KCE REPORT 207Cs

Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

SYNTHESIS

A COMPARATIVE ANALYSIS OF HOSPITAL CARE PAYMENTS IN FIVE COUNTRIES

Belgian Health Care Knowledge Centre

The Belgian Health Care Knowledge Centre (KCE) is an organization of public interest, created on the 24th of December 2002 under the supervision of the Minister of Public Health and Social Affairs. KCE is in charge of conducting studies that support the political decision making on health care and health insurance.

Executive Board

	Actual Members	Substitute Members
President	Pierre Gillet	
CEO - National Institute for Health and Disability Insurance (vice president)	Jo De Cock	Benoît Collin
President of the Federal Public Service Health, Food Chain Safety and Environment (vice president)	Dirk Cuypers	Christiaan Decoster
President of the Federal Public Service Social Security (vice president)	Frank Van Massenhove	Jan Bertels
General Administrator of the Federal Agency for Medicines and Health Products	Xavier De Cuyper	Greet Musch
Representatives of the Minister of Public Health	Bernard Lange	Brieuc Van Damme
	Bernard Vercruysse	Annick Poncé
Representatives of the Minister of Social Affairs	Lambert Stamatakis	Vinciane Quoidbach
	Ri De Ridder	Koen Vandewoude
Representatives of the Council of Ministers	Jean-Noël Godin	Philippe Henry de Generet
	Daniël Devos	Wilfried Den Tandt
Intermutualistic Agency	Michiel Callens	Frank De Smet
	Patrick Verertbruggen	Yolande Husden
	Xavier Brenez	Geert Messiaen
Professional Organisations - representatives of physicians	Marc Moens	Roland Lemye
	Jean-Pierre Baeyens	Rita Cuypers
Professional Organisations - representatives of nurses	Michel Foulon	Ludo Meyers
	Myriam Hubinon	Olivier Thonon
Hospital Federations	Johan Pauwels	Katrien Kesteloot
	Jean-Claude Praet	Pierre Smiets

	Social Partners	Rita Thys	Leo Neels
		Paul Palsterman	Celien Van Moerkerke
	House of Representatives	Lieve Wierinck	
Control	Government commissioner	Yves Roger	
Management	General director	Raf Mertens	
	Deputy general director	Christian Léonard	
	Program Management	Kristel De Gauquier	

Contact

Belgian Health Care Knowledge Centre (KCE)
Doorbuilding (10th Floor)
Boulevard du Jardin Botanique, 55
B-1000 Brussels
Belgium

T +32 [0]2 287 33 88
F +32 [0]2 287 33 85
info@kce.fgov.be
http://www.kce.fgov.be

KCE REPORT 207Cs
HEALTH SERVICES RESEARCH

Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

SYNTHESIS

A COMPARATIVE ANALYSIS OF HOSPITAL CARE PAYMENTS IN FIVE COUNTRIES

CARINE VAN DE VOORDE, SOPHIE GERKENS, KOEN VAN DEN HEEDE, NATHALIE SWARTENBROEKX

COLOPHON

Title:	A comparative analysis of hospital care payments in five countries - Synthesis
Authors:	Carine Van de Voorde, Sophie Gerkens, Koen Van den Heede, Nathalie Swartenbroekx
Reviewers:	Stephan Devriese (KCE), Raf Mertens (KCE), Stefaan Van De Sande (KCE)
External experts:	Valérie Paris (OECD), Wilm Quentin (Technische Universität Berlin), Andrew Street (Centre for Health Economics, University of York), Johan van Manen (Nederlandse Zorgautoriteit), Chapin White (Center for Studying Health System Change, Washington)
External validators:	Niek Klazinga (Academisch Medisch Centrum, Universiteit van Amsterdam; OESO), Hans Kluge (WHO Regional Office for Europe), Ewout van Ginneken (Technische Universität Berlin; European Observatory on Health Systems and Policies)
Acknowledgements:	Anke Bramesfeld (AQUA-Institut für angewandte Qualitätsförderung und Forschung im Gesundheitswesen GmbH), Tamas Evetovits (Barcelona Office for Health Systems Strengthening, WHO Europe), Alexander Geissler (WHO Collaborating Center, Department of Health Care Management, Berlin University of Technology), Mareike Laschat (IGES Institut GmbH, Berlin)
Other reported interests:	Fees or other compensation for writing a publication or participating in its development: Johan van Manen (payments to Nederlandse Zorgautoriteit) Payments to speak, training remuneration, subsidised travel or payment for participation at a conference: Johan van Manen (payments to Nederlandse Zorgautoriteit)
Layout:	Ine Verhulst

Publication date: 27 November 2013

Domain: Health Services Research (HSR)

MeSH: Hospitals; Prospective Payment System; Reimbursement, Incentive; Diagnosis-Related Groups; Comparative Study

NLM Classification: WX 157

Language: English

Format: Adobe® PDF™ (A4)

Legal depot: D/2013/10.273/60

How to refer to this document? Van de Voorde C, Gerkens S, Van den Heede K, Swartenbroekx N. A comparative analysis of hospital care payments in five countries - Synthesis. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE). 2013. KCE Reports 207. D/2013/10.273/60.

This document is available on the website of the Belgian Health Care Knowledge Centre.

FOREWORD

Where do we go with the payment system for hospital care? In April of this year Minister Onkelinx announced that she would present a roadmap for the future hospital payment system in the beginning of October. A roadmap suggests that there is a path one can point out and only needs to follow. But is this true?

If one goes into the subject, the image of a crossing with many pathways emerges and on that crossing there is a post with just as many signs, each pointing in a different direction. There is the pathway of efficiency, of quality, of accessibility or the pathway leading to a fair income for health care providers. But are these pathways really diverging? Are there as many different, diverging hospital payment systems and does a choice for more efficiency necessarily imply a loss of accessibility or fairness? Perhaps the golden mean does not exist and each of the concerned actors has of course his own priorities, but preferably one wants to realize as many objectives as possible.

And, now the decision has been taken to follow the path of reform in the near future, it is useful not to reinvent the wheel. Hence, the Minister commissioned KCE to explore which lessons can be learned from reforms to more prospective hospital payments, based on pathologies, in a selection of countries. Although the cartography of the health landscape undoubtedly largely differs between countries, some useful insights can be gained nevertheless.

Of course, this does not allow for a mapping out of the future way to go for Belgium, but at least it shows which pitfalls can be avoided and which prejudices are solid or not. At this stage we will not yet hazard to make many recommendations, but we are in the starting blocks to contribute to the necessary further research to shape the roadmap.

Christian LÉONARD
Deputy general director

Raf MERTENS
General director

ABSTRACT

BACKGROUND

Since the beginning of the 1990ies an increasing number of European countries base hospital payments on the case-mix of the hospital, i.e. the number and type of pathologies. Some variant of the DRG (Diagnosis Related Group) method is the most common way to measure the case-mix of the hospital. Hospitals are paid the same amount per case belonging to a certain DRG with similar clinical characteristics and a similar pattern of resource use.

Case-mix elements were also introduced in the Belgian hospital payment system during the last two decades. Contrary to other countries, this was done in a fragmented and very partial way. The Minister of Social Affairs and Public Health announced a roadmap for a prospective lump sum hospital payment system, based on patient pathology, to be presented to the Council of Ministers at the beginning of October 2013. In preparation, the Minister asked KCE to make a comparative analysis of the prospective DRG-based hospital payment systems in a selection of countries.

AIM OF THE STUDY

The report addresses the following research questions:

- How are hospitals and medical specialists paid in a selection of countries with a prospective case-based hospital payment system?
- What are the intended and unintended consequences of such prospective hospital payment system?
- How are incentives for improving quality and for stimulating integrated care systems introduced in the hospital payment system?

The ultimate goal is to identify the lessons that can be learned from international experience.

METHODS

The selection of countries is limited to those countries in the Euro-DRG report[a] where the DRG-based prospective hospital payment system is a national system responsible for a considerable part of hospital revenue, with the condition that information was available in French, Dutch, English or German. According to these criteria, England, France, Germany and the Netherlands were selected. The U.S. Medicare program was also analysed since it was the first system to introduce prospective hospital payments based on DRGs.

A grey literature search was supplemented with a selection of peer-reviewed articles. Each country report was validated by a national expert.

[a] Busse R, Geissler A, Quentin W, Wiley M. Diagnosis-Related Groups in Europe: Moving towards transparency, efficiency and quality in hospitals. Copenhagen: World Health Organization on behalf of the European Observatory on Health Systems and Policies; 2011. European Observatory on Health Systems and Policies Series. Available from: http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf

RESULTS

Characteristics of hospital care payments

Before the introduction of DRG-based prospective hospital payments in 1983, hospitals in the Medicare program were reimbursed their costs. In the four European countries the DRG-based prospective system was introduced between 2000 and 2005 to replace a system of fixed or variable budgets. In all countries the new system was **phased in over a multi-year period**.

The **different starting situation** determined de objectives and also the impact of the introduction of the prospective system. The main objectives stated in official documents were increasing transparency; removing waiting lists; a fair allocation of resources among hospitals; improving quality of care; securing accessible care; stimulating competition between hospitals; increasing efficiency and productivity; reducing costs; reducing length of stay.

In none of the selected countries DRG payments are applied to all services or costs. **Exceptions** are, among other things, long-term care; services with a separate classification system (e.g. mental health or rehabilitation care); non-patient related activities (e.g. research and education).

The **price** or the amount per DRG a hospital receives is based on **cost data**. The quality of the data and the uniformity in cost accounting seem inversely proportional to the number of hospitals collecting cost data.

