunding as a result of prospective funding through DRGs. A study published in 2004 suggests that cases treated in intensive care units in selected hospitals received reimbursement at the level of 83 percent of cost on average, thus losing US$2431 per case.[2] Non-intensive care cases (patients treated in a general ward, for example), in contrast, were reimbursed at 105 percent of cost. The authors concluded that payments for cases treated in intensive care units were most adequate in covering costs if the grouped into DRGs that were associated with a high proportion of intensive care cases (reflecting higher average costs as a result).[2] The study suggests that the appropriateness of funding varies between different DRGs and, as a consequence of differences in casemix and other factors, between hospitals.

The introduction of MS-DRGs in 2007 has increased the adequacy of payments for intensive care services in relation to costs, as MS-DRGs more explicitly adjust for different levels of severity. Severity adjustments thus function as a proxy for intensive care treatment. However, the adjustment does not account for the entire costs of treating patients in intensive care, with some potential for underfunding still remaining.

On the other hand, the costs of providing intensive care treatment have to be seen in the context of the overall funding arrangements for hospitals in the US, which allow hospitals to "balance out" losses incurred in one department through profits made in another. Also, against the background of a multi-payer system, hospitals may be able to increase their income by charging higher prices from other payers.[96]

Intensive care professionals and some hospitals have lobbied for years for changes in the DRG system to adjust for different levels of severity. Yet the introduction of MS-DRGs was also driven by concerns about the appropriateness of funding for certain private specialty hospitals. In the US, specialist hospitals often provide elective surgery (e.g. coronary care), which allows them to attract less severely ill patients. If hospitals are funded through DRG, selecting patients that are on average healthier can be highly profitable, as payments reflect the average cost per DRG of all hospitals (providing services to Medicare patients). Hospitals that mainly treat severe cases, in contrast, are likely to receive funding below the level of their costs and thus are at risk of incurring a financial loss. The

introduction of MS-DRGs has reduced this problem, although it has not entirely removed the incentive for hospitals to cherry-pick low cost patients.

There is currently debate about adjusting payments to reflect the outcome of treatment. Medicare has reduced the payment for ecertain groups of cases associated with complications that are likely to result from low quality of care, such as hospital acquired infections or falls after surgery. For these cases, hospitals will receive the base payment per DRG only without the adjustment for severity resulting from the complication. It is not clear yet how this change in policy will affect the funding of intensive care services in future.

CHAPTER 10 DRG payments for newborn intensive care: evidence and issues from a US perspective[u]

10.1 Funding hospital care

The United States does not have a unified national insurance or payment system. Instead there are multiple subsystems, involving a multitude of employer-sponsored health insurance schemes and government programmes. The Medicare programme, run by the Federal Government, provides health insurance for the elderly. In partnership with the government of each state, the Federal Government also runs the Medicaid programme, which provides healthcare coverage for the poor, with rules for eligibility and payment modes determined by the individual states. A second federal–state partnership programme is the State Children's Health Insurance Programme (SCHIP), which was introduced in 1997 to provide coverage for children in low to moderate income households who do not qualify for Medicaid. Many states have two or more different programmes under Medicaid and/or SCHIP. In all three programmes, the government finances the insurance but services are provided, mainly, through private providers.

On the private sector side, while a few large insurance firms tend to dominate the market in any given state, most large employers self-insure and just use insurance companies to manage payments. Because each of these employer-run programmes has the option of establishing their own sets of payment rules, the number of different payment systems can be quite large, even though only a few insurance firms are processing these payments.

As a consequence of the multiple payer system, hospitals may be dealing with a large number of different types of payment contracts. There are five general types of payment contracts:

- fee for service
- discounted fee for service (predetermined percentage discount)
- fixed per diem payments (possibly adjusted by patient type)
- prospectively determined case rates (DRGs)

[u] We are grateful to Ciaran Phibbs for contributing this chapter.

- prospectively determined case rates, with per diem adjustments.

