

## *chapter* five

# **DRGs and cost accounting: Which is driving which?**

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### **5.1 Introduction**

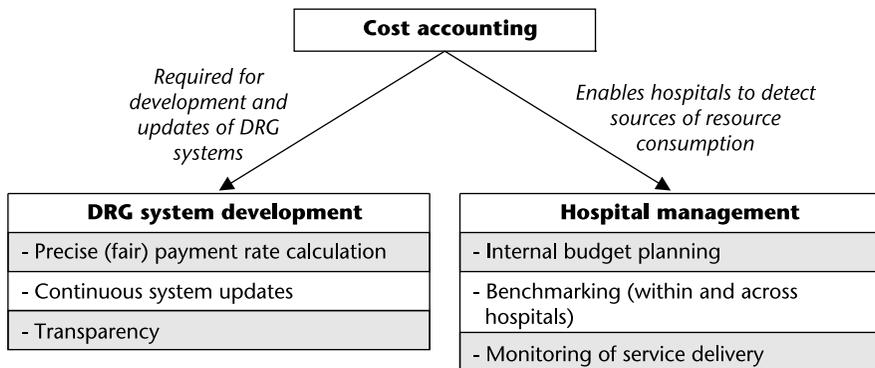
Cost-accounting systems could enable hospital managers to collect, summarize, analyse and control the most relevant information regarding the allocation of resources and reimbursement of hospital services (Finkler et al., 2007; Horngren et al., 2006). Comprehensive cost-accounting systems are able to identify the costs which are generated by some unit of analysis (such as by a diagnosis-related group (DRG)) and could support the development of DRG-based payment rate-setting mechanisms based on standardized cost data (Nathanson, 1984).

In the past, cost accounting has not been of high priority to hospitals in conventional payment systems, such as fee-for-service reimbursement and global budgets. With respect to fee-for-service reimbursement, prices charged for typical conditions linked with standard services (that is, charges/bills invoiced to payers) did not necessarily represent a good estimate of the cost of individual services (Cohen et al., 1993; Ott, 1996). However, costs were, if at all, likely to be registered in decentralized and mutually incompatible information systems (Feyrer et al., 2005). Global budgets used to be the common funding model in most European health care systems. One of the key advantages of global budget arrangements was cost control; a fixed payment was agreed in advance for a target level of activity and hospitals' level of reimbursement was not directly related to the costs per patient (see Chapter 6 of this volume). The inability of prospective budgeting to provide insight into hospital activity restricted the planning – and possibly also the control – of the ever-growing hospital costs.

With the aim of improving the efficiency of hospital care, DRG-based hospital payment systems have been introduced in many European countries since 1983 (see Chapter 2). This development fundamentally changed hospital services from being sources of incremental revenue (revenue centres) to being sources of incremental costs (cost centres) (Berki, 1985).

Figure 5.1 provides an overview of the relevance of cost-accounting systems in the DRG era. Regulatory authorities throughout Europe came to realize that DRGs could not serve as payment rate-setting mechanisms without a functioning cost-accounting system (Feyrer et al., 2005); that is, effective and fair DRG-based hospital payment systems to a large extent depend on high-quality and accurate cost-accounting systems within hospitals (see Chapter 6 of this volume). Therefore, many countries started to routinely collect cost-accounting data from a representative sample of hospitals in order to calculate and continuously update national DRG weights (for example, England, France and Germany). Other countries have imported relative weights from abroad. In any case, the use of DRGs as a payment mechanism increased the awareness of the importance of accurate cost accounting in all hospitals, including those which did not collect data for calculating national DRG prices, since erroneous cost information would lead to inadequate relative weights and, ultimately, unintended incentives for the delivery of services. However, the collection of hospital cost information has led to greater transparency. Moreover, hospital managers recognized that cost accounting could support other purposes than simply payment rate-setting, such as systematic benchmarking and managed competition (Schuster et al., 2006; van de Ven & Schut, 2009). Precise cost information enabled hospital managers to detect sources of resource consumption in order to redesign treatment processes more efficiently.

