INTERNATIONAL DEVELOPMENT IN FOCUS

Transition to Diagnosis-Related Group (DRG) Payments for Health

Lessons from Case Studies

Caryn Bredenkamp, Sarah Bales, and Kristiina Kahur, Editors

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Contents

Acknowledgments *v*
Abbreviations *vii*

Synthesis **1**

Introduction 1
Rationale for DRG Transition 2
Technical Design Decisions 3
Enabling Factors 5
Phasing in of DRG-Based Payment 8
Lessons Learned 9
Notes 12
References 12

CASE 1 **U.S. Medicare** **13**

Rationale for DRG Reform 13
Key Elements of DRG Design 13
Transition Strategy 14
Refinements and Future Direction 15
Note 16
Reference 16

CASE 2 **Australia** **17**

Rationale for DRG Reform 17
Key Elements of DRG Design 18
Transition Strategy 18
Refinements and Future Direction 19
Notes 20
References 20

CASE 3 **Thailand** **21**

Rationale for DRG Payment Reform 21
Key Elements of DRG Design 22
Transition Strategy 23
Refinements and Future Direction 24

CASE 4 **The Kyrgyz Republic** **25**

Rationale for DRG Reform 25
Key Elements of DRG Design 25

Transition Strategy 26
Refinements and Future Direction 27
Reference 28

CASE 5 **Germany 29**

Rationale for DRG Reform 29
Key Elements of DRG Design 29
Transition Strategy 31
Refinements and Future Direction 33
Notes 33
References 34

CASE 6 **Estonia 35**

Rationale for DRG Reform 35
Key Elements of DRG Design 35
Transition Strategy 36
Refinements and Future Direction 38
Note 38

CASE 7 **Croatia 39**

Rationale for DRG Reform 39
Key Elements of DRG Design 39
Transition Strategy 40
Refinements and Future Direction 42
Note 42
References 42

CASE 8 **China (Beijing) 43**

Rationale for DRG Payment Reform 43
Key Elements of DRG Design 43
Transition Strategy 44
Refinements and Future Direction 46
Notes 46

CASE 9 **The Russian Federation 47**

Rationale for DRG Reform 47
Key Elements of DRG Design 47
Transition Strategy 48
Refinements and Future Direction 50
Note 51

APPENDIX A **Summary of Features of DRG Systems 53**

Bibliography 55

Figures

S.1 Duration of the transition period 10
4.1 DRG transition in the Kyrgyz Republic 26
5.1 DRG transition in Germany 31
5.2 Phased convergence to statewide base rate 33
6.1 DRG transition in Estonia 38
7.1 DRG transition in Croatia 41
8.1 DRG transition in China (Beijing) 45
9.1 DRG transition in the Russian Federation 50

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Abbreviations

ACHI	Australian Classification of Health Interventions
ALOS	average length of stay
AN-DRG	Australian National DRG
AP-DRG	All Patient DRG
AR-DRG	Australian Refined DRG
BDPT	Beijing DRG Project Team
BJ-DRG	Beijing Diagnosis-Related Group
BJ-UEBMI	Beijing Urban Employee Basic Medical Insurance
CSMBS	Civil Servant Medical Benefit Scheme
CMS	Centers for Medicare and Medicaid Services
DRG	diagnosis-related group
DRG-GB	DRG payment with a global budget ceiling
DTS	Dijagnosticko-terapijske skupine (Croation term for Australian Refined DRGs)
EHIF	Estonian Health Insurance Fund
FFS	fee for service
FMHIF	Federal Mandatory Health Insurance Fund
G-DRG	German DRG
HCFA	Health Care Financing Administration
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
HZZO	Hrvatski zavod za zdravstveno osiguranje (Croatian Health Insurance Fund)
ICD	International Statistical Classification of Diseases and Related Health Problems
ICU	intensive care unit
IHPA	Independent Hospital Pricing Authority
InEK	Institut für das Entgeltsystem im Krankenhaus (German Institute for the Hospital Remuneration System)
IT	information technology
KZG	Клинико-Затратные Группы (Clinical Cost Groups)
MHI	Mandatory Health Insurance
MHIF	Mandatory Health Insurance Fund

NCSP	Nordic Medico-Statistical Committee Classification of Surgical Procedures
NHSO	National Health Security Office
PPTP	Placanje po terapijskom postupku (DRG-based payment system)
PSRO	Professional Standards Review Organization
R-DRG	Russian DRG
RW	relative weight
SSS	Social Security Scheme
TMHIF	Territorial Mandatory Health Insurance Fund
UCS	Universal Coverage Scheme

Synthesis

INTRODUCTION

The aim of this report is to help policy makers who are considering introducing, or are in the early stages of introducing, diagnosis-related group– (DRG-) based payments into their provider payment mix to understand how other countries (or systems) have made that transition. It sheds light on why particular technical design choices were made, what enabling investments were pertinent, and what broader political and institutional issues needed to be considered. The focus on the strategies used to phase in DRG payment is an important complement to the existing literature on DRG design and implementation.[1]

The nine case studies—United States (U.S.) Medicare, Australia, Thailand, Kyrgyz Republic, Germany, Estonia, Croatia, China (Beijing), and the Russian Federation—were selected because they represent a variety of different approaches to and experiences with the transition to a DRG system. They include the innovators who pioneered DRG payment systems (the United States and Australia), mature systems (such as Thailand, Germany, and Estonia), and countries where DRG payments were introduced only within the past decade (for example, the Russian Federation and China). The inclusion of a particular country or system as a case study should not necessarily be interpreted as an endorsement of the approach taken.

In this report, the concept of transition is used to mean a shift by a particular payer to using DRG-based payments as part of their provider payment mix. In fiscally decentralized health systems or in countries with multiple payers, a full transition will not necessarily imply a nationwide shift; it may be specific to one locality (for example, Victoria state in Australia) or one scheme (for instance, the Universal Coverage Scheme in Thailand). Transition may stop at that point because the full scope of responsibility and autonomy of the payer has been reached, or it may diffuse to other payers (for example, states and schemes) in the country.

The remainder of this synthesis summarizes some of the reasons DRG transitions were initiated, which technical design choices were made and why, what enabling investments were deemed necessary, and the governance arrangements that contributed to (or stymied) success.

RATIONALE FOR DRG TRANSITION

A DRG system classifies hospital cases into groups that are clinically similar and are expected to use similar amounts of hospital resources. When used for payment, the amount per episode of care is fixed for patients within a single DRG category (based on average cost), regardless of the actual cost of care for that individual episode, but varies across DRGs. In general, DRG payments are used for inpatient care services, but are also frequently used for day care and surgery services. Depending on the country, a number of exclusions may also apply, such as for expensive drugs and medical devices, high-tech interventions, transplantations, emergency care, psychiatry, rehabilitation, long-term nursing care, tuberculosis, and HIV/AIDS cases.

Although the principal reason driving the decision to include DRGs as part of the payment mix differs across the health systems explored in these case studies (often because of differences in how the previous systems were organized and financed and, thus, the types of provider behaviors that were encouraged), there are also commonalities. The transition toward DRGs appears to have been motivated mainly by the need to enhance efficiency and sustainability, specifically to overcome escalating health care costs, inefficient and often large hospital networks, adverse consequences of the payment methods in place before introducing DRGs (such as long average length of stay [ALOS], low admission rates, excessive service provision), and skepticism as to whether the care being provided was appropriate. In some contexts, DRGs were also seen as a means to increase the transparency of hospital performance and payment (for example, in Estonia, Germany, Russian Federation, and U.S. Medicare).

In each case, the specific rationale for the introduction of DRGs depended on the previous payment system and the perverse incentives that it created. In countries or systems that were paying providers on a fee-for-service (FFS) basis, such as Beijing, Croatia, Estonia, Russian Federation, and U.S. Medicare, DRGs were seen as a way to reduce the inefficiencies associated with excessive (and sometimes unnecessary) provision of services (especially diagnostic tests) and drug prescribing, as well as long ALOS. In contrast, in countries that introduced DRGs into budget-based systems (such as the global budgets in Australia, the line item budgeting system in the Kyrgyz Republic, or the capitation payment system in Thailand), DRGs were expected to solve the problems of low admission rates and lack of productivity of health care providers (who, with capped remuneration, had little incentive to take on new cases or provide additional services for existing cases). Somewhere in between are the systems that used per diem payment, such as Germany and the Russian Federation, which also create perverse incentives for long ALOS. By paying a fixed amount for a given diagnosis, DRGs were expected to solve some of the overservicing and long ALOS problems of the FFS systems and some of the long ALOS problems of the per diem mechanism, and, in budget-based systems, it was expected to create the necessary incentives for hospitals to admit more cases (when necessary) and treat more complex cases.

The promise of DRG systems had to be weighed against their weaknesses and risks, including that DRG systems create an incentive for hospitals to skimp on services provided per admission (that is, to undertreat), discharge patients prematurely, and cherry-pick low-cost patients. The costs of developing new systems to prevent gaming of DRG payments

(for example, through upcoding and splitting of admissions) also needed to be considered.

In each case, the nature of the previous payment system also influenced the specific structure and design of the new DRG payment system. Health systems that had previously used global budgets tended to introduce DRG systems in combination with global budgets (using the DRG to distribute a global budget), whereas health systems that had previously relied on FFS tended to implement DRGs without a global budget (and often continued to face challenges with cost escalation).

TECHNICAL DESIGN DECISIONS

The early pioneers of DRG payment systems (that is, Australia and U.S. Medicare) had to undertake extensive research, along with early and frequent assessments, to develop and make iterative adjustments to the technical design of the system. Countries that introduced DRGs later faced the important questions of which technical design elements to adopt from existing DRG payment systems in other countries and which elements to develop on their own—and how to make sure the different elements (adopted, adapted, and developed) fit together coherently. Recent advances in computing power, information technology (IT) applications, and digital connectedness within health systems have facilitated the development of country-specific systems.

A summary of the key technical design decisions made in each of the nine different DRG systems is provided in appendix A. The discussion below reviews the two of these that are most important at the time of transition—selection of the grouping logic and determination of the relative cost weights. The grouping logic, or classification of patients into DRGs, is the way the DRG payment system defines the hospitals' "products." The relative cost weights determine the prices of those products. These two elements are the core of a DRG system. Other design elements can be considered modifications of these two foundational elements.[2]

Selection of the grouper

A system or country can either develop its own grouping algorithm (or "grouper") or adopt an existing one, adapting it to fit national features (as needed).

If adopting a grouper from elsewhere, the first consideration is likely to be how well-suited the grouper is to the standardized classifications of diseases and procedure codes currently in use in that country. Before DRG transition, most countries used a version or modification of the International Statistical Classification of Diseases and Related Health Problems (ICD), in most cases version 10 (ICD-10). However, a suitable classification of procedures was not always in place. In those cases, either new national procedure classifications needed to be introduced or existing national procedure classifications needed to be mapped to the procedure codes used in the system from which the grouper was to be adopted.

A further consideration is availability of other information needed for the grouping algorithm, including secondary diagnoses, patient characteristics (for example, age and sex), and treatment characteristics (including length of stay and discharge status). In addition, the technical ease and cost of implementation

(for example, licensing, training, changes in IT infrastructure, availability of an existing grouper), country size, maintenance of the system, and the ability to make international comparisons mattered. Finally, similarities in medical practice and resource use across the two systems influenced the decision of whether, and from where, to adopt an existing grouping algorithm.

Among the nine systems examined in this volume, only two developed their own groupers at the time of transition. The U.S. Medicare program, under the Health Care Financing Administration (HCFA), was the first program in the world to implement DRGs as a payment method and therefore needed to develop its own DRG grouper. This grouper—often known as the HCFA-DRG[3]—was based on the clinical classification then being used in the Medicare system. Currently in its 35th version, this grouper has been adopted by many other systems.[4] The Russian Federation also developed its own grouper (R-DRG), using the primary classifications that were in place at the time (that is, the Russian Nomenclature of Health Services and ICD-10). One justification for this approach was a concern that adopting an international DRG model might lead to disruption of hospital financing, given the significant structural and regional variations in health care organization and costs across the Russian Federation. In general, DRG groupers used by the health systems covered in the case studies are based primarily on the diagnosis, that is, the grouping logic starts from the diagnosis;[5] for surgical cases, they are complemented by information on procedures.

Among the systems that chose to adopt (and adapt) groupers are the Kyrgyz Republic and Estonia. The Kyrgyz Republic adopted the HCFA-DRG, whereas Estonia adopted the NordDRG, which was itself adapted from the HCFA-DRG and is also used by Denmark, Finland, Iceland, Latvia, Norway, and Sweden.

Countries (or systems) may also start by adopting a grouper and then later develop their own, or vice versa. Australia initially used the HCFA-DRG, but then developed the Australian DRG (AN-DRG) and subsequently the Australian Refined DRG (AR-DRG). Germany initially adopted the AR-DRG but soon thereafter developed its own. Thailand initially adopted the HCFA-DRG, then switched to the AR-DRG, and then finally developed its own. Beijing developed its Beijing Diagnosis Related Group (BJ-DRG) based on a similar grouping logic similar to that of the AP-DRG and AR-DRG. In contrast, Croatia began by developing its own grouper based on the logic of the APR-DRG, but then adopted the AR-DRG.

Determining cost weights

To start using DRGs as a payment method, the cost weight for each DRG has to be developed. The cost weight determines how much is paid for one DRG versus another. There are three approaches to calculating cost weights, which can also be combined: use existing charge (or tariff) data, undertake specialized costing studies, or borrow cost weights from other countries. Own cost weights can also be benchmarked against those of other countries to help assess their suitability (for example, Thailand benchmarked its cost weights against those of the Welsh and International Refined DRGs). The approach that different systems took to calculating cost weights depended largely on the type of cost data that were available (or could feasibly be collected).

Thailand, Estonia, Croatia, and Beijing used existing hospital charges or health insurance reimbursements to calculate the cost weights. The extent to

which this approach accurately captures costs depends on the extent to which all components of the cost of providing care—for example, operating budget, salaries, capital depreciation—are included in existing charges. For this reason, systems in which health insurance finances a large share of the total cost of care (through reimbursement) tend to be better candidates for the use of charge data. Also, although charge data may be useful for producing cost weight proxies, they may mask actual cost and allocative efficiency differences that are fundamental for improving efficiency and quality. Consequently, systems that have continued to use prices or charges as proxies for cost have had less success in reducing unit costs and improving quality. Cost weights can also be borrowed on a selective basis. For example, Estonia borrowed cost weights from the HCFA-DRG for those cases for which Estonia had only a few (fewer than 30) cases.

Costing studies were used to calculate cost weights in the U.S. Medicare system, Australia, Germany, and the Russian Federation. In all cases, the process required development of a costing methodology, a data collection system, and a strong partnership with hospitals. The sample of hospitals does not necessarily need to be large, but it needs to be representative (stratified by key variables such as urban-rural location, whether it is a teaching hospital, community poverty, demography, and so on), and the selection (both of criteria and of hospitals) needs to be transparent and the results shared. In the U.S. Medicare system, cost data were developed from a small sample of hospitals that was thought to be representative, using intermediary organizations to review costs and accounting information, and then extrapolated to all hospitals. In Germany, hospitals participated on a voluntary basis (which likely skewed the cost data). The Russian Federation started with a costing study covering 30 hospitals from three regions, and later broadened the study to 12 regions. When costing data are lacking, reasonable proxies can sometimes be used. In the development of the U.S. Medicare system, for example, average length of stay was used as a proxy for the cost of selected services.

