

DIAGNOSIS-RELATED GROUPS (DRG): A Question & Answer guide on case-based classification and payment systems

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Organization

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DIAGNOSIS-RELATED GROUPS (DRG): A Question & Answer guide on case-based classification and payment systems

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FINAL DRAFT

TABLE OF CONTENTS

List of figures, tables and country boxes	iv
Acknowledgements	vi
Acronyms and abbreviations	vii
Key messages and summary	viii
Introduction and purpose of this guide	ix
1. DEFINITIONS	1
1.1. What is a case-based groups system? What is a diagnosis-related groups system?	1
1.2. What are case group weights, the base rate, case mix and case mix index?	3
1.3. How is the payment determined in a case-based payment system?	3
2. ASSESSMENT PHASE	5
2.1. Can a CBG payment system contribute to achieving UHC objectives?	5
2.2. What are the conducive factors and institutional requirements for a CBG system?	8
2.3. How long does it take to develop and implement a CBG system? What are the related costs?	10
2.4. Which stakeholders are likely to influence the design and implementation of the CBG system and how should the different stakeholders be involved?	13
3. PREPARATION AND DESIGN PHASE	14
3.1. Which types of health services, facilities and providers should be included in CBG payment?	14
3.2. Which variables can be used for classification and what are the implications?	16
3.3. Which cost items can be included in the CBG payment?	19
3.4. When is it best to buy an existing DRG system and when should a country develop its own country-specific CBG system?	20
3.5. How are case-group weights and the base rate calculated?	26
3.6. Which data are needed to calculate case-group weights and how can these be generated?	29
3.7. Which adjustment factors can be considered to modulate the CBG payment?	33
3.8. Should CBG payments be linked to a volume or budget cap and, if so, how?	34
4. IMPLEMENTATION, MONITORING AND CONTINUED REVISION	36
4.1. What changes are required at provider level when introducing a CBG system?	36
4.2. How should the CBG system be piloted and phased in?	38
4.3. How can one counter inherent provider incentives created by CBGs?	40
4.4. How can a CBG system improve quality in service provision?	42
4.5. How and how often does a CBG system need to be revised?	43
4.6. How should one inform the public about changes in payment methods and billing practices?	44
CONCLUDING REMARKS	46
GLOSSARY	47
REFERENCES	50
ANNEX 1: EXAMPLES OF CLASSIFICATION SYSTEMS WITH DIFFERENT LEVELS OF COMPLEXITY	56
ANNEX 2: MAIN PROVIDER PAYMENT METHODS AND THE INCENTIVES THEY CREATE...	58
ANNEX 3: LIST OF MAJOR DIAGNOSTIC CATEGORIES (MDC) OF TWO DRG VARIANTS	59

LIST OF FIGURES, TABLES AND COUNTRY BOXES

FIGURES

Figure 1. Overview of the level of complexity of definition of cases, number of groups and information requirements for case-based groups systems and diagnosis-related groups systems	3
Figure 2. Formula for calculating the rate of a CBG or DRG case group	4
Figure 3. Year in which a country started moving towards DRGs and year in which the system was used for payment, for selected countries	11
Figure 4. Aspects to consider when deciding which types of services, facilities and providers should be included in a CBG system	15
Figure 5. Link between volume of services and provider revenue for different arrangements regarding budget caps	34

TABLES

Table 1. Potential effects of CBG introduction on cost containment, effective use of resources, information collection and administrative efficiency in comparison to the previous payment method	7
Table 2. Main DRG variants which have been imported and/or further developed by other countries	21
Table 3. Issues to consider when deciding whether to make or buy a DRG system	26
Table 4. Cost information required and sources of information for different case grouping systems	30
Table 5. Unintended consequences of CBG payment systems and measures to address them	41

FINAL DRAFT

COUNTRY BOXES

Box 1. The importance of provider autonomy to accompany CBG introduction in Mongolia	10
Box 2. DRGs in Chile: a case of progressive implementation	12
Box 3. Development of Ghana’s patient classification system	18
Box 4. Process for identification of relevant DRG classification variables in Viet Nam ..	19
Box 5. Buy and make in Iran: adopting an imported grouper to develop its own DRG system	22
Box 6. Gradual development of a DRG system in Kyrgyzstan	23
Box 7. Matching classification systems and electronic claims data format to facilitate the adoption of the NordDRG variant in Georgia	25
Box 8. Introduction of a patient-level costing system to develop country-specific case-group weights in Lithuania	27
Box 9. A mix of imported and locally-developed case-group weights in Estonia	28
Box 10. PhilHealth’s plan to institutionalize the collection of cost information	30
Box 11. Introduction of ICD-10 in the Philippines and training measures	37
Box 12. Information provision to the public on the Universal Coverage Scheme, its benefits and payment system in Thailand	45

FINAL DRAFT

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FINAL DRAFT

ACRONYMS AND ABBREVIATIONS

ACHI	Australian Classification of Medical Interventions
AR-DRG	Australian Refined DRG system
BR	Base rate
CBG	Case-based groups
CGW	Case-group weight
CMI	Case mix index
DRG	Diagnosis-related groups
FONASA	Fondo Nacional de Salud, Chile
G-DRG	Ghana DRG system
HCFA	American Health Care Financing Administration
ICD	International Classification of Diseases and Related Health Problems
ICHI	International Classification of Health Interventions
MDC	Major diagnostic category
NHIF	National Health Insurance Fund (Lithuania)
NHSO	National Health Security Office (Thailand)
NOMESCO	Nordic Medico-Statistical Committee
UCS	Universal Coverage Scheme (Thailand)
UHC	Universal health coverage
VSS	Viet Nam Social Security

FINAL DRAFT

KEY MESSAGES AND SUMMARY

- A system of case-based groups (CBG) is a classification system that groups patient cases, including services received, into standardized groups according to several variables – most commonly diagnosis, treatment or procedure received, and patient characteristics.
- The introduction of a CBG system is a long-term endeavour which needs continuous investment and updating. The introduction of a CBG system should have clear objectives and should be accompanied by a clear implementation plan that includes intermediate steps, responsibilities for the actors and involved, and timelines.
- In most countries the CBG system is used to collect information on hospital activity, to inform budget formulation/negotiation and often, to serve as a payment system. Its largest impact is that it clearly shows for which services and to which providers funds are allocated.
- The design and timeframe for the introduction of the CBG system have to fit with the country context and the capacities of purchasers and providers. Available capacities for coding, claim processing, financial management, management of purchaser-provider relations (including contracting) and information management should be assessed.
- Providers require a degree of autonomy in the management of their funding in order to respond to the incentives set by a CBG payment system (e.g. by changing mix of staff or other inputs).
- The introduction of a new payment method is not only a technical process. The political economy around the introduction of the system and the expected shifting of resources will create supporters and opponents. The Ministry of Health and purchasers should consult relevant stakeholders, especially providers, during the development of the system.
- If it is possible to launch payment system using an imported diagnosis-related groups (DRG) system within a few years, this is only feasible with strong capacities of purchasers and providers, and electronic medical records based on standardized coding systems already in place. In most countries, adaptations to the health management information system, the purchasing modalities and adjustments to the imported DRG system will take several years.
- The development of a classification algorithm is the technically most complex task. Most countries will start with an imported DRG grouping algorithm, or at least get some inspiration from existing grouping algorithm, that will be adjusted to the country context.
- In other cases a gradual approach, starting with a simple CBG system based on a simple classification algorithm which is then continuously developed, will be more realistic. Such an approach can still achieve strategic purchasing objectives while giving both financial and information management systems time to mature.
- Data quality is key for a DRG system but a simpler CBG system can incentivize and help improve data collection. Weaknesses in data collection or data quality should not prevent a country from introducing a CBG system.
- A CBG system is a tool to contribute to the objectives of universal health coverage (UHC). Incentives set by the system should be carefully considered to ensure that integrated people-centred care, and not economic considerations, remains the overall objective. Monitoring of impact on treatment quality is needed in addition to claims monitoring. It is important to note that gaming and coding creep is going to happen.

FINAL DRAFT

INTRODUCTION AND PURPOSE OF THIS GUIDE

More and more low- and middle-income countries are seeking to strengthen strategic purchasing arrangements in the health sector by using evidence-based processes to define which specific health services should be purchased from which providers, how the services should be paid for and at what rate they should be paid (1, 2). A purposively aligned mixed provider payment system is one of the core policy instruments leading to more strategic purchasing in order that different payment methods will create a coherent set of incentives to influence and guide provider behaviour towards health system objectives (3). Related thereto, payments based on case-based groups (CBG) or, more specifically, diagnosis-related groups (DRG) have gained increased interest from policy-makers across the globe. This document focuses specifically on CBG and DRG. The differences between CBG and DRG are explained below. In general, this publication uses CBG as the wider umbrella term for a case-based classification system and refers to DRG when these are meant explicitly.

When considering the introduction of a CBG system, many policy choices and technical questions arise. Policy-makers have to judge the pros and cons of a CBG system in relation to their country context and the health system challenges they wish to address. They will have to explore whether, and if so how, to introduce a CBG system, and should assess which institutional arrangements and resources are available and which would be required. Importantly, this guide on CBG does not suggest or imply that these payment methods are a magic bullet or the only option to consider when seeking to improve the payment system.

There is a large body of literature on CBG, and in particular on DRG, but it focuses primarily on high-income countries. The purpose of this guide is to explore specifically the CBG-related policy questions and issues relevant to the context of low- and middle-income countries. This document seeks to provide specific guidance and evidence to policy-makers and practitioners on core questions regarding design and implementation that they will be faced with when introducing a CBG system. The guide is written in a Question & Answer (Q&A) format. It provides literature references for further reading and for more technical details and presents various country cases to illustrate specific issues.

The document consists of four parts:

Part 1 outlines **definitions, terminology and the main conceptual aspects** related to CBG and DRG.

Part 2 covers the **assessment phase** and highlights questions and issues that policy-makers should consider before taking the decision to introduce a CBG system.

Part 3 delves into the **preparation phase** by exploring policy and design aspects once a country has decided to introduce a CBG system.

Part 4 is concerned with the **implementation phase** and discusses implementation questions, requirements for system adjustments and the need for monitoring and revision in order to identify and address unintended impacts of a CBG system.

Technical terms are included in a glossary at the end of the document for easy reference.

The following documents provide more details on CBG design and implementation. This guide builds on these references.

Langenbrunner J, Cashin C, O’Dougherty S, editors. **Designing and implementing health care provider payment systems: how-to manuals**. Washington (DC): The World Bank; 2009 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf>, accessed 20 September 2019).

Busse R, Geissler A, Quentin W, Wiley M, editors. **Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals**. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 20 September 2019).

Cashin C, editor. **Assessing health provider payment systems. A practical guide for countries working towards universal health coverage**. Washington (DC): Joint Learning Network for Universal Health Coverage; 2015 (<http://www.jointlearningnetwork.org/resources/assessing-health-provider-payment-systems-analytical-team-workbook>, accessed 20 September 2019).

Annear P, Huntington D, editors. **Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions**. Manila: World Health Organization Regional Office for the Western Pacific; 2015 (<http://www.who.int/iris/handle/10665/208246>, accessed 20 September 2019).

Bredenkamp C, Bales S, and Kahur K editors. **Transition to DRG Payments for Health: Lessons from Case Studies. International Development in Focus**. Washington, D.C: World Bank; 2019.

FINAL DRAFT

1. DEFINITIONS

1.1. WHAT IS A CASE-BASED GROUPS SYSTEM? WHAT IS A DIAGNOSIS-RELATED GROUPS SYSTEM?

A case-based groups (CBG) system is a patient classification system that groups patient cases, including services received, into standardized case groups according to diagnosis and treatment or procedure received. It combines a clinical logic with an economic logic. A CBG system can be used to collect more detailed and/or standardized information about the services provided to patients, as well as in addition as a provider payment method (4, 5).

CBG classification systems usually have the following features in common (5-7):

- Each case group contains cases with similar patterns of resource use (“resource-homogeneous”).
- Cases within a group share common features from a clinical perspective (“clinically meaningful”).
- Each case can be classified into one group (i.e. the classification is exhaustive).
- The use of variables to define a group and to assign a case is based on information collected routinely in medical records.

In its simplest version, there would be only one case group – i.e. each patient falls into the same group. If used for payment, providers would receive the same amount for every patient discharged. With one case group and one payment rate, the payment system would, however, not consider differences in severity and costs across cases (4) and would not create the desired incentives intended by a CBG system.

When a patient classification system is based on medical specialties or the chapters of the International Classification of Diseases (ICD) with no other variables, it would usually consist of 25–27 groups. Additional classification factors to reflect the main cost drivers – such as a whether surgery or medical imaging is provided, added to those chapters of the ICD for which they are relevant – will ensure that groups are economically more homogenous and lead to patient classification systems with around 50 case groups in total.

As more variables are added into the classification logic, the number of cases groups will increase. This will also depend on the information and level of granularity available in medical records which can be used for coding. However, the resulting number of groups needs to be manageable. However, for case groups to remain economically homogenous, a meaningful average treatment cost has to be allocated to each case group. This requires a certain number of cases per group, a condition which would not be fulfilled by a classification system in which every diagnosis would be considered as a distinct case group (5).

A more complex and specific form of CBGs are diagnosis-related groups (DRGs) in that additional and more detailed information on multiple variables such as patient characteristics, procedures undertaken, severity of the case, primary and secondary diagnosis, comorbidities and complications, and/or type of admission are used for the grouping.

In general, a DRG (payment) system comprises:

- a patient classification system based on the set of several variables to define groups,
- a classification algorithm, which is the set of instructions for assigning a particular case to a specific group according to the patient classification logic, and
- usually a specialized software – called “grouper software” – for the digitized case assignment.

Based on the number of variables used for classifying patient cases, the number of case groups range from several hundreds to over 2000 cases (4, 5, 8).

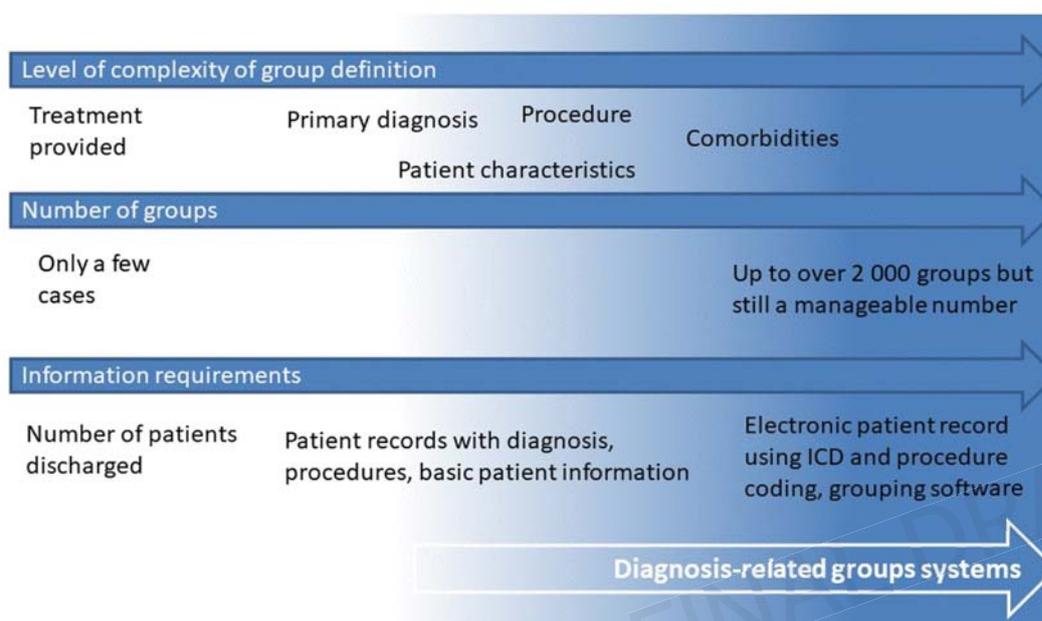
DRG systems vary primarily according to the classification variables they use and the grouping rules applied, such as which diagnoses are classified into the same group or how the classification steps are sequenced (9-11). Section 3.2 outlines which classification variables are frequently used. The different DRG systems are referred to as DRG variants or models and have been given names (e.g. “Australian DRG”). A DRG

variant represents a specific classification system, including a related algorithm and, if applicable, a grouper software. Most DRG variants exist in several versions that reflect the regular updates of the classification algorithm. As countries regularly update their DRG systems, the consecutive versions of a country variant can differ significantly depending on the scope of the revision. Section 3.4 presents the main DRG variants in place around the globe.

The distinction between CBG and DRG systems is not clear cut, rather existing systems show a range of different levels of complexity. Figure 1 shows the continuum ranging from a simpler CBG system to a DRG system. It stretches from a (theoretical) system with only one case to more complex systems with over 2000 case groups defined through several variables (e.g. major diagnosis, surgery provided or not, severity, medical procedures, patient characteristics and comorbidities). Such more complex systems are manageable only by using electronic patient records and grouping software. These more complex systems are referred to as DRG systems.

Fig. 1. Overview of the level of complexity of definition of cases, number of groups and information requirements for case-based group systems and diagnosis-related group systems

Case-based groups systems



Annex 1 outlines country examples with various classification systems, showing how different cases are allocated to groups and thus indicating different levels of complexity.

1.2. WHAT ARE CASE GROUP WEIGHTS, THE BASE RATE, CASE MIX AND CASE MIX INDEX?

A CBG system assigns a **relative case-group weight** to each case group. This case-group weight reflects the resources needed to diagnose and treat a case in a respective case group compared to the average cost of diagnosing and treating across all cases. Alternatively, as is the case in some countries, a direct monetary value is given to each case group.

The **base rate** is the average rate paid per case. The payment for a case is the product (multiplication) of the base rate and the respective relative case-group weight. The base rate is the same for all cases and usually links the CBG payments with the overall available budget for the providers and services paid by the CBG system (4).

The **case mix** is the sum of the relative case-group weights of all cases treated in a health facility during a given period.