The aims of this chapter are to give a short introduction to cost accounting in health care (section 5.2), to provide an overview of the different cost-accounting methods across Europe (section 5.3) and to examine the interaction between DRGs and cost accounting (section 5.4). The final section (5.5) contains some conclusions regarding the interdependency of DRGs and cost accounting, and the prospects for harmonizing cost-accounting systems across Europe. The 12



**Figure 5.1** Cost accounting in the DRG era

countries considered were Austria, England, Estonia, Finland, France, Germany, Ireland, the Netherlands, Poland, Portugal, Spain and Sweden.

## 5.2 Cost accounting in health care

In theory, there are three subsequent steps involved in allocating hospital costs either to individual patients or groups of patient cases that are both medically coherent and cost-homogeneous (St-Hilaire & Crepeau, 2000; Tan et al., 2009c):

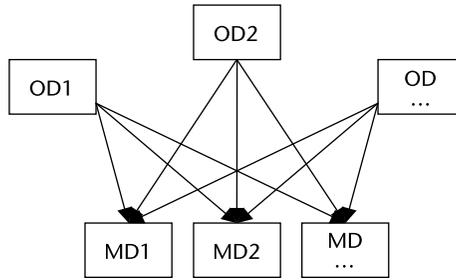
1. *overhead cost allocation*: allocation of hospital overhead costs to medical departments (subsection 5.2.1);
2. *indirect cost allocation*: allocation of department overhead costs to patients (subsection 5.2.2)
3. *direct cost allocation*: allocation of department direct costs to patients (subsection 5.2.3).

### 5.2.1 Overhead allocation

The available literature describes different frameworks for allocating hospital overhead costs to medical departments (Drummond et al., 2005; Williams et al., 1982). The most commonly used framework is cost-centre allocation (Finkler et al., 2007; St-Hilaire & Crepeau, 2000). In cost-centre allocation, a distinction is made between medical departments and overhead departments. Medical departments provide patient care and may involve in- and outpatient clinics, laboratories, operating rooms (ORs) and radiology departments. Overhead departments do not provide patient care and may include departments for administration, facility management, logistics and security. Overhead costs from such departments may be assigned to medical departments by means of various allocation bases, such as the number of inpatient days or the amount of direct costs (Finkler et al., 2007; Horngren et al., 2006).

An alternative, very similar framework is 'activity-based costing'. Activity-based costing does not refer to a separate allocation methodology, but instead emphasizes the importance of identifying the most accurate allocation base; an allocation base should most closely reflect a cause-and-effect relationship between the overhead costs and the medical department (Cooper & Kaplan, 1988). Hospital overhead costs are allocated to medical departments based on the activities which drive them (for example, the area (m<sup>2</sup>) to allocate costs of accommodation, and the number of full-time equivalents to allocate administration costs), instead of using a more generic allocation base for all overhead departments, such as inpatient days or direct costs (Drummond et al., 2005).

Within either cost-centre allocation or activity-based costing, the available literature describes three methods for allocating hospital overhead costs to medical departments. The simplest method is 'direct allocation', in which overhead costs are allocated to medical departments without interaction between overhead departments (Figure 5.2).



**Figure 5.2** Direct method for overhead allocation

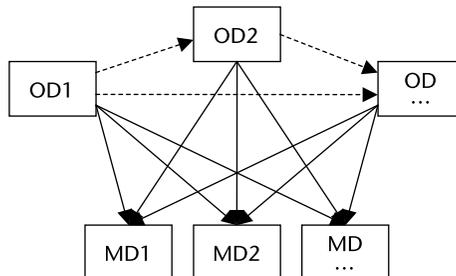
Notes: OD: overhead department; MD: medical department.

A second method, ‘step-down allocation’, partially adjusts for interaction between overhead departments. The method appoints overhead costs to both the medical departments and the remaining overhead departments in a stepwise fashion. The step-down method accounts for unilateral deliveries between overhead departments. This means that the sequence in which overhead departments allocate their costs is important (Figure 5.3); that is, costs of the second overhead department cannot be allocated to the first one.

A final method for allocating costs to medical departments is the ‘reciprocal’ method in which overhead costs are appointed to both the medical departments and to all other overhead departments. The reciprocal method takes into account bilateral deliveries between overhead departments. This means that the procedure should be repeated a number of times to eliminate residual unallocated amounts (Figure 5.4).