In each of the five countries one or more independent **DRG institutes** were established when prospective payments were introduced, to manage and monitor the DRG system.

Medical specialists are salaried in England, Germany and in public and private non-profit hospitals in France. In the Medicare program and in private for-profit hospitals in France medical specialists are paid on a fee-for-service basis. In the Netherlands there is a mixed system with salaried and self-employed medical specialists. The remuneration of medical specialists is always included in the DRG payment if they are salaried and not or only after some years of experience with the payment method if they are paid on a fee-for-service basis.

Intended and unintended consequences

A payment method consisting of a fixed amount for a specific product (the DRG) incentivizes, in theory, (1) to reduce costs per treated patient; (2) to increase revenues per patient and (3) to increase the number of patients. Hospitals have developed divergent response **strategies** in reaction to these incentives. The most common strategies in the five countries are reducing the length of stay; optimizing coding practices; increasing the number of patients by e.g. reducing waiting lists (see Table 6 in the Synthesis).

Additional **policy measures** were taken to stimulate the potential positive impact of DRG payments and to counterbalance unintended consequences. Most measures aimed at a shorter length of stay, e.g. by paying the same tariff per DRG irrespective of the care setting. Coding practices were closely monitored and penalized, if necessary. In the Netherlands and England measures were taken to reduce waiting lists (see Table 7 in the Synthesis).

The **impact** of DRG payments in the five countries was evaluated for transparency; efficiency; quality; fair allocation of resources among hospitals, accessibility:

- Compared to the previous system DRG payments have increased **transparency** in most countries. The complexity of the system (e.g. because of a large number of DRGs) had a negative impact on the readability of the system in some countries.
- The results for cost **efficiency** and productivity are mixed. Efficiency is generally assessed only by partial indicators: length of stay decreased, but this can also be due to other measures; activity increased in the European countries (previously global budgets) and decreased in the Medicare program (previously fee-for-service); the impact on total hospital costs was modest.
- The limited evidence for the impact on quality does not allow drawing general, clear-cut conclusions. Often data are lacking to make a comparison with the situation in the previous system or the impact on quality indicators was analysed only for a limited number of interventions. In most countries there was no increase in the number of readmissions. Moreover, in-hospital mortality and 30-day mortality rates decreased, but this quality increase cannot be attributed with certainty to DRG payments.
- **Fairness** in the allocation of resources among hospitals improved in the Medicare program as well as in Europe.
- We found no evidence for the **selective treatment of patients**.
- In the Netherlands **waiting times** reduced, but the impact of the DRG system cannot be disentangled from additional policy measures.

Quality of care and integration of care

DRG systems as such do not provide incentives to improve **quality of care**. Therefore, many initiatives have been taken in recent years to guarantee or improve quality by means of financial incentives. In some cases this was done by adjusting the DRG system, for example the Best Practice Tariffs (BPTS) in England with, among other things, one tariff for the entire care pathway, and the Bundled Payments for Care Improvement Initiative in Medicare, with post-acute care included in the DRG tariff. In other cases Pay for Performance (P4P) mechanisms were developed to complement the DRG payment system.

A second recent trend is the use of payment mechanisms to encourage the provision of **integrated care** (especially for the chronically ill), such as separate payments for the coordination of care; P4P; bundled payments; global (risk-adjusted) payment for the full range of services related to a specified group of people. The evaluation of these payment systems is, however, limited or non-existent.

DISCUSSION AND CONCLUSION

What can we learn from international experience? Concrete choices for the **design features of the DRG payment system** can make an important contribution to whether priorities are reached. A first choice concerns the integration or not of different care settings (such as day care and outpatient care) in the classification system. Second, in all countries the DRG system includes the majority of care but certain services or costs are not included in the tariff per DRG and are financed by other payment tools. Next, recent and high-quality cost data are essential for a fair allocation of resources among hospitals. A phased introduction of DRG payments over a multi-year period allows all actors time to adjust to the new system and avoids too large budget shifts between hospitals. The management and control of the system (e.g. concerning data collection and cost calculation) was entrusted to one or more independent DRG institutes in all five countries.

In addition to the design features, lessons can also be learned from the confrontation of **objectives, incentives and concrete impact** of DRG payment systems. International experience shows that the **objectives should be clearly defined** at the moment of introduction. A general description of these objectives is not sufficient. Concepts such as 'efficiency' and 'quality' are too broad to give shape to a payment system or to evaluate its impact. No single hospital payment system suffices to attain all objectives. **Other instruments** are also needed. The payment system of hospitals in all countries therefore consists of a sophisticated **mix of different payment mechanisms** that aim to restrict or modify certain negative incentives of the DRG system. To achieve the health policy goals of securing high-quality hospital care at affordable costs the **incentives of hospital management and medical specialists should be aligned**.

Finally, it is important to dispose of an intensive **SWOT analysis of the starting situation** before introducing DRG payments. The starting situation not only determines the goals of the reform, but also its possible impact and it shows the way to the critical success factors.

SYNTHESIS

TABLE OF CONTENTS

1. INTRODUCTION

Providing high-quality and accessible health care in an efficient way is a challenge for all health care systems and providers. Looking back on health care reforms in the last decades, the same pattern in choice of instruments and main focus of policy makers can be found in many developed countries.[1]

Until the beginning of the 1980s, universal health insurance systems were set up and expanded and countries accepted spending above efficient levels to meet distributional goals. The development and diffusion of new technologies increased so rapidly between the 1960s and the beginning of the 1980s, that the primary focus of policy makers shifted from access to health care to cost containment. Regulation and supply restrictions were the main instruments chosen by all countries. For countries with global budgets in the hospital sector, budget limits were tightened. Control measures applied to physicians were overall expenditure caps or tightened fee schedules. The regulatory constraints led to new problems. First, constrained supply combined with more generous demand-side incentives, such as free access to providers and minimal patient cost sharing for covered services, led to increasing waiting lists. Second, the regulatory constraints did not create incentives for efficient provision of services. A third problem was that even regulated systems grew more rapidly than governments could afford because of technological change.

A third wave of health care reforms followed the introduction of universal health insurance and regulatory constraints in the beginning of the 1990s. These reforms can be classified into three types. A first type targeted the demand side by increasing patient cost sharing. Second, some countries have introduced competition between health insurers. A third type of reforms, which are the focus of this report, attempted to create incentives for providers by means of the payment system.

A move to case-based payment systems for hospitals

The rising costs of health care and the perceived inefficiency of the system led in 1983 to the introduction of a hospital case-based payment system, known as the Inpatient Prospective Payment System (IPPS), in the Medicare program in the United States (U.S.).[2] To limit the risk of hospitals attracting less ill patients, different patient classification systems have been developed with the aim of measuring a hospital's case-mix and adjust the fixed payment. For the U.S. Medicare program, Diagnosis Related Groups (DRGs) were developed for that purpose.

Case-based prospective payment is a payment method where hospitals are paid a fixed amount per treated case regardless of the actual costs of the individual hospital.

Diagnosis Related Groups (DRGs) are the best-known method to adjust the fixed amount for the hospital case-mix. DRGs are a classification of hospital cases into groups that are clinically meaningful and are expected to have similar hospital resource use. DRGs are assigned to each case by a grouper program mostly based on diagnoses, procedures and demographic characteristics.

In a **DRG-based prospective payment** system the amount per DRG is determined before care is provided but payments are made after service delivery.

Since then, DRG-based hospital payment systems were introduced throughout Europe, be it with different patient classification systems such as the Healthcare Resource Groups in England or Diagnosis Treatment Combinations in the Netherlands. Most of these systems were introduced between 1995 and 2005. Some countries imported a DRG classification system from another country and refined it to reflect their own practice patterns; others developed complete new classification systems.

Intended and unintended consequences of case-based payment systems

Although the motives to move towards DRGs as well as the specific design features vary greatly across countries, the primary objectives of most countries in Europe were to increase transparency and improve efficiency. As is the case with any other payment system, DRGs can also incentivize unintended behaviour. Potential unintended consequences of DRG-based hospital payments include early hospital discharges; readmissions; increased volume for unnecessary care; cream-skimming and dumping of patients and up-coding. The extent to which DRGs incentivize intended and unintended behaviour has to be empirically explored to determine whether the DRG-system is in line with the societal goals of quality, efficiency and accessibility.

Cream-skimming is the selection of patients who are expected to be more profitable than other risk groups.

Dumping is the avoidance of patients who are expected to be loss-making compared to other risk groups.

Up-coding refers to the practice of entering more severe DRG-codes than the codes corresponding to the delivered care.

A trend to payments for quality of care and integrated care

A recent trend, also observable in countries with DRG-based hospital payment systems, is the integration of incentives for improving quality into the hospital payment system.[3] Strategies to adjust or complement DRG-based payments on the basis of quality are possible at different levels, e.g. at the level of the hospital or of the payment per DRG.[4]

Another trend is the development of bundled payments where a single payment is made for a patient over the entire course of a disease or clinical episode of care, instead of paying for each service individually. One of the goals of bundled payments is to encourage hospitals and physicians to work together to coordinate care and improve care transitions.[3]

What lessons can be learned from international experience?

Belgium followed the international trend to base hospital payments prospectively on the case-mix of a hospital, but did this in a fragmented way. Examples are the (partly) case-mix system for non-medical hospital services, laboratory testing and medical imaging and since 2006 for a subset of hospital drugs. Medical and medical-technical services, however, are mainly paid by fee-for-service. One of the conclusions of the KCE-report on the payment system for hospital drugs was that 'Belgium is the only country with such a fragmentary case-mix hospital financing'.[5]

In April 2013 the Minister of Social Affairs and Public Health announced 'a roadmap for a prospective hospital payment system, based on pathologies, to be presented to the Council of Ministers at the beginning of October 2013'. As part of that roadmap, the Minister asked KCE to make a comparative analysis of the prospective DRG-based hospital payment systems, including the remuneration of medical specialists, in a selection of countries.