The **case mix index (CMI)** is the case mix for a given health facility during a given period divided by the total number of cases (classified under the CBG system) treated by this health facility during the given period. It thus is the weighted average of the case-group weights of all cases treated in that facility. The CMI enables activity and the level of its complexity to be compared across health facilities. It can also be used to determine global budget allocations to health facilities (4, 12).

In general, the CMI of lower-level facilities is lower than that of higher-level facilities, such as tertiary care and university hospitals. University or tertiary hospitals providing a higher share of complex services would have a CMI well above 1 (12, 13).

1.3. HOW IS THE PAYMENT DETERMINED IN A CASE-BASED PAYMENT SYSTEM?

In a case-based payment system, providers are paid on the basis of case groups (“case-based groups”) with a fixed financial amount per case discharged. This means that payments for providers are linked to activity (4, 14).

The payment for the cases is, in principle, determined by a formula consisting of:

- relative case-group weights which indicate the relative cost-intensity of cases of different groups,

multiplied by

- a base rate,

multiplied by

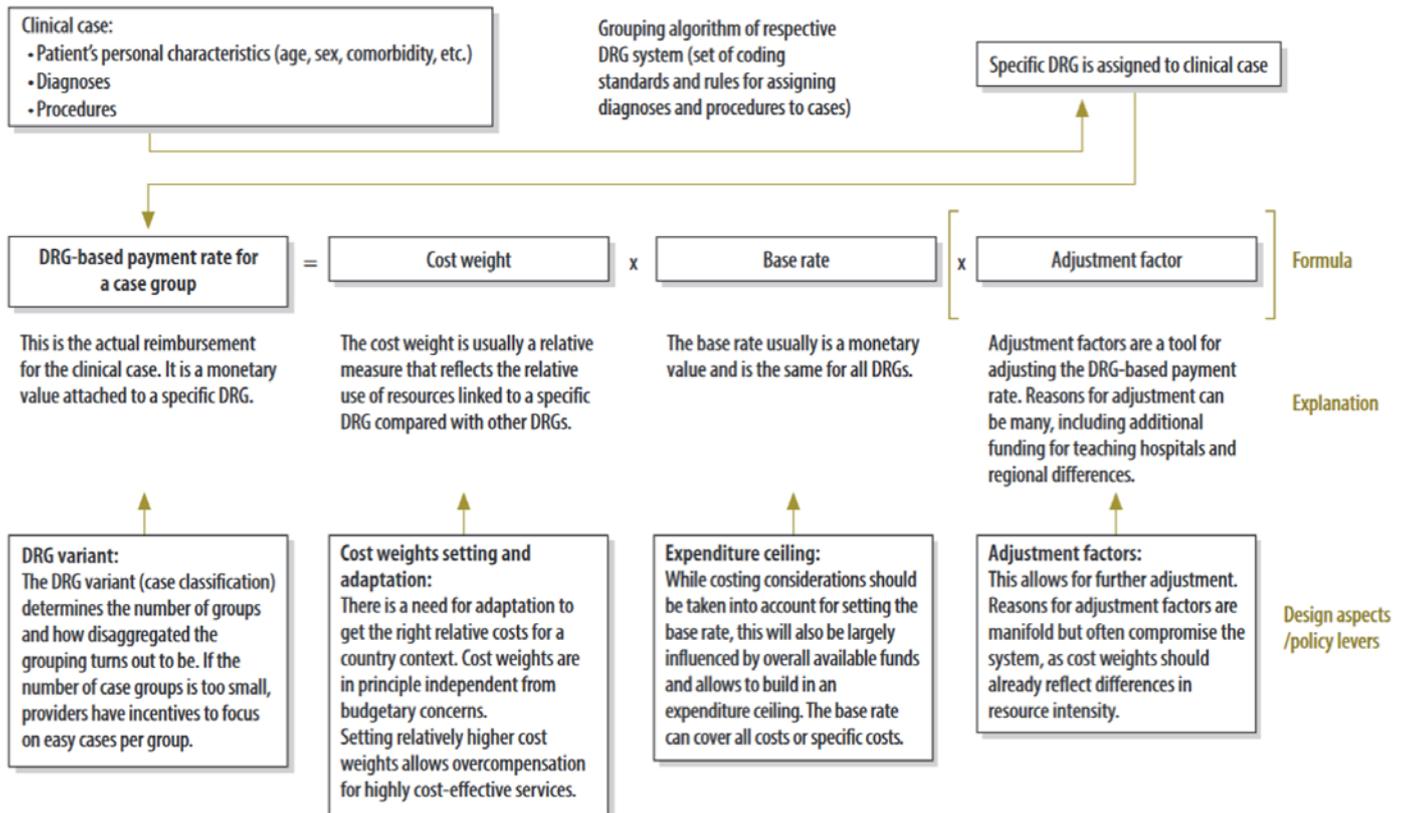
- adjustment factors which allow one to take into consideration the differences in the economic or hospital context (e.g. remoteness, teaching facility) in which providers operate or the sociodemographic or socioeconomic profiles of the patients (6, 15).

Some countries started to set up their case-based payment systems without using case-group weights, base rates or adjustment factors. Instead, they allocated an amount to each defined case. This has been the case,

for instance, in Ghana, Morocco and the Philippines in the beginning (16-18).

Figure 2 presents the core elements for determining a DRG-based payment rate.

Figure 2. Formula for calculating the rate of a CBG or DRG case group



Source: Reproduced from reference (9).

FINAL DRAFT

2. ASSESSMENT PHASE

2.1. CAN A CBG PAYMENT SYSTEM CONTRIBUTE TO ACHIEVING UHC OBJECTIVES?

The ultimate objectives of UHC encompass utilization in line with need (i.e. equitable access), quality in health care and fair financing, while intermediate UHC objectives relate to efficiency, equitable distribution of resources, and transparency. However, many countries face challenges due to, inter alia, inefficient use of funds (e.g. over-provision, under-provision, inappropriate size of facilities or insufficiently prioritized health services), inadequate quality of service provision, and a lack of transparency.

Each payment method, and the combined mix of payment methods, sets incentives for providers and in turn have a positive or negative impact on these objectives (19, 20). A summary of different payment methods and their characteristics is included in Annex 2. This section examines the incentives that a CBG payment system creates and ways in which it can contribute to the final and intermediate objectives of UHC.

In general, CBG payments set two main incentives: 1) providers may reduce the inputs (and hence costs) per case treated, and 2) they may try to increase the number of cases, both of which helps them to increase their income.

With regard to the first incentive, a CBG payment system can improve efficiency in the use of funds by reducing, or even avoiding, overtreatment and unnecessary services while maintaining quality, since healthcare providers have an incentive to reduce the amount of inputs per case. A certain degree of autonomy of providers will be needed to incentivize them to manage their resources more efficiently and to allow them to reallocate savings. On the other hand, this incentive makes providers reduce treatment inputs, thus potentially also leading to under-provision per case or to reduced quality of care (skimping). Moreover, providers may engage in cream skimming of patients with less severe symptoms, refer complex cases, or discharge patients too early in order to reduce inputs needed for treatment and hence costs (4, 20, 21).

With regard to the second incentive above, CBG payments can induce providers to increase the number of treated cases (12, 22), for example by readmitting patients or unbundling cases into individual services to in order to claim for more cases. Nonetheless, an increase in case numbers can be desirable when the hospital utilisation rates for certain services are very low or when there are waiting lists.

FINAL DRAFT

Moreover, through upward adjustment of case-group weights for selected cases, resulting in relatively higher payment rates for such cases, a CBG payment system can be designed to incentivize providers to prioritize certain health services and to shift attention to the needs of specific population groups or geographical areas.

By paying for outputs and allocating funds to activities, a CBG payment system may reduce the funds of providers whose activity is too low to be economically viable. As a result, the payment system can result in a restructuring of the provider sector as providers with insufficient activity may have to close down, merge with other providers, or adjust their service delivery structures (4).

Furthermore, a CBG system collects standardized information on hospital activity which can improve transparency on the types and volume of health services—such as diagnoses, procedures, severity indicators and patient characteristics—delivered by each hospital. When aggregated across all hospitals, a CBG system can provide data on the epidemiological profile of a population, can indicate which population groups and health services are the focus of hospital activity and can show how the budget is distributed across hospitals (21, 23). The information collected through a CBG system can also serve to measure and compare performance across providers (e.g. in relation to cost of treatment or average length of stay). This information can be used strategically to encourage improvements in quality of care or to review patient care pathways systematically (21, 24).

In sum, it is important to note that a CBG system, whether for information collection and monitoring and/or for payment, is not a magical solution to health system performance challenges. A careful assessment is needed to determine whether the introduction of a CBG system is most appropriate or whether another provider payment reform might be more suitable to address a country's performance issues in a given context.

However, when well designed and implemented, a CBG (payment) system can contribute to the UHC objectives (2). Nevertheless, monitoring and control mechanisms are needed so as to avoid that the incentives set by a CBG payment system lead to provider behaviour and hence consequences that are not conducive to UHC, i.e. increased overall expenditure, increased service provision beyond the desired level and reduced quality (4, 20, 21). More information on how the incentives set by a CBG payment system and its consequences can be addressed is provided in Section 4.3. Table 1 summarizes the potential effects of CBG introduction on cost-containment, efficient use of resources, better information collection and administrative costs, depending on the payment system in place prior to CBG introduction. Evidence suggests that a mix of provider payment methods is needed to balance multiple policy objectives (e.g. quality of services and cost containment (20).

FINAL DRAFT

Table 1. Potential effects of CBG introduction on cost containment, effective use of resources, information collection and administrative efficiency in comparison to the previous payment method

<i>Impact of CBG introduction when shifting from this payment method</i>	<i>Cost containment (Section 3.8 provides more details)</i>	<i>Efficient use of resources</i>	<i>Information collection requirements (Section 3.2 provides more details)</i>	<i>Administrative requirements (Section 2.2 and 2.3 provide more details)</i>
<i>Fee-for-service</i>		Fixed rate of CBG payment will reduce unnecessary services which leads to more efficient use of resources	CBG requires only information to identify the case, no information on every service provided is required	Unit of payment changes from every service to treatment episode, simplifying payments
Global budget (not based on activity – e.g. historical budget allocations, population-based)	Without a volume or budget cap, CBG will not lead to cost containment	Depending on the budgeting formula, CBG payments might change the incentives for efficient use of funding/ change to more performance-based budgets CBG payments would allow standardization of payment rates per case across all providers	CBG system will require more detailed information on services provided	CBG system increases administrative burden, requiring management and verification of claims
Line-item budget/ payment for inputs		CBG payments may encourage the reduction of unnecessary inputs, especially if line-item budgets were based on utilization in the previous year	CBG system will require more detailed information on services provided but might lead to less information on inputs used	

Source: Authors' compilation based on references (8, 20, 25).

For further reading, please see:

Cashin C, editor. **Assessing health provider payment systems. A practical guide for countries working towards universal health coverage.** Washington (DC): Joint Learning Network for Universal Health Coverage; 2015 (<http://www.jointlearningnetwork.org/resources/assessing-health-provider-payment-systems-analytical-team-workbook>, accessed 20 September 2019).

FINAL DRAFT

2.2. WHAT ARE THE CONDUCIVE FACTORS AND INSTITUTIONAL REQUIREMENTS FOR A CBG SYSTEM?

The introduction of a CBG system is often part of a larger health-financing reform or a package of measures to make purchasing more strategic. Country experience shows that clear and realistic objectives are needed for CBG introduction, as well as a detailed implementation plan with clear timelines. Evidence also suggests that a health system that is financed predominantly from public sources facilitates the launching of

such payment reforms (4, 5). Moreover, a single-payer model or a harmonized and standardized CBG payment system among multiple purchasers augments purchasing power and will allow for a stronger leverage of the CBG system in order to shape provider incentives and behaviour (7).

Beyond these conducive factors, there are critical institutional requirements that need to be in place, as outlined below.

An effective information management system for hospital data

A CBG system requires detailed patient-level information collected through an information management system as well as institutional capacity to use such a system. At best, a routine data collection system, including medical records, should exist; if not, it needs to be developed (see Section 3.2 on what data need to be collected).

In fact, collecting more detailed and better data on patient cases and the treatments provided, or the introduction of patient records, can be one objective of introducing a CBG system. In this case, the CBG system and the envisaged, more comprehensive health information management system can be developed jointly, growing more complex over time and mutually supporting their further development (6, 14). Importantly, an information management system involves more than data collection; it also encompasses data analysis, verification, validation and auditing (26). Data auditing is critical because there are likely to be

both intentional and unintentional coding mistakes in most CBG systems (27). The purchaser needs to be able to trust the quality of data coding for otherwise it may be reluctant to use the system for payment.

A thorough assessment of the existing information management system will reveal the current set-up and functioning as well as potential gaps. This is the basis on which to further develop and adapt the information management system to the data needs of a CBG system.

Foremost, the health information management system needs to be based on standardized coding of patient cases (27, 28). For example, for a CBG system relying on diagnosis as a criterion for grouping, the International Classification of Diseases (ICD) – and/or country-specific adaptations of it – can serve to provide a standardized coding format.

FINAL DRAFT

Strong technical capacity of purchasers, providers and ministries of health or other relevant regulating agencies to manage the CBG system

Health staff – i.e. doctors and nurses – should have the capacity for routine coding of patient cases, including diagnoses and procedures. In many countries with a CBG system, providers therefore employ specific CBG or DRG coders. These staff are trained in this specific competence and are responsible for translating medical records into the coding format required by the CBG system (29). Moreover, the capacity of health facility managers needs to be in line with the (increased) level of autonomy they are granted, which should accompany the shift from input-based to output-based payment. Moreover, the administrative staff need the capacity to collect, analyse and make decisions about cost information related to service delivery in order to allocate resources across input categories and medical departments (21).

At the purchaser level, capacities for claim management and verification are essential in order to ensure that claims comply with relevant regulations and that providers

receive payments on time. A purchaser also needs the skills to design and adjust the incentives of the CBG payment system in order to align provider behaviour with health-system objectives. Together with the regulators, the purchaser also needs to be able to monitor any potentially unintended consequences of CBG payments. In addition, the classification and coding procedures need to be standardized, regulated and enforced. This should be accompanied by monitoring measures to encourage improvements in the quality of coding and regular updates. This is frequently under the responsibility of the Ministry of Health, which needs capacity to maintain the health information management system and to use data strategically. Ministries of health or purchasers have often created new units with expertise in CBG coding, classification and costing (26, 27). Those units will play a role in continuously updating the system, as noted under Section 4.5.

Adjustments in public financial management rules

When public funds are allocated to providers via a CBG payment system, it is important that public financial management rules allow output-based payment methods to be used. If this is not the case, modifications in existing budget formulation and execution rules may be needed (30). Providers also need sufficient financial and managerial autonomy and flexibility in the use of funds

to allow them to respond to incentives set by the payment method. Provider autonomy should go along with strong accounting and audit systems to ensure accountability in the use of funds (4, 6). An account of the importance of provider autonomy in Mongolia's introduction of a CBG system is contained in Box 1.

FINAL DRAFT

Box 1. The importance of provider autonomy to accompany the introduction of a CBG system in Mongolia

Since it was put in place the Mongolian health insurance scheme has used a flat case payment rate for all inpatient cases differentiated by the levels of health facilities. In 2006 CBG was introduced payments using 22 case groups and extended to 115 groups in 2010. Initially, this switch to more refined output-based payment method was not accompanied by any change in budgeting or in budget execution rules. Both the Ministry of Finance and the Ministry of Health have supervised providers through 1) appointment of their executive managers; 2) annual budget cap based on historical line-item budget planning for a part of provider's revenue; 3) quotas on hospital staff; 4) line item-based budget execution plans with limited flexibility to shift funds across items; and 5) other bureaucratic procedures on residual claimant – i.e. responsibility for covering potential losses and using potential surpluses (31). Since providers lack managerial and financial autonomy to use or reallocate efficiency gains through CBG payments, there is no strong incentive to reduce inputs per case.

In 2013, Mongolia's new Integrated Budget Law significantly changed public financial management regulations. In particular, the number of major line items in the budget used for planning and reporting was reduced from 38 to 5. Providers were given more flexibility to make reallocations across budget line items and the maximum amounts that they can use flexibly without seeking prior approval have been increased. Since 2016, hospital boards, which were set up in 2011, have had the authority to approve spending plans and to appoint the executive management of public hospitals. It is expected that these reforms in hospital autonomy, combined with gradual capacity-strengthening of hospital managers in developing, implementing and reporting on output-based budgets, will create the space for the CBG payment system to set efficiency incentives and also lead to stronger buy-in by providers into the new payment system.

Tsolmongerel Tsilaajav

2.3. HOW LONG DOES IT TAKE TO DEVELOP AND IMPLEMENT A CBG SYSTEM? WHAT ARE THE RELATED COSTS?

The first country to develop and introduce a DRG system was the United States of America, with the process taking more than 10 years before the system was ready to be used for payments. Thereafter, and based on this experience, the rollout took 5–10 years in several European countries. Importantly, ICD coding was already in place both in the USA and Europe. Figure 3 gives an overview of how long it took to

start using CBGs for payment in various countries (28). In most countries, a CBG system has been introduced in phases with gradual extensions, as further detailed in Section 4.2. Even under the most conducive conditions, the introduction is likely to take several years (5). Box 2 describes the progressive development and implementation of DRGs over several years in Chile.

FINAL DRAFT

Moreover, a CBG classification system and related cost weights or payment rates need continuous adjustments and updates to ensure that the grouping remains clinically meaningful and economically homogenous and that it reflects new health technologies. The introduction of a CBG system is not a one-off project (32). The issue of regular updating is further discussed in Section 4.5.

The cost of the introduction and design process of a CBG system depends on many factors and is difficult to estimate. No such information was found in publicly available sources. However, the cost implications of the following aspects need to be considered, apart from resources needed for the policy dialogue and high-level planning:

When buying (importing) a DRG system:

- costs of buying a classification system, including the grouping algorithm and the grouping software in the case of a DRG system;
- cost for adjusting the imported DRG system to the country context;
- initial and ongoing licensing cost, where required.