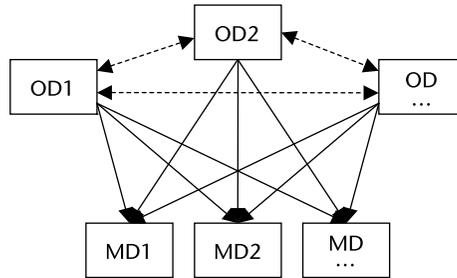
**5.2.2 Indirect cost allocation**

Department overhead costs (indirect costs) are those costs incurred by medical departments that are not directly related to patients, such as the personnel costs of non-medical staff and inventory. Cost-centre allocation and activity-based costing are not applicable to the allocation of costs to patients, because they assume a cause-and-effect relationship with the medical department, rather



**Figure 5.3** Step-down method for overhead allocation

Notes: OD: overhead department; MD: medical department.



**Figure 5.4** Reciprocal method for overhead allocation

Notes: OD: overhead department; MD: medical department.

than with patients. Instead, department overhead costs may be assigned to patients using the following methods (Finkler et al., 2007; Tan et al., 2009c):

- marginal mark-up percentages: indirect costs distributed to direct costs by raising the direct costs with a mark-up percentage;
- weighting statistics: service time, for example, used as a proxy for resource consumption, yielding a cost per treatment minute or inpatient day;
- relative value units: establish the relative cost of each patient by assigning a base value to the base-line resource use of the hospital service and adding relative values to this base value when the patient uses additional resources.

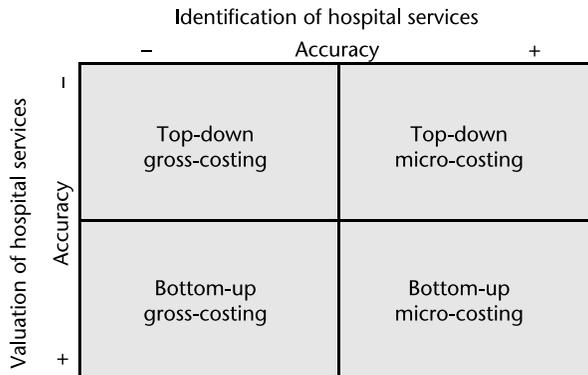
### 5.2.3 Direct cost allocation

Direct costs refer to the costs incurred by medical departments which are directly linked to patients, such as the personnel costs of medical staff (especially if clearly involved with a particular procedure), medications and materials.

Direct costs per patient are calculated by subsequently identifying the quantities of hospital services a patient consumed and valuing these hospital services with their unit costs (Drummond et al., 2005; Jackson, 2000). Overall, there are four methodologies to calculate the direct costs per patient (Figure 5.5). These methodologies differ in terms of the level of accuracy with which they identify hospital services ('gross-costing' versus 'micro-costing') and value hospital services (the 'top-down' versus 'bottom-up' approaches) (Tan et al., 2009b; Tan, 2009).

Gross-costing identifies hospital services at a highly aggregated level; often inpatient days are defined as the only hospital service (Jackson, 2000; Tan et al., 2009b). Top-down gross-costing values inpatient days per *average* patient, whereas bottom-up gross-costing values inpatient days per *individual* patient.

Top-down micro-costing identifies all relevant hospital services at the most detailed level, but values each hospital service per *average* patient (Tan et al., 2009b; Wordsworth et al., 2005). Hospital services may comprise staff time, laboratory services, medical imaging services, medications, medical materials and (surgical) procedures. As the methodology does not require patient-level data, statistical analyses of costs cannot be carried out, and differences between patients cannot be detected (Clement Nee Shrive et al., 2009).



**Figure 5.5** Methodology matrix: Level of accuracy of the identification and valuation of hospital services

Sources: Tan, 2009; Tan et al., 2009b.

Bottom-up micro-costing identifies and values all relevant hospital services at the most detailed level. Because the methodology values hospital services per *individual* patient, bottom-up micro-costing enables statistical analyses to determine whether there are cost differences between patients for each single hospital service and combinations of hospital services (Tan et al., 2009b; Wordsworth et al., 2005).