The focus of this comparative analysis is on the 'lessons learned' from the introduction and reforms of such systems. Special attention will be given to financial incentives to improve quality and to encourage the implementation of integrated care systems.

The report addresses the following **research questions**:

- How are hospitals and medical specialists paid in a selection of countries with a prospective case-based hospital payment system?
- What are the intended and unintended consequences of such prospective hospital payment system?
- How are incentives for improving quality and for stimulating integrated care systems introduced in the hospital payment system?

The **ultimate goal** is to identify the lessons that can be learned from international experience.

A grey literature search was performed and supplemented with a selection of peer-reviewed articles for the country reports as well as for the chapter on quality of care and integrated care. Each country report was validated by a national expert.

In 2011 the European Observatory on Health Systems and Policies launched an extensive report on hospital payment, providing comparative information from 12 European countries that have introduced a DRG-type hospital payment system.[b,4] This Euro-DRG report was a useful source in comparing the objectives, design features and impact of hospital payment systems. For the current study, the **scope** is limited to countries satisfying the following selection criteria:

- The prospective case-based hospital payment system is a national system;
- This payment system is responsible for a considerable part of hospital revenue (i.e. DRGs were introduced to pay hospitals, not just as a benchmarking tool or to increase transparency);
- Information should be available in one of the following languages: French, Dutch, English or German.

This resulted in the selection of four countries[c]: England, France, Germany and the Netherlands. The U.S. Medicare program was also analysed since it was the first system to introduce prospective hospital payments based on DRGs and the (scientific) evaluations of the different reforms of the program are well documented.

A SWOT-analysis of the current hospital payment system in Belgium was not part of the study commissioned by the Minister.

[b] The Euro-DRG report is one of the products of the EuroDRG project, funded under the 7th Research Framework Programme (FP7) of the European Commission.

[c] Although Ireland was included in the Euro-DRG report and fulfils the selection criteria in this study, it is not part of the comparative analysis because of time constraints.

2. DRG-BASED PAYMENT SYSTEMS IN FOUR EUROPAN COUNTRIES AND THE U.S. MEDICARE PROGRAM

Reforms in the way hospitals or medical specialists are paid can have important implications for the health policy goals mentioned in the introduction, i.e. high-quality, accessible and efficient health care. Each payment system has different inherent incentives that can considerably influence hospital or medical specialist behaviour. The combination of three parameters shapes the likely incentives of payment methods:[6]

1. Is the price or budget determined prospectively (before services are provided) or retrospectively (after services are provided)?
2. Is the payment made prospectively or retrospectively?
3. Is the payment related to inputs used (costs) or outputs (services/outcomes) produced?

In DRG-based hospital payment systems, the price per case is set before services are provided but payments are made after service delivery. Payments are related to outputs since they are based on the number of cases treated.

DRG-based prospective payment systems were, however, adopted in very divergent health care systems and hospital sectors and each DRG system has its own specificities. An overview of all details of the DRG systems in the five countries is out of scope of this report. We refer the interested reader to the Euro-DRG report[4] and to KCE Report 121 for England, France and Germany[7]. In this report we focus on the lessons that can be learned from the introduction and reforms of DRG-based payment systems.

Health care system financing

The countries selected for this report can be classified into three systems according to their financing mechanism (Table 1): National Health Service (NHS) with general tax revenue as the main source of financing health services (England); Social Health Insurance (SHI) with social security contributions as the main financing source (France, Germany and the Netherlands); the U.S. Medicare Part A[d] program or Hospital Insurance Program mainly financed by payroll tax. Of course, this broad classification hides the complexity of the real-world systems.

The hospital landscape

Also the hospital landscape is largely divergent across the five countries, for example with regard to hospital ownership (Table 1)[e]. While in England hospitals are mostly publicly owned and in the Netherlands most hospitals are private non-profit institutions, the picture in the other three countries is more mixed. In France and Germany the majority of hospitals are public organizations, while in the U.S. Medicare program this holds for private non-profit hospitals. Until recently, a for-profit motive was not allowed for hospitals in the Netherlands. The share of for-profit hospitals is about 16% in Germany and in the Medicare program and amounts to 25% in France.

2.1. Basic characteristics

Although the system of hospital payment and the remuneration of medical specialists are interrelated, they are described separately. Sections 2.1 to 2.3 refer to the hospital payment system and section 2.4 to the remuneration of medical specialists.

The **hospital payment system in place before the introduction of the DRG-based prospective system** in the U.S. Medicare program was a retrospective cost-based reimbursement system (Table 1). Already in 1983 this system was replaced by the Inpatient Prospective Payment System (IPPS) based on DRGs. By contrast, in the European countries a budgeting system was in place before the introduction of DRG-based prospective payments in the early 2000s. In England, the Netherlands (before 2001), Germany and in the public and private non-profit hospitals in France hard budget constraints prevailed; in the private for-profit hospitals in France and in the Netherlands after 2001 there were soft budget constraints.

In England there were different types of payment contracts between hospitals and health authorities, but the dominant type were annual block contracts where hospitals received a fixed sum of money, without adjustments for activity changes. The fixed sums of money were based on historic funding patterns and not on the actual number of patients treated. Also in the Functional Budgeting system in the Netherlands hospitals annually received a prospectively determined budget. In 2001, global budgets with a hard budget constraint were replaced by volume-based budgets where realized extra production was rewarded with extra resources. German hospitals were paid by prospectively determined hard budgets, consisting of per diem charges and lump-sum payments per case and procedure fees for a limited list of inpatient treatments. These budgets were negotiated with the health insurance funds. When actual activity of the hospital diverged from the target activity hospitals had to pay back 75% of the lump-sum payments per case or procedure and 85-90% of per diem charges. If the actual activity was lower than the target activity hospitals were reimbursed 40% of the lump-sum payments. In France, public and private non-profit hospitals were paid on a global budget basis, mainly based on historical costs and irrespective of actual activity. By contrast, for-profit private hospitals had an itemized billing system with different components: per diem rate for operating costs and drugs; fee-for-service for diagnostic and therapeutic procedures. An annual target budget was negotiated between hospitals and the state. Budget overruns resulted in lower tariffs and if expenses were below the target, tariffs were increased (price/volume control).

---

[d] The U.S. Medicare program consists of four parts (Part A, B, C and D). Only Part A covers hospital costs.

[e] We refer to the scientific report for the references of the country information in the tables.

Given the diversity in previous systems, it is not surprising that the main objectives and impact of the introduction of the DRG-based payment system were also different across countries (see section 4). The **objectives** as stated in official documents can be found in Table 2.

Some of the **patient classification systems (PCSs)** in the European countries originate from the original or updated U.S. DRG system (France and Germany), other countries developed new classification systems (England and the Netherlands). However, the English system shares the basic characteristics of a DRG system. Only the Dutch system is very different. In all countries the diagnosis related 'groups' were given **new names**.

To ease the transition to the new payment method, DRG-based payments were **phased in over a multi-year period**. In most countries the real transition period was longer than originally foreseen. In the transition period the percentage of activities paid on the basis of DRGs increased; hospital-specific cost data was gradually replaced by national average data; the system evolved from a budget-neutral phase to real financial responsibility of hospitals or DRG payments were applied to other care settings (day care and outpatient care). If we define the transition period in terms of the percentage of activities paid on the basis of DRGs, the Netherlands is still in a period of transition with 70% of activities paid by DRGs since 2012.

In the Netherlands and in England **pilot projects** for a limited number of interventions with long waiting lists were carried out before the introduction of DRG payments. These pilot projects were intended to gather experience with the new payment method prior to its real introduction.

Table 1 – Basic characteristics of the hospital sector and the DRG-based payment system in five countries

	England	France	Germany	the Netherlands	U.S. Medicare
Health care system	NHS[1]	SHI[2]	SHI	SHI	Medicare
Hospital ownership	Mostly public	Public (66%)[3] Private non-profit (9%) Private for-profit (25%)	Public (49%)[4] Private non-profit (35%) Private for-profit (16%)	Mostly private non-profit	Public (15.5%)[3] Private non-profit (69%) Private for-profit (15.5%)
Hospital payment before introduction of case-based payment	Block contracts with hard budget constraint, based on historical costs	Public and private non-profit hospitals: hard budget constraint, based on historical costs Private for-profit hospitals: soft budget constraint	Hard budget constraint with per diem charges and lump-sum payments	Soft budget constraint	Retrospective cost-based reimbursement
Introduction year	2003	2004	2003	2005	1983
Name of DRG classification system	Healthcare Resource Group (HRG)	Groupe Homogène de Malades (GHM)	German DRG (G-DRG)	Diagnose Behandeling Combinatie (DBC)	Medicare severity DRG (MS-DRG)[5]
Imported/newly developed system	Newly developed	Imported and adapted	Imported and adapted	Newly developed	Newly developed (original DRG system)
Transition period	5 years	Public and non-profit hospitals: 4 years Private for-profit hospitals: no transition period, but price adjustments to avoid excessive budget cuts	7 years	From 10% of activities in 2005 to 70% in 2012	5 years

1 National Health Insurance; 2 Social Health Insurance; 3 In % of total acute beds; 4 In % of total beds; 5 The MS-DRG system is a revised version (since 2008) of the original DRG system

Table 2 – Objectives of DRG-payments as stated in official documents in five countries

	England	France	Germany	the Netherlands	U.S. Medicare
Increase of efficiency	x	x	x	x	x*
Increase of productivity					x
Increase of volume	x	x			
Fair treatment of hospitals	x	x	x		
Transparency in payments	x		x	x	
Enhancement of innovation	x				
Improvement of quality	x		x	x	
Reduction of overcapacity			x		x
Increase of competition between hospitals			x	x	
Improvement of accessibility			x	x	
Cost control					x

** Specific indicators were defined, such as a reduction of the length of stays; economies of scale; concentration of specialized procedures in referral centres*

2.2. Scope of DRG-based hospital payments

The scope of DRG-based hospital payments refers to the services and/or costs included in the DRG payment per case. However, a 'case' is not defined in the same way across systems. In the Netherlands different DBCs are possible during one stay while in the other countries hospitals receive only one payment per hospital stay. The payment is in general based on the most important diagnosis or treatment. The DBC system, instead, provides one DBC for each diagnosis-treatment combination. A DBC registers the complete process of care, from the initial consultation or examination through the final check-up within a medical specialty.