In some countries (for example, Germany, Kyrgyz Republic, Russian Federation) additional adjustments and coefficients were applied to some of the cost weights to further differentiate payment across providers (for example, based on region, or whether municipal or rural hospital). However, other countries (for example, Australia) minimized adjustments based on provider characteristics, instead making adjustments based on patient characteristics, which are less subject to gaming by providers.

ENABLING FACTORS

Grouper software

The actual grouping of patient cases is operationalized using DRG grouper software. An electronic data reporting system is a prerequisite for grouping cases into DRGs using the software. If an electronic reporting system is not in place, then paper-based medical records will need to be digitized before the grouper can be applied. After the grouping logic and algorithms have been developed (typically by a government agency or a research group under contract), they are programmed into the grouper software, which converts the diagnostic and procedure codes and other patient characteristics to DRG codes.

Grouper software programming can be done in house (by a government or insurance agency) or contracted out to a private IT firm. In some countries, private IT firms develop and market DRG grouper software, which is then checked, licensed, and certified by a government agency to ensure compliance with the DRG grouping algorithms. Each time the grouper logic and algorithms are revised, the software must be updated.

Once developed, application of the grouper software can be centralized or devolved. Grouper software can be built into the purchaser's invoicing system (as in the Estonian Health Insurance Fund) without the need for hospitals to acquire the grouper. Alternatively, the grouper software can be provided free to all hospitals by a central or regional agency, as in the Russian Federation where each Territorial Mandatory Health Insurance Fund develops its own grouper software and provides it free of charge to all hospitals. Another arrangement is for each hospital to be responsible for purchasing its own grouper software (typically developed by a private firm) that conforms to the standards set by the purchaser or regulator (for example, the ministry of health or the health insurance agency). In this case, the grouper is usually certified by the regulator (for instance, Australia or NordDRG).

Training

In most countries, training programs were conducted in government agencies, hospitals, and other relevant institutions during the preparation for, and early implementation of, DRG transition. The training programs often started with training of trainers, who then later provided training to larger groups. The main topics covered during the training were related to the use of primary classifications, coding standards, coding quality, DRG system design and grouping algorithms, costing and tariff setting, reporting, and DRG-specific performance monitoring.

Early evaluation

Early in the transition to DRG payment, evaluation plays an important role in refining the DRG system. In the U.S. Medicare system, evaluation results were submitted to Congress on an annual basis and the impact of DRG payment on parameters of interest was frequently monitored, even to the point of setting up institutions whose specific mandate was monitoring. In Beijing, an impact evaluation study was carried out after one year of implementation of the BJ-DRG payment pilot, and the results provided reassurance to stakeholders of the importance of continuing to implement and expand the DRG payment reform. Some countries have institutionalized the practice of involving all interested stakeholders and experts in evaluation by making a sample of their claims data available to the public for analysis and learning, including the U.S. Medicare system and Croatia (as well as many countries not included in the case studies in this book, such as Indonesia and the Republic of Korea).

Institutionalization through units and teams

The case studies underscore the importance of establishing a DRG unit or center (or at least a designated team) to drive the transition to DRGs. The composition of this unit, its status, and where it sits institutionally differ across systems, and

can shift over time, but the early formation of such an entity is important. For example, Beijing municipality established the Beijing DRG Project Team to lead initial development of the BJ-DRG and complemented it with a DRG Technical Review Committee to review the grouping and relative weights. The DRG payment system development in Estonia was led by a team within the Estonian Health Insurance Fund. Australia established the Australian Casemix Development Program—a well-resourced and -supported collaborative venture between the states, the federal government, universities, the clinical community, statistical agencies, the public and private hospital sectors, and private health insurers—to lead the DRG development process nationally, and the health commission in Victoria pioneered the first use of DRG for payments.

Institutions that can maintain the DRG grouper are also needed. These institutions are not necessarily located within a national ministry of health or a health insurance fund. Germany established the Institute for the Hospital Remuneration System, which is jointly owned by the insurance industry and the German hospitals association (to ensure its neutrality) and is responsible for maintaining the DRG grouper, managing coding quality, defining the costing approach, and producing costing guidance, among other functions. The U.S. Medicare system has an internal casemix center of about 30 experts (including economists, statisticians, and physicians) who constantly review and update the DRGs on an annual basis. The Independent Hospital Pricing Authority (IHPA) in Australia, in place since 2012 when the uniform DRG payment system was introduced nationwide, is responsible for maintaining and updating the DRG grouping logic, setting data standards, setting costing methods, determining relative cost weights, determining the national efficient price, resolving disputes, and performing other related functions.

Estonia relies on a supra-national body, the Nordic Casemix Centre, to maintain the NordDRG grouper, which is then adopted by Estonia every two years. The NordDRG countries collaborate in an annual revision of the Combined NordDRG, which then becomes available for all collaborating countries to incorporate into their own DRG version and use in their own payment systems. This collaboration is a unique way to benefit from a large network of experts, especially for countries with limited capacity to develop their own groupers.

Transparency and stakeholder involvement

The importance of transparency and the involvement of all stakeholders in the DRG transition process—including effective communication between policy makers, medical associations, purchaser organizations, and providers—cannot be emphasized enough. In the U.S. Medicare system, as soon as the new payment system was described in draft regulation, public comments were requested from all stakeholders. Importantly, the regulations also provided all information of interest to stakeholders in great detail (including formulas for computing prices). It was felt that transparency was key to ensuring that hospitals changed their behavior to improve efficiency. Australia places a similarly strong emphasis on transparency and stakeholder consultation in every aspect of DRG development and maintenance. To ensure consultation is meaningful, the IHPA invites stakeholders to provide feedback and comments via a submission process before any new document is finalized. In Estonia, where the DRG transition process was led by the Estonian Health Insurance Fund, a DRG Advisory Committee (including representatives from key medical specialties, different

hospital types, and the Ministry of Social Affairs) was established. This committee was consulted on key implementation issues and helped manage potential opposition from providers who were concerned about the impact that the DRG payment reform would have on their revenues. A broad spectrum of specialists should also be involved in technical design (for example, translating the DRG terminology, mapping of codes, and assessing the appropriateness of the DRG grouping logic).

PHASING IN OF DRG-BASED PAYMENT

Gradually phasing in DRG payments allows flexibility and time for both the purchaser and the provider to understand and adjust to the new system, mitigating financial risk. In almost all systems covered by the case studies, DRG payments were introduced in a phased manner and with mechanisms to protect hospitals from the financial risk associated with DRG transition.

A common first step was to conduct simulations of the impact of DRG payments. Relative weights can be estimated using hospital claims data (charges) or can be borrowed from a country applying the same grouper. Base rate scenarios can be developed based on historical payments or availability of funds, including budget-neutral and redistributive scenarios. Resultant hypothetical hospital revenues under DRG are then compared with hospitals' current revenues to assess the potential financial impact of DRGs. Comparisons of length of stay and other clinical indicators within DRGs can be made across hospitals. Informing hospitals of the results of this analysis gives them time to improve coding and make adjustments to clinical practice before they face the financial consequences of a new payment system. In Croatia, for example, hospitals were obliged to classify patients by DRG for one year before the introduction of DRG payments to see which case types required resource use adjustment. In addition to the simulations, most systems organized some kind of pilot to sort out operational issues.

In the health systems included in this case study volume, the phasing in of DRG payments involved different types of approaches, with some countries using multiple approaches (simultaneously or sequentially):

- *By geography.* Distinct from piloting, a geography-based introduction involves phasing in DRGs starting in a few provinces or hospitals. The Russian Federation piloted DRG payments in 30 hospitals in 3 regions in 2013, and then expanded to 11 regions in 2014, 63 regions in 2015, and 73 regions in 2017 (out of the more than 80 regions of the Russian Federation). Australia's federal system meant that the decision of whether to apply DRG payments was left up to each state (before national health reforms in 2011 led to adoption of a national public hospital DRG funding system).
- *By hospital type.* This approach involves payment to certain types of hospitals, which may be distinguished by type (such as tertiary or secondary) or by administrative level (such as municipal or district level). The BJ-DRG is an example in which DRGs were first implemented in some tertiary hospitals, followed by a gradual phasing in of more tertiary hospitals, with plans to later phase in secondary hospitals. The Kyrgyz Republic initially applied DRG payments in only 13 hospitals in its introductory phase in 1997, before extending to all general hospitals in 2001.

- *Partial DRGs, that is, a set of conditions, cases, or clinical specializations*. Beijing began by shifting payment from FFS to DRGs for only 108 DRGs (out of a possible 650) and at only six tertiary general hospitals, applying the same base rate for all hospitals. The scale-up of the BJ-DRG payment to 300 DRGs (out of a possible 771) and 39 tertiary hospitals did not take place until 2018.
- *Base rate convergence*. Germany introduced DRG payments simultaneously in all hospitals after a period of voluntary participation, but initially applied a hospital-specific base rate (which meant that although the hospital's unit of reimbursement was in DRGs, the amount of payment received was the same as under the previous system [which paid a per diem plus case and procedure fee]). Germany slowly converged to a statewide base rate in steps (15 percent statewide in 2005, 35 percent in 2006, 55 percent in 2007, 75 percent in 2008, 100 percent in 2009), and eventually imposed a nationwide price corridor to limit the base rates negotiated at the state level to within 2.5 percent above and 1.5 percent below the national or federal price. Thailand also used a base rate convergence approach. However, although Thailand's Universal Coverage Scheme shifted quickly from differentiating the base rate by four levels of hospitals to convergence to a national base rate (with a global budget) within two years, Thailand's Civil Servants Medical Benefit scheme still has 27 different base rates for different types of hospitals.
- *Shift in proportion of each case paid by DRG versus FFS*. Like Germany, Estonia introduced DRG payments simultaneously in all hospitals (and for all medical specializations), but Estonia used the same base rate from the beginning (across all facilities). The Estonian approach to managing hospitals' financial risk was to pay each case partly by DRGs and partly by FFS, and increase the proportion reimbursed by DRGs over time (from 10 percent in 2004 to 50 percent in 2005 to 70 percent in 2009).

Looking across the health systems included in this case study volume, it can be seen that it takes a number of years from when countries or systems first embark on DRG-related reforms (defined as the year of the decision to move toward the DRGs or start implementation) to when they have fully made the transition to DRGs (defined as the year when DRGs are used as a payment method) (figure S.1). Even putting aside the preparatory work and piloting, phasing in of the payment transition seems to take about five years. The early transitions, in the U.S. Medicare system and Australia, took the longest whereas the more recent transitions in the Russian Federation and Estonia were quite fast.

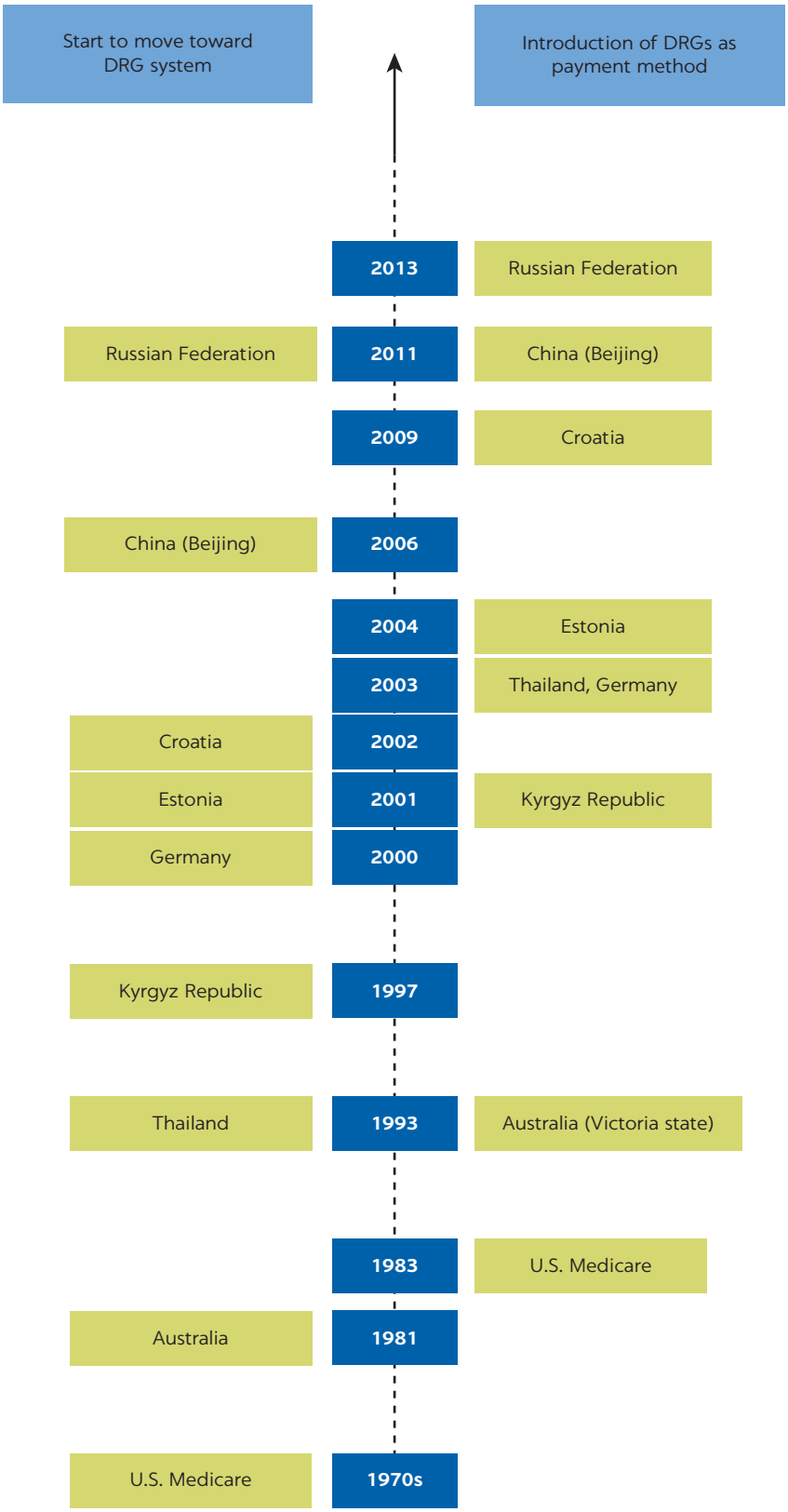
LESSONS LEARNED

DRGs are typically introduced into a financing system with the expectation that they will enhance efficiency and sustainability of health spending. However, meeting those expectations requires careful DRG design, complementary reforms, and thorough consideration of process and politics. Among the many lessons in these nine case studies, the following stand out:

1. **Purpose.** Be clear about the objective of implementing a DRG payment system and what it is expected to achieve for the health system. Otherwise, DRG payment risks becoming an objective in and of itself, when in fact it is a means to an end.

FIGURE S.1

Duration of the transition period



Note: DRGs = diagnosis-related groups.

2. **Organization.** Early on, establish a DRG unit (and, if not a unit, then at least a team) to drive DRG development. This unit not only needs to have the correct skill composition, but should have the ability and authority to effectively convene representatives across agencies and stakeholder groups so that the DRG system is both technically coherent and politically acceptable.