### 5.3 Costing approaches across Europe

#### 5.3.1 Ascertaining cost data across Europe

Nearly every European country has a unique approach to collecting cost data in order to further develop their DRG-based system(s).

##### *Mandatory cost-accounting systems*

Most countries allow their hospitals to use a cost-accounting system which best fulfils their own needs, but some countries require their hospitals to have mandatory cost-accounting systems (such as England and Portugal). However, despite the presence of mandatory cost-accounting systems, some variations between systems may still exist within countries.

##### *Presence of national costing guidelines*

In addition, the absence of mandatory cost-accounting systems does not prevent some countries from encouraging systematic cost accounting by means of national costing guidelines. For example, hospitals in France are recommended to apply the hospital cost-accounting model 'analytical accounting'. In Ireland, regulation relating to the collection of cost data is enforced centrally, using a national costing manual and auditing. In Sweden, national guidelines have been developed for cost-per-case calculations.

*Cost-accounting data used for calculating DRG prices*

The majority of countries use nationally collected cost-accounting data to calculate DRG prices (Austria, England, Estonia, Finland, France, Germany, the Netherlands and Sweden). Other countries have imported DRG weights from abroad (Ireland, Poland, Portugal and Spain), but each of these countries uses at least some cost-accounting data to adjust imported DRG weights to their local situation. Ireland initially adopted a slightly modified version of the Victorian Cost Weights methodology for casemix modelling. These relative cost weights have been refreshed, adjusted to the local context and updated for the Irish health care system in subsequent years. Poland only calculates DRG weights for specific procedures; costs for the remaining procedures are determined relative to the costs of the United Kingdom Healthcare Resource Groups (HRG) system (Version 3.5). Portugal allocates inpatient costs to DRGs based on the cost weights of Maryland in the United States and on the lengths of stay in Portuguese hospitals. Spain also uses relative weights from the United States, adjusting them to the Spanish context. Table 5.1 presents an overview of the different approaches to collecting cost data in 12 European countries.

**5.3.2 Cost-accounting methods across Europe***Number (share) of cost-collecting hospitals*

In most of the countries that use national cost-accounting data for calculating DRG weights, the calculation is based on a selected number of hospitals from which reliable cost-accounting data are collected and pooled. Selected hospitals typically use comparable cost-accounting systems meeting predefined quality standards (for example, Finland, Germany, the Netherlands and Sweden) (Schreyögg et al., 2006). DRG weights may also be based on cost-accounting data from a sample of hospitals which have contracts with the country's national health insurance fund (such as the EHIF in Estonia), or which participate in ongoing projects (for example, in France). Other countries require all

**Table 5.1** Different approaches to collecting cost data in Europe

	<i>Mandatory cost-accounting system</i>	<i>National costing guidelines</i>	<i>Cost-accounting data used for developing DRG prices</i>
Austria	–	–	×
England	×	×	×
Estonia	–	–	×
Finland	–	–	×
France	–	×	×
Germany	–	×	×
Ireland	–	×	–
Poland	–	–	–
Portugal	×	×	–
Netherlands	×	×	×
Spain	–	–	–
Sweden	–	×	×

hospitals to report their activity and unit costs annually to their regulatory authority (as is the case in England).

For example, the subset of 15–25 cost-collecting hospitals in the Netherlands were required to implement cost-accounting systems that were able to capture patient-level data for the allocation of costs to the individual patient and to support the maintenance, registration and validation of the 30 000 diagnosis–treatment combinations (*Diagnose Behandelings Combinaties*, DBCs).

The regulatory authorities in some countries started to provide special monetary incentives to hospitals which complied with predefined standards for cost accounting. In France, the regional health authorities award the yearly salary for a financial controller, by means of the ‘payment for general interest missions’ (MiGAC)<sup>1</sup> to each of the hospitals providing cost-accounting data. After having calculated relative weights without using monetary incentives for participating hospitals in the years 2003 and 2004, Germany introduced such payments in 2005. Currently, the Institute for the Hospital Remuneration System (InEK) reimburses hospitals with an additional fee for voluntarily collecting patient-level cost-accounting data. This consists of a lump sum and a variable amount related to the number of delivered cases and their data quality. In 2008, the InEK spent €9 million to compensate hospitals for their additional efforts (InEK, 2009).