Table 3 clearly shows that there is no country where all services or costs are included in the DRG payment. In all five countries long-term care is not included; inpatient and day care are always included. Only broad categories of services or costs for which the current policy is different across countries are shown in the first part of Table 3 ('scope of payment includes').

The **remuneration of medical specialists** is not included in the DRG payment in the U.S. Medicare program and in French private for-profit hospitals, contrary to England, France (public and private non-profit hospitals) and Germany. In the Netherlands, the statute of the medical specialists determines whether the remuneration is included or not. For salaried medical specialists it is included; self-employed medical specialists are in general also paid on the basis of DBCs, but integrated prices per DBC will not be introduced before 2015. It is noticeable that the remuneration of medical specialists is always included in the DRG payment if they are salaried and not or only after some years of experience with the payment method if they are paid on a fee-for-service basis. The remuneration of medical specialists is treated in more detail in section 2.4.

All countries, except Germany, include (part of) **capital costs** in the DRG payment. In Germany, capital costs such as hospital buildings, beds or medical equipment with an economic life of more than three years, are paid by state ('Länder') budgets. In France, hospitals have to fund capital investments from the DRG payments but public hospitals receive specific funding to finance large investment plans imposed by hospital reforms. There is, however, no clear information on the magnitude of the part of capital costs funded by this alternative stream.

Mental health care and rehabilitation care are in general not included in the DRG payments for acute inpatient care but most countries are extending the concept of DRGs to these services, be it with a separate classification system. Applying the same principles as in the classical DRG-based systems – classifying patients into cost homogenous groups based on diagnoses and procedures and paying hospitals on the basis of calculated average costs of patients in these groups – for patients with mental disorders is often considered inappropriate since length of stay and treatment modalities vary widely. Separate classification systems have been developed in the Netherlands and the U.S. Medicare program, it is planned for 2014 in Germany (mental health care) and in France and England some initiatives have been taken. In the Netherlands, payments for curative mental health care (first 365 days) are based on DBCs since 2008 and since 2009 for rehabilitation care but a budgeting system applied until 2012 for rehabilitation care and until 2013 for mental health care. Since then, an output-based payment system (number of DBCs) is gradually applied to both sectors.

Also for **outpatient ambulatory care** policies largely differ across countries. In France, outpatient ambulatory care is completely excluded from DRG payments while in England and the Netherlands it is fully integrated. DRG payments in Medicare and Germany are not limited to the inpatient stay period but also include pre-care and/or after-care services. In the U.S. Medicare program outpatient ambulatory care provided by the admitting hospital within three days before an inpatient admission is included in the DRG. In Germany, pre-care performed within five days before the patient is admitted and after-care within 14 days after the end of the inpatient admission are included.

DRG-based payments never constitute the entirety of hospital revenues. The services and costs mentioned in the previous paragraphs are examples of additional payments for patients not classified into the DRG system (e.g. outpatients, mental health care, rehabilitation care) and for excluded costs (e.g. remuneration of medical specialists in the U.S. Medicare program or capital costs). Hospitals are also paid for non-patient care activities such as **teaching, medical education and research**. Finally, additional payments or surcharges are paid for activities for DRG-classified patients such as **technological innovations, specialized services, expensive drugs and devices and intensive care units** (ICU).

In the U.S. Medicare program hospitals treating a high percentage of **low-income patients** receive a percentage add-on payment for each case paid through IPPS. No such additional payment was found for the other four countries.

Table 3 – Scope of DRG-based hospital payments in five countries (2013)

	England	France	Germany	the Netherlands	U.S. Medicare
Number of payments per hospital stay	One[1]	One	One	Several possible	One
Scope of DRG payment includes					
Medical specialist remuneration	Yes	Yes in public and private non-profit hospitals No in private for-profit hospitals	Yes	Yes[2]	No
Capital costs	Yes	Partly	No	Yes	Yes
Mental health care	No, but some initiatives	No, but some initiatives	Separate system is planned	Separate system	Separate system
Rehabilitation care	No, except for some types of rehabilitation[3]	No, but some initiatives	Yes	Separate system	Separate system
Outpatient ambulatory care	Yes	No	No, except hospital pre-care within 5 days and post-care within 14 days	Yes	No, except hospital pre-care within 3 days
Outside the scope of DRG payment but additional payments for					
Teaching and medical education/research	Yes	Yes	Yes	Yes	Yes
Expensive drugs and devices	Yes	Yes	Yes	Yes	Yes
ICU[4]	Yes	Yes	No[5]	Yes	No
Highly specialized services	Yes	No	Yes	No	No
Innovative technologies	Yes	Yes	Yes	Yes	Yes

1 In the most recent version of HRGs (Healthcare Resource Groups) unbundled HRGs are possible, e.g. for expensive drugs and d evices; 2 The remuneration of medical specialists and the relation with the DBC payment is treated in section 1.1; 3 Rehabilitation care in specific rehabilitation centres is not included in the DRG payment but early rehabilitation in acute hospitals is; 4 ICU = intensive care unit; 5 In addition to specific DRGs for intensive care stays without a specific diagnosis, a split criterion holds for the ICU.

2.3. Costing: data and methods

All DRG-based hospital payment systems build on two mechanisms: defining the hospital product and its price. While some characteristics of the hospital product in the five systems were described in sections 2.1 and 2.2, this section elaborates on its price and more specifically on the cost data underlying the payment per DRG.

A first step in determining the DRG tariff is to attach a monetary value to the resources that were used for treating a patient. **Valuation methods** are based on costs or on prices (sometimes called fees, tariffs or charges). Although charges and costs are used interchangeably as synonyms in the literature, they have different meanings. Charges may or may not reflect actual resource consumption or costs. Costs are the amount of expenditure incurred on or attributable to a particular good or activity. Ideally, the DRG payment should reflect the actual (average) hospital costs for a specific case and its treatment since prices also reflect the historical bargaining power of providers or political negotiation and may overestimate or underestimate true costs. Since most countries had a poorly developed cost accounting system at the moment of introduction of the DRG-based hospital payment system, the implementation of it was phased in during a transition period of several years.

In general, there seems to be a trade-off between ensuring high-quality **cost data**, the number of hospitals collecting the cost data (the sample size) and the uniformity of cost accounting rules across hospitals.

In all countries **outlier cases** (based on cost or length of stay) are paid for separately, except in the Netherlands where the problem of outlier cases is dealt with by opening a new DBC for a new diagnosis and treatment combination. In the other countries, there is only one payment per hospital stay.

Table 4 – Cost data collection in five countries (2013)

	England	France	Germany	the Netherlands	U.S. Medicare
Cost data					
Sample size	Mandatory participation 100%	Voluntary participation 20% of public hospital stays and 5% of private hospital stays	Voluntary participation 15% of hospitals	Mandatory participation 100%	Mandatory participation 100%
Costing	Mandatory cost reporting	Common accounting rules	Common accounting rules	Mandatory cost reporting	Official cost reporting forms
Time lag to cost data	3 years	2 years	2 years	2 years	2 years

2.4. Remuneration of medical specialists

The remuneration of medical specialist activities is included in the DRG payments in England, Germany and France (only for public and private non-profit hospitals). In these countries medical specialists are salaried whereas in the U.S. Medicare program and in private for-profit hospitals in France, they are paid on a fee-for-service basis. In both countries, fee-for-service payments are made separately from DRG payments. In the Netherlands, the statute of the medical specialists determines whether their remuneration is included in the DRG payment or not (see Table 3 and Table 5).

In France and the U.S. Medicare program, fees are calculated on the basis of a scale (the resource-based relative value scale (RBRVS)) which makes a distinction between a professional component (time and skill of the medical specialist as well as intensity and stress associated with the service) and a practice cost component (e.g. office rents, personnel costs). A detailed description of the calculation of the fees is given in the scientific report.

The **remuneration of self-employed medical specialists in the Netherlands** has changed several times the last decade. Before the introduction of the DBC system, hospitals received lump-sum payments based on historical incomes which had to be distributed among the medical specialists. Due to increasing waiting lists, a small production incentive was introduced in the lump-sum payments. With the introduction of the DBC system, lump-sum payments were gradually replaced with incomes based on the produced number of DBCs. Between 2008 and 2011 a normative income was calculated for all self-employed medical specialists, consisting of a uniform hourly tariff (also composed of a professional and a practice cost component as in France and the U.S. Medicare program) and a normative time per DBC. The actual income, however, was determined by the number of produced DBCs. Budget overruns in 2008 and 2009 led to fee cuts in 2010 and a new budgeting system as of 2012 to prevent future budget overruns. In the transition period 2012-2014 the maximum increase of the macro budget for the remuneration of medical specialists is set at 2.5% per year. The macro budget is distributed among hospitals and independent treatment centres ('Zelfstandige Behandel Centra', ZBCs) on the basis of historical revenues. Independent treatment centres were included in the macro budget to avoid strategic substitution from hospitals to ZBCs. The budget at the individual hospital level is then distributed amongst medical specialists. Their incomes consist of a fixed component (75-85%) for the remuneration of regular activities (number of DBCs) and a variable component (15-25%) for the remuneration of e.g. practice costs, education, quality and innovation. From 2015 onwards, integrated prices for the hospital and medical specialists will be introduced. The successive reforms of the remuneration of self-employed medical specialists in the Netherlands illustrate the search for **aligning the incentives of hospital management and medical specialists** through their payment system.