3. **DRG patient classification (grouper).** Adopting a grouper, rather than developing a new one from scratch, may make good sense. Most case study countries, including high-capacity developed countries (Australia, Germany), adopted their groupers from other countries. Adaptations can always be developed later, either on one's own (such as Thailand) or as part of a multicountry or multisystem collaboration (such as the NordDRG). A caveat is that the same primary diagnosis and procedure codes need to be in place in both countries. Also, adopting a grouper is not necessarily without costs (for example, licensing fees and capacity development to adapt the grouper to local clinical and costing structures).

4. **Determining cost weights.** Determining DRG cost weights need not involve time-consuming and expensive costing studies; many countries have used hospital charge data for this purpose. However, as noted, the use of cost weight proxies based on charge data entails some risk. Regardless of whether charge or cost data are used, providers must be actively involved from the beginning so that consensus can be reached that the incentives created by the relative cost weights are compatible with health system objectives. Adjustments can be made over time as technologies and practices change.

5. **Need for a hard budget ceiling.** Regardless of whether the previous payment system used global budgets, the use of closed-ended hospital payments (for example, hard budget or volume ceilings) are exceptionally important if the efficiency goals of DRGs are to be attained. FFS systems that introduce DRGs without a global budget of some sort are likely to continue to face cost escalation.

6. **Phasing in DRGs.** Successfully phasing in DRGs takes time and a systematic stepwise approach. A period of learning, preparation, and adjustment is necessary to reduce the risk of technical problems, to manage the financial risk of providers and give them time to adjust, and to manage any political opposition that may thwart reform efforts. In many countries, simulations and analysis of claims data by DRG were important building blocks. Most phase-in approaches contained measures to reduce short-term financial risk (for example, use of a budget-neutral period, phased base rate convergence, part-FFS–part-DRG payments).

7. **Transparency and stakeholder involvement.** All relevant stakeholders should be involved early on and close partnerships should be forged with hospitals. Stakeholder involvement will become particularly important at later stages in the transition pathway if and when simulations reveal inefficiencies in certain hospitals or specializations and hard decisions need to be made about payment levels. Effort should also be put into training and capacity-building to ensure widespread understanding of DRGs across a broad range of stakeholders. Transparency in all processes and decisions regarding DRG development and adjustment is key.

8. **A DRG payment system requires continuous maintenance.** Even when the DRG payment transition appears to be complete, the work is not yet done. DRG payment systems require continuous fine-tuning of classifications and monitoring of data quality and integrity. The grouper needs to be updated and maintained; the coding quality needs to be monitored and improved; primary classifications will need to be revised; and changes in the cost of services and the development of new diagnostics and treatment methods will affect cost weights. Creating a DRG unit or center and institutionalizing processes for regular and transparent evaluation, updating, and fine-tuning will be critical for the DRG payment system to achieve the goals to which it aspires.

NOTES

1. Readers may wish to consult the following resources for more guidance on the design and implementation of DRG payments: Langenbrunner, Cashin, and O'Dougherty (2009); Busse et al. (2011); Mathauer and Wittenbecher (2012); and WHO (forthcoming).
2. For example, extending DRG payments to cover services beyond inpatient care is part of defining the hospitals' product, whereas decisions to exclude certain cost elements or to make adjustments to payments in rural areas or for teaching hospitals affect prices.
3. The HCFA-DRG was the original U.S. Medicare DRG. The All Patient DRG (AP-DRG) is an expansion of the basic DRG used by Medicare to be more representative of non-Medicare populations. The refined version (APR-DRG) is similar to the AP-DRG, but also measures severity of illness and risk of mortality in addition to resource utilization.
4. Seven other groupers have been developed by private companies in the United States and are used by other national and state-level programs, and have also been adopted by other countries.
5. Among the case studies, the exception is the Kyrgyz Republic, where the grouping of surgical cases was based on surgical procedures only, without taking into account the diagnosis information. However, nonsurgical cases used information on diagnosis.

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1 U.S. Medicare

RATIONALE FOR DRG REFORM

The United States (U.S.) Medicare system is a national health insurance program, begun in 1966 under the Social Security Administration and the Health Care Financing Administration (HCFA) and now administered by a renamed Centers for Medicare and Medicaid Services (CMS), that provides health insurance for Americans age 65 and older as well as for other select groups with specific conditions. Today, it provides health insurance to almost 60 million people, of whom about 50 million are elderly.

In the 1970s, Medicare commissioned Robert Fetter, John Thompson, and their colleagues at Yale University to develop a "casemix" classification system that would identify medical "product lines" that could be used to improve the quality of care pathways. At the outset, then, the Medicare casemix system was not envisaged as a payment system. Later, however, it was found that the categorization of clinical care could be matched with the use of resources. This was the first inclination that the work of Fetter and Thompson (1965) could be applied to payment systems.

KEY ELEMENTS OF DRG DESIGN

The new scheme was piloted in one state (New Jersey) in 1980,[1] an evaluation was carried out, and the findings were used to develop a National Diagnosis Related Group (DRG) Program. The national DRGs used national program data for the clinical classification. However, the data were not very good. For about 30 percent of records, only one diagnosis or no diagnosis was available. Also, cost data were drawn from only a small sample of hospitals, using intermediary organizations to review costs and accounting information, and then standardized across hospitals. When good cost data were lacking, the average length of stay was used because it was found to correlate well with costs. An impact analysis was conducted in 1981. Adjustments were made to better protect hospitals from financial risk and to allow hospitals to generate revenue

within 5 percent of their historical revenues. In other words, if the change in revenues for a given hospital was more than 5 percent, adjustments were made to cost weights (if systematic) or the hospital-specific base rate was used.

In 1982, Congress passed legislation approving nationwide implementation starting in late 1983. Congress passed the bill because program costs were growing at 18 percent year over year as a result of the fee-for-service payment system, which was an unsustainable increase in hospital care costs.

TRANSITION STRATEGY

Importantly, the DRGs would be phased in over time. This allowed flexibility and time for both the purchaser and the provider to understand the new system and for refinements to be made. Because such a system had never been implemented before, anywhere in the world, there was concern over its viability and impacts.

The phase-in, starting in 1983, was as follows:

- Year 1: Hospitals would receive 25 percent DRG payment and 75 percent historic payment
- Year 2: 50 percent DRG payment and 50 percent historic payment
- Year 3: 75 percent DRG payment and 25 percent historic payment

The historic payment used the hospital-specific base rate, whereas the DRG payment was based on a national base rate. A small number of individual categories were adjusted for price to allow a minimum of risk to providers in the first year. At the beginning, there were 467 DRG categories. Initially, DRG payments covered only operational costs (including salaries of employees) and not capital costs, but adjustments to cover the cost of capital were included within three years of commencement of the DRG payment system (around 1985). Adjustments were made for teaching hospitals (equivalent to 7 percent additional payment, an amount based on negotiation more than on analysis of cost structure) and for rural hospitals as a subsidy to keep the rural hospitals open despite occupancy rates that were lower than urban hospitals. Certain special types of facilities were also excluded (including children's hospitals, rehabilitation facilities, psychiatric-related facilities, and long-term care hospitals) because ex ante impact analysis showed that DRGs could not adequately predict resource use.

Transparency was an important component of the transition strategy. The new payment system was described in draft regulation in March 1982, and public comments were requested from all stakeholders. These comments were used to finalize the regulation in October 1982 with phase-in from 1983. Importantly, the regulations provided information on all formulas for how prices were computed and paid. It was felt that transparency was key to hospitals changing their behavior to improve efficiency.

Processes to monitor and evaluate impact, and make adjustments, were put in place from the start. Congress requested that an annual evaluation of the DRG system be conducted. Evaluation reports were prepared each year during the first several years of the program, and made publicly available and studied widely. The Medicare program also reviewed the volume of admissions nationally and sent weekly reports to the White House. Volume increases were feared because of the incentive that DRG payments create to

increase admissions. However, volumes did not increase (possibly because close monitoring of this statistic was publicized). Further, the implementers reviewed coding practices to limit the upcoding that had been seen at the beginning of the program. In the early years of the DRGs, upcoding was addressed through ongoing reviews of facilities, training and accreditation of coders by professional associations, administrative fines, and national rebasing to maintain overall spending levels.

Providers, on average, made significant profits in the first three years. The Medicare program monitored profits, and used these margins to justify no payment modifications in the early years. In other words, there was no adjustment for medical sector inflation. This zero update policy generated significant savings for the program in the early years. So, although Medicare saved nothing in its first year, the update factor "squeeze" meant that the program generated savings in the later years under DRGs.

The DRG program also included the newly developed Professional Standards Review Organization (PSRO) program to improve the quality of care. These organizations were local, community-based physician teams (well respected by their peers) contracted by the Medicare program purchaser. One of the PSRO organizations' first tasks was to identify all unnecessary types of hospital admissions. They found that almost 35 percent of cases admitted could have been handled outside the hospital. Consequently, to discourage unnecessary admissions, the DRG program increased payment (relative weights) for outpatient specialty services. The PSROs also established criteria for admissions (for example, related to clinical severity) to prevent unnecessary admissions. They instituted medical record reviews in 5 percent of all contracted hospitals. These reviews focused on three areas: (a) appropriate admissions, (b) whether necessary care services were administered during the stay, and (c) whether there was an appropriate discharge plan in place when the patient left the hospital.

REFINEMENTS AND FUTURE DIRECTION

Within the first few years of implementation, average lengths of stay dropped by significant margins. Private and nongovernmental hospitals also restructured themselves in response to the new incentives. Restructuring included changing the staff mix (for example, shifting from lower-level to higher-level nurses), adding or reducing beds, opening surgical theaters (to specialize in surgical "product lines" where efficiencies could be found in higher volumes), introducing outpatient centers (where cases that were previously admitted could be seen at lower cost), and introducing new systems or processes (such as financial management systems to track costs). Increases in the price of outpatient services, implemented in parallel, reinforced the efficiency incentives of the DRG reform while also cushioning providers' financial risks. Costs were contained: cost increases for inpatient care fell from about 18 percent to about 3 percent within the first year.

The Medicare program also established an internal casemix center of about 30 experts to constantly review and update the DRGs annually. The experts included economists, statisticians, and physicians. Each year, classifications were reviewed and refined, base rates were set according to national budgets, and prices were set based on updated cost data.

Currently, the Medicare DRG program is implementing its 35th version of the HCFA grouper. Over time, the number of DRGs has increased to 989 and the DRGs have been refined to include four severity levels within each category. In addition, claim forms have become much more detailed. In 1983, up to five diagnoses could be coded; today up to 25 primary and secondary diagnoses are accepted, allowing much richer casemix detail for both payment and quality purposes.

NOTE

1. About that time, DRG payment mechanisms were used in four states (Maryland, Massachusetts, New Jersey, and New York) under demonstration waivers that permitted state-level experimentation with alternative payment mechanisms, but this was not part of the formal phasing in of the U.S. Medicare DRG payment system.

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2 Australia

RATIONALE FOR DRG REFORM

Australia began its implementation of diagnosis-related groups (DRGs) in the 1970s and 1980s with academic collaboration between New South Wales University and Yale University (which had been instrumental in the development of the U.S. Medicare DRG system). In 1981, the Australian government provided a substantial grant to Professor George Palmer's program to analyze Australian national statistical data sets by grouping them to the then-current U.S. Health Care Financing Administration (HCFA)[1] version of the DRGs (Turner and Short 1999). It was recognized that the DRG classification design, that is, classifying patients into groups with similar levels of resource use, could standardize for casemix and allow valid comparisons of hospital efficiency and output-based payment.

Development of an Australian National DRG (AN-DRG) was important for DRG payment to gain greater acceptance among clinicians (Duckett 2008), particularly because the system had to cover all demographic groups, not just older persons as in the U.S. Medicare program. The Australian Casemix Development Program was established and funded in the 1989 five-year Medicare Agreements between the Australian Commonwealth and state governments.[2] It was a well-resourced and -supported collaborative venture between important stakeholders, including the states, the federal government, the clinical community, statistical agencies, universities, public and private hospital sectors, and private health insurers. The first AN-DRG classification was issued in 1992. In 1998, when the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) was introduced, the Australian Refined DRG (AR-DRG) replaced the AN-DRG. In 2005, the Commonwealth and the states agreed to introduce activity-based funding for all public hospitals to provide a basis for more efficient use of taxpayer resources, and for increased transparency in the use of those funds. The objective of the DRG payment system, as laid out in the 2011 National Health Reform Agreement, was to improve access to services and public hospital efficiency (Parliament of Australia 2016).

KEY ELEMENTS OF DRG DESIGN

The DRG system in Australia includes the following elements, which have been developed gradually over time:

- *The classification system* comprising the ICD-10-AM and Australian Classification of Health Interventions (ACHI), along with standards updates and documentation releases[3]
- *The National Hospital Cost Data Collection* program in both public and private hospitals, which consists of a high-profile hospital unit-cost analysis system
- *AR-DRG classification system* manuals and the *AR-DRG coding software accreditation* certification register, issued by the Casemix Development Program and later by the Independent Hospital Pricing Authority (IHPA)[4] for regulating vendors of AR-DRG grouper software
- *DRG-based pricing* for both inpatient and ambulatory care services in hospitals through IHPA's publication of the national efficient price on an annual basis (since 2012)

Quality assurance is underpinned by clinical coding audits in each state hospital system conducted by external organizations hired by state health departments and independent reviews of National Hospital Cost Data Collection costing studies by consulting firms commissioned by IHPA (undertaken at regular intervals). Data integrity assurance measures are also in place in each state and are generally based on peer reviews of activity data analysis and coding improvement responses to the outputs of the audit schemes.

Analyses of hospital activity and costs are published annually, at both the state and national levels, through comparative statistics publications such as the Australian Hospital Statistics (open access) and the IHPA national benchmarking portal (limited access).

TRANSITION STRATEGY

Australia's federal system and the substantial autonomy of each state led to significant cross-state diversity in the transition toward DRG payments for public hospitals, eventually culminating in a unified national casemix funding system following the 2011 National Health Reform Agreement. At this point DRGs became the formal basis for Commonwealth funding distributions to public hospital networks Australia-wide in addition to the existing DRG-based payments being made to the hospitals by the states. This created the imperative for states to measure and pay their local funding contributions (approximately 50 percent) to hospitals using compatible prices and payment models, thereby producing improved system-wide performance transparency.

Prior to direct Commonwealth payments for hospital services, Victoria had been the first state to fully implement DRG payment for its public hospital inpatient services in 1993 (Duckett 2008) using the AN-DRG classification. In the years leading up to DRG payment in Victoria, HCFA-DRG classifications were already used to measure and report on hospital activity, with the "Rainbow Book"—detailing the comparative activity and performance statistics of state hospitals in Victoria—published for about five years. This virtual "shadow payment" mechanism focused attention on the need to reduce costs in the less efficient hospitals to achieve the government policy objectives of containing

growth in health sector expenditures while maintaining output activity levels and quality. This also satisfied the government's concurrent severe fiscal constraint policies. DRGs provided the tool needed to identify hospitals with higher costs per casemix-adjusted output where such efficiencies were most achievable.