There is a trade-off between ensuring high-quality data standards and obtaining a representative number of cost-collecting hospitals. A large number of hospitals may provide a clearer picture of differences in the severity of cases, or in the structure of hospitals in a particular country, insofar as these factors have already not been adjusted for separately. However, a small number of cost-collecting hospitals – with comparable, high-quality cost-accounting systems – may allow the data quality obtained to be higher, but with the disadvantage that data on rare treatments (for multiple trauma patients, for example) might not be available (Schreyögg et al., 2006).

#### *Overhead allocation*

For the allocation of overhead costs to the medical departments, European countries either use the direct method (England, Estonia, Finland, the Netherlands and Sweden) or the step-down method (France). Germany intends to use the step-down method in the hospitals from which cost-accounting data are collected. If this is not feasible, however, a combination of the step-down cost-accounting method and other methods (such as the direct method) can be used. In the Netherlands, hospitals are free to choose the method to be used for the allocation of hospital costs. As the allocation method was found to have only a minor impact on individual patients’ costs, hospitals commonly use the simple method of direct allocation.

#### *Indirect and direct cost allocation*

Most countries require their cost-collecting hospitals to report minimum datasets containing patient and/or hospital characteristics, some clinical parameters (such as diagnoses, status at discharge) as well as cost-accounting data. Minimum datasets containing cost-accounting data are fairly similar across European countries. For example, Finland collects resource-use and unit cost data relating

to inpatient days, outpatient visits, laboratory services, medical imaging services, medications, blood products, surgical procedures and pathological services for each treated patient.

In Austria, hospitals can implement cost-accounting systems to suit their needs. However, hospitals financed by State Health Funds report highly aggregated and standardized data (113 out of 264 hospitals). In contrast, most countries apply various weighting statistics in combination with the micro-costing methodology to allocate costs from the medical department to patients. Countries recording data on itemized resource consumption apply the bottom-up approach to allocate hospital costs to *individual* patients (or hospital services) (Finland, Germany, the Netherlands and Sweden). Countries in which patient-level data are not available apply the top-down approach to allocate hospital costs to *average* patients (inpatient admissions) (England, Estonia and France). In England, a working group of costing experts has been established to support the implementation of Patient-Level Information and Costing Systems (PLICS) within the National Health Service (NHS). As of yet, the implementation of PLICS is not mandatory and the number of hospitals that have introduced patient-level costing is not known. In Estonia and France, the calculation of DRG costs is a combination of the top-down accounting model with a (small) proportion of costs being identified at the patient level.

#### *Data checks on reported cost data*

In most countries, data checks on reported cost-accounting data initially take place internally at the hospitals. In addition, data checks are commonly carried out annually either by the national authority (in England, Estonia, Germany and the Netherlands) or by the regional authority (in Austria and France). In Finland, ensuring data quality is the sole responsibility of the hospitals, as no official data quality and plausibility checks are undertaken at the national or regional levels. In Sweden, the National Board of Health and Welfare publishes reports on coding activity and quality based on information from the National Patient Register (NPR) but it is the county councils' responsibility to check the quality of data through case record audits.

In most countries, national/regional data checks on reported cost-accounting data primarily focus on resource-use information, in terms of technical and clinical validity; that is, coded hospital services are held against certain patient and/or hospital characteristics. For example, a check is performed to establish whether a procedure is allowed/plausible for a specific hospital or patient. In some countries, data checks are additionally performed on unit cost information (Germany, the Netherlands and Sweden). In Germany, unit costs are compared to minimum and maximum values, to unit cost ratios between hospital services, and to corresponding resource-use information; for example, costs for a hip replacement must reflect the material cost of implants. Cost-accounting data are either checked for all hospitals (in Germany, the Netherlands and Sweden) or for random samples (in Austria, England, Estonia and France).

Table 5.2 presents some characteristics of the cost-accounting methods in eight European countries, using their own cost-accounting data for calculating DRG prices.