In the Medicare program initiatives to gear fee-for-service payments to the growth of the gross domestic product failed due to resistance from medical specialists (organizations).

Table 5 – The remuneration of medical specialists in five countries (2013)

	England	France	Germany	the Netherlands	U.S. Medicare
Remuneration system	Salaried	Public and private non-profit hospitals: salaried Private for-profit hospitals: fee-for-service • Professional component • Practice cost component	Salaried (with private fees for private medical treatments)	Salaried Self-employed medical specialists: produced DBCs[1] with normative hourly tariff and time	Fee-for-service: • Professional component • Practice cost component • Malpractice component (insurance premiums)

1 DBC = Diagnose Behandel Combinatie (Diagnosis Treatment Combination)

2.5. Establishment of a DRG institute

In all five countries one or more independent agencies responsible for the management and monitoring of the DRG system were established. These 'DRG institutes' have different tasks and responsibilities, but they are all involved in the collection and control of data; the development of the cost-accounting system; the calculation and updates of DRG cost weights or prices. The German institute INeK (Institute for the Hospital Remuneration System) is financed through an additional charge of €0.13 per DRG case. Other institutes receive a subsidy from the Ministry of Health, e.g. the Dutch institute DBC-O (Diagnose Behandel Combinatie-Onderhoud (DBC-Maintenance)), responsible for the development and maintenance of the DBC system, received a subsidy of 13.6 million euro in 2012.

In some countries cost-collecting hospitals receive money for their efforts. In France, a specific budget is allocated to pay salaries of hospital financial controllers. Hospitals that voluntarily participate to the cost-data collection receive a lump sum and a variable amount according to the number of cases and the quality of data in Germany. Both payments are financed through an additional charge of €0.97 per DRG case. In the Netherlands, the costs of the voluntarily participating 'frontrunner' hospitals are also financed by the DBC system.

3. HOSPITAL STRATEGIES IN A DRG-BASED HOSPITAL PAYMENT SYSTEM

3.1. Hospital response strategies to DRG payments

In essence, most DRG-based hospital payment systems boil down to hospitals receiving an average price for a well-defined hospital product where the hospital product consists of a group of diagnoses and/or treatments. Hence, in theory, this paying method incentivizes hospitals (1) to reduce costs per treated patient; (2) to increase revenues per patient and (3) to increase the number of patients.[4] Resulting hospital response strategies can imply a positive or negative impact on the objectives of the DRG payment system.

Table 6 gives an overview of possible hospital strategies in reaction to the incentives of such payment system. The second column provides a general description of the strategy, while in the third column the strategy is made concrete. The selection of concrete strategies in based on Table 6.3 in Busse et al.[4] However, some concrete strategies were classified under another general strategy, and the list of possible strategies was adapted. For each concrete strategy a plus- or minus-sign indicates whether the strategy has a positive or negative impact on the objectives of DRG-based payments. The fourth to eight column show whether the concrete strategy was followed in the five countries. 'Yes' means that we found evidence that the strategy was followed, 'no' that it was not followed and a '-' means that we found no evidence for the concrete strategy. Even if no evidence was found for a specific strategy, we added the strategy in Table 6 because the fact that possible strategies were not investigated may also be informative. The evaluation of the hospital strategies in the five countries is mainly but not exclusively based on reports from official bodies.

The first incentive to **reduce the cost per patient** is generated because the hospital payment for a patient in a specific DRG does not depend on the costs of the individual hospital to provide services for that patient. The costs per patient can be reduced by reducing the length of stay, reducing intensity of provided services and selecting specific patients. Four of the five countries optimized their care setting by providing more services in day or outpatient care. For the other strategies to reduce the length of stay, the results are less clear or are more divergent across countries. Inappropriate early discharges, which are one of the major potential negative consequences of DRG-based payment systems, do not seem to be a problem in Germany; for the U.S. Medicare program there was no increase in the number of readmissions. However, the number of patients discharged in unstable conditions increased; in England studies show divergent results; in France increasing readmission rates were found for some specific interventions.

Strategies to reduce the intensity of provided services are hardly documented, except for patient selection strategies. We found no hard evidence of patient selection strategies, but there is a potential danger of treatment centres selecting less-risky patients in England. These centres mainly treat simple, elective care, and are designed to specialise in one or two high-volume procedures.

The second incentive to **increase revenue per patient** can be achieved by changing coding practice or by cost shifting. Coding of diagnoses and procedures improved due to the DRG-based payments, but optimizing coding practice in an unjustified way (up-coding) did occur as well. Some cost shifting occurred in the early years of the U.S. Medicare program, but recent evidence is contradictory.

Evidence on the third incentive to **increase the number of patients** mainly refers to waiting lists. In England it is unclear whether waiting times were reduced by the DRG-based hospital payment system or by other policy measures such as waiting time targets (see section 3.2). In the Netherlands, an active policy to reduce waiting times was in place already before the introduction of the DBC system. Waiting times are also part of the negotiating process between insurers and hospitals, in addition to the price and volume of DBCs. In the four European countries volume increased after the introduction of DRG payments. In some countries this volume increase was already there before the introduction of the new payment system.

Table 6 – Incentives of DRG-based hospital payments and hospital strategies in five countries

Incentives for hospitals of DRG payments	Hospital strategies		Was the strategy followed? England	France	Germany	the Netherlands	U.S. Medicare
Reduce cost per patient	**Reduce length of stay**	Optimize care setting? (day care/outpatient care) (+)	Yes	Yes	Yes	Yes	Yes
		Optimize hospital care pathway (+)	-	No	Yes	-	-
		Integration of care/care coordination by transfer from hospital to other providers (+)	-	-	-	-	-
		Inappropriate early discharge (-)	Increase of readmission rates but unclear whether related to payment system	Increase of readmission rates within 30 days for specific interventions	No	-	No increase of readmission rates or impact on one-year mortality but more patients are discharged in unstable conditions
	Reduce intensity of provided services	Withhold necessary services (quality/under treatment) (-)	-	-	-	-	-
		Avoid delivery of unnecessary	-		-	-	Decrease in the number of hospital

Incentives for hospitals of DRG payments	Hospital strategies		Was the strategy followed? England	France	Germany	the Netherlands	U.S. Medicare
		services or underutilized hospital capacity (+)					beds but no increase in the hospital occupancy rate
	Select patients	Avoidance of unprofitable cases (dumping) (-)	No, except potentially in treatment centres, as they can apply patient exclusion criteria	Legally forbidden in public hospitals; no early discharges of expensive patients	-	-	-
		Select low-cost patients within DRGs (cream-skimming) (-)	No, except potentially in treatment centres, as they can apply patient exclusion criteria	-	No	-	-
		Specialize in treating patients for which the hospital has a competitive advantage (-)	-	No	Changes observed in the hospital structure and increase of the case-mix but unclear relation with the hospital payment system	-	Increase of specialized services and increase of the case-mix but unclear relation with the hospital payment system
Increase revenue per patient	**Change coding practice**	Improve coding of diagnoses and procedures (+)	-	Yes	Yes	Yes	Yes

Incentives for hospitals of DRG payments	Hospital strategies		Was the strategy followed? England	France	Germany	the Netherlands	U.S. Medicare
		Unjustified classification of patients (-)	No	Yes	Yes	Yes	Yes, more likely in for-profit hospitals
	Cost shifting	Increased prices for services for private patients because of underpayment for Medicare services (-)	-	-	-	-	Yes, in early years
Increase number of patients	**Change admission rules**	Reduce waiting lists (+)	Yes, but unclear impact of payment system	-	-	Yes	-
		Split care into multiple admissions (-)	-	-	-	-	-
		Admit patients for unnecessary services (supplier-induced demand) (-)	-	No proof but suspicion for cataract	-	Yes	-
			Volume increase started before introduction of DRG payments, also increase in global hospital budget	Volume increase but not exclusively related to DRG payments	Volume increase started before introduction of DRG payments	Yes	No

Source: Modified from Table 6.3 in Busse et al. (2011)[4]

3.2. Policy measures to guide hospital strategies

In all countries policy measures were taken to stimulate hospital strategies with a potential positive impact on the objectives of DRG-based payments or to counterbalance strategies with unintended consequences. A selection of hospital strategies for which concrete policy measures were found, are included in Table 7.

Most policy measures are related to strategies targeting a **reduction in the length of stay**. Examples of policy measures to stimulate day care or outpatient care include applying the same tariff in different care settings; applying a higher tariff for day care or outpatient care for selected procedures ('Appropriate settings' best practice tariffs (BPT) in England); prior approval to perform some surgical interventions in an inpatient setting. In the Netherlands, substitution effects between inpatient care, day care and outpatient care are better accommodated in the DBC system itself.