Key design features associated with DRG payment success in Victoria included the following (Duckett 1995):

- Clear definition of the hospital product to be paid by DRGs (inpatient services), with other funding arrangements for other service types.
- Setting of a global budget for inpatient care based on historical trends in DRG-standardized activity levels and a benchmark efficiency level base rate (lower than the average to achieve cost reduction).
- Mitigation of risk to hospitals of severe casemix bias through adjustments for outlier length of stay.
- Fixed base payments based on historical activity (about half of the payment) combined with variable payment depending on actual activity up to a negotiated cap.
- An explicit funding measure to allow for cost increases caused by increased health care demand and technology adoption, while controlling the amount within the budget allocation. Each year, a strategic policy-determined "additional throughput pool" was set aside to pay for a fixed percentage increase in inpatient expenditures to cover this changing demand. Eligibility to receive additional funds requires meeting certain quality criteria. This pool is allocated to hospitals in proportion to activity in excess of negotiated caps, so the greater the volume in aggregate, the lower the amount paid per case.

Within three years, all other Australian states, except New South Wales, had adopted DRG payments with AN-DRG classification for public hospitals (Willcox 2005), although with some variation in implementation. New South Wales used DRGs for resource use benchmarking in the 1993–2000 period instead of as a payment mechanism. In this state, extensive efforts in developing hospital costing methodology were funneled into monthly feedback to hospitals about resource use per DRG compared with other hospitals, helping to nudge providers toward more uniform resource use. By 2008, all states were funding their public hospitals based on AR-DRG activity data. Although Australian casemix payments were developed for budget allocation to public hospitals, DRGs have also been incorporated into private insurer–provider contracts. By the late 1990s, almost all contracts between private insurers and hospitals were on a DRG basis (Willcox 2005).

During establishment of the DRG system in Australia, substantial efforts were made to educate stakeholders and to study and debate DRG classifications, costs, and payments. This work led to the creation of a diverse and broad casemix community in Australia, who understood and could credibly champion its use for analysis and payments (Duckett 2008; Hindle and Eager 1994).

REFINEMENTS AND FUTURE DIRECTION

Looking ahead, Australia is focusing on refinement and integration of casemix classifications and payments beyond acute inpatient care. Australia is developing and refining classifications for subacute care (including rehabilitation, palliative care, geriatric evaluation and management, and psychogeriatric care), non-acute

care (that is, maintenance care), non-admitted care services (outpatient care), mental health care and emergency care, and hospital research, training, and teaching activities. Refining provider payments to foster integration of care is another focus.

NOTES

1. This agency is now called the Centers for Medicare and Medicaid Services.
2. In Australia's federal system national and state governments have joint responsibility for funding public hospitals, which are operated by the states. Hospital funding is regulated by a series of agreements between the Commonwealth and the states. From 1984 to 1998 these were called Medicare Agreements. From 1998 to 2008 they were called Australian Healthcare Agreements, and since then they have been called National Healthcare Agreements.
3. The first seven editions of ICD-10-AM and ACHI were developed by the National Centre for Classification in Health, University of Sydney. The eighth edition of ICD-10-AM/ACHI/Australian Coding Standards (ACS) (implemented July 1, 2013) was developed by the National Casemix and Classification Centre, University of Wollongong. The ninth and tenth editions of ICD-10-AM/ACHI/ACS were developed by the Australian Consortium for Classification Development, led by the National Centre for Classification in Health, University of Sydney.
4. The IHPA is an independent government agency established under Commonwealth legislation on December 15, 2011, as part of the National Health Reform Agreement reached by the Council of Australian Governments in August 2011.

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3 Thailand

RATIONALE FOR DRG PAYMENT REFORM

Even before the early 2000s when Thailand embarked on reform toward diagnosis-related groups (DRGs), extensive reforms had been aimed at cost containment and financial protection of patients. Contractual capitation payments had been introduced within the Social Security Scheme (SSS), a compulsory contributory social health insurance program covering workers in the formal private sector, and had been considered successful in containing costs associated with the provision of outpatient and inpatient services to insured workers by private and public hospitals. However, capitation payments had also resulted in low admission rates, prompting the Health Systems Research Institute to begin studying case-based (DRG) payments as an alternative prospective payment system for inpatient services in 1993. However, it was not until 2001, when Thailand introduced the Universal Coverage Scheme (UCS) to provide tax-funded health coverage to all Thai citizens, including the three-fourths of the population in the informal sector, that a shift to capitation contracts for primary care service and DRG payment for inpatient service was made.

The UCS was the first, and largest, of the Thai health benefit schemes to adopt DRGs. Starting in 2003, the UCS used Thai DRG Version 3 for inpatient services. Beginning in 2005, the SSS also used Thai DRG Version 3 in a blended payment system, to provide an additional payment on top of the capitation rate for more severe case types. The Civil Servant Medical Benefit Scheme (CSMBS), which was the most costly of the schemes, adopted Thai DRG Version 4 for inpatient services in 2007. Currently, the UCS uses Thai DRG Version 5 for payment while the CSMBS and the SSS use Thai DRG Version 6, with different base rates used by each scheme. Each scheme makes independent decisions about its payment arrangements (which presents a challenge to hospitals with regard to data submission).

KEY ELEMENTS OF DRG DESIGN

DRG classification

The first research on DRG classification in 1993 focused narrowly on accident and emergency cases, using the U.S. Health Care Financing Administration (HCFA) DRG classification logic. However, Thailand was an early adopter of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) disease classification, whereas the HCFA-DRG relied on ICD-9-CM. This technical issue led Thailand to begin developing its own Thai DRG. Thai DRG Version 1 was criticized for not covering all possible combinations of diseases and procedures. Thai DRG Version 2, released two years later, accommodated all possible combinations, but did not yet reflect disease complexity.

Further development of the Thai DRG grouper was spurred by introduction of the Universal Coverage Scheme (UCS) in 2002, run by the National Health Security Office (NHSO). By the time Thailand was ready to implement DRG payments within the UCS, the Thai DRG (now Version 3, with 1,283 groups) had adopted the Australian Refined DRG logic to better reflect disease severity, using combinations of up to 12 diagnosis codes and 12 operating room procedure codes. Subsequent versions of the Thai DRG modified this logic to better reflect Thailand's health system environment, such as Thai DRG Version 4 (1,920 groups), which introduced bilaterality (that is, both sides, such as left and right eyes) or the multiplicity of operating room procedures into the DRG classification trees. Updating of the Thai DRG involved many clinical experts. By Version 5, the number of DRGs had increased to almost 2,500, but was scaled back to 1,500 in Version 6.

DRG grouper software

The Thai DRG grouper software was made available to all hospitals at no cost. This strategy enabled hospitals to work with the DRG grouper on their own patient data to gain a full understanding of how the grouper works. Data requirements for the Thai DRG grouper were instrumental in sparking standardization of data submission and accumulation of inpatient claims for national health policy assessment and development, including further refinement of DRGs.

Costing and tariff setting

As early as Thai DRG Version 1, calculation of Thai DRG cost weights (also known as relative weights [RW]) was based on hospital charge data. This was made possible by data on fee-for-service payments and user charges before UCS was introduced. Earlier versions of the Thai DRG RW were benchmarked with the Welsh DRG and the International Refined DRG (IR-DRG) groupers (with the support of the developer, 3M Corporation). Results of statistical analyses found high homogeneity within the groups and high heterogeneity between groups (as is desired). However, hospitals complained that variations in charging practices (or different charge-to-cost ratios) between hospitals of different ownership types (public versus private), levels (community versus general versus regional versus specialized), and functions (teaching versus nonteaching), and, most importantly, variations in payment practices across government insurance

schemes (CSMBS versus SSS versus UCS) meant that the global budgets for DRG payments were not always adequate. Only one set of RWs was recalibrated for each Thai DRG version based on nationally pooled inpatients from all hospitals and schemes, with minimal standardization on room and board charges per day. Although they used the same set of RWs, the three government insurance schemes used different base rates based on the average hospital charge per RW, thus reimbursing different amounts for the same condition.

Training

Every time a new DRG version is launched, each insurance scheme organizes training for hospital staff. Each new version of the DRG classification requires changes in the distinction between case types, defined by primary disease or procedure code level of detail. The training facilitates compliance with the adoption or deletion of these primary classification codes (diagnosis and procedure) for higher performance of the new DRG grouper software.

TRANSITION STRATEGY

In Thailand, each of the three government insurance schemes followed a different DRG transition path:

Implementation of DRG payments in the UCS was rapid. While transferring responsibility for running the UCS to the NHSO, in 2003 the Ministry of Public Health started using DRGs to allocate the inpatient care budget using four different base rates, roughly corresponding to hospital level and function. Teaching hospitals had the highest base rate (16,000 Thai baht [THB] per RW) while community hospitals had the lowest (about THB 4,000 per RW). The government agreed to establish an extra THB 5 billion contingency fund to compensate large hospitals incurring losses. Two years later, based on the reasoning "why pay a different price for the same product," the NHSO introduced a single base rate policy combined with a hard global budget at the national level. By combining the DRG payment with a global budget ceiling (DRG-GB), the NHSO could easily control the inpatient budget while providing patients with access to all levels of hospitals. However, teaching hospitals successfully negotiated to maintain a high base rate for referral cases, especially referrals from different regions of the country. The single DRG-GB was later transformed into 13 regional DRG-GBs to give regions more responsibility for monitoring and managing. This tight cost control by the DRG-GB was not popular with the bigger hospitals (regional and teaching hospitals), which constantly pressured the prime minister for contingency funding to compensate for financial losses related to inpatient care. In 2019, the NHSO received additional inpatient budget resources to guarantee a fixed base rate of THB 8,000 per RW to nonreferral cases and THB 10,500 per RW for referral cases.

The CSMBS began by collecting electronic inpatient claim data based on fee-for-service payments from 2004 to 2006. In 2007 it implemented DRG payments using Thai DRG Version 4 with individual hospital base rates calculated using the 2004–06 data. The CSMBS consolidated 1,000 hospital base rates into 27 base rates reflecting 27 hospital groups in 2018. Furthermore, the CSMBS created the outlier reimbursement scheme (ORS) to compensate for extremely high-cost cases. The ORS was funded by setting aside 1 percent of the inpatient

budget for additional payments to hospitals after scrutinizing (auditing) individual cases. Because of the high base rates for large hospitals in the CSMBS, compared with the lower DRG-GB base rate from the UCS, combined with the ORS, both large and small hospitals more easily accepted the changes in the newer Thai DRG versions, including the changes in RWs. On the whole, the CSMBS was able to stabilize total inpatient expenditure with 27 differentiated DRG base rates.

The SSS adopted DRGs in 2005 to adjust for the risks in capitation payment for inpatient utilization. Under this policy hospitals with a higher casemix index would receive a slightly higher capitation rate. In 2013 the SSS introduced an explicit blended payment method in which hospitals receive their base capitation payment, but also receive additional case-based DRG payments equivalent to THB 15,000 per RW for cases starting at RW equal to 2 and higher to compensate for higher resource use.

REFINEMENTS AND FUTURE DIRECTION

The Thai Casemix Centre of the Health Systems Research Institute, whose role is to update DRGs and develop new casemix systems, is now working on detailed costing at refined standardized service levels in various sizes of hospitals. It is hoped that detailed cost data by universal resource identifiers will remove disputes in the calibration methodology for future refinement of the Thai DRG. Furthermore, the Thai Casemix Centre is also working on casemix systems for psychiatric inpatient care, subacute care, non-acute care, and Thai traditional medicine to cover more modes of care using more effective payment tools to meet the broader need for achievement of universal health coverage.

4 The Kyrgyz Republic

RATIONALE FOR DRG REFORM

The Kyrgyz Republic inherited its health system from the Soviet period—an integrated Semashko model, publicly financed and owned, hospital centered, with services focused on individual acute treatment and minimal prevention. The MANAS Health Care Reform Programme (1996–2006) formed the basis for the establishment of the Mandatory Health Insurance Fund (MHIF), which introduced a case-based payment system for public providers in 1997. Introducing a case-based hospital payment system was one element in a broader health financing policy whose goal was to shift resources to the primary health care sector, streamline the oversized hospital sector (particularly in urban areas), use resources more efficiently in the hospital sector, increase the autonomy of hospitals to allocate their own resources, and increase the responsiveness of the health system to patients and the population (Cashin et al. 2005).

At the time, diagnosis-related groups (DRGs) were only used for additional payment on top of line-item budget allocations. DRGs were accompanied by performance-based staff bonuses, and a higher DRG base rate was introduced specifically for those patients who were exempted from formal co-payments. This led to high acceptance of the system by both providers and patients.

KEY ELEMENTS OF DRG DESIGN

The Kyrgyz system for grouping cases is based on U.S. Health Care Financing Administration (HCFA) DRGs but calculated with Kyrgyz utilization and cost data. The HCFA, now known as the Centers for Medicare and Medicaid Services, is a federal agency within the United States Department of Health and Human Services and was the first agency in the world to introduce DRGs for hospital financing.

The name of the Kyrgyz case-based system is translated as "Clinical Cost Groups" and goes by the Russian acronym KZGs. Each KZG (клинико-затратные группы) has a relative weight (meant to reflect the relative costliness of the cases in the group as compared to other groups) that is used to adjust payments to

hospitals based on the data from the inpatient Clinical Information Form (known as Form No. 066/Y) reported by hospitals to the MHIF for each case. Data from the paper-based Form No. 066/Y, filled out by doctors by hand, are entered into the online system by hospital administrators.

The initial set of groups was quite simple. There were 28 categories, most of which reflected a relative average cost for an entire hospital department or subspecialty because the patient-level clinical data were not available. The data that were available included cost accounting estimates of cost per case in each department, average length of stay for cases in each department, and average length of stay for some groups of diagnoses in each department. By counting cases in each of these 28 groups with and without a stay in the intensive care unit (ICU), 56 groups were created (28 times 2). This initial set of case categories was used for about 20 months.

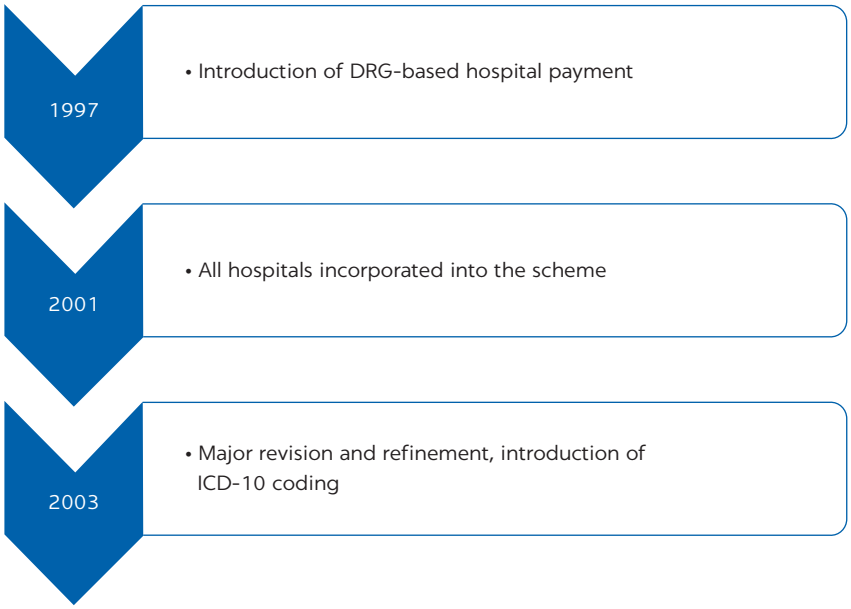
The MHIF also established a utilization review intended to link payments with clinical performance.