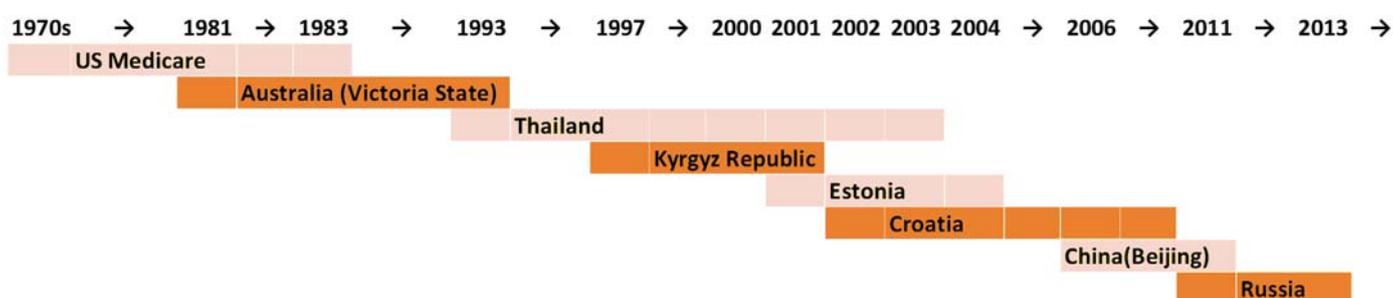
When developing a CBG system:

- costs of developing an own classification system and the corresponding grouping algorithm and grouping software.

In addition, there are:

- costs for introducing/adjusting the facilities' information management systems;
- costs for introducing/adjusting the information management systems of purchasers;
- costs for data collection and costing studies to inform payment rates and relative cost weights under the CBG system;
- costs for training staff of providers and purchasers;
- costs of financial incentives that may be needed to obtain initial support from providers or to encourage complete reporting (especially when the CBG system is not used for payment);
- costs for communication and advocacy to providers and the wider public.

Figure 3. Year in which a country started moving towards DRGs and year in which the system was used for payment, for selected countries



Source: adapted from reference (28).

FINAL DRAFT

Box 2. DRGs in Chile: a case of progressive implementation

In Chile a first DRG pilot, focusing on information collection and analysis of case mix, started in 2002 in four major hospitals with technical support from the Catholic University of Chile. The pilot highlighted the relevance of having a strong hospital information management system, the need to agree on and collect the necessary minimum set of data and the importance of designating and training coding teams for data entry.

From 2007 onwards, the Ministry of Health and FONASA (the national health fund, operating as a health insurance type purchaser) were evaluating the possibility to use DRGs as hospital payment method. Starting in 2010, the International Refined (IR)-DRG variant was gradually expanded to 25 public hospitals for information collection. Hospitals developed their coding capacity, implemented DRG software and applied a standardized system for collection of cost information. Case weights and calculation of the base rate have been developed and continuously revised. In 2017, accounting systems in public hospitals had matured sufficiently to provide necessary information for a detailed costing study to re-evaluate both relative case group weights and the base rate.

Starting in 2015, FONASA uses flexible contracting mechanisms to pilot DRG payments for private providers. FONASA decided to buy bed days from the private sector for a set of pathologies for which there are long waiting lists in the public sector. It expressed those pathologies in DRGs. As cost structures differ between public and private providers, there are differences in DRG rates between the public hospitals, with their rates being based on costing studies, and the private sector, with rates being based on a tender process. However, funding channelled through DRG to private providers accounts for less than 1% of FONASA's total budget.

The implementation of DRG payments in Chile has been slow and the DRG system is still mainly used for information collection. FONASA has announced its plan to extend DRG payments in 2020 to public hospitals.

Camilo Cid and Gabriel Bastías

FINAL DRAFT

2.4. WHICH STAKEHOLDERS ARE LIKELY TO INFLUENCE THE DESIGN AND IMPLEMENTATION OF THE CBG SYSTEM AND HOW SHOULD THE DIFFERENT STAKEHOLDERS BE INVOLVED?

A range of different stakeholders will be involved and/or influencing the design and implementation of a CBG system. First, the parliament and the whole of government will be involved if changes to legislation are needed. The Ministry of Finance defines public financial management rules, which also apply to the CBG payment system, and has an interest in protecting financial sustainability. Interest groups such as provider associations, patient associations or medical associations are often consulted formally on health policies but may also try to lobby informally to ensure that their interests are reflected (33, 34). The technical nature of the introduction of a CBG system usually limits active involvement in the development process to the Ministry of Health, the purchasing agencies, provider associations and medical associations.

The Ministry of Health and/or the purchasing agency are usually the drivers for the development of a CBG system. The Ministry of Health, as steward of the health system, is interested in improving data collection and in ensuring that CBG payments set the right incentives for providers to align their behaviour with health-sector objectives and UHC goals. For the purchasing agency, a CBG payment system serves to increase efficiency in the use of funds, to contain costs and to gather better information about the services and providers on which the funds are spent (35). Additionally, high-level leadership by the Ministry of Health will be required in order to overcome potential opposition and to support the development of a CBG system that is acceptable to all stakeholders

(35). Country experience shows that a specific unit, or at least a designated team, should be set up to take charge of CBG development. Over time a mandated unit that is able to maintain the system will be equally important (28).

The introduction of a CBG payment system implies (re-)allocation of funds and/or changes to how decisions on fund allocation are taken. Some facilities may receive more funds than before while others may receive less. As a result, some providers may be critical of the introduction of a CBG payment system. However, different providers will have different interests. Hospitals with a complex case mix may be more supportive of a CBG system than rural hospitals providing a low volume of services. It is important that providers are consulted and involved during the design process and that the classification logic is transparent (29, 35). To encourage provider buy-in, the purchaser and the Ministry of Health should ensure that provider perspectives are taken into account, provider concerns about potential losses of revenue are discussed and transitional measures are considered (see more details in Section 4.2 on phasing in the CBG payment system). Provider trust in the payment system and a feeling that it leads to a transparent and fair distribution of resources are equally important (14).

External experts, agencies providing technical assistance and private sector developers of CBG systems or software might also contribute to the development process and it is important that their efforts are aligned with the government agenda.

3. PREPARATION AND DESIGN PHASE

3.1. WHICH TYPES OF HEALTH SERVICES, FACILITIES AND PROVIDERS SHOULD BE INCLUDED IN THE CBG PAYMENTS?

Which types of health services should be part of the CBG payments?

CBG systems are based on the classification of health services into clinically and economically homogenous groups. For that matter, most CBG systems initially apply to acute inpatient care in hospitals. Acute inpatient care services are relatively easier to classify as cases can be defined as all diagnoses, tests and treatments provided between admission and discharge. Also, inpatient services usually account for a large share of health sector spending (6, 36).

In contrast, it is difficult to apply a CBG system to health services for which diagnosis or other grouping criteria are not good predictors of treatment costs. This is the case, for instance, for long-term psychiatric or rehabilitation care or when the number of cases is too small to calculate a meaningful average cost for cases within a specific case group (e.g. for organ transplants). Likewise, for intensive care

or cases requiring expensive therapeutics and medicines, it is not the diagnosis that drives the cost but the intensive care stay or the price of medicines. Most CBG systems therefore do not apply to these types of services or they provide additional payments for such outliers, as noted under Section 4.3 (22, 37).

Several high-income countries have extended CBG payments to some outpatient care services. However, outpatient health care services are in most cases paid through fee-for-service, line-item budgets, global budgets or capitation payments. This is because cost differences between different primary health care and/or outpatient services are less stark, thus less in line with the underlying logic of CBGs. Using CBGs for high-volume and low-cost services could also imply disproportionately high administrative costs (20, 38).

Which types of facilities should be included in the CBG payment?

A CBG payment system that aims at cost control or restructuring of the hospital sector should include those health facilities that consume a significant share of health service cost. Inpatient care, and especially surgical cases, usually consume a large

part of the budget. Primary care facilities provide health services that are less resource-intensive. As a result, most CBG payment systems apply to secondary and tertiary care facilities (4, 20).

FINAL DRAFT

Which types of providers should be included in the CBG payment?

In a number of low- and middle-income countries, public financing for health services can be spent only on government health-care providers. However, the transparent allocation of CBG funds to providers could create the necessary trust and accountability to make it possible to pay private providers using public funds. Additionally, the inclusion of private providers in a CBG payment system will allow for the systematic collection of information on their services. It may be necessary to adjust CBG payment rates for private providers, especially when government providers continue to receive some budget allocations (e.g. for health worker salaries) along with the CBG payments (21, 29). In addition, through selective contracting, purchasers may choose to pay only selected public or private providers through CBG payments.

The types of facilities in a hospital market can be very heterogeneous, ranging from local hospitals in remote areas to rather urban-based secondary and tertiary hospitals in the public and private sector that provide high-technology services. Decisions on the design of the CBG system, including which providers to cover, should be examined critically with regard to the potential impact on, and alignment with, overall priorities in equitable access to services and financial coverage.

Figure 4 gives an overview of the range of aspects to further consider when deciding which types of services, which types of facilities and which types of providers (private/public) to include in the CBG system.

Figure 4. Aspects to consider when deciding which types of services, facilities and providers should be included in a CBG system

Aspects to consider regarding...

Which types of services should be covered?

- Can services be grouped into clinically and economically homogenous groups?
- Can cost of services be reasonably predicted by (a combination of) diagnosis, procedure and/ or other patient characteristics?
- Can a payment rate be (relatively easily) established?

Which types providers should be included?

- Can the provider deliver priority health services?
- Is equitable access enhanced?
- Are providers subject to regulations and monitoring that allow to address concerns around patient safety?
- Is capacity to code and report along a CBG payment system available?

Which types of facilities should be covered?

Tertiary facilities	Secondary care facilities	Primary health care facilities
<ul style="list-style-type: none"> – Can research and teaching activities be adequately reflected in the CBG payment formula? – Can high cost treatment be adequately covered through CBG? – Will CBG only cover general inpatient treatment while high cost treatment and/ or teaching activities will be paid by different methods? 	<ul style="list-style-type: none"> – Are secondary care facilities providing services which are major cost drivers? – Are secondary care facilities the main providers of inpatient care? – Does the system go beyond piloting and tries to cover the largest share of inpatient treatment provided? 	<ul style="list-style-type: none"> – Is the administrative burden justifiable and manageable for facilities which provide high volume and low cost services? – Are sufficient staff and capacity to code available at primary health care facilities?

Source: compilation by authors based on references (5, 20, 37)

3.2. WHICH VARIABLES CAN BE USED FOR CLASSIFICATION AND WHAT ARE THE IMPLICATIONS?

The starting point for building a CBG classification system, particularly when it is to be used for payment, are the key determinants of resource consumption – generally diagnoses and procedures – as classification variables (15). These and other variables that are commonly used for classification are explained below. The actual order of sequence depends on the CBG system and its specific classification algorithm.

Diagnosis: Most CBG systems start by grouping cases on the basis of principal diagnosis into *major diagnostic categories* that correspond to organ system or cause/etiology and that are generally associated with medical specialties. In general, classification systems distinguish fewer than 30 major diagnostic categories (5). Major diagnostic categories mostly follow ICD chapters. Annex 3 provides two examples of DRG variants with their major diagnostic categories.

Coding of principal diagnoses (as well as of secondary diagnoses, see below) can be based on ICD-10, an earlier ICD version, or ICD-11 (which was adopted by the World Health Assembly in May 2019) or a country-specific adaptation. The diagnosis will provide the most accurate information on a population's disease burden. However, diagnoses are not always good predictors of cost because resource needs for treatment tend to depend primarily on the procedures used rather than on the diagnoses (5).

Some CBG systems start their classification process by identifying cases that are both highly specialized and high-cost and assign them to a so-called “pre-MDC group” (where “MDC” refers to “major diagnostic categories” into which the other cases will then be categorized). The pre-MDC cases are often paid by other payment methods since it is difficult to classify them in economically homogeneous groups (5).

Secondary diagnoses: Secondary diagnoses reflect comorbidities and complications that are used in an additional grouping step because they also have a significant effect on treatment cost. In addition, some classification systems distinguish between levels of severity within a diagnosis. DRG systems include comorbidities for coding, but this adds complexity and requires providers to have stronger coding capacities and purchasers to be able to check coding accuracy (5, 14). Several high-income countries have also added the functional status of patients as a classification variable¹ (39).

Procedures: Most CBG systems also include procedure codes because several procedure or treatment options may exist for a diagnosis. Procedure and treatment options are equally decisive for treatment costs. The principal diagnosis combined with a procedure can be a good start for the development of a simple CBG system which can then be gradually developed further. The simplest and most common

¹ For coding of functional status the International Classification of Functioning, Disability and Health (ICF) provides a standardized coding format. The WHO Disability Assessment Schedule 2.0 (WHO-DAS 2.0) provides an ICF-based, generic instrument for functional status assessment. The WHO-DAS 2.0 has also been incorporated into the ICD-11 section on functioning.

differentiation is between medical and surgical cases (5). Current procedure coding is often country-specific (5). The Beta-2 draft of the International Classification of Health Interventions (ICHI) was launched by WHO in 2019. It will provide guidance and orientation for coding interventions in an internationally comparable manner (40).

Patient characteristics: Patient characteristics can serve as additional classification variables. Patient age is the most important patient characteristic to affect treatment cost. Case-group weights or payment rates can be differentiated for children and adults undergoing procedures for which age has different cost implications. Sex as a patient characteristic is primarily used as a quality check to ensure that sex-specific diagnoses and procedures are reimbursed only for patients of the respective sex. Moreover, with regard to promoting equitable access to health services, cost weights or payment rates could be differentiated for patients from poor or marginalized population groups (5).

Administrative variables related to admission and discharge: Cases can further be differentiated by admission type, such as inpatient versus day case/ outpatient or elective versus non-elective surgery. Another option is to differentiate by discharge type, such as discharge, referral or death (5).

Variables related to resource consumption: The case classification may consider variables that indicate a higher resource consumption within a case. Examples include length of stay, use of mechanical ventilation, or a stay in a specialist department (e.g. intensive care unit, psychiatric ward) or use of high cost drugs (5).

Case classification in a DRG system is generally based on the following five main steps (5):

1. Before the classification begins, the data are checked to exclude cases with incorrect or missing information.
2. Very high-cost and highly specialized cases (e.g. organ transplants) are identified and put into a special “pre-MDC” category.
3. Cases are allocated to mutually exclusive MDCs according to the principal diagnosis. A few systems use other variables such as age (e.g. to assign cases to a neonatal major diagnostic category).
4. The grouping algorithm classifies patients into a “surgical” or “medical” partition. Some systems include additional variables with other relevant non-surgical procedures, such as medical imaging.
5. All DRG systems check for further characteristics of the case, such as complexity of the principal and sometimes secondary diagnoses, type of procedures, combinations of both, and sometimes age, length of stay or treatment setting, or type of discharge. This serves to assign the patient to the final case group.

However, sequencing of variables varies across DRG variants. Annex 1 provides simplified overviews of different classification systems. When selecting the variables for the case classification system, it is important to consider what potential incentives these variables create for providers. If a certain diagnosis can be treated by more than one procedure, providers will have an incentive to use the procedure with the highest return for the hospital. A description of how Ghana developed its patient classification system is contained in Box 3. Box 4 illuminates the process of identifying DRG classification variables in Viet Nam.

Box 3. Development of Ghana's patient classification system

The Ghana National Health Insurance Authority (NHIA) developed a CBG system – called the “Ghana DRG system” or G-DRG – to be used for payment, starting in January 2007. A team of experts from the Ghana Health Service and health workers – including doctors, nurses, midwives and pharmacists – took approximately six months to develop the classification algorithm. The G-DRG has been applied for payment in all facilities receiving payments from the NHIA since April 2008.

The development of the classification system was based on the following steps:

- 1. The list of the principal diagnoses to be covered by the new payment system were grouped into major diagnostic categories (MDCs). Specialties reflected in the MDCs were: adult medicine, paediatrics, adult surgery, paediatric surgery, ear nose and throat, obstetrics and gynaecology, dentistry and ophthalmology.*
- 2. Within these MDCs, diagnoses were further grouped according to whether a surgical procedure is required or not.*
- 3. For diagnoses needing a surgical procedure, further grouping steps were introduced, namely:*
 - grouping according to the major organ system if applicable and*
 - grouping according to the complexity and type of procedures to be performed.*
- 4. Diagnoses which did not need a surgical procedure were grouped by principal diagnoses based on major organ systems.*
- 5. The obtained case groups were further finetuned by considering similarities of resource use in providing care to the patients in order to create economically homogenous groups.*

The result was the G-DRG system composed of a manageable number of 546 inpatient DRGs which capture most inpatient cases treated in Ghanaian health facilities.

Source: reference (41)

FINAL DRAFT

Box 4. Process for identification of relevant DRG classification variables in Viet Nam

The Viet Nam Social Security (VSS) pays providers mainly through fee-for-service. The deficit of the health insurance fund increased by more than 15 times between 2005 and 2009. In addition, fee-for-service payments created high administrative costs for both the VSS and health care providers.

Therefore, in 2012, the Ministry of Health decided to launch a pilot project in all provincial and district hospitals – which were all secondary care hospitals – in Ninh Binh province to assess how the VSS can pay providers using DRG payments. The pilot DRG system was based on the Thai DRG variant. The pilot served to finetune this classification system to the Vietnamese context, to determine which classification variables should be used for grouping cases, and to develop related case-group weights. The result was a Viet Nam-specific classification system and grouping algorithm with around 400 DRGs. These are defined through principal diagnosis, procedures, comorbidity and patient clinical complexity level, and are further specified for some case groups by age, sex, length of stay, body weight and type of hospital discharge. Piloting of this new system is still ongoing and will expand to 34 selected hospitals in five provinces.