To optimize hospital care pathways, the English authorities introduced the 'streamlined pathway' BPTs for cataract to reduce the number of outpatient appointments following surgery. Also in England several tariffs aim at stimulating integration and coordination of care by the transfer of care from the hospital to other care providers: post discharge tariffs for four rehabilitation pathways; maternity pathway tariffs paying hospitals for all the pregnancy-related care without further payment for individual elements of activity. Again, in the Netherlands, the specific structure of the DBC system combining diagnosis and treatment in one care product provides disincentives to cumulate payments for individual elements of activity. In Medicare, integrated care is stimulated by means of bundled payments linking payments for multiple services received during an episode of care.

Finally, to avoid inappropriate early discharge the following measures were developed: lower length of stay thresholds implying that in case of a discharge earlier than the threshold the hospital receives a reduced DRG payment; reduction of payments in case of readmission.

To avoid **patient selection** strategies, hospitals treating a high percentage of low-income patients receive higher payments in the U.S. Medicare program.

All countries implemented control mechanisms and penalties to counteract **up-coding** strategies or to avoid patients being admitted for **unnecessary services.**

In the Netherlands and England several measures were introduced to keep **waiting times** within acceptable bounds.

Table 7 – Hospital strategies and related policy measures in five countries

Hospital strategies	Policy measures
Optimize care setting (day care/outpatient care) (+)	• Same tariff for inpatient and day care for a selection of DRGs (France) • Some surgical interventions must have a prior approval of the health insurance to be performed in inpatient hospital care (France) • 'Appropriate settings' best practice tariffs (England)
Optimize hospital care pathway (+)	• 'Streamlined pathway' best practice tariffs (England)
Integration of care/care coordination by transfer from hospital to other providers (+)	• 'Streamlined pathway' best practice tariffs, post discharge tariffs, maternity pathway tariffs (England) • Health insurance funds can promote integration of care via contracts with providers from different sectors (Germany) • 'Bundled payments' that include inpatient and post discharge services during an episode of care (Medicare)
Inappropriate early discharge (-)	• Introduction of a length of stay threshold (France) • No extra payment for readmissions within 30 days (England and Germany) • Payment reduction for excess readmissions concerning acute myocardial infarction, heart failure, and pneumonia patients (Medicare)
Patient selection (-)	• Possibility of tariff reduction in case of patient selection resulting in average lower costs (England) • Adjustments of payments for hospitals treating a high percentage of low-income patients (Medicare)
Unjustified classification of patients (-)	• Controls and penalties (all countries)
Reduce waiting lists (+)	• Waiting time targets (England) • Establishment of treatment centres for routine procedures for short-stay patients (England) • Acceptable waiting time limits ('Treek norms') (the Netherlands) • Mandatory publishing of mean expected waiting times for outpatient clinic diagnosis and treatment (the Netherlands) • Government sponsored health care portal with information on hospital waiting times (the Netherlands)
Split care into multiple admissions (-)	• Tariff reduction if readmission within 3 days in the same hospital/DRG (France)
Admit patients for unnecessary services (supplier-induced demand) (-)	• Monitoring of regional rates of use of some procedures. Guidelines developed for procedures with highly variable regional rate of use (France) • Controls and penalties for non-medically justified admissions/services (Medicare) • Negotiations on volume between health insurance funds and hospital. Activity above target activity has to be (partly) reimbursed (Germany and the Netherlands) • Control of unnecessary admissions (Medicare)

4. EVALUATION OF THE IMPACT OF DRG-BASED HOSPITAL PAYMENTS

The five countries share some common objectives of the introduction of a DRG-based hospital payment system. These include enhancing transparency, increasing efficiency and, to a lesser extent, improving quality. Only in the U.S. Medicare program cost containment was a policy objective. An evaluation of the impact of the new payment method on these objectives is, however, not straightforward. First of all, very often adequate data are lacking to perform such evaluation. Second, an improvement in a stated objective may also be due to specific policy measures implemented to enhance achievement of that objective (see Table 7). Third, the objectives were often stated in general terms, without clearly defining the exact 'target'. This holds especially true for quality and efficiency. The results in Table 8 are mainly, but not exclusively, based on reports by official bodies (an '-' indicates that we found no study evaluating the impact on the specific objective).

Transparency improved substantially because information on hospital products and related prices has increased compared to the system in place before the introduction of DRGs, especially in countries that traditionally used global budgets as hospital payment method. With the introduction of new care products in 2012 in the Netherlands, the number of DBCs was reduced to about 4 400 care products because the original classification system was considered too complex and not manageable (about 30 000 DBCs were applied in practice). The other countries have increased their number of DRGs since the introduction of the system. In Germany, this has been evaluated as making the system more complex. Unclear rules for opening a new DBC for a single patient (the Netherlands) or unclear rules for determining prices (the inclusion or not of investment costs in France) made the system less readable.

Increasing **efficiency** was another common policy objective. Efficiency is, however, a widely used term with different meanings. In the official documents evaluating the impact on efficiency of DRG-based hospital payments some partial indicators of efficiency were found, complementing technical efficiency and the broader concept of productivity: activity level; length of stay (LOS); total hospital costs; cost per case. The results for cost efficiency and productivity are mixed; activity increased in European countries (previously global budgets) and decreased in the U.S. Medicare program (previously FFS); LOS decreased but it is not always clear if this was due to the new payment system or not; the impact on total hospital costs was modest.

The impact on **quality** is unclear because data are often lacking which makes a comparison with the situation in the previous system difficult or because the impact was analysed only for a limited number of interventions. As with efficiency, quality of care is a multidimensional concept which makes it difficult to evaluate if no clear definition is provided. The limited evidence for specific quality indicators suggests that there was no adverse impact on quality of care. In most countries there was no increase in the number of readmissions. Moreover, in-hospital mortality and 30-day mortality rates decreased, but this quality increase cannot be attributed with certainty to DRG-payments.

Fairness in the allocation of resources is considered to have improved since it was more in accordance with provided activity than the previous budgeting system in Europe. The DRG-based payment system in the Medicare program is also considered as being more fair because of the adjustment of the DRG tariff for hospitals treating a high percentage of low-income patients.

We found no evidence of the **selective treatment of patients**. In the Netherlands, **waiting times** decreased but the impact of the DBC system cannot be disentangled from additional policy measures.

Table 8 – Evaluation of the impact of DRG-based hospital payments in five countries

	England	France	Germany	the Netherlands	U.S. Medicare
Transparency	*Positive impact	Positive impact but lack of transparency of the price fixing process	*Positive impact but less readable because of increasing number of DRGs	*Positive impact but less readable due to large number of DBCs (before 2012) and unclear coding rules	-
Efficiency	*	*	*	*	*
• **Technical efficiency/ productivity**	-	Productivity growth for public hospitals; Unclear impact of productivity for private hospitals	-	Mixed impact on efficiency: price decrease but volume increase	No improvement
• **Activity**	Increase of day-case rate	*Increase already started before introduction of DRG payment Limited increase of day-case rate	Increase	Increase	Decrease
• **LOS**	Decrease but also other explanatory factors	Decrease	Decrease already started before introduction of DRG payment	Decrease	Decrease
• **Total hospital cost**	No impact	-	Slightly lower growth rate	Increase	*Lower growth rate; Medicare payments to medical specialists is one of the most rapidly growing components
• **Cost per case**	-	-	Slightly higher growth rate	-	Decrease at the beginning and increase the years after

Quality	*No negative impact	-	*No negative impact	*Positive impact on hospital mortality but decrease already started before introduction of DRG payment; no evidence of impact on effectiveness	Unclear impact but no deterioration of quality
Fair allocation of resources between hospitals	*Positive impact	*Improvement but allocation of resources between hospitals is still not neutral	*Improved but no adjustments for input price variation between states (Länder)	-	Improved by additional payments/adjustments, e.g. for hospitals treating a high-percentage of low-income patients
Patient accessibility	Impact on outcome indicators the same across patient characteristics but potential cream-skimming by treatment centres	Impact on length of stay the same across patient characteristics	No proof of cream-skimming; longer waiting time for SHI than PHI patients but no comparison with waiting times before DRGs	* Shorter waiting lists	Accessible care in terms of supply of services

** Stated objective of the implementation of the DRG-based payment system; DRG = Diagnosis Related Group; LOS = length of stay; PHI = Private Health Insurance; SHI = Social Health Insurance*

5. FINANCIAL INCENTIVES TO IMPROVE QUALITY OF CARE AND INTEGRATED CARE

New trends in hospital payment systems

DRG-based payment systems have evolved since their introduction. Three major trends in the development of DRG payment systems are observable. The first trend is the extension of the DRG system from acute inpatient hospital care to other services (day care and outpatient care) or other facilities (mental health or rehabilitation facilities). The scope of hospital payments in the five DRG systems was already discussed in section 0.

A second, more recent trend is the integration of incentives for improving quality. DRG-based payment systems may present a risk to quality of care because hospitals are incentivized to reduce the cost per stay. The available evidence does not support the frequently postulated detrimental effects on quality of care when a transition takes place from a retrospective cost-based payment (as the previous system in the U.S. Medicare program) or fee-for-service payment to case-based prospective payment. However, since DRG-based payment systems do not explicitly reward providers (hospitals or medical specialists) for improving quality, in recent years many initiatives, linked to payment, have been taken to guarantee or improve quality. Some mechanisms are included in the DRG payment system and intend to improve quality by modifying some features of the DRG system; other mechanisms complement the DRG system. They are described under the heading of 'Pay for Performance (P4P)'. Quality initiatives not linked to payment (e.g. public reporting; audit and feedback) are out of scope.

A third trend is the use of payment mechanisms to encourage the provision of integrated care for the chronically ill.

5.1. Quality adjustments of DRG-based hospital payments

Potential adverse effects on quality of care are counterbalanced by adjustments within the DRG system. We briefly describe three initiatives.