About half of all neonatal cases are treated by government run programmes. Given the multitude of different payment systems and payers used by the private sector and the lack of centralised information about which private insurers are using which system, it is not possible to track all of the different types of payment mechanisms or the extent to which each is used.

10.2 Activity-based funding of care for newborns in the US

10.2.1 Introducing DRGs into the system

In the US, DRGs are coded at discharge, considering all diagnoses for a given hospital stay when assigning the DRG. Thus the DRG will attract funding according to the care that a patient actually received, including complicating conditions that were undiagnosed at admission to hospital. This type of "ex post" classification is especially important for newborns as the full extent of newborn illness is never known "ex ante".

The original DRGs were developed for Medicare, using data from the Medicare system, which did not include obstetric or newborn cases. However, as an afterthought, the developers also obtained some data for newborn and obstetric cases from another data source, but since these cases were not relevant to the Medicare patient population, this system was not well developed, with a total of only seven DRGs for all newborns (Table 6).

Table 6 DRGs relating to neonatal care

DRG	Description
385	Neonates; died or transferred
386	Extreme immaturity, neonates
387	Prematurity with major problems
388	Prematurity without major problems
389	Full-term neonate with major problems
390	Neonates without other significant problems
391	Normal newborns

These DRGs were only used by a few payers[v] as the short-comings of these DRGs were quickly recognised. Research evidence demonstrated that these groups were inadequate for prospective payment of neonatal care.[97] For DRGs to reflect costs adequately, the cases grouped in any given DRG must be relatively homogeneous. Further, they must be structured so that they are not subject to systematic selection bias. Yet, in the case of neonatal DRGs these criteria are only partly met, namely only for normal newborns and newborns with only minor problems. Both DRGs exhibit relatively homogenous distributions and so DRG type prospective payment appropriately reflects these cases (DRGs 390 and 391) (Box 4). In contrast, the remaining five DRGs constituted too few groups to reflect the complexity of individual cases accurately, resulting in very

[v] They were part of the early implementation of DRGs in New Jersey in the early 1980s, which was the precursor to the Medicare DRGs.

heterogeneous groups and creating substantial selection bias problems for tertiary centres that treated the most complex cases. For example, Phibbs et al. (1986) demonstrated that the proposed reimbursement levels for these DRGs reflected only a small fraction of the actual costs incurred by six tertiary NICUs in California.[97]

Box 4 Distribution of costs and use of neonatal intensive care for newborns

The vast majority of newborn infants are normal well babies with no need for any level of specialised neonatal care. In the US, this category includes about 90 percent of all newborns, with some state-to-state variation. Some US states have very high shares of ethnic groups with higher rates of preterm delivery, in particular states with a large proportion of African-American newborns. A detailed analysis of 2000 data for all deliveries in California demonstrated how about 90 percent of newborn infants incurred costs consistent with normal newborns while the remaining 10 percent incurred higher costs, reflecting admission to a neonatal intensive care unit (NICU) or lower level special care nursery.[98] Of these, 5 percent incurred costs of US$3000–10,000 per case (in 2003 US dollars), consistent with, given US charge structures, limited needs for any level of NICU care.

However, the remaining 5 percent of infants incurred substantial costs, and virtually all of them spent at least some time in the NICU. The distribution of the costs for infants who do require neonatal intensive care is strongly skewed towards preterm newborns (especially very preterm infants) and those with serious congenital anomalies that require surgical treatment.[97, 99] Both groups tend to incur high costs and have long length of stay. Phibbs and Schmitt (2006) demonstrated that the distribution of costs and length of stay varies even by week of gestation.[100] This holds even if survivors and non-survivors are considered separately.

Recognizing the limitations of the DRGs for neonates and many other paediatric cases, in the late 1980s the National Association of Children's Hospitals and Related Institutions (NACHRI) created a set of Pediatric Modified DRGs (PM-DRGs), which included 47 DRGs for newborns. Although this system greatly reduced the problem of heterogeneous groupings, it also resulted in many groups with very small cell sizes. This set of DRGs was adopted by some private sector payers for a while, but they were eventually superseded by the all-patient refined DRGs (APR-DRGs).