The pilot phase to develop the Vietnamese DRG system took much longer than expected. One reason was the need to link the definition of case groups and the services they include to clinical pathways. These had yet to be developed in line with the Ministry's plan for people's health protection, care and promotion. This process took several years and is expected to be finalized in 2020.

Dr. Tham Chi Dung

3.3. WHICH COST ITEMS CAN BE INCLUDED IN THE CBG PAYMENT?

Costs for providing health services can be differentiated into several cost items, such as salaries, medicines, consumables, equipment or capital. These cost items can be paid for through various financial flows. Some CBG systems do not pay for and do not include salary costs, which often continue to be provided by the Ministry of Health through supply-side financing. Capital costs are excluded from most CBG systems because decisions on capital investment and expensive or high-tech equipment often require a long-term perspective and

are usually part of a national investment plan (37). For example, in Austria, Czechia, Finland, Germany and Ireland, capital costs of providers are covered through additional allocations and are therefore not included in the DRG payments (37). However, CBG payments to private providers might have to reflect capital cost as well.

The larger the share of costs covered under the CBG payments, the more room there is for the provider to relocate these resources internally. Moreover, financial

incentives created by the CBG payments might not be strong enough to change provider behaviour if only a small share of the total cost of health services is paid by the CBG system; and hence the impact of a CBG payment system and its contribution to making purchasing more strategic would be reduced (4).

Including only selected cost items in the CBG payment system makes it possible to share the expenditure risk of unknown health service use between the provider and the purchaser. On the one hand, lower

utilization rates would not necessarily lead to a facility's closure if staff and equipment costs are funded from other sources. This can allow providers to continue operating in remote areas with low utilization and with limited activity-based payments. On the other hand, partial cost inclusion in CBG payment limits the potential of the CBG system to restructure and optimize the provider market – i.e. aligning hospital bed capacity with the size and needs of the population in its catchment area (4).

3.4. WHEN IS IT BEST TO BUY AN EXISTING DRG SYSTEM AND WHEN SHOULD A COUNTRY DEVELOP ITS OWN COUNTRY-SPECIFIC CBG SYSTEM?

Countries usually import DRG systems from another country, including the related grouping algorithm and, if applicable, related software. There are no documented cases of a country buying a (simpler) CBG system from elsewhere. However, buying or making a DRG grouping algorithms and grouper software is not an either-or choice. A country can buy and apply without further adjustment; 2) buy and adapt to the context, leading to the development of a country-specific DRG variant; 3) copy (without buying, if this option is available) and adjust to the country's context; or 4) develop its own DRG system for its own setting. Even though some countries have initially bought a DRG system, they have later developed their own system or changed to another DRG variant if those have been a better fit for the (evolved) country context.

The USA began developing a DRG system in the 1970s and introduced it as a

payment method in 1983. Other systems developed from new were those of the United Kingdom (1992), Austria (1997) and Netherlands (2005). However, most other countries developed their DRG systems on the basis of an existing DRG variant (42). Busse et al. (2011) provide an overview of which European countries developed their own DRG system and which ones chose to import an existing variant (Table 2) (5). Since a DRG system requires constant adjustment, most of the countries that initially imported a DRG system will develop their own country-specific variant over time (28). Box 5 describes how the Islamic Republic of Iran adopted an imported grouper to develop its own DRG system.

An instructive description of the development and the current design of the Health Care Financing Administration DRG variant which is used by the Centres for Medicare and Medicaid Services is provided in the reference (43) next page.

FINAL DRAFT

Table 2. Main DRG variants which have been imported and/or further developed by other countries

DRG variant	Country of origin	Adopted/ further developed by (not an exclusive list)	Classification system used	Link to more information
Health Care Financing Administration (HCFA) DRG/ Medicare Severity (MS) DRG	USA	NordDRG, France, APR DRG	Diagnoses: ICD-10-Clinical Modification procedure: ICD-10-Procedure Coding System	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/MS-DRG-Classifications-and-Software.html
All patient refined (APR) DRG	USA (used by over 25 state Medicaid programs in 2019)	Spain, Portugal, Australia	Diagnoses: ICD-10 Procedures: ICD-10-Procedure Coding System	https://www.3m.com/3M/en_US/health-information-systems-us/providers/grouping-and-classification/apr-drgs/
Australian Refined (AR) DRG	Australia	Ireland, Germany, Iran, Lithuania, Thailand	Diagnoses: ICD-10-Australian Modification Procedures: Australian Classification of Health Interventions	https://www.ihpa.gov.au/what-we-do/ar-drg-classification
NordDRG	NordDRG owner countries: Denmark, Finland, Iceland, Norway, Sweden	Estonia Latvia	Diagnoses: ICD-10 Procedures: Nordic Medico-Statistical Committee Classification of Surgical Procedures	http://www.nordcase.org/eng/
Health Care Resource Groups (HRG)	United Kingdom	Poland	Diagnoses: ICD-10 Procedures: Office of Population Censuses and Surveys health care procedure and intervention coding	https://digital.nhs.uk/services/national-casemix-office
Thai DRG	Thailand	Philippines, Vietnam, Indonesia	Diagnoses: ICD-10 Thai Modifications Procedures: ICD-9 Clinical Modifications	http://www.tcmc.or.th/main/

Source: Compilation by authors based on reference (5).

For further reading, please see:

Centres for Medicare and Medicaid Services. **Design and development of the Diagnosis Related Group (DRG)**. Baltimore: CMS/ Department for Health and Human Services; 2013 ([https://www.cms.gov/ICD10Manual/version34-fullcode-cms/fullcode_cms/Design_and_development_of_the_Diagnosis_Related_Group_\(DRGs\)_PBL-038.pdf](https://www.cms.gov/ICD10Manual/version34-fullcode-cms/fullcode_cms/Design_and_development_of_the_Diagnosis_Related_Group_(DRGs)_PBL-038.pdf), accessed 31 October 2019).

Box 5. Buy and make in Iran: adopting an imported grouper to develop its own DRG system

Iran has been using fee-for-service payments and case-based payments for 90 procedures to pay hospitals since the 1990s. In order to improve efficiency and productivity, utilization management and introduce performance-based budgeting, the Iranian Ministry of Health decided in 2015 to explore the introduction of a DRG payment system for case-based hospital payment and budget allocation. As a start, different DRG variants were assessed for how they would fit with the Iranian health system and context. Following a consultation process with national and international DRG experts in 2016 and a qualitative research project carried out by Iranian health economists, the Ministry of Health identified the Australian Refined DRG variant (AR-DRG) as the most appropriate option. The reasons for this decision were the high quality and availability of AR-DRG documentation, the availability of technical assistance and support from the Australian Independent Hospital Pricing Authority (IHPA) and grouper suppliers, the widespread use of the AR-DRG system in many countries and a long history of refinement and regular updates.

Iran signed a confidentiality deed (a commercial contract and agreement which specifies if, how and for which purpose information can be used or passed on) with the IHPA to evaluate the AR-DRG system in relation to the Iranian context. According to this contract, Iran has access to the AR-DRG version 9.0, which is based on ICD-10 Australian Modification and the Australian Classification of Medical Interventions (ACHI), and the related Australian Coding Standards.

The development and implementation of the DRG system is taking place in three phases. During the first phase of testing, data compatibility between the AR-DRG requirements and data currently included in medical records was assessed in a number of public hospitals. Currently, the second phase is focusing on system adaptations needed to run a DRG system. Those include adaptations to classifications and clinical coding, provider payment policies, performance and quality management procedures, price and tariff-setting as well as IT and health information management systems. Three universities and two AR-DRG grouper suppliers are supporting some 50 hospitals in managing DRG-based budget allocations and in monitoring performance and clinical practices at physician and hospital levels. The third phase entails the development of an Iran-specific DRG variant by adjusting and changing the AR-DRG case-group weights and the classification algorithm to the needs of Iran.

Iran aims in the long term to develop its own payment system based on an integrated care approach encouraging providers and purchasers to deliver and buy comprehensive healthcare packages in order to improve the health-care delivery process.

Mahdi Naderi

FINAL DRAFT

With regard to simpler CBG systems, countries usually develop their own version. Examples include Ghana, Morocco, Philippines and Tunisia (16, 17, 41, 44). Likewise, Kyrgyzstan decided to develop its own CBG system by combining diagnosis for medical cases and procedures for surgical

cases and then further splitting them by age (Box 6). In such a system the number of groups will be lower and the development of a classification algorithm simpler, as will the costing for relative case weights. For such less complex CBG systems, grouping software is not necessarily required (4).

Box 6. Gradual development of a CBG system in Kyrgyzstan

The Mandatory Health Insurance Fund of Kyrgyzstan introduced a case-based payment system for public providers in 1997 as part of broader health financing reform. At the time, CBG payments were additional on top of line-item budget allocations. The CBG payments were accompanied by performance-based staff bonuses. Higher CBG base rates are paid for patients who are exempted from formal co-payments.

The initial classification algorithm was simple. There were 28 case groups mostly following the hospital department structure or clinical sub-specialities, which were further divided according to whether a patient had been in the intensive care unit or not. Thus, the CBG system consisted of 56 case groups in total. This initial set of case groups was used for about 20 months.

A first revision increased the number of case groups to 144 and eliminated the direct connection between an intensive care unit stay and a higher payment rate. In 2003, the system was revised a second time to replace ICD-9 diagnosis coding with ICD-10. Nowadays, only principal diagnosis and the main (i.e. most resource-intensive) procedures are used for the CBG assignment. The only additional characteristic taken into account is the patient's age (< 15 years, ≥15 years). In total there are now 284 CBGs. Another revision is currently ongoing and has three main objectives: 1) to update the classification of surgical procedures, 2) to review the classification algorithm to improve clinical homogeneity by now using main diagnostic categories as the first classification step, and 3) to reduce age-related splits in case groups.

Triin Habicht

The most complex part of a DRG system is the development of the algorithm for allocating cases to case groups. Importing a classification algorithm from another country rather than developing one's own can reduce time and costs. Buying a classification algorithm usually includes acquiring an accompanying grouping software with a licence agreement. Some classification algorithms are open source,

are freely available/downloadable and can thus be adjusted to the country context as needed. Other algorithms have more restrictions. Most DRG systems are developed by public or semi-public organizations, but private companies also develop and sell classification algorithms and software. If a DRG variant, including a related algorithm and/or software, is bought, it is important that the classification

algorithm is also shared openly and is adjustable, with the developers being responsive to the needs of the buyer. Some country experiences have shown that merely receiving the grouping software without insights into the classification algorithm and without options to adjust it will create significant problems and may lead to a huge loss in time and spending.

Consequently, when buying a DRG system it is very important to have insight into the classification algorithm and to be able to adjust the algorithm as the system evolves.

Further factors to consider when deciding whether to buy a DRG system or create one's own are outlined in the following sections.

Similarities between the imported and the envisaged case classification system

An existing classification algorithm can be adopted if there are sufficient similarities in the classification systems, cost structures and the treatment practices between the DRG system to be imported and the envisaged classification system. The larger the differences, the more difficult and expensive it will be to adjust the imported system. The envisaged DRG variant should cover the same levels (types) of health facilities and the same categories of services as the imported DRG system.

With respect to classification systems, one important point is the underlying coding for diagnoses and procedures. If those are not the same, data has to be mapped to the imported system before it can be used to run the imported grouping algorithm. As most DRG variants are based on ICD coding for diagnoses, grouping by diagnoses makes existing classification algorithms more easily applicable. Comparison of several country DRG variants has shown that the major diagnostic categories tend to be similar and that they are aligned with medical specialties (36).

Often, however, there are larger differences between countries in the treatment practices and how they are coded as well

as in the cost structures (5). The share of cost on human resources, for instance, tends to be larger in high-income countries than in middle-income countries. To assess differences in cost structures, the classification algorithm can be tested with existing information. Alternatively, clinical experts can advise as to how far their own treatment practices differ from the treatment practices that underlie the grouping logic of the imported system.

The adequacy of a DRG variant for the context of an importing country can be evaluated by using data that are available (such as from hospital discharge summaries). The required information should include diagnosis (primary and secondary), procedures and patient characteristics that can be used to generate coded information. The coded information can be fed into the classification algorithm to analyse the extent to which cases are allocated to the appropriate case groups. However, such evaluations are costly if data are not available electronically. These evaluations are often a first step towards a pilot phase (36). An account of Georgia's experience in this is contained in Box 7.

FINAL DRAFT

Box 7. Matching classification systems and electronic claims data format to facilitate the adoption of the NordDRG variant in Georgia

Georgia applied a country-specific CBG payment system with a high number of case groups defined through a combination of ICD-10 and the Nordic Medico-Statistical Committee (NOMESCO) classification of surgical procedures. Over the years this locally built system has been finetuned to limit the number of case groups (e.g. some areas of cardiology) but there has been no comprehensive solution for all clinical areas.

In mid-2017 the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health, and Social Affairs of Georgia decided to introduce a DRG system for payment. A feasibility study revealed that the NordDRG system is suitable for Georgia as health providers already use the same surgical procedures classification system as the Nordic countries. Similarly, Georgia applies ICD-10 which is also used by the NordDRG system. Thus, there was no need to introduce a new primary classification system. Consequently, the pragmatic option for Georgia is to adopt the NordDRG grouper, while keeping the possibility of adding country-specific adjustments in the future.

Another important supportive factor for adopting the NordDRG system is the availability of digital patient-level claims data which include all information required by the NordDRG classification algorithm. However, some efforts are needed to further improve data quality in parallel to implementing the new system. By the end of 2018, the Nordic Casemix Center had developed the Georgian version of the NordDRG classification algorithm. Transition to the new system began in mid-2019 (45).

Source: reference (45)

Availability of routinely collected patient information

A DRG system relies on patient data collected by a well-functioning information management system. To use an imported DRG system, health facilities must routinely collect patient data at a similar level of detail. If no strong patient information management system exists, the development of a CBG system that uses existing data is a more viable option (4, 29).

Importing a DRG system and its classification algorithm can be useful if cost data are

lacking, and if the imported system includes relative weights that can be used as cost assumptions and then be gradually adjusted. Using these cost assumptions can reduce the need for additional costing studies.

Table 3 compares the option of developing a country-specific CBG system or DRG system to the transitional strategy of first importing an existing system and then gradually adjusting it.

FINAL DRAFT

Table 3. Issues to consider when deciding whether to make or buy a DRG system

	Importing and gradually adjusting an existing DRG system	Adopted/ further developed by (not an exclusive list) Developing a new DRG (CBG) system
Acceptability and ownership	There is a risk of insufficient ownership. Stakeholders must be engaged and the system appropriately contextualized.	The process of developing a new system will strengthen ownership among key stakeholders and build capacity.
Cost	Costs may be more modest, but there may be licensing cost upfront and on a continuing basis (risk of vendor lock-in). Additional cost for country-specific data collection and adjustments has to be factored in.	Development cost is generally higher but it will depend on the complexity of the system.
Time period required for the introduction	Importing may take relatively shorter time, being feasible within a few years, but the time needed also depends on the extent of necessary adjustments.	Developing takes relatively longer but it might support capacity-building for key stakeholders.
Data needs	Importing requires well-functioning patient data collection systems. It requires less data collection if cost assumptions are imported, but adaptations will be needed.	Developing requires more data collection for the initial development. A locally developed system can be designed in line with the existing capacity of the patient data collection system.
Suitability for a country's health system	Importing a system requires adaptations to reflect cost structures and patterns of clinical practice.	A locally developed system may reflect a country's health system well, facilitating acceptance by providers. The system might be perceived as fairer.
Maintenance and regular revisions	An imported system may require external support for maintenance unless sufficient capacity is available or built locally.	Sufficient capacity is needed to build up the system and maintain it locally. It may thus also require external support.

Source: Compilation based on references (4, 14, 29).

3.5. HOW ARE CASE-GROUP WEIGHTS AND THE BASE RATE CALCULATED?

Calculation of case-group weights

The relative weight of a case group reflects the average treatment cost of an average case in this specific group in relation to the average treatment cost of all cases. Case-group weights are computed by dividing the average costs of cases falling within a

CBG through the average treatment costs of all cases in a country, as outlined in the equation below. A case-group weight of 1.2 for a specific group A would mean that the average treatment cost for a case in group A would be 20% higher than

FINAL DRAFT

the average treatment cost across all groups. Consequently, a CBG with a case-group weight of 1.0 implies that average treatment costs of patients falling into that

CBG are equal to the average treatment costs of all cases within the country (4, 12). The formula for calculating the case group weight is as follows (based on (4)):

$$CGW_i = \frac{\text{Average cost per case}_i}{\text{Global average cost per case}}$$

Box 8 shows how Lithuania used patient costings to develop its own case-group weights, while Box 9 describes how Estonia

has applied a mix of imported and locally-developed case-group weights.

Box 8. Introduction of a patient-level costing system to develop country-specific case-group weights in Lithuania

Lithuania started to use Australian Refined DRG system (AR-DRG) in 2012 after a feasibility study in 2009 and a preparatory phase from 2009 to 2011. During the preparation phase, the Australian Classification of Medical Interventions (ACHI) was introduced and the ICD-10 version in use was updated. Lithuania has aimed to develop its own case-group weights from the very beginning. Until now all acute care hospitals submit annually aggregated cost data reports by 16 main cost categories to the National Health Insurance Fund (NHIF). These nationally collected cost data are combined with the cost structure of each DRG group taken from the Australian relative case-group weights. On this basis, the NHIF constructs country-specific case-group weights. These follow the cost structure of the Australian DRG system, but the cost related to different cost categories is calculated on the basis of data from Lithuanian hospitals. The weakness of this methodology is that it follows the cost structure of the Australian health system which, in some cases, may differ significantly from the Lithuanian reality. Eventually a more systematic approach to validate case group weights was needed.

Therefore, in 2015, the NHIF initiated the patient-level costing project in 15 hospitals that represent the whole scope of acute inpatient care. The project has a triple aim:

- 1. to develop Lithuanian DRG case-group weights reflecting, the cost structure of Lithuanian hospitals;*
- 2. to analyse hospital sector performance; and*
- 3. to give hospitals the possibility to analyse their own cost data to find areas for improvement.*

The NHIF has developed a standardized cost accounting software and provides hands-on technical guidance to support participating hospitals. The costing project is expected to provide results in 2020. First experiences suggest that the complexity of the patient-level costing system requires more time for implementation at hospital level than initially planned.