Best Practice Tariffs (BPTs)

Since 2010 different types of BPTs have been introduced in England. A BPT is a national tariff that has been structured and priced to incentivize and adequately pay for care that is high quality and cost effective. A first type incentivizes the appropriate care setting for a set of surgical procedures; a second type covers the price of the entire care pathway to reduce variability (only for cataract treatment); and a third type is granted to hospitals if they comply with evidence-based guidelines in the treatment of patients.

Extending the treatment episode to post-acute care

To incentivize coordination and integration of care it is desirable to extend the DRG-related payment for an integrated set of treatments, including outpatient visits, rehabilitation, and so on. An interesting example is Medicare's **Bundled Payments for Care Improvement Initiative** where a single payment is granted for an episode of care in a hospital followed by post-acute care in a skilled nursing or rehabilitation facility, the patient's home or another facility for a selection of episodes and fixed period of up to 90 days post-acute care. Such a system is challenging and requires a sophisticated integrated information system. First, the episodes have to be selected and second, their length has to be fixed. Longer episode lengths provide greater assurance that patients' conditions have stabilized but they also imply more variation in costs across patients and therefore place increased financial risk on the hospital or other entity receiving the bundled payment.

Excluding hospital-acquired conditions and readmissions from payment

One of the potential perverse effects of DRG-based hospital payment systems is that hospitals receive extra budget for patients who develop complications during their hospital stay. Disentangling complications (caused by the hospital) from co-morbidities (which the patient already has upon admission) to exclude the beneficial effects of hospital-acquired conditions from the DRG-based payment is a possible strategy. For example, in England hospitals are not paid for 'never events'. These are serious patient safety events that are largely preventable.

Another strategy to adjust DRG-based payments with the purpose of increasing quality of care is to penalize hospitals financially for readmissions within 30-days for the same condition (e.g. only reimbursing one episode of care or decreasing hospital payments in case readmission for a selection of DRGs is deemed excessive compared to a benchmark).

5.2. Pay-for-performance (P4P)

Pay-for-performance (P4P) ties financial incentives to the quality of performance. This mechanism is increasingly used by policy makers to drive improvements in health care quality with two renowned examples in the hospital setting. The first is **Medicare's Premier Hospital Quality Incentive Demonstration** (PHQID) program which is a P4P program that operates in a budget neutral manner (1 or 2% bonuses versus 1 or 2% penalties) using 34 predominantly process measures for 5 clinical conditions (Acute Myocardial Infarction (AMI), Community Acquired Pneumonia Acute (CAP), Chronic Heart Failure (CHF), Coronary Artery Bypass Graft surgery (CABG), and hip or knee replacement surgery). Evaluation programs showed initial (first two years) improvements in process measures that could not be attenuated with longer follow-up (i.e. after 6 years). No improvement of patient outcomes was found at any stage of the program. Based on this program, Medicare now introduced the 'value-based purchasing program' (a nationwide P4P program that still needs to be evaluated).

The second example is the **Advancing Quality** program, which is a P4P program based on PHQID, that was introduced in all NHS-hospitals in the Northwest region of England. Its implementation was associated with a reduction in mortality. Important differences with the U.S.-program were the larger bonuses (4%) that were awarded to a greater proportion of participants. In addition, bonuses were directly invested in quality improvement initiatives. The program was absorbed by a new P4P program, implemented in the whole of England: the **Commissioning for Quality and Innovation** (CQUIN). This program was not associated with an improvement in process or outcome measures. CQUIN is based on locally agreed targets and measures. Although local strategic and clinical input in P4P programs was evaluated as valuable it seems better to centralize technical design issues (e.g. defining indicators; agreeing thresholds; setting prices).

Mixed results for effectiveness of P4P

Many studies have found improvements in selected process measures of quality and suggested that P4P can potentially be effective. But at this point convincing evidence, especially on patient outcomes, is still lacking. Nevertheless, published results do show that a number of specific targets may be improved by P4P when design choices and context are optimized and aligned:

- P4P targets are selected on baseline room for improvement;
- Selection of evidence-based process and (intermediary) outcome indicators;
- Stakeholder involvement;
- Reward both quality improvement and achievement;
- Distribution of rewards at the individual level and/or at the team level;
- Monitoring system for potential unintended consequences;
- Well thought-out incentive size;
- Larger quality improvement policy.

5.3. Payment systems to improve integrated care for the chronically ill

The ageing population and the rising prevalence of chronic diseases underscore the need for new innovative payment approaches that incorporate appropriate financial incentives for integrated care. We distinguish four levels in these payment incentives:

- Separate payment for the coordination of care or for extra effort;
- Pay-for-performance (P4P) mainly targeting GP practices: payment or financial incentive associated to improvements in the process and outcomes of chronic care;
- Bundled payment for a group of services for a specific disease involving multiple providers;
- Global (risk-adjusted) payment for the full range of services related to a specified group of people.

An example of a bundled payment for a specific disease involving multiple providers is an innovative scheme (called '**Keten-DBC**' in Dutch) in the Netherlands, providing an annual payment for the complete package of care required by patients with chronic diseases. Since 2010 (after a 3-year experimentation period for diabetes only), health insurers are able to purchase all of the health care services needed to manage a range of chronic diseases (diabetes, COPD, or vascular disease) through the payment of a single fee to newly created contracting entities called 'care groups'. Care groups are clinically and financially responsible for all assigned patients in the care program. The services to be covered in the generic care bundles are set by national disease-specific health care standards, but the price for each bundle of services is negotiated individually between insurers and care groups to spur competition.

The **Gesundes Kinzigtal Integrated Care** model in Germany is an example of a transition towards global payment arrangements. Contrary to other integrated care programs in Germany, the Gesundes Kinzigtal Integrated Care initiative is one of the few population-based integrated care systems that covers all sectors and indications of care for a specified population. Profits, derived solely from realised savings relative to the average costs of care, are shared between the management company and the sickness funds on the basis of a negotiated shared savings contract. Health care providers continue to be reimbursed in the same way by statutory health insurers, with additional pay-for-performance reimbursement provided by Gesundes Kinzigtal GmbH (the management company) for services not normally covered but which are considered important to achieve better quality of care. In addition, all providers are given a share of the company's profit on the basis of individual provider performance. Various safeguards to mitigate the potential for risk selection have been put in place.

Accountable Care Organizations (ACO) in the U.S. are a new payment mode where provider groups willing to be accountable for the overall costs and quality of care for their patients are eligible for a share of the savings achieved by improving care. Payers establish quality benchmarks and risk-adjusted spending targets for the patients cared for by the physicians in the ACO.

The evaluation of these payment systems to improve integrated care for the chronically ill is currently very limited or non-existent.

6. DISCUSSION

In this study we discuss the lessons learned from international experience at two levels. A first level concerns the design features of a DRG-based payment system such as the need for high-quality and recent data, the phased introduction and included/excluded services and costs. At a second level we confront objectives, incentives and real-world impact of DRG-based payment systems and highlight the need for a mix of payment systems.

Lessons learned from the design options of DRG-based payment systems

The specific design features of a DRG-based hospital payment system can make an important contribution to whether quality, efficiency or accessibility priorities are reached.

A first design feature is the **classification system**. England and the Netherlands developed a new classification system, France and Germany imported an updated version of the original DRG system and adapted it to their own practice patterns. Contrary to the other countries, the DBC system in the Netherlands registers the complete process of care, from the initial consultation through the final check-up, in one DBC. From the beginning, the DBC concept was independent of the setting of care delivery and inpatient, day and outpatient care were included. In the other countries (except England), outpatient care is not included (yet). A classification system limited to acute care settings reinforces fragmentation of care. However, initiatives are taken to extend prospective payment methods to other care settings, including rehabilitation and mental health care.

The availability of **high-quality and recent cost data** is a second important feature of a DRG-based hospital payment system. There seems to be a trade-off between ensuring high-quality data, the uniformity of cost accounting rules across hospitals and the number of hospitals collecting the cost data. If the number of cost-collecting hospitals is not representative or is too low to provide a clear picture on rare treatments, the resulting payment per DRG may result in unfair treatment of hospitals.

On the other hand, standardized and certainly mandatory cost-accounting systems can more easily be introduced in a sample of hospitals with comparable cost-accounting systems.

In England and the Netherlands pilot projects for a limited number of interventions with long waiting lists were carried out before the introduction of DRG payments to gather experience with the new payment method prior to its real introduction. All countries phased in the implementation of DRG payments during a **transition period** of several years to allow all actors time to adjust to the new system. In this transition period the percentage of activities paid on the basis of DRGs increased or the system evolved from a budget-neutral phase to real financial responsibility of hospitals, but in none of the five countries only a selection of DRGs was included in the system to avoid manipulation of the system such as up-coding and cost shifting.

An adequate IT infrastructure is needed for the management and monitoring of data collection, cost accounting and system updates (e.g. to reflect changes in clinical practice). In all five countries, a **DRG institute** was established and financed to that end.

In none of the five countries all services or costs are included in the DRG payment. Excluded services have to be financed by **other payment tools**. These include payments for services provided to patients for whom no satisfactory classification system is available (e.g. mental health and rehabilitation care); payments for non-patient related activities (e.g. teaching and research); outlier payments; payments for distortive price components (e.g. expensive drugs); payments for services where the incentive to shorten the patient's length of stay is considered harmful (e.g. ICU).