TRANSITION STRATEGY

At the beginning of the hospital payment reform in 1997, the MHIF began with the KZG payments to 13 hospitals (out of 335 eligible hospitals); the system was extended to all general hospitals in the country by 2001 (figure 4.1). Some specialist centers are still excluded from DRG payments, and a High Technology Fund Programme was established under the Ministry of Health for financing high-technology and high-cost services.

The initial version of KZGs gave higher weights (and payments) to cases with ICU treatment; hence, the MHIF deemed it necessary to review these

FIGURE 4.1
DRG transition in the Kyrgyz Republic



Note: DRG = diagnosis-related groups; ICD-10 = International Statistical Classification of Diseases and Related Health Problems–10.

cases to confirm that the ICU was really needed. Some of the hospitals understood the case-based formula and "upcoded" cases by putting *yes* in the ICU field in the discharge form in a high percentage of cases, and the ICU rate increased significantly. As the payment system was implemented and data became available from the information and billing systems, the MHIF was able to recalculate the cost per case and case weights for individual diagnoses. After the first revision of the KZG categories in 1999, the direct connection between ICU admission and payment level was eliminated. The ICU admission rate subsequently dropped from 59.9 per 1,000 hospital admissions (in 1998) to 50.4 per 1,000 (in 1999).

In the beginning, the calculation of KZG rates was not cost related but budget driven, because KZGs were not meant to pay for actual costs but intended as a method for distributing MHIF funds. Initially, all MHIF revenues for patient care were devoted to inpatient services. The size of the primary care pool was residual (total MHIF revenues less administrative costs and the inpatient payment pool). An economic adjustment factor was applied to account for changes in available funds to avoid adjusting the base rate.

Currently, the Kyrgyz Republic applies six adjustment factors (rural, small cities, areas of high elevation, level of inpatient facility, economic, and medical preventive care organizations) to calibrate its payment system for different provider levels and for different regions.

The current KZG system is a simple version of a case-based payment system; it does not make full use of the available clinical data, nor does it meet the main principles of internationally used case-based systems. Only the principal diagnosis and the main (most resource-intensive) procedures are used for the DRG assignment, so the Kyrgyz case-based payment system does not fully reflect the level of hospital resources used. The only additional item to enable the KZG calculation is the patient's age (< 15 years, ≥15 years). Only two additional diagnoses for complications and comorbidities can be recorded in the system; consequently, on average, only 0.83 additional diagnoses are recorded per patient. Nevertheless, the presence of comorbidities and complications is not taken into account in the current grouping algorithm. Another problem is that many diagnoses are inaccurate, as a result of both upcoding and lack of precision (with International Statistical Classification of Diseases and Related Health Problems [ICD-10] coded to the three-character level), because there are no automatic coding controls.

REFINEMENTS AND FUTURE DIRECTION

The KZGs were first revised in March 1999 to contain 144 groups based on accumulated cost and clinical data. In 2003, the second revision and refinements of the system were carried out based on ICD-10 diagnosis coding, which replaced ICD-9 codes. Currently, about 9,400 relevant ICD-10 diagnoses and 2,550 ICD-9-CM medical procedure codes are used for assignment to one of the 284 billable KZGs.

Modernizing the existing KZG system has been considered a number of times, including with the support of international organizations. The options under consideration have been refinement of the existing Kyrgyz DRG model, adoption of the Australian Refined DRG (AR-DRG), or adoption of the German DRG (G-DRG).

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5 Germany

RATIONALE FOR DRG REFORM

Beginning in 1996, hospitals in Germany were financed through (a) per diem charges, (b) activity-oriented payment including case fees (covering the costs for a patient's entire hospital stay), and (c) procedure fees. The government intended to gradually extend the scope of services reimbursed through activity-oriented payment to promote efficiency, transparency, and quality in the hospital system. Consequently, the Social Health Insurance Reform Act of 2000 obliged the self-governing bodies (the German Hospital Federation, the Federal Association of Sickness Funds,[1] and the Association of Private Health Insurance Companies) to select a universal, performance-related prospective case fee payment system based on diagnosis-related groups (DRGs). When this new system was ready to be implemented (2002), case fees and procedure fees still accounted for less than one-fourth of all reimbursements for hospital services.

DRG development and refinement has been institutionalized in the Institute for the Hospital Remuneration System (Institut für das Entgeltsystem im Krankenhaus, InEK),[2] which oversees the hospital remuneration system in Germany. The InEK came into operation in 2002, following legislation to introduce a DRG payment system across the German health care system. It maintains the DRG, sets the coding rules, and licenses the rules for the grouping software. It produced the original grouper software, but now certifies grouper software developed by private companies. It is also responsible for the entire price-setting process. It defines the costing approach, produces guidance on costing, and oversees hospital activity and patient-level cost data collection, some of which are from all hospitals and some from samples. With these cost data, it then sets the relative weights and other tariffs that apply to hospital inpatient activity.

KEY ELEMENTS OF DRG DESIGN

DRG grouper

The Australian Refined DRG (AR-DRG 4.1) scheme was chosen as a basis for creating a German DRG (G-DRG) system in 2000 because of its high degree of

accuracy in differentiating resource consumption. The subsequent adaption of the AR-DRG to G-DRG was undertaken by the authorized self-governing bodies in collaboration with professional medical societies and medical associations. In the pilot phase (2001), the AR-DRGs were introduced without any changes in 20 hospitals. Based on this experience, the DRGs were recalculated by the InEK. This new version (the first G-DRG) was tested by hospitals that had volunteered for early conversion to DRG payment in 2003. The G-DRG grouping logic considers the diagnosis and its clinical severity, comorbidities, the age of the patient admitted, and the medical procedure performed. In contrast to many other DRG systems, the grouping process in Germany attaches special importance to medical procedures. As a result, the number of DRGs grew quickly from 664 case groups in 2002 to 824 in 2004 and roughly 1,300 in 2018. The grouping algorithms are revised annually, as are the relative weights (RWs) for the various DRGs, which are determined on a national level based on retrospective cost and claims data.

Adjustments

Although most DRG payments use national uniform cost weights, others are subject to negotiation between individual hospitals and payers. Additional reimbursement (through fees) can also be negotiated for a small number of DRGs that have either a small sample size or high cost variance, for highly specialized services if it can be proved that the service in question is not yet appropriately reimbursed through DRGs, for surcharges for innovative diagnostic and treatment procedures, for expensive drugs, for medical devices, for outpatient geriatric care, for grants for teaching, and for activities related to quality improvement or integrated care and other items (Busse and Blümel 2014). In addition, certain special facilities and hospital departments can negotiate exclusion from the G-DRG system and receive payment through individually negotiated fees. Overall, these additional payments amount to about 20 percent of reimbursement for nonpsychiatric inpatient care.

Volume control

At the local level, hospitals and health insurance funds negotiate the number and kinds of services to be delivered in the following period to determine the hospital's DRG budget. If the hospital overprovides compared with this negotiated budget, then the hospital has to pay back 65 percent of the additional revenue. If actual revenue (service volume) is less than the negotiated volume, then the hospital receives 20 percent of the shortfall. A second mechanism, called the additional volume deduction, is in place to control the agreed-on annual increases in hospital revenue: the base rate for additional casemix is reduced by 25 percent (that is, extra volume is only compensated by 75 percent). This hinders structural change and competition between hospitals (Klein-Hitpaß and Scheller-Kreinsen 2015).

Controlling fraud and addressing potential adverse effects

In the early stages of DRG implementation, many disputes arose between hospitals and sickness funds, especially related to referral and readmission. Today, regional Medical Review Boards regularly review and inspect hospital

coding practices. Hospitals found to have intentionally upcoded to increase profits repay an amount equal to twice the reimbursement fee in penalty. Disputes are dealt with in Joint Arbitration Committees at the state level. The G-DRG system also has measures in place to address the potential for adverse early discharges related to DRGs by reimbursing expensive services adequately, as well as deducting payments for short-stay outliers. In addition, readmissions for the same reason within 30 days after discharge are not reimbursed.

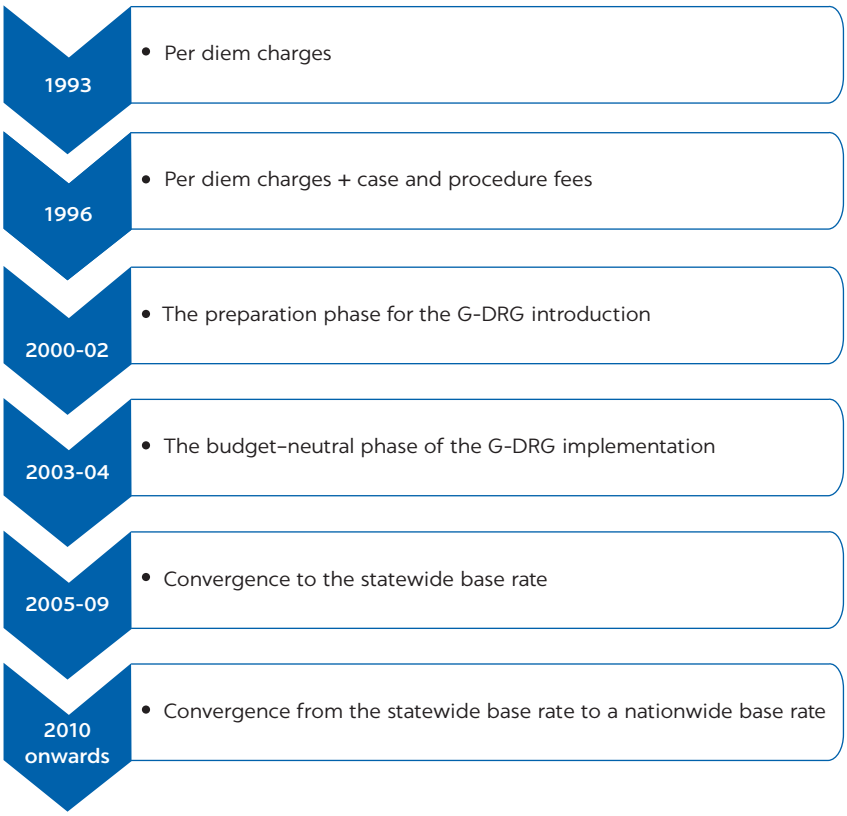
Information technology

The introduction of DRGs has stimulated substantial investments in information technologies and in monitoring and control activities. There is more information and transparency with respect to the range and prices of hospital services, which has probably increased hospitals' technical efficiency.

TRANSITION STRATEGY

The introduction of the DRG-based payment system was gradual, with a stepwise withdrawal of the former mixed payment system. It can be divided into four phases (figure 5.1).

FIGURE 5.1
DRG transition in Germany



Note: G-DRG = German diagnosis-related groups.

Preparation phase

In the preparation phase (2000–02) a cost-accounting system was developed and cost weights were calculated from a sample of voluntary participating hospitals (about 100 hospitals in 2002). The first version of the G-DRG system had 664 DRGs. During this phase, the International Classification of Procedures in Medicine of the World Health Organization was converted into the German Operations and Procedures Codification Index (Operationen und Prozedurenschlüssel) and the International Classification of Diseases (ICD) codes into the ICD-10-German Modification (ICD-10-GM).

Budget neutral phase

In the so-called budget-neutral phase (2003–04), hospitals received the budgets as negotiated previously but DRGs (at a hospital-specific base rate) were the unit of reimbursement, not per diems. DRGs were used in all acute hospitals for all types of services except for certain predefined services and for care in departments of psychiatry and psychosomatic medicine, where per diem charges continued to apply for inpatient services as well as for pre- and post-hospital care. Since 2013, the G-DRG system has also been used for care in departments of psychiatry, psychotherapy, and psychosomatic medicine.

Convergence phase

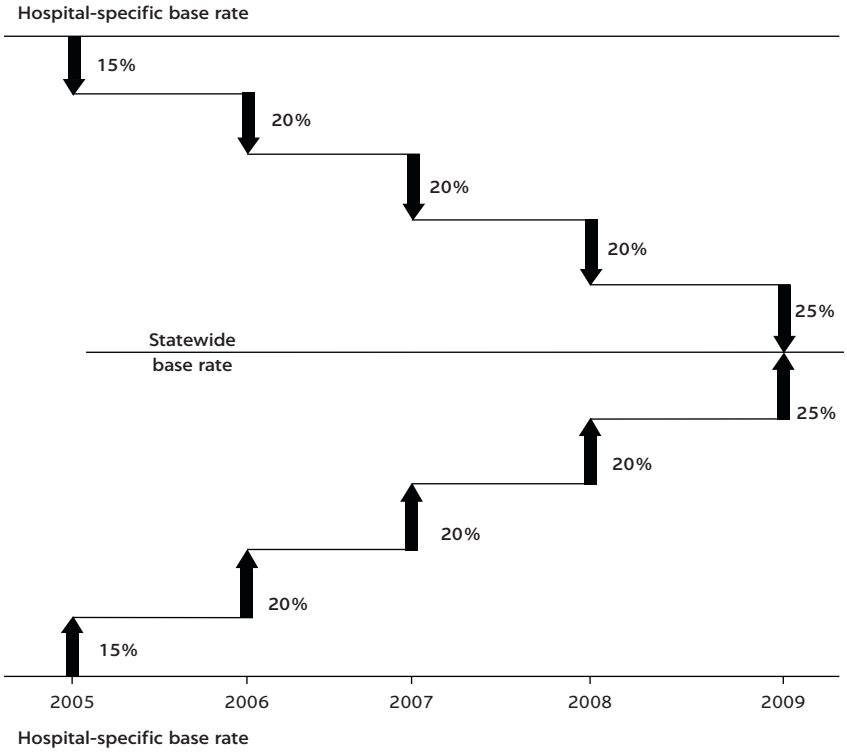
In this phase, the hospital-specific base rates were progressively converged to a statewide base rate (2005–09). At the beginning of the convergence phase, the hospital base rates varied substantially. In 2005, the individual base rates were calculated as a ratio of the statewide base rates (15 percent) and individual hospital base rates (85 percent). The ratio shifted to 35:65 in 2006, 55:45 in 2007, and 75:25 in 2008 (figure 5.2). Since 2009, the uniform statewide base rate has been used (100:0). During this convergence phase, measures were also taken to ensure that budget reductions were limited to protect hospitals from the risk of unjustifiable reductions that could be due to an underdeveloped DRG Case Fee Catalogue. The absolute value by which the individual budgets of affected hospitals could be reduced in 2005 was limited to 1 percent of the modified initial value from 2004. The limit was then increased to 1.5 percent in 2006, 2.0 percent in 2007, 2.5 percent in 2008, and 3.0 percent in 2009. There was no upper limit on budget increases. In 2009, when local hospital prices fully converged to state-specific base rates (one for each of the 16 states), state-specific base rates ranged from €2,777 to €3,073 across the German states, reflecting historical pricing patterns rather than input price or cost differences.