Source: reference (46)

Box 9. A mix of imported and locally-developed case-group weights in Estonia

In 2001, the Estonian Health Insurance Fund (EHIF) decided to implement a DRG payment system and to adopt the NordDRG system.

In order to develop and calculate case-group weights that are country-specific, two approaches were pursued. The first one was to calculate case-group weights based on existing fee-for-service tariffs. Claims with fee-for-service information were available in digitalized form for all hospitals since 2000. DRG case-group weights were calculated on the basis of data from January to June 2003. Since tariffs include all cost categories (personnel, consumables, overheads and capital costs) and providers are allowed to charge only the official co-payments from the patients, these data gave a good approximation of relative costs. The second approach was to use the case-group weights from the American Health Care Financing Administration (HCFA) DRG variant.

Simulations with data sets for both methods were undertaken and discussed with the DRG Advisory Committee in 2003. This recommended to use Estonia's own case-group weights, except for DRGs with a low case number (less than 30) for which the HCFA weights should apply.

DRG payments were then partially introduced in 2004. The DRG base rate was calculated using the overall available budget, thus assuming budget neutrality. DRG payment rates are not differentiated by hospital type. Teaching hospitals receive the same base rate as general hospitals, although their case mix index is higher since they treat relatively more complex cases. The unified base rate reflects the assumption that patients in the same DRG group should have on average the same cost, regardless of where they receive their treatment.

Until now, Estonia has continued to apply a similar methodology for DRG case-group weight calculation. This is possible because DRG payments form 70% of total claims cost, while the other 30% is still reimbursed on the basis of fee-for-service. Since 2006, fee-for-service tariffs have been calculated by using selected hospitals' cost data and applying an activity-based costing methodology.

Source: reference (47)

Calculation of the base rate

The base rate is calculated on the basis of the overall available budget for the health services remunerated through CBG and

the overall expected case mix for a specific period (generally the budget year). As the precise volume of services to be provided is

FINAL DRAFT

not known prospectively, a simple estimate is an expectation of the same volume as provided in the previous year. The formula

used for calculating the base rate is as follows (4):

$$BR_t = \frac{Budget_t}{\sum_h Cases_{h,t-1}}$$

where BR_t = base rate for the time period t

$Budget_t$ = available overall budget for services to be paid by CBG in time period t

$Cases_{h,t-1}$ = total number of cases at provider h during the time period t-1 (previous year).

A detailed description with examples of how to calculate relative case-group weights and base rates can be found in:

Langenbrunner J, Cashin C, O'Dougherty S. **Designing and implementing health care provider payment systems: how-to manuals**. Washington (DC): The World Bank; 2009: 159–70

(<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf>, accessed 28 September 2019).

3.6. WHICH DATA ARE NEEDED TO CALCULATE CASE-GROUP WEIGHTS AND HOW CAN THESE DATA BE GENERATED?

Data needs

To calculate case-group weights, the average cost of treating a case within every case group must be determined. While all cost information is useful, it is specifically required for the cost categories that are included in and paid by the CBG system.

Table 4 provides an overview of data requirements and possible data sources for different types of case grouping – i.e. complexity levels of CBG systems. Box 10 outlines how the collection of cost information is being gradually institutionalized in the Philippines.

FINAL DRAFT

Table 4. Cost information required and sources of information for different case grouping systems

Type of case grouping	Data requirements	Data sources
No case grouping (flat case payment)	Average cost per case across all providers covered by the CBG system	Historical provider budgets, other provider expenditure and utilization data
Case-based grouping which distinguishes only between different departments or clinical specializations	Department average cost per bed-day; department length of stay	Provider budgets and cost-accounting system/analysis; other provider expenditure and utilization data
Case-based grouping which includes subgroups for different departments or clinical specializations, but which is still less complex than a DRG system	Department average cost per bed-day; patient-level treatment cost disaggregated by diagnosis and/or procedure; length of stay and other characteristics of the case/patient depending on those variables used for defining the case groups	Provider budgets and cost-accounting system/analysis; patient-level data on age, sex, ICD code for primary diagnosis, length of stay, surgery and other characteristics of the case (such as intensive care, procedure, type of bed, type of discharge)
Diagnosis-based grouping	Department average cost per bed-day; disaggregated by diagnosis; length of stay and other characteristics of the case/patient	Provider budgets and cost-accounting system/analysis; patient-level data on age, sex, ICD code for primary diagnosis, length of stay, surgery and other characteristics of the case (such as intensive care, procedure, type of bed, type of discharge).

Source: Reference (4).

Box 10. PhilHealth’s plan to institutionalize the collection of cost information

The Philippine Health Insurance Corporation (PhilHealth) started its reflection and development of a DRG payment system in 2009 in order to move away from fee-for-service payments. However, one major challenge was the lack of detailed and disaggregated cost information to inform relative case-group weights. Collection of cost data started in 2009 using a top-down costing tool. However, these costing studies were not systematically conducted. Data collection was further impeded by a lack of electronic data collection, the absence of national standards for hospital accounting, reluctance of providers to provide transparent information and limited capacity and experience in conducting costing studies.

Ten years later, in 2019, the PhilHealth Board approved a long-term comprehensive plan with the objective of institutionalizing the collection, analysis and policy use of cost information. The plan includes three major pillars, namely:

FINAL DRAFT

Box 10. (Contd.)

First, PhilHealth has compiled a costing toolkit which includes data collection forms, training manuals, communication templates to facilitate information exchange between local PhilHealth offices and providers, and evaluation forms. These standardized tools will allow for collecting comparable data across health-care providers.

The second pillar consists in the institutionalization of the cost information collection and validation process. Providers have to submit cost information regularly and this requirement is part of accreditation standards and the provider contract. The submitted data will be analysed by PhilHealth in collaboration with academic or research institutions so as to develop and update cost weights. It will also be fed into a dialogue between PhilHealth, the Department of Health, providers and patient representatives. This can contribute to reflections on the affordability of the benefits as well as provide information about the quality of health services. Moreover, it can serve as feedback to providers and can enable communication regarding the results of the data analysis for mutual accountability between PhilHealth and providers, and the joint definition of priorities.

Finally, the third pillar focuses on strengthening IT systems and capacities to automate and reduce as far as possible the reporting burden.

The implementation of the costing information collection plan is anticipated for 2020. This will allow PhilHealth to collect cost information from providers routinely in order to develop case-group weights as a crucial element of a DRG payment system.

Melanie Coronel Santillan

Generating cost data

Data are ideally collected from the cost-accounting system at hospital level which enables the treatment cost per patient to be identified and, if needed, facilitates the allocation of indirect costs incurred by hospitals to individual cases. Such detailed information may often not be collected routinely, especially prior to the roll-out of a CBG system. Some form of cost estimation or modelling may therefore be needed (29). The quality and granularity of available cost data are likely to increase over time while capacities and methodologies for the collection of cost data become institutionalized. The

use of cost information for payments will incentivize providers and purchasers to improve data quality. The approaches below outline different methods for generating costing data. A combination of these approaches can be an effective way of closing data gaps.

Introduction of cost-accounting systems in a sample of providers. Although it allows for cost information to be collected routinely, introducing a cost-accounting system that enables patient data to be linked to cost data at the necessary level of disaggregation can be costly. Some

countries chose to implement such a system only in a sample of providers which receive a compensation payment for the additional administrative burden. The sample should be representative so that the data collected will provide adequate information for designing and updating payment rates (37).

Costing studies. Costing studies can be conducted if data are lacking or if the information available from routine data collection is incomplete. Again, the provider sample for the costing study must be representative of all providers that will be included in the payment system.

Recommendations on how to do costing studies can be found in:

Langenbrunner J, Cashin C, O'Dougherty S. **Designing and implementing health care provider payment systems: how-to manuals.** Washington (DC): The World Bank; 2009: 159–70 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf>, accessed 28 September 2019).

Özaltın A, Cashin C, editors. **Costing of health services for provider payment: a practical manual based on country costing challenges, trade-offs, and solutions.** Arlington (VA): Joint Learning Network for Universal Health Coverage; 2014 (http://www.jointlearningnetwork.org/uploads/files/resources/JLN_Costing_Toolkit_Interactive_FINAL.pdf, accessed 28 September 2019).

Use of fee-for-service payments. If fee-for-service payments are replaced by a CBG system, the existing fee schedules can be used to estimate the costs of different case groups. This avoids costly collection of cost data through specific studies. However, it should be considered carefully because fee-for-service payments may include historical inefficiencies. In a first phase this might limit the cost-containment potential of the CBG system, but CBG payments that are similar to previous rates can also facilitate acceptance of the new system by providers. For example, Estonia, and Thailand used fee-for-service rates as a starting point for developing relative cost weights (28, 47).

Importing cost assumptions from an existing grouper. This option is available

when a country imports a grouper that includes relative case-group weights. These assumptions can be used when introducing the system and can then be gradually finetuned. The importing country should then make adjustments with a focus on the most frequent cases or the main drivers of treatment cost (12). It is important to undertake impact assessment to explore the impact and identify if further adjustments are needed.

Regardless of which method or mix of methods is used to generate cost data for the design of the CBG system, cost assumptions and calculations must be constantly updated to reflect changes in cost structures, innovations and the introduction of new technologies.

FINAL DRAFT

3.7. WHICH ADJUSTMENT FACTORS CAN BE CONSIDERED TO MODULATE THE CBG PAYMENT?

The basic idea of a CBG system is to pay the same for each case within the same group. However, adjustment factors can be used to raise or lower CBG payments to compensate for factors which cannot be captured by the classification system itself (8, 12), such as the remoteness of a health facility or other specifics. The adjustment factors can be considered as additional coefficients in the formula to determine the case payment (22), and must align with policy objectives. The following adjustment factors are found in practice:

Geographical criteria: Regional differences within countries (e.g. differences in prices or transport distances) result in different input costs for providers. A purchaser may also want to encourage service provision in remote areas or compensate for lower provider income resulting from lower utilization rates in sparsely populated areas (22). These differences can be addressed with a geographical adjuster.

Equity criteria: Providing treatment to patients who belong to defined vulnerable population groups can be more resource-intensive. To improve equity in access to health services, regulators or purchasers might want to offer financial incentives to providers to treat such patients. For instance, in the Australian hospital payment system an adjustment factor is added to provide higher payments for services provided to indigenous Australians (49).

Provider level adjustments: Some systems might apply different payment rates for different providers. For instance, there could be higher rates for hospitals using more specialized technologies or equipment. Adjustment factors could also serve to compensate teaching hospitals for their teaching activities, which are difficult to reflect in a CBG payment system classification. However, such adjustment coefficients, if not carefully designed, may create the wrong incentives. If secondary or tertiary facilities receive higher payments for simple treatments which can be provided at lower cost at lower-level facilities, there is less incentive for providers to direct patients to lower-level facilities (7). Such adjustment factors might also encourage providers to invest in high-tech equipment to obtain higher payments.

Hospital-specific adjustments: When a CBG payment system is introduced, some hospitals might face significant reductions in their revenues; for instance, their previous overall budget might have been higher than the CBG payment system's remuneration for their activity level. Specific hospital adjustments can be used for an interim period (with a clear phasing-out plan) to ensure that the hospital's income under the new CBG system does not diverge too much from its previous level of funding. However, the hospital-specific adjustments should not become permanent as this would undermine the objective of the CBG system (22).

FINAL DRAFT

3.8. SHOULD CBG PAYMENTS BE LINKED TO A VOLUME OR BUDGET CAP AND, IF SO, HOW?

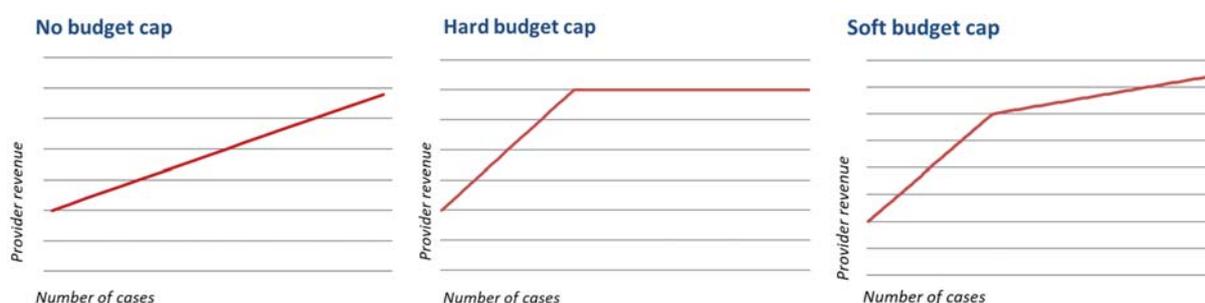
The shift to a CBG payment system creates incentives to increase the number of cases and can therefore escalate expenditure. In this regard, several approaches exist to share the financial risk of increased case numbers between purchasers and providers.

The first approach is to set payment rates per case prospectively and to apply a volume cap or a budget cap. This cap is

based on how much can be covered with the available budget. Purchasers and providers need to negotiate this cap in advance during the contracting process (24, 29).

Figure 5 illustrates how total revenue per provider develops under prospective setting of payment rates and in various scenarios with and without a volume or budget cap.

Figure 5. Link between volume of services and provider revenue for different arrangements regarding budget caps



Source: Authors' compilation based on references (14, 24).

When there is **no volume/budget cap**, the provider revenue increases without limit with the number of cases treated.

Under a **hard budget or volume cap**, any cases that exceed the agreed budget cap per provider within a budget period will not be reimbursed. Providers have an incentive once the cap is reached to limit cases or ration services by creating waiting lists or making referrals. The financial risk associated with higher-than-expected volume lies with the provider (24).

Under a **soft budget cap**, additional services will be reimbursed but at a lower payment rate; the base rate is also commonly reduced in the case of DRGs. The payment rate can be set so that it is slightly below, equal to or above the marginal costs for treating a case. To encourage providers to limit the number of cases they treat, the rate would have to be equal to or below the marginal cost for treating the service. The financial risk of higher-than-expected volume is shared between provider and purchaser (24).

FINAL DRAFT

More information on setting soft budget caps can be found in:

De Lagasnerie G, Paris V, Mueller M, Kumar A. **Tapering payments in hospitals – experiences in OECD countries**. Paris: Organisation for Economic Co-operation and Development; 2015 (OECD Health Working Paper, No. 78; https://read.oecd-ilibrary.org/social-issues-migration-health/tapering-payments-in-hospitals_5js4h5rlkxxr-en#page6, accessed 28 September 2019).

The second approach is to set payment rates retrospectively and to adjust payment rates in order to cover with the available budget the entire volume of services that have been provided. Providers collect points that reflect the relative severity of the cases treated. At the end of the budgeting period, usually the budget year, the available budget is divided by the total of points accumulated by all providers covered by the payment system in order to determine the base rate (24). This point system is used, for instance, by the Universal Coverage Scheme in Thailand (51).

A third option is to use the CBG payment rates and expected volume or the case mix index as the basis for setting a **prospective fixed budget** covering a defined period. While this is a way to inform the budget-setting process, it in fact becomes a cap. Importantly, the budget will not be adjusted

in line with the actual volume or case mix of services provided. The provider will bear the financial risk of higher activity levels but will also keep any savings if the activity is lower than expected. When the budget is set, case volumes from previous years are taken into account in order to weaken the incentive to reduce the number of cases (e.g. by rejecting or referring patients, or cream-skimming for patients with less severe cases) (24).

Whichever budget or volume cap approach is chosen, the predictability of the budget is important for both providers and purchasers. Tight budgets may make providers look for other income such as balance billing or informal payments. Strong administrative controls and monitoring are therefore needed to minimize such practices, as noted in Section 4.3 and Section 4.5.

More country examples on budget and volume caps can be found in:

Busse R, Geissler A, Quentin W, Wiley R, editors. **Diagnosis-related groups in Europe moving towards transparency, efficiency and quality in hospitals**. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 28 September 2019).

FINAL DRAFT

4. IMPLEMENTATION, MONITORING AND CONTINUED REVISION

This section highlights questions about implementation that must be addressed during the pilot and implementation phases.

4.1. WHAT CHANGES ARE REQUIRED AT PROVIDER LEVEL WHEN INTRODUCING A CBG SYSTEM?

Introducing a CBG system usually requires significant adjustments to financial management systems and procedures at provider level, including in information

collection, claims management and human resource management. Specific training may also be needed to support providers.

Adaptations in financial management

Changes in financial flows to providers may be significant, especially if CBG payments mean that providers are to be paid by outputs. Where the CBG payment system replaces input-based budget allocations, providers will have to modify their internal budgeting and financial procedures. However, providers may still have to develop budget plans and report expenditure following input-based budget structures. In

contrast, a shift from fee-for-service to CBG payments might require fewer adaptations in financial management. With more detailed information on hospital activity, the facility management might still be able to reshuffle resources to better reflect the workload of each department. Facility managers have to be able to lead such transformations without risking disruptions in service provision (30).

Modifications to the provider's data collection and information management systems

The CBG classification algorithm may require data that are not yet collected by providers or data at levels of disaggregation

not yet available. However, clinical and patient data elements of sufficient quality are needed for many purposes in

FINAL DRAFT

addition to implementing a CBG system. The introduction of a CBG payment system should not lead to a situation where providers focus only on collecting information on those variables or codes that influence payment rates at the expense of a more comprehensively documented patient history. The introduction of CBG payments can incentivize data collection (4).

When a grouper software is used, data collected through hospital information management systems must be interoperable

with the software. The adaptation may entail significant cost. If not already used by providers, computerized (information) management systems can be developed and introduced in parallel to ensure that data are standardized and respond to the needs for medical documentation on patient cases, reporting on health statistics, hospital management and claims processing. Developing a separate system that serves only the CBG increases the reporting burden of providers and should be avoided (4).