A mix of hospital payment systems is needed to meet societal goals

Hospital payment systems are one of many measures used to promote health policy goals, i.e. providing high-quality and accessible health care in an efficient way. In the five selected countries, DRG-based payment systems were introduced for that purpose. In the Netherlands for example, reforms in the hospital payment system were, however, part of broader structural reforms to enforce the role of market mechanisms. Increased competition was the key to attain societal goals and the DRG-payment system with price competition between providers was one but important instrument to achieve these goals.

In addition to supporting the broader societal goals, DRG-based hospital payment systems were also introduced to increase **transparency** and to improve the **fair treatment of hospitals**. Both objectives are thought to contribute to improved efficiency and quality of care. The success of hospital payment reforms in achieving societal goals depends in part on factors that go beyond the design features of the payment system. In all countries policy measures were taken to stimulate hospital strategies with a potential positive impact and to counterbalance others. No hospital payment system can achieve all of the stated objectives. Instead, other instruments are required.

A DRG-based hospital payment system has the potential to increase transparency by determining prospectively a price for a well-defined hospital product (the DRG). Clear rules on the coding and price fixing of DRGs are preconditions for a transparent system. Concerning the number of DRGs, a balance needs to be found between a sufficient number to guarantee fair treatment of hospitals and the risk of complex system as was the case in the original DBC system in the Netherlands.

Enhancing hospital **efficiency** was a common policy objective in all five countries under consideration, either by linking payments to activity instead of global budgets (the four European countries), or by replacing retrospective cost-reimbursement with prospective payments (U.S. Medicare program). However, there is hardly any empirical evidence on the impact of DRG-based hospital systems on (technical) efficiency. Instead, the impact on partial indicators of efficiency has been evaluated, such as control of total costs. It should be kept in mind that a prospective payment system based on DRGs does, as such, not necessarily give incentives to control **total hospital costs**. After all, DRG-based payments are based on the number of cases treated and only the price of the hospital product is controlled. Moreover, the impact of the DRG-based system on total hospital costs is largely dependent on the system in place before its introduction (budget or fee-for-service).

Access to care can be assessed by **waiting lists** or by **patient selection strategies** such as dumping and cream-skimming and by waiting lists. No evidence was found for dumping or cream-skimming of patient groups, but there is a potential danger of cream-skimming by treatment centres that are specialized in simple, elective care for a limited number of high-volume procedures. In England, these treatment centres have contractually agreed patient-exclusion criteria, which makes it difficult to disentangle cream-skimming from selection based on safety grounds. Strict regulation and monitoring are needed to avoid unfavourable patient selection in specialized centres.

Waiting lists and long waiting times are not an inherent problem of DRG-based payments. Waiting lists were a major problem in England and the Netherlands before the introduction of DRG-based payments and were due to global budgets with hard budget constraints.

The available evidence does not support concerns about the potential adverse effects on **quality of care**. Again, the impact of the payment system cannot be isolated from the impact of other policy measures. In all five countries, but especially in England and in the U.S. Medicare program, many additional initiatives, linked to payment, have been taken to guarantee or improve quality. An essential prerequisite is the availability and monitoring of information on quality of care. In most countries, information on process quality and patient outcomes is not routinely collected.

There is some evidence that DRG-related measures (e.g. the best practice tariffs (BPTs) in England) and pay-for-performance programmes can potentially be effective for quality, but convincing evidence is still lacking. Published results show that a number of specific targets may be improved by P4P when design choices and context are optimized and aligned. Examples are the selection of topics with baseline room for improvement; stakeholder involvement; well thought-out incentive size; rewarding both quality improvement and achievement.

Moreover, huge resources are needed for the design and implementation of the systems and sometimes these payment schemes are considered too complicated. In general, mechanisms within the DRG-based payments (such as BPT) were implemented only after some years of experience with the DRG-based payment system.

A disclaimer on the report

As mentioned in the introduction, the main objective of this report was to identify the lessons learned from international experience from the introduction and reforms of DRG-based hospital payment systems. Given the time constraints, the comparative analysis has clearly some limitations.

First, the analysis includes only five countries while other countries might for example have implemented interesting design features in their payment system, enhancing quality. Second, DRG-based payment systems are technically and administratively complex and they involve substantial data collection efforts (cost, medical and resource use data). However, these issues were hardly discussed. Third, the evaluation of hospital strategies and of the impact of the DRG-based systems in the five countries was mainly based on reports from official bodies. Other data sources, such as journal articles, were hardly consulted (except for the scoping review of the literature to study financial incentives to improve quality and to encourage the implementation of integrated care systems). No quality assessment of the official reports was performed. Fourth, KCE was asked to make a comparative analysis of the DRG-based hospital payment systems in a selection of countries. Hence, the focus of the report is on payments for the hospital and its medical specialists while new and innovative (payment) initiatives that encourage quality of care and integrated care systems are only briefly treated. Quality initiatives not related to payments, such as public reporting, are out of scope. Fifth, the study is restricted to a comparative analysis of hospital payments out of public resources. Out-of-pocket payments by patients (co-payments or supplementary payments) are out of scope. Finally, the report hardly goes into the political context in which a reform of the hospital payment system takes place or into the governance structure or the complexity of regulation.

7. CONCLUSION

International experience clearly shows that the **objectives** of the introduction of a DRG-based hospital payment system **should be clearly stated**. Moreover, the system should be designed in the context of broader health policy goals since changes in the hospital sector also have an impact on other sectors such as outpatient specialist or general practitioner care. Reforms of the payment system do create new incentives and providers (hospitals as well as medical specialists) adapt their behaviour accordingly.

However, a general description of these objectives is not sufficient. Concepts such as ‘efficiency’ and ‘quality’ are too broad to give shape to a payment system or to evaluate its impact.

A second lesson concerns the **impact** on these objectives. Briefly, we can state that a DRG-based hospital payment system without additional measures offers no guarantee for quality or integration of care. This also holds for containment of total hospital costs because DRG payments stimulate rather than curb production (in terms of number of stays). A mix of DRG payments and a type of budgeting is needed to achieve volume and cost containment. Although the five countries in the study aimed at increasing efficiency, the impact on this objective was hardly assessed. Most studies evaluated the impact on total costs, length of stay or volume. DRG payments increase transparency of hospital production more than other systems. Waiting lists do not result from DRG payments but are mainly caused by (hard) global budgets. The available evidence does not show patient selection. There is, however, a potential danger of selection of patients with favourable risks, particularly if treatment centres that are specialized in simple, elective care for a limited number of high-volume procedures, are allowed. In general, hospitals are paid in a fairer way because their incomes and activities are better aligned.

The concrete **design characteristics** of DRG payments make an important contribution to attaining the intended goals. Recent and high-quality cost data are needed for, among other things, a fair treatment of hospitals. The selection of services and costs included in DEG payments is fundamental. In all countries some services and costs are financed by other payment tools. A mix of payment systems, including fee-for-service payments, per diem payments and global budgets is more likely to achieve the societal goals of securing high-quality hospital care at affordable costs than any other hospital payment mechanism alone. The payment system of hospitals in all countries therefore consists of a highly sophisticated mix of different payment mechanisms that aim to restrict or modify certain negative incentives of the DRG system. This mix of hospital payment systems illustrates the **inevitable trade-off between different societal goals**.

Especially relevant for Belgium, with a dual payment system in which medical specialists are remunerated on a fee-for-service basis and hospitals are budgeted, are the many reforms of the Dutch system in the remuneration scheme of medical specialists. In essence, these reforms can be summarized as a search for **aligning the incentives of hospital management and medical specialists** with the aim of attaining the health policy goals.

Finally, it is important to dispose of an intensive **SWOT analysis of the starting situation** before introducing DRG payments. The starting situation not only determines the goals of the reform, but also its possible impact and it shows the way to the critical success factors.

REFERENCES

1. Cutler D. Equality, efficiency, and market fundamentals: the dynamics of international medical-care reform. Journal of Economic Literature. 2002;40:881-906.
2. Cylus J, Irwin R. The challenges of hospital payment systems. Euro Observer. The Health Policy Bulletin of the European Observatory on Health Systems and Policies. Autumn 2010;12(3):1-4.
3. Busse R, Geissler A, Aaviksoo A, Cots F, Hakkinen U, Kobel C, et al. Diagnosis related groups in Europe: moving towards transparency, efficiency, and quality in hospitals? BMJ. 2013;346:f3197.
4. Busse R, Geissler A, Quentin W, Wiley M. Diagnosis-Related Groups in Europe: Moving towards transparency, efficiency and quality in hospitals. Copenhagen: World Health Organization on behalf of the European Observatory on Health Systems and Policies; 2011. European Observatory on Health Systems and Policies Series. Available from: http://www.euro.who.int/__data/assets/pdf_file/0004/162265/e96538.pdf
5. Swartenbroekx N, Van de Voorde C, Crott R, Ramaekers D. Financing of hospital drugs: a descriptive study of several European countries and Canada. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2004. KCE Reports 8. Available from: https://kce.fgov.be/publication/report/financing-of-hospital-drugs-a-descriptive-study-of-several-european-countries-and
6. Cashin C, O'Dougherty S, Samyshkin Y, Katsaga A, Ibraimova A, Kutanov Y, et al. Case-based hospital payment systems: a step-by-step guide for design and implementation in low- and middle-income countries. December 2005.
7. Van De Sande S, De Ryck D, De Gauquier K, Hilderson R, Neyt M, Peeters G, et al. Feasibility study of the introduction of an all-inclusive case-based hospital financing system in Belgium. Health Services Research (HSR). Brussels: Belgian Health Care Knowledge Centre (KCE); 2010. KCE Reports 121 (D/2010/10.273/03). Available from: https://kce.fgov.be/publication/report/feasibility-study-of-the-introduction-of-an-all-inclusive-case-based-hospital-fin