All Patient Refined DRGs were created in the late 1980s when New York State was moving to an "all-payer" system in which all of the various insurance systems would use a standardised set of DRGs for all inpatient acute medical care. Recognising the limitations of existing DRGs, New York contracted with 3M Health Information Systems, the Medicare contractor for the administration of DRGs, to refine DRGs to make them more appropriate for non-Medicare populations, developing the APR-DRGs. Starting with the PM-DRGs and combining some groups, they reduced the number of neonatal DRGs from 47 to 28 (Table 7). The classification system is based on birth weight (BW) groups as a

proxy for prematurity and controls for the need for major surgical procedures.[w] Although gestational age is a much better predictor of resources needed to care for premature infants, it is notoriously problematic to measure accurately.

In general, the APR-DRG system is considered to perform better with regard to classifying neonates into homogenous groupings than the initial DRGs. However, there remain problems with small numbers, heterogeneous groups and the potential for selection bias due to selective referral of the highly complex cases to selected tertiary centres. Yet, despite these challenges, APR-DRGs are the set of DRGs that are used by most, if not all, of the organisations that use DRGs to pay for neonatal care.

Since the initial creation of the APR-DRGs, 3M Health Information Systems has expanded the system to include four levels of severity within each DRG. Additional changes could be in progress, against the background of the 2007 revision to the Medicare DRGs which introduced Medicare Severity-DRGs (MS DRGs). However, revisions to the paediatric-specific DRGs tend to lag behind developments with Medicare DRGs.

10.3 Limitations of all-patient refined DRGs with regard to funding neonatal (intensive) care

Although the APR-DRGs represent a major improvement over the original Medicare DRGs for neonates, there are some major limitations. Areas of concern relate to (1) heterogeneity of groupings for preterm infants, (2) heterogeneity of complications, (3) heterogeneity of procedures, (4) the association between reimbursement levels and quality of care, and (5) selection bias due to selective referral.

10.3.1 Heterogeneous groupings for preterm infants

Phibbs and Schmitt (2006) demonstrated how even within single weeks of gestation there are very wide distributions of the costs of infants, especially for the most premature infants.[100] These very wide cost distributions persist even after controlling for survival, which can have a considerable effect on costs. Survival is an important predictor of the costs of preterm infants as over 75 percent of infants of very low birth weight (below 1500g) who die do so within two days of birth. Wide cost distributions may result in differential DRG payments because of selected medical conditions/complications and the need for major surgery. However, the main sources of variance in cost are differences in the severity of neonatal lung disease, which is not and cannot be built into DRGs. Severity of illness within a diagnosis is not easily compatible with ICD codes, which do not allow for differentiation for severity of illness. It is difficult to identify appropriate proxy measures for severity in neonatal care such as the need for or level of respiratory support, as this is also strongly affected by the quality of care.

Similar issues apply to infants who require major surgical procedures to correct congenital anomalies where there is a wide range in the degree of anomalies. For some, this can range

[w] Birth weight groups used: <500g, 750g, 1000g, 1250g, 1500g, followed by 500g intervals to 2500g, and then grouping all infants >2500g; For preterm cases needing major surgical procedures the birth weight groups were wider, distinguishing: <1500g (VLBW) and 1500–2499g.

from no clinical impact, with no intervention required, to being life threatening and requiring one or more major surgical procedures and extensive post-operative care. Current DRGs are only based on diagnosis and surgery (if this is necessary). Even restricting to those anomalies that require surgical intervention, there can still be very wide ranges in the severity of a given defect and in the costs required to treat the defect. Furthermore, the current DRG system combines all of these conditions into one or two groups, not allowing for further disaggregation into specific conditions, and there is also wide variation in the severity of illness and the expected costs of treatment of infants with different types of anomalies.

10.3.2 Heterogeneous complications

The list of complications used by APR-DRGs involves very heterogeneous groupings. All of the indications that trigger higher DRG payment for significant complications are major complications that require extensive treatment, but there is substantial variation in the mean added costs of treating them. In addition, there is a fairly large condition-specific variance in marginal treatment costs for most of these conditions.