Changes in human resource management and the need for training

The introduction of new reporting procedures requires changes to administrative processes. Purchasers and providers will have to provide training to ensure that staff are familiar with the new system. Training topics include DRG system design and grouping algorithms, the use of primary classifications, coding standards and rules, coding quality, reporting, and DRG-specific performance monitoring (28). Providers may also hire specialized coders

whose role is to extract the necessary information from medical records and to code it as required by the classification system. Coders will relieve doctors and nurses of these administrative tasks. Likewise, regular training, with feedback, is needed to improve the quality and accuracy of coding (7). Box 11 the measures taken for introducing ICD-10 in the Philippines and the need to train and retain coders.

Box 11. Introduction of ICD-10 in the Philippines and training measures

The Philippines Department of Health decided in 1998 to introduce ICD-10 as a patient classification system in hospitals and registries in order to improve the quality of morbidity and mortality statistics from health-care providers. Various measures were introduced to accompany this process:

- 1. A national ICD-10 Technical Working Group was created in 1999 consisting of representatives from the Department of Health, the Philippine Statistics Authority, PhilHealth, the Association of Philippine Medical Colleges, the Association of Municipal Health Offices of the Philippines and selected hospitals. The composition of this working group has since been revised to include other offices that are involved in generation of health statistics.*

Box 11. (Contd.)

2. *Various training courses for different target groups were developed to build up capacity to implement ICD-10. The ICD-10 Training of Trainers is a two-week course designed for potential trainers from the Department of Health and its attached agencies. There is also a five-day ICD-10 training course for coders that is offered to medical records staff, government regulatory officers, statisticians and local civil registrars who use morbidity and mortality data, in addition to hospital coding staff. A separate three-day course was specifically designed for medical staff who are responsible for the documentation related to patient records.*
3. *Through Administrative Order No. 47 s. 2000, the Department of Health mandated the use of ICD-10 for recording all diagnoses of patients. The licensing requirements for hospitals were updated to include the full implementation of ICD-10, including procurement of ICD-10 books, use of ICD-10 in all medical records and hospital statistics and reporting, and the 5-day training course of medical records officers. PhilHealth complemented the department's Administrative Order with its own information on the use of ICD-10.*

These efforts resulted in better-quality health data. However, there remain several concerns – such as a fast turnover of trained coders (due to high demand in the international labour market) and inadequate IT infrastructure in providers' and regulatory offices. It will be important to enhance understanding among senior managers in PhilHealth and the Department of Health of, among other issues, the importance of good data quality, the need to improve monitoring and evaluation and the importance of strengthening penalties and sanctions for noncompliance with ICD-10 in order to further improve coding quality in the Philippines.

Ronald Paguirigan

4.2. HOW SHOULD THE CBG SYSTEM BE PILOTED AND PHASED IN?

The introduction of a CBG system can be facilitated by an implementation plan that clearly defines the strategy and timelines for transitioning to the new system so that purchasers and providers can prepare for changes in financial allocations.

To ensure provider buy-in and to avoid disruptions in service delivery, most

countries have chosen to phase in CBG payments gradually. This helps in managing financial risks to providers by avoiding significant changes in provider income from one year to the next. It also allows for gradual standardization of payment rates if significant variations existed prior to the introduction of CBG payments (14).

FINAL DRAFT

Various ways of phasing in and piloting can be combined.

Shadow billing or shadow budgets: If a well-functioning computerized claim system is in place and can be used for CBG claims, immediate countrywide piloting through shadow payments is possible, especially in smaller countries. Hospitals start case reporting according to the CBG system and the respective payment is calculated. During an agreed transition period, the actual payment still follows the previous provider payment method. This allows sufficient time to adjust the reporting system and to allow providers to prepare for the upcoming changes in resource allocations (6).

Gradual increase of the share of hospital income coming from CBG payments: One option is for hospital revenue to be calculated according to both the case-based payments and the previous payment method. Initially a limited part of the case-based hospital budget (e.g. 20%) will be paid, while the remaining payment (e.g. 80%) is allocated according to the previous payment method. The proportion of the budget based on CBG payments is then gradually increased (14). A second option is to pay different base rates per hospital or group of hospitals in order to avoid abrupt changes in hospital income. The base rates will then converge over time (28). This is different from covering only certain cost items using CBG payments as discussed below. Here, payment calculation and financial management rules apply equally to the whole budget and there is no distinction between cost items.

Extension of geographical coverage: The CBG system is piloted in one region only or in a limited number of hospitals. This geographical sample should be large enough to draw general lessons and/or to adjust the system to make it applicable

to the whole country at a later stage. This can be based on voluntary participation, as was the case in the Republic of Korea, but it should be noted that voluntary participation has the risk that self-selection may lead to a biased, nonrepresentative sample (14).

Piloting CBG payment for one level of hospital only: In this option the CBG system applies only to providers at a certain level of care, for example secondary health services only, or tertiary care only. This approach makes it more difficult to include other hospital levels at a later stage because cost structures tend to differ between levels of care. In addition, it may lead to different payments for different levels of facilities which is not in line with the CBG principle of paying the same amount for all cases in the same case group. This approach also carries the risk that providers may try to avoid treating patients by referring them without sufficient justification.

Extension of hospital activities covered: CBG payments can also be applied to a limited number of diagnoses and/or procedures – e.g. those with long waiting times or priority health services, as these would be services for which the purchaser wants to encourage increased provision. However, under this option, providers have an incentive to shift patients from services not covered by CBG to services covered by CBG if the latter are better remunerated (14).

Extension of cost items covered: Some CBG systems initially cover only the cost of consumables and medicines, and/or operational costs. Additional cost items – such as salaries, hospital administration costs or equipment – can be gradually included over a defined time period. This approach helps to strengthen the management capacity of providers over time. It is a useful approach in settings

where providers have limited management capacity and where an easy-to-administer system is needed. However, the approach limits the effects by which a CBG system can trigger a restructuring of the provider market, although this may be an objective of the payment reform (14).

Extension of population groups covered or piloting with one scheme only: The CBG payment system can be piloted for the treatment of patients covered under

a specific scheme (as was the case in Thailand (35)) or for patients with specific characteristics (i.e. patients over 70 years). The design of the pilot should avoid creating incentives for cream-skimming of patients by providers (14). This option should be considered carefully as it carries a high risk of discrimination against patients whose treatment is covered by a less attractive payment system.

4.3. HOW CAN ONE COUNTER INHERENT PROVIDER INCENTIVES CREATED BY CBGS?

CBG payments create incentives for providers to increase the number of cases. This can lead to cost escalation or to the provision of high volumes of non-priority or unnecessary services. CBG payments can also incentivize under-provision of cases (52).

Table 5 provides an overview of administrative measures to address these

problems. Three types of administrative measures can be identified: budget or volume caps (for more information see Section 3.8), regular revisions of the CBG system (for more information see Section 4.5), and direct control mechanisms (i.e. monitoring and auditing) which are further outlined below.

Monitoring of key indicators

When providers have incentives to reduce the number of inputs per case, the quality of care can be compromised. Consequently, there will be a need to monitor quality-related indicators which commonly include length of stay, survival rates after 3, 6 or 12 months, and/or readmission for the same diagnosis. Performance in relation to

these indicators can be linked to payments where the information management system allows. In several countries, frequent monitoring was established at the beginning of CBG introduction, including making key indicators publicly available on the purchaser's website (28).

FINAL DRAFT

Table 5. Unintended consequences of CBG payment systems and measures to address them

CBG incentive	Control measures
Upcoding	<p>Use a sufficient number of case groups to allow for economically homogenous grouping and ensure appropriate payment through regular updates of case classification, payment rates and relative case weights.</p> <p>Introduce a global budget for a specific case mix and volume.</p> <p>Undertake coding audits.</p>
Increase volume	<p>Introduce a hard or soft volume cap.</p> <p>Apply a reduced case rate for payments over a certain threshold.</p> <p>Introduce a global budget at regional level to allow for retroactive calculation of the base rate on the basis of the case mix of services provided by all hospitals in the region and the total budget available for the region.</p> <p>Undertake regular updates of the CBG case classification and relative weights.</p> <p>Monitor referral practice and waiting lists.</p>
Reducing quality	<p>Introduce clinical auditing to assess whether diagnosis and treatment of a sample of cases was performed according to applicable guidelines and patient pathways.</p> <p>Monitor key variables, such as length of stay, rate of readmission, mortality rates.</p> <p>Introduce specific payments for outliers, including significantly longer or shorter inpatient stays than the average length of stay for a specific treatment, and cost outliers.</p> <p>Apply a reduced payment or no payment for readmissions, comorbidities that were not encoded at admission but need very mature and well-functioning information and monitoring systems and carry the risk that comorbidities will not be treated, or patients not readmitted.</p> <p>Regularly update the CBG case classification system and relative weights.</p>
Under-provision/ avoiding costly patients	<p>In addition to the measures listed under reducing quality:</p> <p>Monitor referrals and waiting lists.</p> <p>Focus on procedure instead of diagnosis in the classification algorithm to ensure that payment is aligned with treatment.</p>

Source: Compilation based on references (4, 12, 52).

Adjusted payments for outliers

Payments can be adjusted for outliers regarding length of stay. As an example, additional payments can be allocated to complex cases with a length of stay significantly above the average, or reduced rates could apply to inpatient stays that are shorter than a certain threshold (12, 52).

Additional payments could also be allocated for cost-outliers. Some CBG systems group those cases into a pre-MDC group in the first step of their classification algorithm. Additional payments for cost outliers can also encourage the use of technological innovations which tend to be more costly.

Auditing of claims, coding practice and data quality

Checking of auditing claims, coding practice and data quality is important to reduce incentives for upcoding. For example, audits of DRG payments in France identified errors in up to 60% of medical records analysed. This level of errors, for which there are various causes, can have significant financial implications. Unclear definitions and insufficient training in coding can be reasons for disagreements on how diagnoses should be coded (12).

Some coding mistakes can be considered as fraudulent. Consequently, procedures to check data quality systematically should be in place and should include:

- automatic checks of compliance with data standards and format during data collection;

- electronic and/or manual checks to ensure data and coding coherence before payments are processed;
- retroactive evaluation and analysis of data to detect variations and outliers that may refer to coding issues.

Audit and control mechanisms require intensive capacity-building and a sufficient budget on the side of the purchaser. A sound sampling methodology is important when selecting claims to be audited since the auditing of claims, including the coding of medical records, is very expensive. Electronic and system-wide checks of claims can to a certain extent reduce the need for detailed external audits (12).

4.4. HOW CAN A CBG SYSTEM IMPROVE QUALITY IN SERVICE PROVISION?

A CBG system alone will not improve the quality of health services provided. However, countries have tried to integrate variables into their CBG system in order to incentivize providers to improve quality in service provision (23) at various entry points, namely:

At the hospital level, the payment amount per case or the adjustment factors can be linked to the quality criteria that apply to all services delivered by the provider. These payments can be made contingent upon the fulfilment of selected quality criteria of an accreditation scheme or a quality assessment framework of the Ministry of Health (23).

At the level of a CBG, the payment amount for a specific case group can be conditional on respecting specific quality or treatment guidelines for respective CBGs, with a focus on the procedural level. These could include standards related to availability of specialized medical equipment, supportive services to provide comprehensive care (e.g. onco-psychological care) or specialists. This would require specific treatment guidelines and/or identification of best practices. It would also be more difficult to monitor as the purchaser would have to rely primarily on self-reporting by the provider. As a result, such measures are not applied frequently. One example is from Germany, where a health insurance

FINAL DRAFT

fund pays higher rates for coronary bypass surgery if the treatment scores higher than average on quality indicators that are part of the German external quality assurance system (23).

At the individual patient level, the payment amount linked to a (patient) case will be adjusted according to defined quality criteria. The most common example is a reduced payment – or even none – for readmission under the same CBG within a certain time frame or nonpayment for comorbidities that were not recorded at admission and are therefore assumed to result from treatment (23). These quality criteria are thus primarily linked to outcomes.

Including quality criteria in the design of the CBG system requires additional data to be collected. This can be easier at the provider level, but more detailed information is needed to introduce such a mechanism for a specific CBG or at patient level. Again, strong information management systems

will be needed. CBG payments have the potential to incentivize this additional data collection but monitoring and auditing mechanisms must be in place to ensure data accuracy (23).

An important question is how to pay for treatments based on technological innovations that improve quality and how to induce their adoption. CBG payments will only encourage providers to adopt technological innovations in treatment if these reduce the cost per case. However, if providers wish to adopt technological innovations that have a beneficial impact on treatment quality but are more costly than conventional treatment, supplementary or separate payments or adjustments in the CBG system may be applied to cover the higher cost. If a CBG system is updated frequently, new diagnostic and treatment options can be reflected through additional case groups or adjusted relative weights (30).

4.5. HOW AND HOW OFTEN DOES A CBG SYSTEM NEED TO BE REVISED?

A CBG system needs continuous review and adjustment to take account of changes in clinical processes and consumption of resources. This review process also allows for further finetuning of the classification system and classification algorithm, and for further adjustment of case group weights and tariffs, including the base rate. Moreover, a review can also help decrease the scope for upcoding. This may lead to changes in the number and definition of case groups and the relative cost weights. In addition, changes may be needed

that go beyond the CBG system, such as adaptations to the data collection system, the reporting system or regulations related to the implementation of the CBG system (12, 32).

It is helpful to establish a specific body or committee to take charge of the revision process and to propose and adopt adjustments. This committee should include at the minimum purchaser and provider representatives. It is important to have clear rules and procedures for

adjusting case classifications, creating new case groups, or removing groups if they are not appropriate. Clear rules help ensure transparency in the design and revision of the CBG system and avoid the process being taken over by interest groups. Most countries have created a “case mix centre” under the Ministry of Health or the purchasing agency, or as an independent agency, to be in charge of updating the classification algorithm. Thailand, for instance, has a case mix centre under the Ministry of Health which regularly proposes updates to the country’s DRG system (28). A case mix centre can also be involved in costing studies.

If there is no routine data collection process to generate information on changes in the average cost per case within a given group or changes in cost structure, regular costing studies will be needed. Given the time it takes to collect, compile and analyse data, most revisions of relative case weights are based on data which are between one and three years old (32).

In most cases, patient classification systems are updated when necessary. Revisions in classification systems may include updates to the diagnosis classifications such as ICD-

10 country-specific variations or procedure classifications. These changes must also be reflected in the classification algorithms and grouper. Several CBG systems have a process of annual updating, such as those of Thailand or the Nordic Casemix Centre which maintains the classification system and algorithm used in several northern and eastern European countries. In the latter, member countries can submit proposals for the creation, merging or removal of case groups (53).

In general, there is pressure from providers to increase the number of groups over time and to introduce specific mechanisms to ensure that high-cost services are paid at higher rates. However, an increased number of case groups does not necessarily improve the CBG system. Indeed, a CBG system with many more case groups can be more difficult to manage, especially from a purchaser’s perspective, as verification of the right classification of cases tends to become more cumbersome. Consequently, various countries also remove case groups that are not used or may merge cases in order to reduce the number of overall case groups (5).

4.6. HOW SHOULD ONE INFORM THE PUBLIC ABOUT CHANGES IN PAYMENT METHODS AND BILLING PRACTICES?

Information to the general public should focus on the issues that affect patients. Patients must be informed about and understand their entitlements and obligations, including co-payment requirements, whether balance billing is allowed and which referral and gate-keeping rules apply. Patients who understand their rights and obligations can also contribute to checking provider compliance (e.g. they

can report providers who engage in balance billing through complaints mechanisms where they are in place).

Agencies in charge of CBG development might also invite public comments on draft documents which they make available on their website, as is the case in Australia and the United States. Publishing performance and monitoring indicators can also facilitate

engagement by the general public (28). Purchasers can distribute information on the new payment method through existing channels, including websites, telephone hotlines, national and local media, as

well as distributing information materials to providers and local authorities. The measures taken in Thailand to inform the public about the country's health coverage scheme are described in Box 12.

Box 12. Information provision to the public on the Universal Coverage Scheme, its benefits and payment system in Thailand

In 2001, Thailand introduced the Universal Coverage Scheme (UCS), a health coverage scheme for all citizens outside formal sector employment funded from general government revenues. The UCS introduced DRG payments for inpatient care. The National Health Security Office (NHSO), in charge of operating the UCS, recognized the need for effective communication with all stakeholders and used various channels to support smooth implementation from the beginning.

The launch of the UCS was publicized through the slogan "30 Baht treats all diseases". "30 Baht" (less than US\$ 1) refers to the co-payment per visit or per admission at health facilities, while "treats all diseases" describes the comprehensive benefit package covering all diseases, except for a few treatments (e.g. antiretroviral treatment, renal replacement therapy). The list of excluded health services was broadcast widely through multiple channels such as television, radio, newspapers and the Internet.

In parallel, providers at subdistrict level were required to register eligible members through a door-to-door census. These measures made the UCS widely known to eligible persons, health providers and the general public. Health facilities were further informed about the new payment method through workshops, meetings and official instructions published in the Royal Thai Government Gazette.

Another measure was to institutionalize mechanisms for which health-care providers' and citizens' voices are heard and concerns are rectified. For instance, the NHSO conducts technical hearings with providers before an upgraded DRG version is implemented. DRG manuals are published on the NHSO website and in paper. For providers, in addition to an annual meeting with health-care providers on operational details of the UCS, the NHSO also established a helpdesk reachable both by telephone and online to provide clarifications related to capitation and DRG payments. Beneficiaries can reach the NHSO through a 24/7 call centre to obtain information on their benefits and rights under the UCS and to receive assistance to resolve conflicts with providers. Moreover, the NHSO collects feedback from providers and UCS members during annual public hearings, as mandated by law. Finally, broadcasting of rights and entitlements linked to the benefit package continues through multiple channels, including new platforms such as YouTube, Facebook, Instagram and on the NHSO's own mobile application.