**Table 5.2** Different characteristics of the cost-accounting methods in eight European countries

	<i>Overhead cost allocation to medical departments</i>	<i>Indirect cost allocation to patients</i>	<i>Direct cost allocation to patients</i>	<i>Number (share) of cost-collecting hospitals</i>	<i>Data checks (regularity)</i>
Austria	Varying by hospital	Varying by hospital	Gross-costing	20 reference hospitals (~ 8% of all hospitals)	Regional authority (irregularly)
England	Direct	Weighting statistics	Top-down micro-costing	All hospitals	National authority (annually)
Estonia	Direct	Mark-up percentage	Top-down micro-costing	Hospitals contracted with the EHIF	National authority (annually)
Finland	Direct	Weighting statistics	Bottom-up micro-costing	5 reference hospitals meeting particular cost-accounting standards (~ 30% of specialized care)	No, responsibility of hospitals
France	Step down	Weighting statistics	Top-down micro-costing	99 volunteering hospitals participating in the ENCC (~ 13% of inpatient admissions)	Regional authority (annually)
Germany	Step down (preferably)	Weighting statistics	Bottom-up micro-costing	125 volunteering hospitals meeting InEK cost-accounting standards (~ 6% of all hospitals)	National authority (annually)
Netherlands	Direct	Weighting statistics	Bottom-up micro-costing	Unit costs: 15-25 volunteering general hospitals (~ 24% of all hospitals)	National authority (annually)
Sweden	Direct	Weighting statistics	Bottom-up micro-costing	Hospitals with case costing systems (~ 62% of inpatients admissions)	National and regional authorities (annually)

### **5.3.3 Breadth of costs covered by European DRG-based payments**

The relative importance of any DRG-based hospital payment system is determined by the share of hospital costs that are covered by DRG-based payments (see Chapter 6, section 6.3, Table 6.2). DRG payment is the principal means of reimbursing hospitals in the majority of European countries. For example, inpatient care funding through DRGs represents 75–85 per cent of hospital costs in Germany and Portugal. However, most countries exclude some (medical) specialties and/or hospital services due to (Schreyögg et al., 2006):

- the usual incentive set by the DRG system to shorten the patient's length of stay, which is considered harmful in these specialties (for example, intensive care);
- coding problems in hospital services for which DRG prices cannot be reliably calculated because they are rarely provided (for example, for multiple trauma care);
- circumstances involving specialties in which a diagnosis seems to be a bad predictor for costs (for example, psychiatric care).

Some countries therefore exclude the costs for rehabilitation (France, Germany, Ireland and Sweden), psychiatric services (England, Finland, France, Germany and Ireland), and intensive and emergency care (Finland, France and Poland). Other costs excluded from the system may involve primary care services, community services and ambulance services (England); neonatology, dialysis and radiotherapy performed during hospitalization (France); geriatric services (Ireland); and burn treatment (Sweden). Costs for excluded hospital services are mostly reimbursed via supplementary fees, fee-for-service reimbursement and/or surcharges (see Chapter 6 of this volume).

In addition, the costs for expensive drugs (in France, Germany, the Netherlands, Poland and Sweden) and/or expensive materials (in France, Spain and Sweden) are not commonly reimbursed using DRGs.

With respect to specialties, the costs for education and research are not commonly funded through DRGs. Some countries also exclude capital costs and interest (for example Austria, Finland, Germany and Ireland) and allowance for debts (for example Germany and Ireland). Other disregarded costs may relate to taxes, charges and insurance (in Germany), pensions (in Ireland) and accreditation (in Sweden).

## **5.4 Developing DRG systems with cost data**

### **5.4.1 Relevance of cost-accounting systems**

Cost-accounting data play an important role in calculating DRG weights (Nathanson, 1984). If the data given by cost-accounting systems are imprecise, hospitals are likely to be over- or underpaid for specific DRGs. In practice, profitable DRGs may compensate for less-profitable DRGs (cross-subsidizing). However, if cost-accounting data lead to an overestimated payment for a specific

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DRG, hospitals are disincentivized to reorganize treatment processes in order to improve efficiency for certain groups of patients. On the other hand, if cost-accounting data lead to an underestimated payment for a specific DRG, hospitals are disincentivized to provide high-quality care as this may lead to costs above the payment level. These hospitals may start to compromise quality in order to reduce their costs (or losses). Consequently, the appropriate level of hospital payment to a large extent determines the effectiveness and fairness of DRG-based hospital payment systems. Hospital managers, as well as regulating authorities, should consider whether the benefits of more reliable cost data justify the additional costs and complexity incurred in improving the cost-accounting systems to obtain accurate and detailed information. The choice that they make between costing methods should reflect the importance of accurate cost estimates, feasibility and the costs associated with introducing the system (Clement Nee Shrive et al., 2009).