10.3.3 Heterogeneous procedures

Likewise, the list of procedures that trigger higher reimbursement for APR-DRGs is very heterogeneous. Not only do the procedures cover every major organ system, but even within organ systems there is substantial variation in the average marginal treatment costs of the condition in question. As with complications, when combined with the procedure-specific variance, this results in very wide cost distributions.

10.3.4 Reimbursing poor quality of care

Although providing higher reimbursement for additional case complexity does seem appropriate, it may have substantial implications for the quality of care for neonates. This is because there are several major complications associated with extremely preterm infants that can be greatly influenced by the quality of care, including necrotising enterocolitis, intra-ventricular haemorrhage and other haemorrhage in the brain, retinopathy of prematurity and bronco-pulmonary dysplasia. While these problems may occur even with exemplary care, the rates of these conditions are much higher as a result of sub-standard care.

These conditions have been included in the complications lists and associated surgical procedures in the procedures lists, as both are associated with significant increases in treatment costs. However, because of their association with substandard care, increasing reimbursement for these complications without careful adjustment may cause the system to reward care of lower quality.

This problem could however be addressed by reducing the payment for these complications to the level of payment paid for cases without these complications. This would provide a financial reward for higher quality neonatal intensive care units that have lower rates of complications and penalise those units that provide lower quality of care. This, in turn, would create a strong financial incentive for hospitals to invest in quality to minimise the occurrence of these complications. However, any such policy would need to be carefully considered as most of these complications may be prevented by higher quality care, yet some cases may be unavoidable. Although this would be reflected in the mean

payment, a small NICU would be subject to increased risk of a "bad draw" (more unavoidable complications) and resulting financial loss. Furthermore, financial losses incurred from such a system would make it more difficult for neonatal intensive care units that provide lower standards of care to improve quality. However, this type of payment could provide an strong incentive for consolidating neonatal intensive care units, which may help reducing neonatal mortality as suggested by recent US evidence.[101]

10.3.5 Selection bias due to selective referral

Because many of the DRGs relating to neonatal care represent groups of conditions that are quite heterogeneous in relation to cost and length of stay, there is potential for selection bias. This is particularly a problem in neonatal care, given the tiered structure of neonatal intensive care units. Only a subset of units will have a full complement of paediatric and surgical subspecialists required to treat some of the rarer and more complex cases. Since these complications and surgical procedures are grouped with those that have lower resource requirements, the selective referral of these more complex cases to a subset of the tertiary centres creates a situation where the expected resource use of a substantial subset of infants treated at these centres have expected costs that are substantially above the level of reimbursement. This type of selection bias is present in the US and represents a substantial share of the patient load at many large neonatal intensive care units, especially those at larger children's hospitals and major medical schools.

10.4 Implications for England

There are several factors that need to be considered in designing an activity-based funding system for neonatal intensive care in England. Given the problems noted above, some development work will almost certainly be necessary, including preparatory work to obtain accurate secondary data on costs, especially if there is a decision to tailor the DRG system to address some of the limitations with current DRG systems for neonates. Consideration should be given to some carefully tested pilot projects before rolling out a new system for the entire country.

In comparison with units in the US, most neonatal intensive care units in England are relatively small. Although there are many small units in the US, these mostly provide mid-level neonatal intensive care or they only treat premature infants without providing a full range of paediatric sub-specialties or surgical specialties. Essentially none of the neonatal intensive care units in the US that receive specialised referrals of the most complex cases and surgical cases are small or mid-sized units. In England, many of the units at the top of the tertiary structure providing specialised care that is not available at all tertiary units are much smaller than units providing a comparable level of care in the US. Their relatively small size makes them much more vulnerable to selection bias. This greatly increases the likelihood that in any given year many neonatal intensive care units in England will have expected costs that are substantially different from any prospectively determined payment.

Given that there is good evidence that larger centres achieve better outcomes, the proposed change in payment systems does perhaps present an opportunity to use the payment system to move the organisation of perinatal care in England towards a more regionalised system with a smaller number of larger neonatal intensive care units. Given the relatively

short distances involved, it may be geographically feasible to reduce the number of units in many parts of the country, while still maintaining reasonable access to care.