In sum, easily understandable messages, clear instructions, real-time support for both beneficiaries and providers, as well as the use of multiple communication channels, were crucial for smooth implementation of the UCS and for adoption and acceptance of the new payment methods.

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CONCLUDING REMARKS

Using case-based groups for information and payment is one instrument for moving towards strategic purchasing. However, the effects of a CBG system strongly depend on the system's design and how well it aligns with the overall health system.

The following points must be considered throughout the processes of design, pilot, implementation and monitoring:

- Policy-makers and practitioners should critically reflect whether the problems of health-system performance can be addressed with the envisaged payment reform – i.e. the introduction and operation of a CBG system.
- When setting the objectives to be achieved by operating a CBG system, one must consider whether the proposed design of the CBG is appropriate for maximizing these objectives or whether alternative design features may be more appropriate.
- The introduction and operation of a CBG system should be part of a longer-term strategy with clear objectives supported by an implementation plan that includes intermediate steps, responsible bodies and timelines.
- A CBG system should be updated continually to ensure that it fits the respective health system context. Administrative measures – including control – need to be in place to address any expected undesirable effects of a CBG system.
- There should be continuing assessment of whether the key stakeholders – i.e. the Ministry of Health, the purchaser(s) and the providers – have the required capacities and, if not, how these capacities can be generated.
- Policy-makers need to evaluate whether the proposed design of the CBG system is in line with the capacity of the health information management system.
- Policy-makers and practitioners should ask whether supporters and opponents of the CBG have been identified and whether strategies have been developed to address any concerns.
- Integrated people-centred care and the objectives of universal health coverage must remain at the heart of the CBG, and any risk that the economic objectives of purchasers and providers take priority over patients' needs must be constantly mitigated.

FINAL DRAFT

GLOSSARY

This glossary is reproduced from: Cashin C, editor. Assessing health provider payment systems: a practical guide for countries working toward universal health coverage. Washington (DC): Joint Learning Network for Universal Health Coverage; 2015. There are a couple of terms included from other sources. For those entries, the source is referenced directly in the text.

adjustment coefficient. A coefficient applied to the base payment rate to adjust payment for the cost of meeting the health-service needs of different population groups or legitimate cost differences related to specific provider characteristics (e.g. being located in a rural or remote area or serving as a teaching facility).

average length of stay. The average number of bed-days (inpatient days) for each patient discharged from the hospital. The average length of stay can be calculated for an entire facility, a department, or a diagnosis-related group classification.

balance billing. The practice of a health-care provider charging a patient for the difference between what the purchaser agrees to pay for the service and what the provider chooses to charge.

base rate. The average payment rate paid by the purchaser to the provider per unit of service, bundle of services, or registered individual.

bed-day. A day during which a patient stays overnight in a hospital. Also referred to as an inpatient day or patient day.

blended payment system. A payment system that combines elements of multiple payment methods to maximize the beneficial incentives (and minimize the perverse incentives) of each. Also called a mixed-model payment system.

bundled service payments. The allocation of a fixed payment to a health-care provider to cover all services, tests and procedures grouped into a higher aggregated unit (e.g. a service package or hospital discharge) rather than payment for each individual service.

capitation payment. A payment method in which all providers in the payment system are paid a predetermined fixed rate in advance to provide a defined set of services to each individual enrolled with the provider for a fixed period. Also called per capita provider payment.

case-based payment. A hospital payment method that pays hospitals a fixed amount per admission or discharge, depending on the patient and clinical characteristics, which may include department of admission, diagnosis and other factors. The payment rate covers all tests, procedures and other services provided during the hospital stay. If the cases are grouped according to diagnosis, it is a case-based diagnosis-related group (DRG) payment method.

case group. A group of hospital cases defined for a case-based hospital payment system that includes cases with similar clinical characteristics and that require similar resources to diagnose and treat cases or complete a phase of case management.

case group weight. A measure that reflects the relative use of resources linked to a specific case group in comparison to the overall average for all case groups. It is calculated by dividing the average cost per case in a given case group by the global average cost per case. It reflects the resource intensity of diagnosing and treating cases in the case group relative to the average (54).

case mix. The average relative complexity and resource intensity of services required to diagnose and treat patients in a hospital due to diagnosis, disease severity and personal characteristics such as age.

FINAL DRAFT

classification algorithm/grouper. An algorithm that assigns hospital cases to groups with associated relative case weights to calculate case mix or final payment rates for each case in a case-based hospital payment system. The grouper is often accompanied by a computer program, grouper software, to run the algorithm automatically.

comorbidity. A condition that is not related causally to a patient's principal disease process but increases a patient's total burden of illness (54). It is also reflected through secondary diagnoses.

cost. The value of resources (inputs), expressed in monetary terms, used to produce a good or service, carry out an activity, or achieve a goal.

cost accounting methods. Methods that use accounting principles to classify and measure all costs incurred in producing a good or service, carry out an activity, or achieve a goal.

cost item. An input, or resource, used by providers to deliver health services to which costs are attached. Cost items include both capital and recurrent items.

diagnosis-related group (DRG). A classification of hospital case types into groups that are clinically similar and are expected to have similar hospital resource use. The groupings are based on diagnoses and may also include procedures, age, sex and the presence of complications or comorbidities. DRGs are an example of a system of case groups and relative case weights. See also case-based payment.

fee-for-service provider payment. A payment method that pays providers for each individual service provided. Fees or tariffs are fixed in advance for each service or bundle of services.

fixed-fee schedule. The list of fees or tariffs set in advance in a fee-for-service payment system.

formula-based payment calculation. Calculation of payments to providers based on a transparent mathematical formula with predefined parameters rather than the use of fixed tariffs or other non-formula bases.

global budget provider payment. A payment method that allocates a fixed amount to a provider for a specified period to cover aggregate expenditures to provide an agreed-upon set of services. The budget can be used flexibly and is not tied to specific line items for input expenses (e.g. personnel, medicines, utilities).

hard budget cap. Total amount of resources allocated to the health sector, or a subsector such as the hospital sector or all facilities paid using CBG, which serves as a firm limit on expenditures in that sector during the budget period, which means that budget or volume overruns will not be compensated (54).

health purchaser. An entity that transfers pooled health care resources to providers to pay for covered health-care goods, services and interventions. Purchasers can include health ministries, social insurance funds, private insurance funds and other entities that manage health funds on behalf of the population.

health purchasing. The allocation of pooled resources to health-care providers on behalf of the covered population to pay for covered health-care goods, services and interventions.

incentive. An economic signal that directs individuals (e.g. health workers) or organizations (e.g. health provider institutions) toward self-interested behaviour. The incentives created by a provider payment system will affect provider decisions about the services they deliver, how they deliver them, and the mix of inputs they use for delivery.

input. A resource (e.g. personnel time, supplies, equipment) that is used to produce a good or service, carry out an activity, or achieve a goal.

International Classification of Diseases (ICD). A tool for recording, reporting and grouping conditions and factors that influence health, medicaments, infectious agents, severity, substances, buildings, devices and all aspects relevant to the description of injuries. The purpose of the ICD is to allow the systematic recording, analysis, interpretation and comparison of mortality and morbidity data collected in different countries or areas and at different times and across all sectors of the health system, for epidemiology, case mix, patient safety, primary care and much more. The classification system is currently in its 11th edition (ICD-11) and is published by the World Health Organization (55).

major diagnostic category (MDC). A broad category of diagnoses generally based on organ systems or disease etiology that is generally associated with a particular medical specialty. MDCs cover the whole range of the ICD (54, 56).

line-item budget provider payment. The allocation of a fixed amount to a health-care provider for a

FINAL DRAFT

specified period to cover specific input costs (e.g. personnel, medicines, utilities).

outlier case. Extreme case which falls outside predefined limits for cost or length of stay. The outlier case threshold is sometimes called the trim point (54, 56).

output. The result of a production process – a good or service, a completed activity, or an achieved goal. See also unit of payment.

payment cap. A limit on the total payments to a provider or group of providers under a payment system.

per diem provider payment. A payment method that pays a fixed amount per inpatient day to hospitals for each admitted patient. The per diem rate may vary by department, patient, clinical characteristics, or other factors.

prospective payment. Payment system in which rates are set in advance and/or providers are paid before services are delivered.

provider autonomy. Decision rights of a health-care provider to make key management decisions such as those related to staffing, salaries and bonuses, use of other inputs, physical assets, organizational structure, resource mobilization, output mix and use of surplus revenue.

provider benchmarking. Comparing the performance of health-care providers to average performance or against high performers, using specific indicators or measures.

provider payment. The allocation of resources to a health-care provider to deliver the covered package of health-care goods, services and interventions to the covered population.

provider payment method. The way in which a purchaser pays health-care providers to deliver a service or set of services. A provider payment method is defined primarily by the unit of payment. See also unit of payment.

provider payment rate. The amount of money that a purchaser pays to a provider to deliver a service or set of services under the payment system.

provider payment system. One or more payment methods and all supporting systems, such as contracting and reporting mechanisms, information management systems and financial management systems.

public financial management system. The rules governing how public budgets are created, disbursed and tracked.

rate-setting. The process of determining provider payment rates.

relative case weight. A coefficient applied to the base rate in a case-based hospital payment system to adjust the payment for a case upward or downward to reflect the cost of treating cases in a particular group relative to the average cost per case for all cases. Used to calculate case mix. See also case mix.

relative cost. The cost of a good or service as it compares with the cost of other goods and services, expressed in terms of a ratio between two costs or between one cost and a weighted average of all other goods or services available.

soft budget cap. The amount of financial resources allocated to the health sector, or subsector such as hospitals or facilities paid using CBG, which serves as a target, although providers are compensated for overruns if expenditures or volume of services provided exceed the predefined target of the budget period (54).

unbundling of services. The practice of reporting ungrouped individual service components (e.g. hospital discharge that is ungrouped into bed-days and into all tests and procedures) instead of the related aggregate case in order to charge or claim reimbursement for each unit rather than the higher-level “bundled” unit (54).

unit of payment. The unit of output for which a health-care provider is paid under the payment method – per service, per visit, per case, per bed-day, or per person per year.

universal health coverage. Ensured access to essential health services for an entire population without risk of financial hardship or impoverishment.

upcoding. The often fraudulent practice of coding hospital cases so that they are assigned to a case group that is reimbursed at a higher rate or has a more advantageous relative case group weight than the case group to which the case actually belongs based on the observed clinical characteristics of the case (54).

FINAL DRAFT

REFERENCES

1. Mathauer I, Dale E, Jowett M, Kutzin J. Purchasing health services for universal health coverage. How to make it more strategic? Geneva: World Health Organization; 2019 (Health Financing Policy Brief, No. 6, accessed 29 September 2019).
2. World health report. Health systems financing: the path to universal coverage. Geneva; World Health Organization; 2010).
3. Mathauer I, Dkhimi F. Analytical guide to assess a mixed provider payment system. Geneva: World Health Organization; 2019 (<https://apps.who.int/iris/handle/10665/311020>, accessed 13 September, 2019).
4. O'Dougherty S, Cashin C, Samyshkin E, Ibraimova A, Katsaga A, Kutanov E et al. Case-based hospital payment systems. In: Langenbrunner JC, Cashin C, O'Dougherty S, editors. Designing and implementing health care provider payment systems. How-to manuals. Washington (DC): The World Bank; 2009 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf?sequence=1>, accessed 29 September 2019).
5. Kobel C, Thuilliez J, Bellanger M, Pfeiffer K-P. DRG systems and similar patient classification systems in Europe. In: Busse R, Geissler A, Quentin W, Wiley M, editors. Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
6. Mathauer I, Wittenbecher F. Hospital payment systems based on diagnosis-related groups: experiences in low- and middle-income countries. *Bull World Health Organ.* 2013;91:746–56A. doi: 10.2471/BLT.12.115931.
7. Mathauer I, Wittenbecher F. DRG-based payment systems in low- and middle-income countries: Implementation experiences and challenges. Geneva: World Health Organization; 2012 (<http://www.who.int/iris/handle/10665/75150>, accessed 29 September 2019).
8. Annear PL, Kwon S, Lorenzoni L, Duckett S, Huntington D, Langenbrunner JC et al. Pathways to DRG-based hospital payment systems in Japan, Korea, and Thailand. *Health Policy.* 2018;122:707–13. doi: 10.1016/j.healthpol.2018.04.013.
9. Paat-Ahi G, Aaviksoo A, Swiderek M. Cholecystectomy and diagnosis-related groups (DRGs): patient classification and hospital reimbursement in 11 European countries. *Int J Health Policy Manag.* 2014;3:383–91. doi: 10.15171/ijhpm.2014.121

FINAL DRAFT

10. Quentin W, Scheller-Kreinsen D, Geissler A, Busse R. Appendectomy and diagnosis-related groups (DRGs): patient classification and hospital reimbursement in 11 European countries. *Langenbecks Arch Surg.* 2012;397:317–26. doi: 10.1007/s00423-011-0877-5
11. Peltola M, Quentin W. Diagnosis-related groups for stroke in Europe: patient classification and hospital reimbursement in 11 countries. *Cerebrovasc Dis.* 2013;35:113–23. doi: 10.1159/000346092
12. Cots F, Chiarello P, Salvador X, Castells X, Quentin W. DRG-based hospital payment: intended and unintended consequences. In: Busse R, Geissler A, Quentin W, Wiley M, editors. *Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals.* Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
13. Geissler A, Scheller-Kreinsen D, Quentin W, Busse R. Germany: understanding DRGs. In: Busse R, Geissler A, Quentin W, Wiley M, editors. *Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals.* Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
14. Duckett S. Issues in the design and implementation of case-based payment. In: Annear PL, Huntington D, editors. *Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions.* Geneva: World Health Organization; 2015 (Asia Pacific Observatory on Health Systems and Policies, Comparative Country Studies 1:2, http://apps.searo.who.int/PDS_DOCS/B5325.pdf, accessed 29 September 2019).
15. Quentin W, Geissler A, Scheller-Kreinsen D, Busse R. Understanding DRGs and DRG-based hospital payment in Europe. In: Busse R, Geissler A, Quentin W, Wiley M, editors. *Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals.* Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
16. Arrêté du ministre de la santé n° 239-07 du 16 safar 1428 (6 mars 2007) portant approbation de l'avenant n° 1 à la convention nationale conclue entre les organismes gestionnaires de l'assurance maladie obligatoire et les médecins et les établissements de soins du secteur privé. Rabat: Ministry of Health; 2007 (<https://www.sante.gov.ma/Reglementation/Pages/ASSURANCE-MALADIE.aspx>, accessed 27 August 2019).
17. New PhilHealth case rates for selected medical cases and surgical procedures and the no balance billing policy. Manila: Philippines Health Insurance Corporation; 2011 (https://www.philhealth.gov.ph/circulars/2011/circ11_2011.pdf, accessed 29 September 2019).
18. Kipp R, Baveja L. Developing nations can gain from better bundled payment information. Milliman White Paper, 2013.

FINAL DRAFT

19. Cashin C, Ankhbayar B, Phuong HT, Jamsran G, Nanzad O, Phuong NK et al. Assessing health provider payment systems: a practical guide for countries working toward universal health coverage. Washington (DC): Joint Learning Network for Universal Health Coverage; 2015 (accessed 29 September 2019).
20. Langenbrunner JC, Cashin C, O'Dougherty S. What, how and who: an introduction to provider payment systems. In: Langenbrunner JC, Cashin C, O'Dougherty S, editors. Designing and implementing health care provider payment systems. How-to manuals. Washington (DC): The World Bank; 2009 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf?sequence=1>, accessed 29 September 2019).
21. Annear PL, Xu K. Contextual issues for DRG-based hospital payment. In: Annear PL, Huntington D, editors. Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions. Geneva: World Health Organization; 2015 (Asia Pacific Observatory on Health Systems and Policies, Comparative Country Studies 1:2, http://apps.searo.who.int/PDS_DOCS/B5325.pdf, accessed 29 September 2019).
22. O'Reilly J, Busse R, Häkkinen U, Or Z, Street A, Wiley M. Paying for hospital care: the experience with implementing activity-based funding in five european countries. *Health economics, policy and law*. 2012;7:73-101.
23. Or Z, Häkkinen U. DRGs and quality: for better or worse? In: Busse R, Geissler A, Quentin W, Wiley M, editors. Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
24. Street A, O'Reilly J, Ward P, Mason A. DRG-based hospital payment and efficiency: theory, evidence, and challenges. In: Busse R, Geissler A, Quentin W, Wiley M, editors. Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
25. Geissler A, Quentin W, Scheller-Kreinsen D, Busse R. Introduction to DRGs in Europe: common objectives across different hospital systems. In: Busse R, Geissler A, Quentin W, Wiley M, editors. Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
26. Pongpirul K, Walker DG, Winch PJ, Robinson C. A qualitative study of DRG coding practice in hospitals under the Thai universal coverage scheme. *BMC Health Serv Res*. 2011;11:71. doi: 10.1186/1472-6963-11-71).