Several previous studies have demonstrated that DRG-based hospital payments do not always adequately reflect costs (Busse et al., 2008; Heerey et al., 2002; Skeie et al., 2002; Tan et al., 2009a). This may be explained by inaccuracies in the patient classification and cost-accounting systems.

### *Inaccuracies in the patient classification*

Although health care providers have long contended that every patient is unique, the reality of DRG-based hospital payment systems is that patients are grouped together, and that some groups represent a mixture of diagnoses to a greater extent than others. Countries with itemized resource use per patient commonly use cost accounting to support adequate resource allocation, to assess the homogeneity of resource consumption within each DRG, to calculate separate DRG payments for patients requiring more complex resource use (for example, due to complications and co-morbidities (CCs)) and/or to test the effect of changes in the PCS (for example France, Germany, the Netherlands and Sweden). For instance, medical DRGs were found to be less homogeneous than surgical DRGs in France, but the creation of new DRGs was restricted by the small number of cases which would be affected in different medical stays. Cost accounting has shown that the dispersion around the mean costs varies greatly between DRGs, with highly variable DRGs most likely to comprise a wide variety of different diagnoses and treatments (Jackson, 2000).

### *Inaccuracies in cost-accounting systems*

The extent to which cost-accounting systems could support the efficient and fair use of DRG systems as a reimbursement tool relies on:

- the number and composition (sample characteristics) of hospitals from which cost-accounting data are collected and the quality of data delivered by these hospitals;
- the accuracy of the cost-accounting method (see subsection 5.4.2);
- the ability to maintain/update the cost-accounting data in a timely manner.

### **5.4.2 The accuracy of the cost-accounting method**

The extent to which cost-accounting systems could support the effective and fair development of DRG-based hospital payment systems as a reimbursement tool is determined by the accuracy of the cost-accounting method used in the respective country or region. However, the nature of costs is such that the more refined the analysis, the more costly it generally is. The reciprocal method theoretically allocates hospital costs to medical departments most precisely. At the same time, it is more time-consuming than the methods used across Europe ('step-down' and 'direct' methods). Earlier studies have revealed no statistically significant relationship between alternative cost-accounting methods and the unit costs produced (St-Hilaire & Crepeau, 2000; Zuurbier & Krabbe-Alkemade, 2007). Likewise, relative value units are believed to most closely reflect actual resource consumption for the allocation of hospital costs to patients, but their calculation requires more detailed data than operational methods require (weighting statistics and marginal mark-up percentages). Weighting statistics have been shown to provide reasonably similar cost estimates, while marginal mark-up percentages result in substantially different cost estimates compared to those based on relative value units (Tan et al., 2009c).

Bottom-up micro-costing may be the preferred methodology for calculating DRG weights because it helps hospital managers to understand whether cost differences between and within DRGs arise from variation in resource-use intensity or from variations in the costs of hospital services; it can also help to understand the distributional form of the cost-accounting data on which DRG payments are based (Jackson, 2000; Tan et al., 2009b). Unlike the alternative methodologies, bottom-up micro-costing allows for insight into the costs directly employed for *individual* patients, cost homogeneities and high-cost outliers. However, countries need to rely on top-down micro-costing (or gross-costing) if their hospitals' cost-accounting systems do not collect itemized resource-use data for each individual patient (as is the case in England, for example). Top-down micro-costing has proven to be a strong alternative to bottom-up micro-costing in terms of accuracy, and the approach is fairly feasible with respect to data availability, costs and complexity (Tan et al., 2009b). In contrast, both economic theory and empirical studies support the notion that gross-costing results in rather inaccurate cost estimates. For example, the patient's diagnosis has an important effect on the use of resources, and this is something which is not generally reflected by gross-costing methods (Jackson, 2000; Swindle et al., 1999).