Table 7 Neonatal all patient refined DRGs

DRG	Description
580	Neonate, transferred <5 days old, not born here
581	Neonate, transferred < 5 days old, born here
583	Neonate w ECMO
588	Neonate bw <1500g w major procedure
589	Neonate bw <500g
591	Neonate bw 500–749g w/o major procedure
593	Neonate bw 750–999g w/o major procedure
602	Neonate bw 1000–1249g w resp dist synd/oth maj resp or major anomaly
603	Neonate bw 1000–1249g w or w/o other significant condition
607	Neonate bw 1250–1499g w resp dist synd/oth maj resp or major anomaly
608	Neonate bw 1250–1499g w or w/o other significant condition
609	Neonate bw 1500–2499g w major procedure
611	Neonate bw 1500–1999g w major anomaly
612	Neonate bw 1500–1999g w resp dist synd/oth maj resp cond
613	Neonate bw 1500–1999g w congenital/perinatal infection
614	Neonate bw 1500–1999g w or w/o other significant condition
621	Neonate bw 2000–2499g w major anomaly
622	Neonate bw 2000–2499g w resp dist synd/oth maj resp cond
623	Neonate bw 2000–2499g w congenital/perinatal infection
625	Neonate bw 2000–2499g w other significant condition
626	Neonate bw 2000–2499g, normal newborn or neonate w other problem
630	Neonate bw >2499g w major cardiovascular procedure
631	Neonate bw >2499g w other major procedure
633	Neonate bw >2499g w major anomaly
634	Neonate bw >2499g w resp dist synd/oth maj resp cond
636	Neonate bw >2499g w congenital/perinatal infection
639	Neonate bw >2499g w other significant condition
640	Neonate bw >2499g, normal newborn or neonate w other problem

Source: All Patient Refined Diagnosis Related Groups (APR-DRGs). Methodological overview.[102]

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APPENDICES

Appendix A: Questionnaire

Activity-based funding of intensive care services using diagnosis-related groups (DRGs)

Hospital financing

How is hospital care funded and by whom?

What proportion of hospital activity is paid through DRGs (or equivalent) and how is the remainder paid for?

When was the DRG-based funding system introduced?

What were the objectives for introducing DRG-based funding?

Is the DRG system mandatory through the health system or can different payers decide whether they want to use it?

Is the same payment system used for public and private sectors of provision (i.e. publicly or privately (for profit or not-for-profit) owned hospitals)?

Are activity-based funding systems applied equally across regions/states? If not how do regions/states differ?

Description of the DRG system

Which DRG system is used?

Which grouper is used to describe clinical activity? What are the main categories?

How many categories exist? How many sub-categories?

What services, sectors, patient groups, treatments and interventions are excluded and why?

Who sets the price/tariff? How often are prices/tariffs reviewed and on what basis?

To what extent does the tariff reflect actual hospital costs? How are hospital costs monitored/calculated?

How is the system monitored for example for its impact on provision and financial performance of individual hospitals? And by whom?

Funding intensive care

How is intensive care defined (e.g. as care for patients with multiple organ failure in need of organ support)?

How is intensive care for adults funded (e.g. per diem, per case, block/volume contract)? Please describe.

How is intensive care for neonates and children funded?

How are specialist intensive care services, such as burns, funded?

If a DRG system is used to fund intensive care for adults, neonates and/or children, please describe:

How is intensive care defined in the grouping system?

What clinical grouper is used?

How are the costs of intensive care captured?

When was this system of funding intensive care introduced?

What alternatives of paying for intensive care have been considered?

What were the reasons for choosing this funding mechanism over other options?

How well does the funding system for intensive care work?

What are the disadvantages and advantages of the current approach to financing intensive care?

What are the tensions among stakeholders regarding the current approach to funding (e.g. clinicians, hospital managers, and policy-makers)?

Are there any changes to the funding system for intensive care being considered and why?