FINAL DRAFT

27. Streveler DJ, Sherlock SM. Health management information systems: linking purchasers and providers. In: Langenbrunner JC, Cashin C, O'Dougherty S, editors. Designing and implementing health care provider payment systems. How-to manuals. Washington (DC): The World Bank; 2009 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf?sequence=1>, accessed 29 September 2019).
28. Bredenkamp C, Bales S, Kahur K (eds). Transition to DRG Payments for Health: Lessons from Case Studies. International Development in Focus. Washington (DC): The World Bank; 2019.
29. Langenbrunner JC. Conclusions and lessons for the region. In: Annear PL, Huntington D, editors. Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions. Geneva: World Health Organization; 2015 (Asia Pacific Observatory on Health Systems and Policies, Comparative Country Studies 1:2, http://apps.searo.who.int/PDS_DOCS/B5325.pdf, accessed 29 September 2019).
30. Cashin C, Bloom D, Sparkes S, Barroy H, Kutzin J, O'Dougherty S. Aligning public financial management and health financing: sustaining progress towards universal health coverage. Geneva: World Health Organization; 2017 (<https://apps.who.int/iris/bitstream/handle/10665/254680/9789241512039-eng.pdf?sequence=1>, accessed 29 September 2019).
31. Cashin C, Ankhbayar B, Tsilaajav T, Nanzad O, Jamsran G, Somanathan A. Assessment of systems for paying health care providers in Mongolia: implications for equity, efficiency and universal health coverage. Washington (DC): The World Bank; 2016.
32. Quentin W, Scheller-Kreinsen., Busse R. Technological innovation in DRG-based hospital payment systems across Europe. In: Busse R, Geissler A, Quentin W, Wiley M, editors. Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
33. Sparkes SP, Bump JB, Özçelik EA, Kutzin J, Reich MR. Political economy analysis for health financing reform. *Health Syst Reform*. 2019;1–12. doi:10.1080/23288604.2019.1633874.
34. Roberts M, Hsiao W, Berman P, Reich MR. Getting health reform right: a guide to improving performance and equity. New York (NY): Oxford University Press; 2004.
35. Kwon S, Shon C. Implementation experience with DRG-based payments. In: Annear PL, Huntington D, editors. Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions. Geneva: World Health Organization; 2015 (Asia Pacific Observatory on Health Systems and Policies, Comparative Country Studies 1:2, http://apps.searo.who.int/PDS_DOCS/B5325.pdf, accessed 29 September 2019).

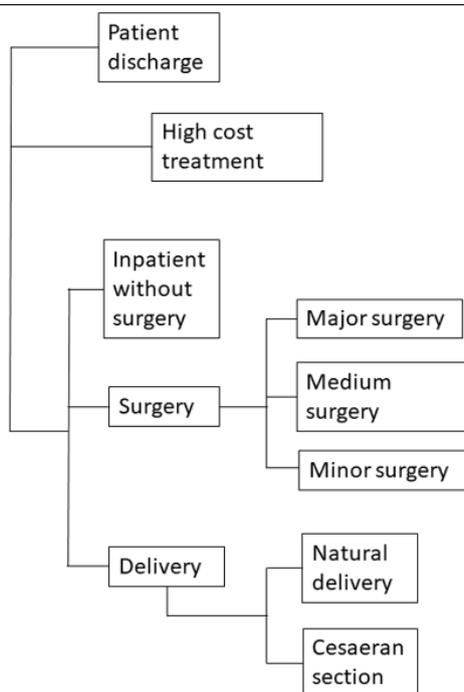
FINAL DRAFT

36. Busse R, Quentin W. Moving towards transparency, efficiency, and quality in hospitals: conclusions and recommendations. In: Busse R, Geissler A, Quentin W, Wiley M, editors. *Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
37. Tan SS, Serden L, Geissler A, Van Ineveld M, Redekap K, Heugren M et al. DRGs and cost accounting: which is driving which? In: Busse R, Geissler A, Quentin W, Wiley M, editors. *Diagnosis-related groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Maidenhead and New York (NY): Open University Press – McGraw-Hill Education; 2011 (http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf, accessed 29 September 2019).
38. Cashin C, Gubonova O, Kadyrova N, Khe N, Kutanov E, McEuen M et al. Primary health care per capita payment systems. In: *Designing and implementing health care provider payment systems. How-to manuals*. Washington (DC): The World Bank; 2009 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf?sequence=1>, accessed 29 September 2019).
39. Hopfe M, Stucki G, Marshall R, Twomey CD, Üstün TB, Prodinger B. Capturing patients' needs in casemix: a systematic literature review on the value of adding functioning information in reimbursement systems. *BMC Health Serv Res*. 2016;16:40. doi: 10.1186/s12913-016-1277-x.
40. *International classification of health interventions*. Geneva: World Health Organization; 2019 (<https://mitel.dimi.uniud.it/ichi/docs/#introduction>, accessed 29 August 2019).
41. Sabi W. An evaluation of the DRG-based payment system of the National Health Insurance Authority of Ghana. 2013. (unpublished)
42. Lucyk K, Lu M, Sajobi T, Quan H. Disease groupings: what are they, how are they used, and how do they compare internationally? *Perspect Health Inf Manag*. 2016:1–12.
43. *Design and development of the diagnosis-related group (DRG)*. Baltimore: Centers for Medicare & Medicaid Services; 2016 ([https://www.cms.gov/ICD10Manual/version34-fullcode-cms/fullcode_cms/Design_and_development_of_the_Diagnosis_Related_Group_\(DRGs\)_PBL-038.pdf](https://www.cms.gov/ICD10Manual/version34-fullcode-cms/fullcode_cms/Design_and_development_of_the_Diagnosis_Related_Group_(DRGs)_PBL-038.pdf), accessed 31 October 2019).
44. *Strengthening health financing systems in the Eastern Mediterranean Region towards universal health coverage. Health financing atlas 2018*. Cairo: World Health Organization Regional Office for the Eastern Mediterranean; 2019 (http://applications.emro.who.int/docs/EMROPUB_2019_EN_22347.pdf?ua=1, accessed 27 August 2019).
45. *Georgia: building an efficient and transparent financing system for UHC*. Geneva: Universal Health Coverage Partnership; 2019 (<https://uhcpartnership.net/wp-content/uploads/2019/04/JWT-Georgia-story-from-the-field-web-final-April-2019.pdf>, accessed 30 August 2019).

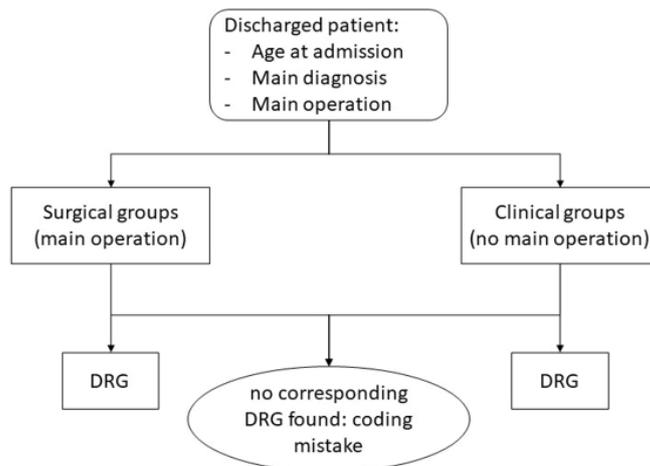
FINAL DRAFT

46. 20 years of compulsory health insurance and 25 years of the National Health Insurance Fund under the Ministry of Health – An overview. Vilnius: National Health Insurance Fund of Lithuania; 2017 (http://www.vlk.lt/sites/en/news/Documents/VLK_AP%202017.pdf, accessed 31 October 2019).
47. Overview of Estonian experiences with DRG system. Tallinn: Estonian Health Insurance Fund; 2009 (https://www.haigekassa.ee/uploads/userfiles/Implementation_DRG_EST_291209_cover%281%29.pdf, accessed 9 September 2019).
48. Özaltın A, Cashin C. Costing of health services for provider payment: a practical manual based on country costing challenges, trade-offs, and solutions. Washington (DC): Results for Development Institute/Joint Learning Network for Universal Health Coverage; 2014. (http://www.jointlearningnetwork.org/uploads/files/resources/JLN_Costing_Toolkit_Interactive_FINAL.pdf, accessed 9 September 2019).
49. National efficient price determination 2019–2020. Sydney: Independent Hospital Pricing Authority; 2019 (https://www.ihpa.gov.au/sites/default/files/publications/national_efficient_price_determination_2019-20.pdf, accessed 9 September 2019).
50. de Lagasnerie G, Paris V, Mueller M, Kumar A. Tapering payments in hospitals. Experiences in OECD countries. Paris: Organisation for Economic Co-operation and Development; 2015 (OECD Health Working Papers, No. 78) doi: doi:<https://doi.org/10.1787/5js4h5rlkxxr-en>.
51. OECD, WHO, Barber SL, Lorenzoni L, Ong P. Price setting and price regulation in health care. Paris: Organisation for Economic Co-operation and Development; 2019 (<https://www.oecd-ilibrary.org/content/publication/ed3c16ff-en>, accessed 29 September 2019).
52. Murakami Y, Lorenzoni L. Assessing the impact of case-based payment. In: Annear PL, Huntington D, editors. Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions. Geneva: World Health Organization; 2015 (Asia Pacific Observatory on Health Systems and Policies, Comparative Country Studies 1:2, http://apps.searo.who.int/PDS_DOCS/B5325.pdf, accessed 29 September 2019).
53. NordDRG users' manual, version 2012 NC PR1. Helsinki: NordCase Nordic Casemix Centre; 2012 (http://www.norddrg.net/norddrgmanual/NordDRG_2012_NC/index.htm, accessed 10 September 2019).
54. Langenbrunner J, Cashin C, O'Dougherty S, editors. Designing and implementing health care provider payment systems. How-to manuals. Washington (DC): The World Bank; 2009 (<https://openknowledge.worldbank.org/bitstream/handle/10986/13806/48599.pdf?sequence=1>, accessed 29 September 2019).
55. International classification of diseases for mortality and morbidity statistics, eleventh revision. Reference guide. Geneva: World Health Organization; 2019 (<https://icd.who.int/icd11refguide/en/index.html>, accessed 29 September 2019).
56. Bardsley M, Coles J, Jenkins L. DRGs and health care. The management of case mix. London: King's Fund Publishing Office; 1989.

ANNEX 1: EXAMPLES OF CLASSIFICATION SYSTEMS WITH DIFFERENT LEVELS OF COMPLEXITY

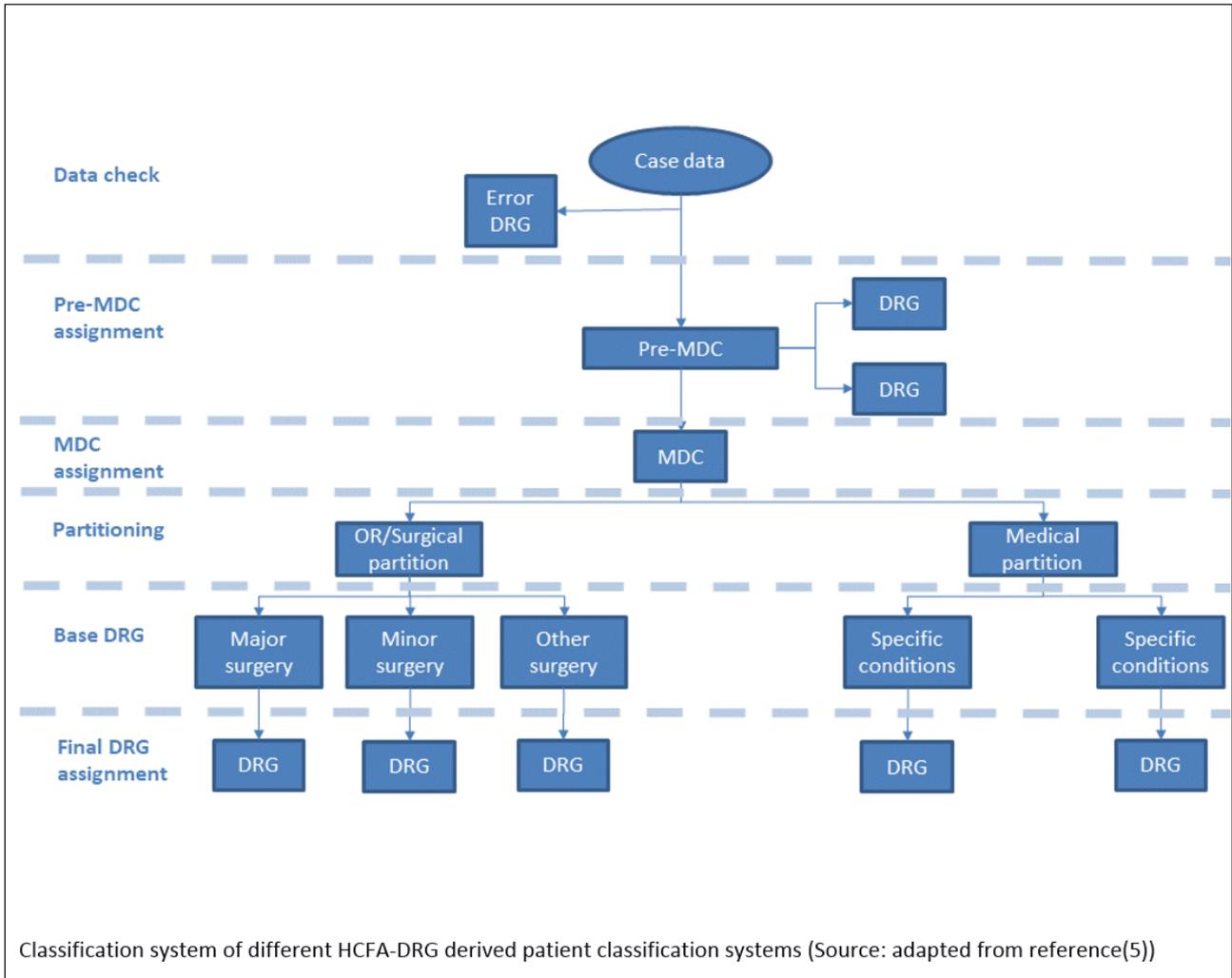


Classification system for inpatient case grouping in the Lao Peoples' Democratic Republic (Source: compilation by authors).



Classification system for the first hospital case grouping system in the Kyrgyz Republic (Source: compilation by the authors based on reference (4)).

FINAL DRAFT



FINAL DRAFT

ANNEX 2: MAIN PROVIDER PAYMENT METHODS AND THE INCENTIVES THEY CREATE

Reproduced from Mathauer I, Dale E, Jowett M, Kutzin J. Purchasing health services for universal health coverage: How to make it more strategic? Geneva: World Health Organization; 2019.

Payment method	Definition	Incentives
Line-item budget	Providers receive a fixed amount to cover specific input expenses (e.g. staff, drugs, ...).	Under-provision
Per diem	Hospitals are paid a fixed amount per day that an admitted patient is treated in the hospital.	Extended length of stay, reduced cost per case; cream-skimming
Case-based ("DRG")	Hospitals are paid a fixed amount per admission depending on patient and clinical characteristics.	Increase of volume, reduction of costs per case, avoidance of severe cases
Global budget	Providers receive a fixed amount of funds for a certain period to cover aggregate expenditures. Budget is flexible and not tied to line items.	Under-provision, also in terms of quality
Fee-for-service	Providers are paid for each individual service provided. Fees are fixed in advance for each service or group of services.	Over-provision
Capitation	Providers are paid a fixed amount in advance to provide a defined set of services for each individual enrolled for a fixed period of time.	Under-provision

Source: References (1, 19).

FINAL DRAFT

ANNEX 3: LIST OF MAJOR DIAGNOSTIC CATEGORIES (MDC) OF TWO DRG VARIANTS

List of MDC of the Medicare DRGs 1985 (56)

- MDC 1 - Diseases and disorders of the nervous system
- MDC 2 - Diseases and disorders of the eye
- MDC 3 - Diseases and disorders of the ear, nose and throat
- MDC 4 - Diseases and disorders of the respiratory system
- MDC 5 - Diseases and disorders of the circulatory system
- MDC 6 - Diseases and disorders of the digestive system
- MDC 7 - Diseases and disorders of the hepatobiliary system and pancreas
- MDC 8 - Diseases and disorders of the musculoskeletal system and connective tissue
- MDC 9 - Diseases and disorders of the skin, subcutaneous tissue and breast
- MDC 10 - Endocrine, nutritional and metabolic diseases and disorders
- MDC 11 - Diseases and disorders of the kidney and urinary tract
- MDC 12 - Diseases and disorders of the male reproductive system
- MDC 13 - Diseases and disorders of the female reproductive system
- MDC 14 - Pregnancy, childbirth and the puerperium
- MDC 15 - Newborns and other neonates with conditions originating in the principal period
- MDC 16 - Diseases and disorders of the blood and blood-forming organs and immunological disorders
- MDC 17 - Myeloproliferative diseases and disorders and poorly differentiated neoplasms
- MDC 18 - Infectious and parasitic diseases (systemic or unspecified sites)
- MDC 19 - Mental diseases and disorders
- MDC 20 - Substance use and substance induced organic mental disorders
- MDC 21 - Injury, poisoning and toxic effects of drugs
- MDC 22 - Burns
- MDC 23 - Factors influencing health status and other contacts with health services

List of MDC of the NordDRG Users' Manual Version 2012 (53)

- MDC 1 - Diseases of the nervous system
- MDC 2 - Diseases and disorders of the eye
- MDC 3 - Diseases and disorders of ear, nose, mouth and throat
- MDC 4 - Diseases and disorders of the respiratory system
- MDC 5 - Diseases and disorders of the circulatory system
- MDC 6 - Diseases and disorders of the digestive system
- MDC 7 - Diseases and disorders of the hepatobiliary system and pancreas
- MDC 8 - Diseases and disorders of musculoskeletal system and connective tissue
- MDC 9 - Diseases and disorders of skin and subcutaneous tissue
- MDC 30 - Diseases and disorders of breast
- MDC 10 - Endocrine, nutritional and metabolic diseases and disorders
- MDC 11 - Diseases and disorders of kidney and urinary tract
- MDC 12 - Diseases and disorders of the male reproductive system
- MDC 13 - Diseases and disorders of the female reproductive system
- MDC 14 - Diseases and disorders of the pregnancy, childbirth and puerperium
- MDC 15 - Neonatal DRG
- MDC 16 - Diseases and disorders of the blood and blood-forming organs and immunological disorders
- MDC 17 - Myeloproliferative diseases and disorders, poorly differentiated neoplasms
- MDC 18 - Infectious and parasitic diseases
- MDC 19 - Mental diseases and disorders
- MDC 20 - Alcohol and drug use and alcohol and drug induced mental disorders
- MDC 21 - Injuries, poisonings and toxic effects of drugs
- MDC 22 - Burns
- MDC 23 - Factors influencing health status and other contacts with health services
- MDC 24 - Multiple significant trauma
- MDC 25 - HIV infection

FINAL DRAFT



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