Second convergence phase

The aim of the second convergence phase (2010–14) was to converge state-level prices to a narrow federal corridor, to increase the homogeneity and fairness of price setting across German hospitals. Starting in 2010, the federal self-governing bodies annually set a federal base rate (*Bundesbasisfallwert*). This base rate is determined by taking the casemix-weighted average of all prices negotiated at the state level (for the previous year) and adding a price change ceiling. This price change ceiling was initially intended to be empirically determined based

FIGURE 5.2

Phased convergence to statewide base rate



on hospital inflation, but was eventually set as the higher of the hospital inflation rate or the growth rate in sickness fund contributions, with consequently little effect on controlling cost escalation. A price corridor is then defined around the base rate (between 2.5 percent above and 1.5 percent below the federal base rate), which sets boundaries for negotiations between state-level provider associations and health insurance funds.

REFINEMENTS AND FUTURE DIRECTION

Since 2016, hospitals have been allocated additional budgets for their nursing staff (*Pflegezuschlag*) to counteract the cutbacks in nursing staff induced by a DRG-based payment system. Another recent reform, implemented in 2017, was the introduction of extra payments for rural hospitals (*Sicherstellungszuschlag*), which are important to ensure sufficient funding for the provision of care in those localities.

NOTES

1. Germany sickness funds are the equivalent of social health insurance in other countries. There are 118 competing, nonprofit, nongovernmental sickness funds (as of January 2016) in the statutory health insurance system. Employees and employers have a statutory obligation to contribute on behalf of the employee.
2. During the DRG preparation phase (up until 2003), this technical body was financed jointly by the Federal Association of Sickness Funds and the German Hospital Federation. Since 2004, it has been financed by a surcharge on each DRG documented by hospitals.

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6 Estonia

RATIONALE FOR DRG REFORM

In 2001, the Estonian Health Insurance Fund (EHIF) decided to implement a diagnosis-related group– (DRG-) based payment system. At the time, Estonia struggled with a large hospital sector, long waiting times, volume inflation resulting from the fee-for-service (FFS) payment system that had been in place for a decade, and budget pressures caused by the impact of the Russian economic crisis of 1999. As early as 1998 Estonia had begun to introduce case-based payments for the most common and easy-to-define inpatient cases, such as appendectomy, hip and knee replacements, and normal childbirths. Still, the overall impact of this case-based system had been rather limited. The introduction of the DRG system was seen as a way to contain costs, limit volume growth, and increase the overall efficiency and transparency of the hospital sector.

KEY ELEMENTS OF DRG DESIGN

DRG grouper

Three alternative DRG systems were considered: the Australia Refined DRG, the Nordic Countries Joint DRG (NordDRG), and Estonia's own case-based system. Pros and cons of different options were assessed against the following criteria: the primary classification needed for the DRG grouping, adjustments that would be needed to the information technology (IT) system, cost of implementation and maintenance, suitability to Estonian clinical practice, and availability of technical assistance. The International Statistical Classification of Diseases and Related Health Problems (ICD-10) disease classification had been implemented in Estonia since 1997 but there was no classification for surgical procedures (except for the 700 codes used by the FFS system). However, Estonian surgeons had translated the Nordic Medico-Statistical Committee Classification of Surgical Procedures (NCSP) and planned to implement it. Thus, it was easy to fulfill the primary classifications requirement of the NordDRG system. Proximity of the Nordic countries, easy access to their technical support, and the existing clinical collaboration between Estonia and the Nordic countries increased the attractiveness of the NordDRG system. In addition, the Nordic countries' lack of

commercial interest in Estonian DRG development and their openness to involving Estonian experts in the NordDRG development process were important. Because electronic individual patient–based invoicing had been in place in Estonia since 2000, a third alternative considered was to use these data to develop Estonia's own DRG grouper. However, the total number of cases was not large (about 300,000), making high-quality grouper development challenging. Also, the development of an own grouping logic would have required much greater technical expertise and effort. Consequently, the most pragmatic option was to use the NordDRG grouper while keeping open the possibility of tailoring it to country-specific needs in the future.

Costing and tariff setting

Two alternatives were considered for the calculation of DRG cost weights. The first option was to use Estonia's own weights, calculated based on existing administrative tariffs and invoices from January to June 2003. Because tariffs include all costs (personnel, consumables, overhead, and capital costs) and providers are not allowed to charge the patient extra except for official co-payments, these data would provide a good approximation of costs. The second option was to use the U.S. Health Care Financing Administration (HCFA) DRG cost weights. Simulations of both systems were performed and discussed with the DRG Advisory Committee (see below), which recommended using Estonia's own weights but applying the HCFA weights for those DRG groups with a low number (fewer than 30) of cases. DRG tariffs were calculated by assuming budget neutrality (that is, the DRG base rate reflected average cost per case) without differentiation by hospital type (for example, teaching hospital versus general hospital). Instead, teaching hospitals receive additional funding that is not related to medical care but is related to the teaching function (and tariffs include all costs except costs related to teaching and research). The assumption behind the unified base rate is that the same case should have the same cost (and therefore reimbursement) regardless of where it is treated.

TRANSITION STRATEGY

The DRG implementation plan was prepared in 2001 with the initial objective of implementing DRGs in 2002, but it soon became clear that more preparation time was needed. To reduce the risk of technical problems and opposition from providers, it was agreed that the DRG system would be implemented step by step.

Primary classifications

The NordDRG system is based on ICD-10 and the NCSP. As discussed above, the NCSP was not in official use in Estonia at the time that the decision to shift to DRG payments was made; it was implemented in 2003. Implementation was assessed after the first few months and stronger enforcement was introduced, with surgical invoices without the NCSP no longer accepted for reimbursement. A similar approach had previously been used for ICD-10. Specific coding manuals were not prepared but it was expected that the standard ICD-10 and NCSP coding instructions would be followed.

IT system and grouper software

In 2000, the EHIF IT system already covered the whole country and all providers had already adjusted their IT systems to be compatible with it. This enabled the introduction of the central NordDRG grouper with minimal effort because it was built into the central invoicing system; all providers received access to the central grouper rather than having to purchase their own groupers, which would have increased the cost burden and time required for DRG implementation.

Training

In 2002 the EHIF organized a one-day training session on NCSP classification for interested providers. The next year follow-up training for hospitals was conducted in different regions of the country with the aim of discussing the NCSP logic and the main obstacles encountered during the first year of implementation. A three-day training course on DRG logic was also offered to clinicians and hospital staff in 2002.

Reimbursement policy

The DRG payment system is in place in all hospitals that have a contract with the EHIF and provide inpatient acute care, outpatient surgery, or both. It is used to reimburse most inpatient care conditions. Some specialties, such as psychiatry, rehabilitation, and long-term nursing care, are excluded. Furthermore, conditions or specialties that are likely to have low- and high-cost outliers continue to be reimbursed on an FFS basis.

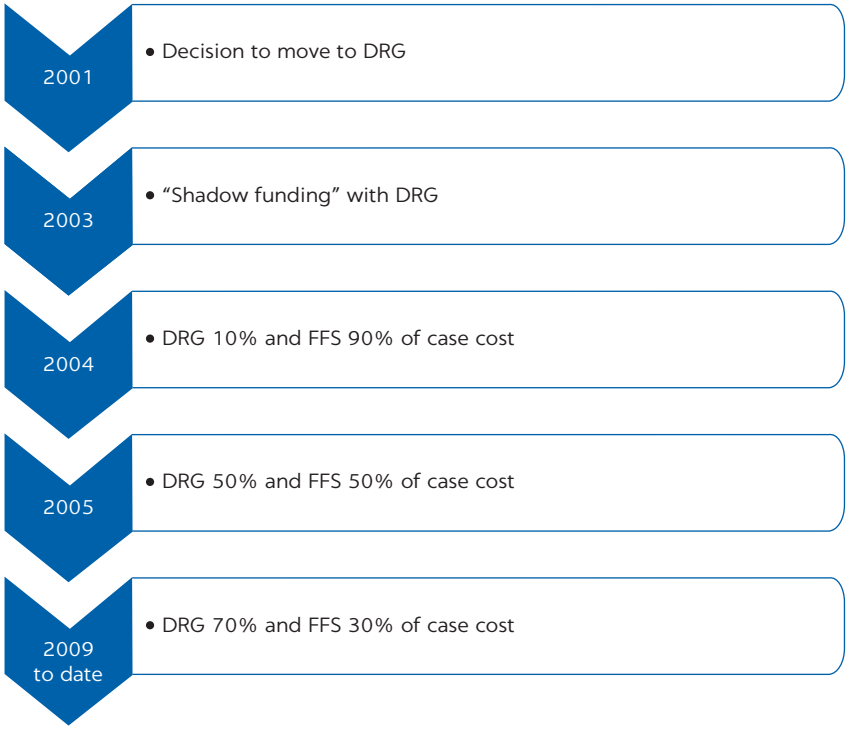
Phase-in policy and piloting

In 2003 the DRG system was implemented as a case grouper but not yet as a payment mechanism. The option of phasing in DRGs as a payment mechanism by applying it to a limited number of specialties where the financial risk is smaller (for example, ophthalmology) was considered. It was finally decided that the DRG payment system would be universally applied (to all providers and for all medical specialties) from the beginning of DRG payment implementation (in 2004), but would be implemented in parallel with the "old" FFS system with only a proportion of each invoice reimbursed by the DRG tariff. This approach would reduce the financial risk that providers would face in transition. The proportion paid by the DRGs would increase over time. During the first year, the DRG share was 10 percent; it was increased to 50 percent after one year (in 2005), and then to 70 percent in 2009 (figure 6.1), a proportion that is still in effect.[1]

Stakeholder involvement

The DRG implementation process was led by the EHIF. During the process, the EHIF involved various medical specialists whose role was to translate DRG terminology, to map the NCSP and operation codes, and to assess the suitability of the DRG grouping logic as it relates to clinical practice. In the initial stages, hospitals were not very interested in engaging with the DRG development process, but after the preliminary tariff simulations were produced their interest grew. Early on, the EHIF established a DRG Advisory Committee, which included

FIGURE 6.1
DRG transition in Estonia



Note: DRG = diagnosis-related group; FFS = fee for service.

representatives from key medical specialties, the Ministry of Social Affairs (which is responsible for health and other social policies), and different hospital types. This committee was consulted on key implementation issues and helped to better manage the opposition of providers who were afraid of the potential negative impact of DRG payment reform on their revenues.

REFINEMENTS AND FUTURE DIRECTION

Over the years, several refinements have been made to the DRG payment system in Estonia. Although there are no plans to increase the share of the cost reimbursed by the DRGs beyond the 70 percent that has been in place since 2009, there are plans to introduce new payment methods for certain areas, for example, episode-based payments. The Nordic Casemix Centre releases a new NordDRG grouper version every year. Estonia initially continued to use the original version of the grouper, but now the NordDRG grouper's new version is adopted every second year. DRG weights, tariffs, and reimbursement principles are reviewed annually and the methodology has been fine-tuned over the years.

NOTE

1. For example, if the FFS-based cost of the invoice is €1,000 and the DRG tariff for that case is €900, then the total cost of the invoice is calculated as follows: €1,000 × 30 percent + €900 × 70 percent = €300 + €630 = €930.

7 Croatia

RATIONALE FOR DRG REFORM

Before 2002, hospital services in Croatia were paid on a fee-for-service (FFS) basis. Under the FFS reimbursement system, hospitals were reimbursed on the basis of inputs used, which consisted of three separate components: (a) hospital hotel services, paid through a flat rate per diem; (b) medical services provided; and (c) pharmaceuticals and other supplies that were paid for separately, depending on the cost of each item. Hospitals typically had a high bed occupancy rate (89.9 percent) and long average length of stay (8.2 days). The Croatian Health Insurance Fund (Hrvatski zavod za zdravstveno osiguranje, or HZZO) started to shift toward the use of a diagnosis-related group– (DRG-) based payment system, referred to as the Placanje po terapijskom postupku (PPTP), in 2002. The main goals behind introducing the DRG payment system were cost reduction and rationalization of resources, as well as improvement of certain performance indicators such as shortening average length of stay per hospitalization and thereby achieving higher patient turnover and reduced waiting times for certain procedures (Džakula et al. 2014).

KEY ELEMENTS OF DRG DESIGN

The PPTP system was based on broad case groups in the All Patients Refined DRGs (APR-DRGs) of the United States. At the time of introduction, 42 PPTP broad case groups were created. The diagnoses included were those with the highest cost, the highest volume, or the longest waiting time. By 2006, the number of services reimbursed through the PPTP system had grown to 118 selected groups (again, prioritizing those that were high cost or high volume), with the remainder still being paid for using the input-based FFS system. The use of broad-based case groupings in the PPTP system (as opposed to more detailed DRGs), as well as the prices set for the PPTPs, has made them quite unpopular with providers, many of whom argue that the system underestimates the intensity of resource use for more complicated medical cases. Nonetheless, encouraged by reports of efficiency gains arising from

implementation of the PPTP schedule, including reductions in length of stay, the government decided to gradually move toward a comprehensive prospective case-adjusted payment system based on the Australian Refined DRGs (AR-DRGs), known locally as Dijagnosticko-terapijske skupine (DTS) (Voncina, Strizrep, and Džakula 2007).

The Australian DRG variant was considered more effective than other DRG variants at the time because it used a cumulative measure (called the Patient Clinical Complexity Level) of all secondary diagnoses that indicates the patient's overall complexity and determines the final AR-DRG.

One of the greatest challenges to the introduction of the AR-DRGs in Croatia was the difference in the approaches to DRG costing taken by the two countries. Croatian cost weights were developed based on the cost data that were available before the introduction of the DRG-based system (patient-level electronic invoicing was introduced in 1999), which differed substantially from the Australian data on resource use, which was collected in costing surveys and reflected Australian clinical practice and monitoring of hospital billing.

A second major challenge was related to the incentives that DRG payment systems create for providers to upcode, that is, to code patients as having more serious or more complicated conditions than they actually have in order to be reimbursed at a higher rate. To monitor possible upcoding and other gaming, the HZZO used fraud detection software. The algorithm automatically detects anomalies to help target suspicious claims that need to be verified with chart audits.

Subsequent adjustments to the DRG grouper were made to better accommodate the introduction of transplant surgery and day surgery, including organ and tissue transplant. Also, same-day DRG groups were removed from the system and the same cost weights were used for inpatient and outpatient surgeries, giving hospitals an incentive to provide surgical procedures as day surgery rather than inpatient surgery. Because of these two adjustments, the total number of DRGs in the Croatian version of the AR-DRG was 630 compared with 664 in the Australian version in use at the time (version 5.1).