## **5.5 Impact of cost accounting on hospitals**

Currently, cost-accounting systems certainly represent an improvement over the information that was formerly available in many institutions. Cost-accounting systems offer an efficient and clinically sound approach for describing and managing hospital activity, in order to offer greater transparency in the financing of health care. Hospitals across Europe recognized that cost-accounting data are fundamental for systematic benchmarking and for

managed competition approaches that can improve the efficiency of hospital service delivery (Schuster et al., 2006; van de Ven & Schut, 2009). First, cost-accounting systems facilitate the comparison of performance indicators, along with productivity and efficiency parameters. Benchmarking has also helped hospitals to manage and control operating processes and thus improves their performance; for example, it encouraged the use of DRGs in assessing the budgetary impact of anticipated changes in the volume and casemix of patients and in monitoring actual expenditure versus expected levels (for example in England, France and Estonia). Second, managed competition has allowed authorities in many European countries to provide powerful incentives to other actors in the system, such as health insurers/sickness funds (Busse et al., 2006). It led to the use of DRGs to negotiate on service quality and access, as well as on detailed cost- and volume-based financial components (for example in England, Estonia, the Netherlands and Spain). Finally, cost-accounting data enable regulatory authorities to monitor unintended incentives that are supposed to accompany DRG-based payments, such as treatment of patients whose expected costs are lower than the associated reimbursement, up-coding of expensive DRGs to increase revenue, cost minimization or shifting of treatment costs onto other parties, and compromising quality of care (see Chapter 6 of this volume).

### **5.6 Conclusions: Which is driving which?**

One may argue that cost accounting is driving the further development of DRGs. The introduction of DRG-based hospital payment systems in Europe partly originated from the absence, or inadequacy, of information relating to cost data (Feyrer et al., 2005). Cost-accounting data made it possible to validate cost homogeneities and to detect cost-outliers in the patient population. This led to revisions and refinements of the existing DRG systems. However, one could also argue that DRGs are driving cost accounting. The introduction of comprehensive and standardized cost-accounting systems was encouraged by the need to collect data for calculating DRG weights as well as supporting hospital management and auditing. Revisions of existing cost-accounting systems are undertaken to improve the effectiveness and fairness of DRG-based hospital payment systems. Regardless of which argument one chooses, the following observations cannot be disputed: (1) DRG systems cannot function well without accurate cost accounting; and (2) the necessity of cost-accounting systems to use costs based on a unit of analysis is met by DRGs. However, it is crucial to note that DRG and cost-accounting systems should be developed independently of each other; otherwise it will be impossible to validate the systems' performance individually.

The way in which cost-accounting data are collected for developing DRG-based hospital payment systems and the way in which DRG weights are calculated differ substantially among the European countries concerned. Two observations are important in this regard. First, the characteristics of the DRG and cost-accounting systems reflect the current situation but are, in effect, subject to (rapid) change based on the dynamics of the systems they represent.

Second, there is no 'best' cost-accounting system in general, because the choice of the system must be made based on the characteristics of the cost-collecting hospitals and the national health systems concerned, as well as on the objective that health policy-makers intend to fulfil by using DRG systems. However, the only way to truly evaluate DRGs in terms of medical coherence and cost homogeneity is to define costs at the *individual* patient level. Cost-accounting systems may not be sufficiently meaningful to measure, compare and improve efficiency of hospital care if DRG costs are not defined according to bottom-up micro-costing.

Each DRG-based hospital payment system has similar aims (for example, to increase transparency, to ensure adequate hospital reimbursement) but reaching these is to be achieved within different nation-specific health system contexts (see Chapter 2). Therefore, it is unlikely that cost-accounting systems across Europe will be harmonized in the near future. However, European countries are likely to deal with many of the same issues concerning the ongoing process of developing and updating DRGs and cost-accounting systems in the years to come. An overall similarity in terms of the problems they encounter may in time lead to greater interest in finding common solutions that are adjustable for each country.

## 5.7 Note

- 1 *Missions d'intérêt général et de l'aide à la contractualisation*: Missions of general interest and assistance with contracting, including payments for education, research and public health programmes.

## 5.8 References

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