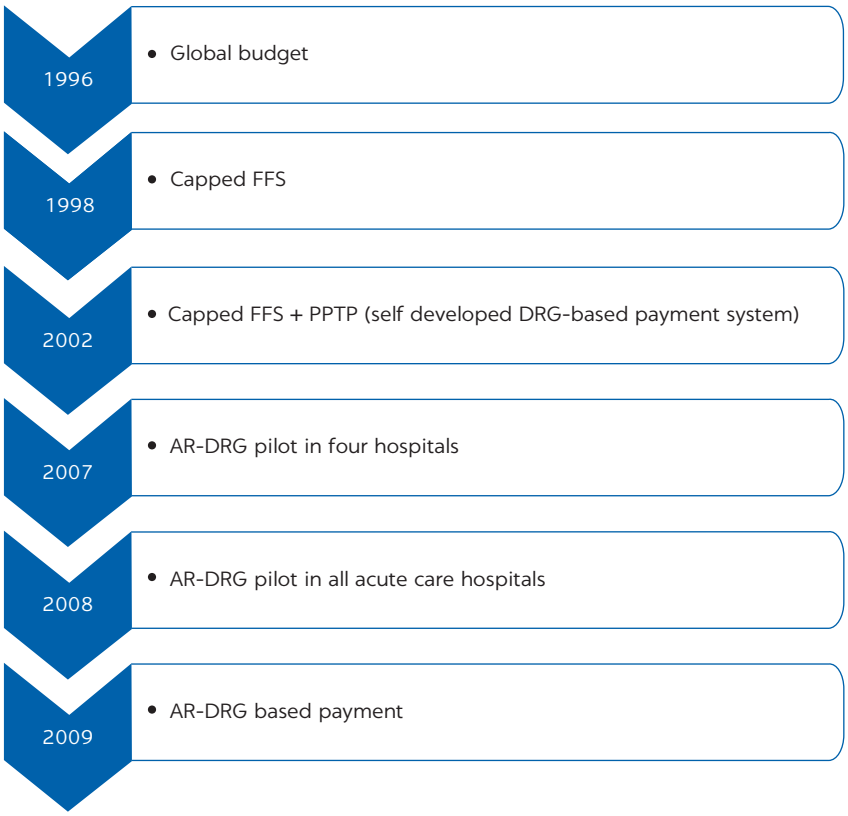
The HZZO also developed its own DRG grouper software that supported all of the above-mentioned adjustments. An important feature of the Croatian DRG system is the monthly reporting on detailed statistics related to the DRG payment system (such as length of stay and cost per DRG), covering all hospitals contracted for payment from the HZZO, to allow for hospital benchmarking. These data are published on the HZZO website and are publicly available to all citizens.

TRANSITION STRATEGY

The DTS was implemented in three phases to allow hospitals to make a smooth transition to the new payment system, with payment by DRG only commencing in the third phase (figure 7.1).

In the first phase, implementation of DTS was piloted in four Croatian hospitals from February 2006 to April 2007. Piloting was supported by international consultants with the main focus being on training of trainers. Training in diagnosis and procedure coding, coding standards, and DRG grouper logic and design principles was carried out, but payment was still based on the FFS system.

FIGURE 7.1
DRG transition in Croatia



Note: AR-DRG = Australian Refined DRG; DRG = diagnosis-related groups; FFS = fee for service; PPTP = Placanje po terapijskom postupku (DRG-based payment system).

In the second phase, DTS was introduced into all Croatian acute hospitals contracted by HZZO (both public and private) beginning in January 2008, initially running only as a classification and recording system in tandem with existing billing systems. Until January 2009, all hospitals continued to be paid according to the old two-tiered FFS and PPTP schedule but were also obliged to record cases according to the new DRG classification for monitoring purposes. All health professionals were trained to ensure the suitability and quality of the coding used.

Payment for hospital services based on DRGs in facilities contracted by HZZO (Phase 3) began in January 2009. Since then, almost all inpatient services and day surgeries have been paid based on DRGs, and approximately 90 percent of hospital revenue comes from HZZO.[1] Currently, hospital budgets have fixed and variable parts. Historical activity (measured in DRGs) is used to determine the fixed budget constraint for hospitals, which is set at 85 percent of the amount they would receive if they maintained activity at the same level as in the past. The variable part of the budget paid by HZZO for hospital care is equal to 15 percent of the historical budget and is used for multiple purposes. Part of this fund is used to pay the FFS payments for extremely costly procedures, including transplants, interventional cardiology or neurology, and very expensive drugs. Some of this fund is used to pay hospitals based on activity

exceeding the initially allocated budgets, but subject to a fund ceiling. Hospitals also compete for additional payments (up to 5 percent of the total budget) that are made only if selected Key Performance Indicators and Quality Indicators are achieved.

REFINEMENTS AND FUTURE DIRECTION

The AR-DRG Version 5.2, which is the basis for DTS, was released more than 10 years ago (September 2006). The HZZO simply adopted diagnosis and procedure classifications and coding standards and they have not been modified since. Currently, HZZO is considering updating the DTS to the most recent version of the Australian DRGs.

NOTE

1. Note that the Ministry of Health and local governments are responsible for capital investment and infrastructure maintenance in the hospitals under their jurisdiction (Džakula et al. 2014, 23).

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8 China (Beijing)

RATIONALE FOR DRG PAYMENT REFORM

In 2009, the Chinese government announced its intention to reform hospital payments by moving from fee for service (FFS) to other forms of prospective payment, including case-based payment. Diagnosis-related groups (DRGs) were considered to be a more sophisticated case-based payment method that introduces an element of financial risk to service providers as a way to reduce health service overuse. Following the central government's guidance, the Beijing municipal government indicated that DRGs would be introduced and used for medical performance management, hospital funding, and provider payment within the Beijing municipal area. Since 2009, the Beijing Health Commission has been using DRGs to assess hospital performance. The DRG payment system was introduced to the Beijing Urban Employee Basic Medical Insurance (BJ-UEBMI) for purchasing inpatient services in some tertiary hospitals in 2011. At the time, the BJ-UEBMI covered approximately 12 million people, or 60 percent of Beijing's population.[1] The implementation of the DRG payment system in Beijing was an attempt to institute DRG in China, but was subsequently followed by the introduction of other versions of DRGs (including the CN-DRG and the C-DRG).[2]

KEY ELEMENTS OF DRG DESIGN

The debate about which DRG version would be most suitable for Beijing lasted for many years. Some researchers suggested direct adoption of the United States' All Patient DRG (AP-DRG) or the Australian Refined DRG (AR-DRG), while others thought that the AP-DRG or AR-DRG should be used as the starting point for development of a local DRG for Beijing. It should be noted that hospitals in Beijing use International Statistical Classification of Diseases and Related Health Problems– (ICD-) 10 diagnoses and ICD-9 procedure codes, whereas the AP-DRG is based on ICD-9 disease and procedure codes and the AR-DRG is based on ICD-10–Australian Modification disease codes and Australian Classification of Health Interventions (ACHI) procedure codes;

therefore, it would be necessary to re-map codes, regardless of which DRG was adopted. In 2006, the Beijing DRG Project Team (BDPT) was established. The BDPT completed initial development of the Beijing Diagnosis-Related Group (BJ-DRG) in 2008, based on a similar grouping logic as that of the AP-DRG and the AR-DRG, consisting of 650 DRGs.

The initial base rate and relative weights were calculated using three-year (2008–10) historical discharge data from the BJ-UEBMI rather than from costing studies. The base rate for each DRG was the average FFS expenditure per admission of all cases. The relative weights were computed by dividing the average FFS expenditure per admission falling within a DRG by the average FFS expenditure per admission of all cases.

A DRG Technical Review Committee was set up to review the initial grouping and relative weights. If consensus was not reached on the proposed relative weights or groupings, further evidence was gathered so adjustments could be made. The final DRG groupings and relative weights had to be approved by both the Beijing Health Commission, representing the viewpoints of hospitals in the development of the DRG, and the Health Insurance Agency, serving as the payer of health care services.

Furthermore, to determine which version of the grouper would perform best given Beijing's specific context, the BDPT conducted a comparison study using 1.3 million inpatient records from 154 hospitals in Beijing in 2008. Specifically, the BDPT carried out the following tasks: (a) developed grouping software according to the logic of the AP-DRG and mapped diagnosis codes from ICD-9 to ICD-10; (b) developed another grouping software based on the logic of the AR-DRG and mapped procedure codes from ACHI to ICD-9; and (c) developed a third grouping software according to the logic of BJ-DRGs, which was designed to use ICD-10 diagnoses and ICD-9 procedure codes directly. The study concluded that, compared with the AP-DRG and the AR-DRG, the performance of the BJ-DRG was acceptable, although further revision and improvement would be needed.

TRANSITION STRATEGY

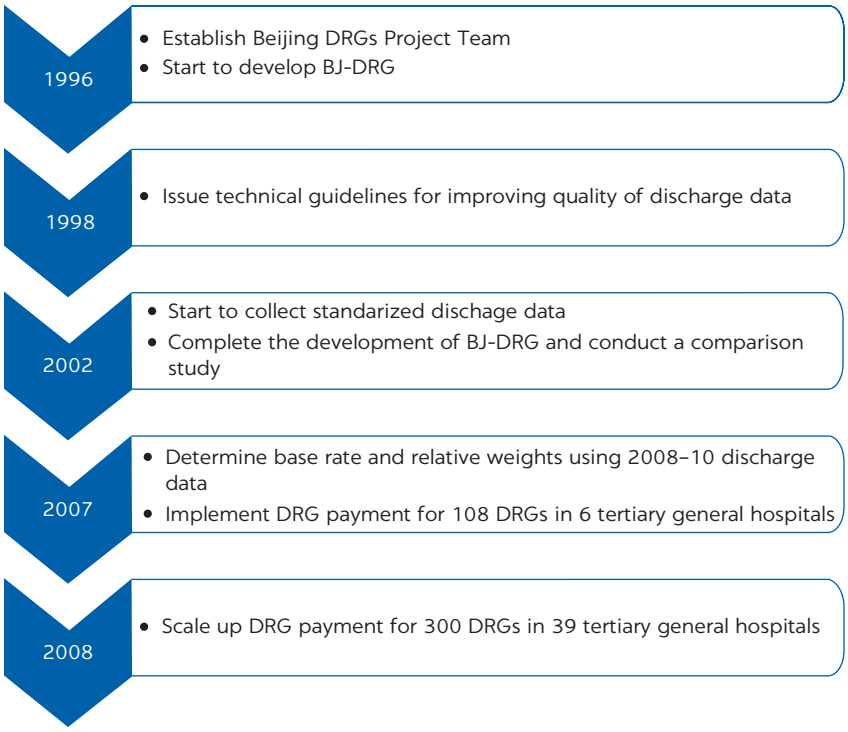
The performance of the grouper may be affected considerably by the quality of discharge data, which may include errors, incomplete information, and variation in coding of the same condition across hospitals. Therefore, before the introduction of the BJ-DRG, significant effort was made to improve the standardization and quality of data. The data quality measures put in place by the Beijing Health Commission, starting in 2007, contained three elements. The first element was unifying the coding of diagnoses and procedures. Although all local hospitals had used ICD to code diagnoses and procedures since 2003, the ICD coding system had not been maintained systematically, in the sense that the methodologies for coding new diseases and procedures differed across hospitals. To deal with this problem, the Beijing Health Commission released a coding system, called the ICD-Beijing Clinical Modification, to unify all codes for diagnoses and procedures and establish a mechanism for maintaining the coding of diagnoses and procedures. The second element was standardizing the variables included in discharge data by issuing, in 2007, a technical guideline for recording discharge data. The third element was training and monitoring. Staff responsible for coding and medical personnel were trained on how to code the diagnoses and

procedures under the new coding system as well as on how to record discharge data in accordance with the technical guidelines. In addition, a monitoring group consisting of senior experts in the areas of ICD coding, medical information, and hospital management was established to regularly assess the quality of discharge data and supervise implementation of the new discharge data standards.

The transition to UEBMI's payment by DRG started with a pilot that covered only a few hospitals and a small share of the total DRGs (figure 8.1). In October 2011, the pilot reform began shifting payment of 108 diagnoses or procedures from FFS to a DRG approach at six tertiary general hospitals. The same price was applied to all hospitals and no risk adjustments were made for the characteristics of hospitals or patient mix. These 108 DRGs (out of a possible 650) represented about 40 percent of BJ-UEBMI cases and 50 percent of hospital expenditures. The Beijing Health Insurance Center, which was in charge of the pilot program's rollout and implementation, selected these DRGs for use in the pilot because cases within each of the groups were more homogeneous than cases in other DRG groups. An impact evaluation of this pilot program found that, one year after implementation, the BJ-DRG payment system had led to significant reductions in expenditures and out-of-pocket payments per admission, while there was no evidence of a decrease in the length of stay, increase in readmission rates, or increase in the admission of cases not eligible for DRG payments. Despite these promising results, the scale-up of the BJ-DRG payment system did not take place until 2018 because of lack of clear guidance from the central government about the use of the DRG payment system. At the time, the Ministry of Human Resources and Social Security, which was responsible for managing the

FIGURE 8.1

DRG transition in China (Beijing)



Note: BJ-DRG = Beijing DRG; DRG = diagnosis-related groups.

UEBMI, was supportive of a global budget payment system and, therefore, the Human Resources and Social Security Bureau of Beijing was not sure whether they should scale up the DRG payment system. In fact, since 2013, hospital-specific hard budget caps have been imposed on all six pilot hospitals.

In June 2017, the General Office of the State Council issued the Guiding Opinion on Further Deepening Provider Payment Reform of Basic Medical Insurance, in which piloting the DRG payment system was featured as one of the five top priorities. As a result, the BJ-DRG payment system (with hospital-specific hard budget caps) was scaled up to all 39 tertiary general hospitals in Beijing in 2018 and broadened to cover 300 DRGs (out of a possible 771). These 300 DRGs represent about 75 percent of the BJ-UEBMI cases and 80 percent of hospital expenditures.

REFINEMENTS AND FUTURE DIRECTION

The grouping and relative weights are reviewed annually by the core team of the DRG Technical Review Committee and adjusted as necessary. The base rate is adjusted annually by a certain growth rate that is negotiated between the Health Insurance Agency and hospitals. Currently, the BJ-DRG uses the same base rate for all hospitals, given that they are all tertiary general hospitals. Beijing plans to phase in secondary hospitals in the future, and the expectation is that policy makers will likely assign them a different base rate with the justification that their costs are largely different.

Various versions of DRGs are currently being used for payment throughout China. The newly established National Healthcare Security Administration is working on standardization of DRG payment policies, procedures, and technical guidelines nationwide. In this context, the China Healthcare Security DRG (CHS-DRG) was announced in October 2019 and will be introduced in 30 cities in 2020 and used for payment from 2021. It is expected that the DRG payment system will be scaled up throughout China quite rapidly and that there will be gradual convergence toward one DRG payment approach.

NOTES

1. By 2017, almost 16 million people were enrolled in the BJ-UEBMI, equivalent to about 73 percent of Beijing's population.
2. The CN-DRG was introduced by the Bureau of Medical Administration of the National Health Commission in 2015. The first version was based on the BJ-DRG and was intended to be used for hospital performance management purposes (for more than 2,000 hospitals nationwide). The C-DRG was introduced by the Department of Finance of the National Health Commission in 2017 and is currently being used in Sanming in Fujian province, Shenzhen in Guangdong province, and Karamay in Xinjiang Uyghur Autonomous Region.

9 The Russian Federation

RATIONALE FOR DRG REFORM

The Russian Federation introduced the Mandatory Health Insurance (MHI) system in 2003 to finance the Program of State Guarantees for Medical Care Provision, which defines the set of health services that are nominally universal, free, and guaranteed as a constitutional right to all Russian citizens. The MHI system is regulated and supervised by the Federal Mandatory Health Insurance Fund (FMHIF) and locally managed by the Territorial Mandatory Health Insurance Funds (TMHIFs) that were created in each region of the Russian Federation (that is, oblasts, republics, krays, autonomous okrugs, and federal cities). TMHIFs were free to choose their preferred provider payment methods, which produced variations in the way hospital services were financed across the Russian Federation. The most common payment methods used by TMHIFs to reimburse hospital services were case-based and bed-day payments. Following adoption of the Mandatory Health Insurance Law in November 2010, which consolidated and harmonized health financing transfers from the FMHIF to the TMHIFs according to a fixed amount per insured person (the so-called one-channel financing system), the FMHIF decided in 2012 to unify payment modalities throughout the country. After consideration of international experience, the Russian Federation adopted a diagnosis-related groups— (DRG-) based payment system for hospital-based care to reduce territorial variations in tariffs for the same inpatient services, increase transparency and equity, and improve hospital efficiency and productivity.

KEY ELEMENTS OF DRG DESIGN

DRG grouper

Two options for designing a grouper were considered: use an established DRG system (for example, the Australian Refined DRG [AR-DRG] or the Health Care Financing Administration [HCFA] DRG system developed in the United States in the early 1980s) or develop a Russian DRG (R-DRG) grouper from scratch. The decision to develop a novel R-DRG grouper was based on the

following considerations. First, an international classification of surgical procedures was not available in the Russian language. The Russian Nomenclature of Health Services (Nomenclature), approved by the Ministry of Health in 2012, was the only classification for surgical procedures available in the Russian language at the national level. Second, the TMHIFs had electronic databases with patient-level discharge data, which would facilitate the development of a new R-DRG grouper. Third, there was the perceived risk that an international DRG model could produce significant imbalances in hospital financing, given the significant structural and regional variations in health care organization and costs across the Russian Federation. Therefore, developing a new R-DRG model was the preferred option, with structural adjustment coefficients to consider local conditions and ensure a smoother transition to the new payment system.

Costing and tariff setting

To estimate the average cost per case for each group of cases, a step-down cost-accounting study covering 30 hospitals from three Russian regions (Kirov, Lipetsk, and Tomsk) was conducted in 2012. In 2014, the cost-accounting study was replicated in 12 regions, generating more thorough data that were then used to update the R-DRG weights. DRG tariffs were calculated by multiplying the DRG base rate (which reflects the average cost per case) by the DRG weights. Finally, structural adjustment coefficients were applied to differentiate tariffs across hospital types (for example, regional, municipal, and rural) and regions.

TRANSITION STRATEGY

Primary classifications

The R-DRG grouper uses the International Statistical Classification of Diseases and Related Health Problems– (ICD-) 10 to code a patient's diagnosis and the Russian Nomenclature to classify surgical interventions. The Nomenclature was familiar to most Russian specialists, but it was not used as a classification system in hospitals. Thus, the Federal Ministry of Health and the FMHIF mandated its use for the coding of surgical operations performed at health institutions starting in mid-2012. In addition, TMHIFs participating in the R-DRG pilot required hospital invoices to code surgical procedures according to the Russian Nomenclature to be accepted for reimbursement.

Information technology system and grouper software

The basic algorithm of the R-DRG grouper was developed using a Microsoft Access database and Excel spreadsheet software. Then, TMHIFs developed their own R-DRG grouper software in accordance with national Information Technology regulation and the R-DRG algorithm. The TMHIFs provide the R-DRG grouper software (or the Excel spreadsheet) free of charge to all hospitals, together with the technical support to run and use it. The hospital invoicing systems used by the TMHIFs were updated to include ICD-10 for primary and secondary diagnosis, Nomenclature code for surgical procedures, and patients' discharge information (age and sex of the patient, secondary diagnosis, and length of stay at the hospital).

Training

During the pilot phase, training on the foundation and operationalization of the R-DRG system was delivered to more than 700 regional health authorities and TMHIF staff, hospital managers, and clinicians from 77 regions of the Russian Federation. Quarterly monitoring and evaluation workshops in each of the pilot regions were an important part of the training program. Additional training on step-down cost-accounting methodology was delivered to the staff of the hospitals participating in the cost-accounting studies. No special training for using the Nomenclature in the framework of R-DRG pilot implementation was delivered. However, the quarterly monitoring and evaluation workshops discussed the problems identified by health practitioners in the use of the Nomenclature for health procedure coding. Suggestions from the regions participating in the R-DRG pilot were submitted to the Federal Ministry of Health and considered in refining the Nomenclature.

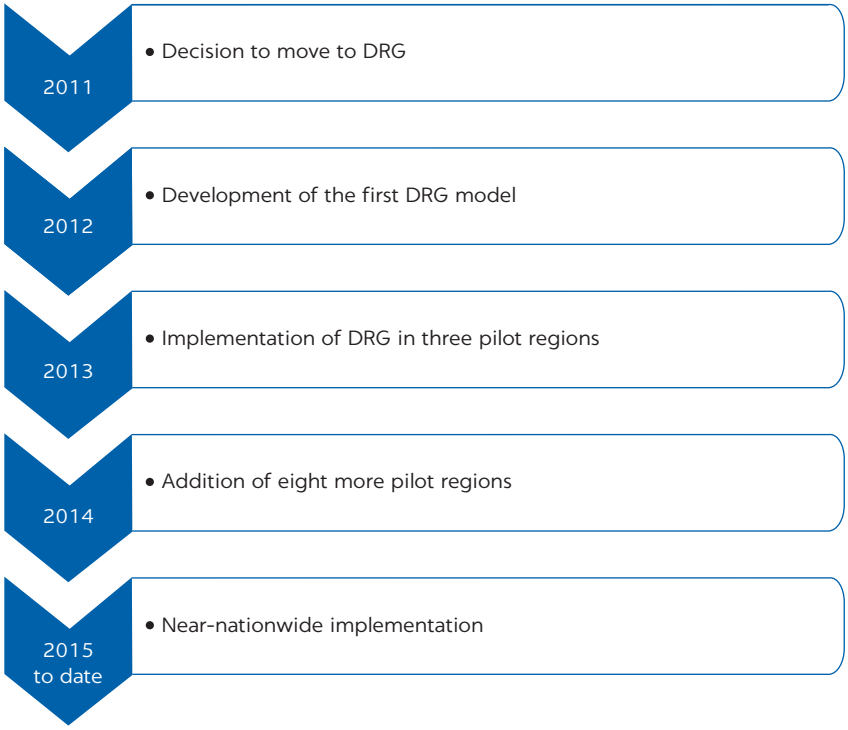
Reimbursement policy

By 2018, the R-DRG model was used by the TMHIFs of 76 federal entities to reimburse all types of hospital services (including rehabilitation and day care) provided under the MHI system, except for mental health, tuberculosis, HIV/AIDS, and a set of high-technology interventions that are financed directly through federal and regional budget transfers. R-DRG payments are supposed to be sufficient to reimburse hospitals for all costs related to the provision of services, apart from infrastructure costs and expensive equipment.

Phase-in policy and piloting

The first R-DRG model was fully developed by the end of 2012 (figure 9.1), based on the clinical and economic data from the three pilot regions—Kirov, Lipetsk, and Tomsk. Implementation plans were developed in each pilot region, and included thorough simulation of financial risks for every hospital and risk mitigation measures. In 2013, all three regions used the R-DRG model for actual payments to hospitals. However, during the pilot phase, hospital-level parameters (for groups of hospitals of a similar type, for example, county hospitals and community hospitals) were introduced to mitigate the financial impact of the new payment method. After one year of implementation, the pilot was evaluated as successful and expanded to eight additional regions. In October 2013, the Government Decree included the R-DRG among the payment methods recommended under the MHI system. In November 2013, the Federal Ministry of Health and the FMHIF published Federal Guidelines for the hospital payment method based on the novel R-DRG grouper. In 2014, the parameters of the R-DRG model were recalculated based on new clinical, statistical, and cost-accounting information from the 11 regions comprising the expanded pilot. In 2015, the refined R-DRG model was adopted as the actual payment method in all pilot regions except St. Petersburg. Because of its large population, the transition period in St. Petersburg needed to be extended. In the same year, many other regions of the Russian Federation had begun implementation of the R-DRG based on Federal Guidelines. Overall, in 2015, 63 regions were using DRGs for hospital payments; this number has continued to increase, reaching 73 regions in 2017.[1] However, some regions, such as Moscow City, still use their own modification of case-based systems.

FIGURE 9.1
DRG transition in the Russian Federation



Note: DRG = diagnosis-related groups.

Stakeholder involvement

The regions participating in the R-DRG pilot were selected by the FMHIF. Design and implementation of the R-DRG was the result of intensive work and collaboration among the FMHIF, the TMHIFs, hospital managers, clinicians from virtually all regions of the Russian Federation, and development partners. The FMHIF also effectively communicated the results of the studies and pilots to a wide audience, including Parliament, academia, and the media.

REFINEMENTS AND FUTURE DIRECTION

The first R-DRG model was introduced in 2013. It was very simple, consisting of only 187 groups (excluding, for example, cancer groups and rehabilitation) and used only two classification criteria. Since then, the R-DRG has been revised annually, adding new features and refinements. As of 2018, the sixth version of the R-DRG comprised 339 groups for inpatient hospital care and 132 groups for hospital day care. It uses a total of seven classification criteria in addition to the main diagnosis and the main surgical operation: age and gender of the patient, secondary diagnosis, hospital length of stay, use of mechanical ventilation in intensive care, antineoplastic drug therapy regimen for oncology, and patient severity (assessed by specific scales) for rehabilitation and intensive care.

Opportunities for further refinement are still available. First, the R-DRG can be further refined to include additional factors that influence costs, related to the complexity and severity of the episode of care and the resources used. Second, the cost-accounting studies could be institutionalized to produce cost data to update the R-DRG weights at regular intervals. The cost-accounting study methodology could also be improved to better estimate the structural drivers of hospital costs (for example, type of providers and geographical characteristics).

NOTE

1. The Russian Federation is composed of more than 80 regions.

APPENDIX A

Summary of Features of DRG Systems

COUNTRY	START TO MOVE TOWARD DRG SYSTEM	YEAR OF INTRODUCTION OF DRGS AS PAYMENT METHOD	ADOPTED THE GROUPER OR DEVELOPED OWN	PREVIOUS PAYMENT SYSTEM	DATA USED FOR CALCULATION OF DRG TARIFFS OR COST WEIGHTS	NEEDED TO CHANGE THE PRIMARY CLASSIFICATIONS	IF YES, WHAT KIND OF CHANGES	NUMBER OF DRGS (INITIAL/ MOST RECENT)
U.S. Medicare	1970s	1983	Developed own	FFS	Cost data were developed from a small sample of hospitals to review costs and accounting information, and then standardized across hospitals. Average length of stay was also used because it was found to correlate well with costs when good costing data were lacking.	No	The classification system was continually updated after the first year. ICD-9-CM was replaced by ICD-10-CM in the 33rd version of the grouper.	467/989
Australia	1981	1993 (Victoria)	Initially used HCFA version, later developed own DRG (AN-DRG) and then refined it (AR-DRG)	Global budget	National Hospital Cost Data Collection	Yes	Originally used ICD-9-CM but moved to ICD-10-AM and ACHI with Version 4.1 of AR-DRG in 1998.	527/803
Thailand	1993	2003	Initially adopted HCFA, then AR-DRG, finally developed own	FFS and capitation	Hospital charge data were inherited with FFS user charges before UCS was implemented.	No		511/1,543
Kyrgyz Republic	1997	2001	Adopted HCFA	Line-item budget	The calculation of rates was not cost related, but budget driven, given that DRGs were not meant to pay for actual cost, but as a way to distribute Mandatory Health Insurance Fund funds.	Yes	ICD-9 was replaced with ICD-10.	28/284
Germany	2000	2003	Initially adopted AR-DRG, finally developed own	Case fees, procedure fees, per diem rates	Cost-accounting system to calculate cost weights was developed.	Yes	International Classification of Procedures in Medicine was converted into the German Operations and Procedures Codification Index. ICD codes were converted into the ICD-10-German Modification.	664/1,300
Estonia	2001	2004	Adopted NordDRG	FFS, per diem rates	Patient-level data based on already-existing administrative tariffs and invoices.	Yes	Nordic Classification of Surgical Procedures was adopted in the year before DRG payments started.	≈500/≈ 800

(continued)

APPENDIX A, *continued*

COUNTRY	START TO MOVE TOWARD DRG SYSTEM	YEAR OF INTRODUCTION OF DRGS AS PAYMENT METHOD	ADOPTED THE GROUPER OR DEVELOPED OWN	PREVIOUS PAYMENT SYSTEM	DATA USED FOR CALCULATION OF DRG TARIFFS OR COST WEIGHTS	NEEDED TO CHANGE THE PRIMARY CLASSIFICATIONS	IF YES, WHAT KIND OF CHANGES	NUMBER OF DRGS (INITIAL/ MOST RECENT)
Croatia	2002	2009	Initially self-developed DRG-based payment system (PPTP), later adopted All Patient Refined DRG and finally AR-DRG	Capped FFS	Cost data that were available before the introduction of the DRGs (patient-level electronic invoicing was introduced in 1999).	Yes	Diagnosis (ICD-10-AM) and procedure classifications (ACHI) were adopted.	42 (PPTP)/630 (AR-DRG)
China (Beijing)	2006	2018	Developed own (BJ-DRG) based on All Patient DRG and AR-DRG	FFS	Three-year (2008–10) historical discharge data of Beijing Urban Employee Basic Medical Insurance was used.	No		108/300
Russian Federation	2011	2013	Developed own (R-DRG)	Case fees, per diem rates, FFS	A step-down cost-accounting study.	Yes	Russian Classification of Medical Services (the Nomenclature) used for procedure classification was updated. The Nomenclature was supplemented with many surgical interventions and diagnostic procedures not included before the introduction of the DRGs.	187/471

Note: ACHI = Australian Classification of Health Interventions; AN-DRG = Australian National DRG; AR-DRG = Australia Refined DRG; DRG = diagnosis-related groups; FFS = fee for service; HCFA = Health Care Financing Administration; ICD = International Statistical Classification of Diseases and Related Health Problems; ICD-9- (10-) CM = ICD Version 9 (10), Clinical Modification; ICD-10-AM = ICD Version 10, Australian Modification; PPTP = Placanje po terapijskom postupku (Croatian DRG-based payment system); UCS = Universal Coverage Scheme.

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This book examines how nine different health systems—U.S. Medicare, Australia, Thailand, Kyrgyz Republic, Germany, Estonia, Croatia, China (Beijing) and the Russian Federation—have transitioned to using case-based payments, and especially diagnosis-related groups (DRGs), as part of their provider payment mix for hospital care. It sheds light on why particular technical design choices were made, what enabling investments were pertinent, and what broader political and institutional issues needed to be considered. The strategies used to phase in DRG payment receive special attention.

These nine systems have been selected because they represent a variety of different approaches and experiences in DRG transition. They include the innovators who pioneered DRG payment systems (namely the United States and Australia), mature systems (such as Thailand, Germany, and Estonia), and countries where DRG payments were only introduced within the past decade (such as the Russian Federation and China). Each system is examined in detail as a separate case study, with a synthesis distilling the cross-cutting lessons learned.

This book should be helpful to those working on health systems that are considering introducing, or are in the early stages of introducing, DRG-based payments into their provider payment mix. It will enhance the reader's understanding of how other countries (or systems) have made that transition, give a sense of the decisions that lie ahead, and offer options that can be considered. It will also be useful to those working in health systems that already include DRG payments in the payment mix but have not yet achieved the anticipated results.

The Government of Japan

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