

Diagnosis Related Group Costs in a Regulated Environment

Claude Le Pen¹, Gilles Berdeaux²

Pharmacoeconomics 2000, Feb. 17 (2) : 115-120

(1) Legos, Université Paris-Dauphine et CLP Santé, Paris, France

(2) Direction des Politiques de Santé et des Affaires Européennes, Pierre Fabre Médicamane, Boulogne, France

ABSTRACT

The availability of the Diagnosis Related Group (DRG) system for determining hospital costs in some European countries has encouraged its use in pharmacoeconomic evaluations. The DRG system was developed in the US to provide data for prospective payments for hospitals. However, the financing of hospitals in some European countries is still based on the so-called “global budget” approach.

Therefore, results of pharmacoeconomic studies involving hospitals financed by the “global budget” approach in which DRG costs have been used require careful consideration. The main points to consider are: (i) that most of the cost components constituting the DRGs are in fact charges fixed by the government. This cost-charge ratio varies significantly across different DRGs, altering economic consequences when cost-shifting between DRGs; (ii) that there is rarely a perfect concordance between attributable cost (as proposed by the DRGs) and the definition of variable cost (as defined in economic evaluations); (iii) from the Sickness Fund’s point of view, the way DRGs could be interpreted is rather unclear: financing or benchmarking?; and (iv) the perspective of DRG cost is a mixed patient-hospital perspective which is neither the societal nor the health insurance perspective generally used in pharmacoeconomic evaluations.

In conclusion, the use of DRG costs is a major improvement for pharmacoeconomic evaluation. However, many hypotheses still need to be made in these studies, depending on the economic perspective of the study. Therefore, the results of pharmacoeconomic studies should be considered and discussed in line with the national financing system of the hospitals involved.

For the economic assessment of healthcare, the measurement of hospital costs is often crucial. Once a drug treatment for a particular disease has been shown to decrease the rate of hospital admissions or the average length of hospital stay, the potential benefit of new treatments will depend on the value of avoided or shortened hospitalisations. However, even for economic evaluations based on clinical trial data, direct observational data are often missing; all the cost elements of hospital stays are generally not fully recorded. In most cases, only the average length of stay and some elements of direct medical costs are available. The same problem exists for economic evaluations based on medicoeconomic modelling; e.g. in decision tree analyses or Markov models where hospital costs are attached to some definite health states or clinical events. It is not always possible – or it is too costly – to assess hospital costs related to individual patients. Alternatively, valuing hospital costs by applying a daily average cost to the average length of stay is barely satisfactory because daily hospital costs are rarely associated with a specific diagnosis. Patients with very different conditions can have the same hospital costs just because they have been hospitalised in the same service during the same duration. This may bias the economic evaluation, especially when a particular treatment reduces medical staff workload or the use of other medical resources.

The US report on cost effectiveness in health and medicine¹ refers to 2 main approaches to this problem, namely using Diagnosis Related Group (DRG) data or using administrative data, i.e. patient billing information. The latter approach, although perhaps the most appropriate, is hindered by the commonly held belief that charges poorly approximate the economic cost of care². Furthermore, in countries where hospitals are directly financed by a public health fund through a global budget procedure, patient billing information is not always available. This is, for instance, the case in France. So, we are most often left with the DRG method. Many examples of studies based on DRG costs can be found in the literature (e.g. the comparative analysis of 3 antineoplastic agents in breast cancer by Launois et al³. Statement 11 of the French guidelines for the economic evaluation of healthcare⁴ recommends the use of the Programme de Médicalisation des Systèmes d'Information (PMSI) data; PMSI being the national programme for computation of DRG costs for French public hospitals⁵. The advantage of using such data is obvious – DRG costs are disease-specific, comparable and relatively. They are broken down into various components (e.g. doctors' wages, nursing costs, x-rays and laboratory tests, drug consumption) and allow for a structured analysis of costs incurred.

Nevertheless, using these DRG costs without precaution may lead to significant flaws because they rely on methodological assumptions that are not necessarily obvious to the user. In this paper, we emphasise some of these points to prevent the naïve and potentially misleading use of such data in the economic evaluation of healthcare.

1. FINANCING TOOL VERSUS INFORMATION TOOL

The utility of DRG costs may vary from one country to another, depending on the way they are constructed and used. The key point is whether the DRG system is used as a financing tool or merely as an information tool. When used as a financing tool, DRG costs represent a “real” amount of resources; therefore, it makes sense to use these costs in economic evaluations. However, when used as an information tool, a DRG costs represents a cost per diagnosis which does not directly relate to hospital budgets. This is precisely the case with the French PMSI system. Public hospitals in France are financed through a global budget procedure

which has nothing to do with the cost per DRG. The basic budget for a given year is determined by applying a government-determined nationally permitted rate of increase to the budget of the previous year. Local adjustments for each hospital are then negotiated, taking into account various factors such as morbidity, hospital bed supply, specific investment programmes, etc ...⁶

In this context, the DRG system is only used to make budget comparisons between hospitals with different activity levels and different case mixes.

Basically, a relative cost index is attached to each medical intervention in order to measure, in a nonmonetary unit, the amount of total resources (including doctors' and nurses' time, drug use, medical devices, etc ...) used compared with other interventions. For instance, a gastroscopy without biopsy is weighted as 108 points while a Doppler scan of the neck vessels is weighted as 6 points. The weights of different interventions are then summed up for each patient stay. Finally, each stay is attached to a DRG. For instance, a stay for cancer chemotherapy without complications (DRG 587) receives an average value of 839 points and a stay for a total mastectomy is weighted at 2 430 points (DRG 368 for patients older than 69 years of age) of 2 031 points (DRG 369 FOR PATIENTS UNDER 70 years of age). Thus, any hospital can compute an activity index by multiplying each DRG weight by the number of correspondent admissions. Activity is measured along the same scale across hospitals irrespective of the difference in the case mix. Finally, the hospital budget is divided by the number of activity points to get the specific value per point of activity. This value provides a comparative index of hospital productivity after adjusting for the level of activity and for the specificity of the case mix⁴.

A national value for the point of activity level is computed in the same way, i.e. by dividing the total hospital budget by the total number of points aggregated at the national level. In 1998, this value was approximately 13.03 French Francs (FF) [\$US 2.17], yielding a national DRG cost of FF 10 864 [\$US 1 810.67] for DRG 587 (patients who received cancer chemotherapy without complications), FF 31 651 [\$US 5 275.17] for DRG 368 (patients older than 69 years of age who had a mastectomy) and FF 26 325 [\$US 6 054.17] for DRG 369 (patients under 70 years of age who had a mastectomy)⁷.

It follows from this procedure that the cost per DRG (in monetary units) at the national level does not reflect the real use of economic resources of a specific DRG. If the hospital budget increases, the unit value of a DRG and, hence, the value of all DRGs will increase without there being any change in the amount of actual resources used. Thus, DRG weights and costs per DRG become a means of determining the relative share of a predetermined budget absorbed by 1 DRG rather than true economic (or opportunity) costs.

Therefore, if this type of information is used in economic evaluations, even for reasons of availability, it should be kept in mind that it has nothing to do with the real costs of resources. International cost comparisons based on DRGs are often misleading, especially between those countries in which DRGs are used to finance hospitals and those countries in which they are just an information tool without immediate and direct budgetary consequences.

2. ECONOMIC COSTS VERSUS REGULATED COSTS

The efficient allocation of resources from a societal perspective requires that decisions are based on opportunity costs as reflected by prices that would prevail in free markets under perfectly competitive conditions. However, in the medical field, observed prices are often, in reality, regulated prices that diverge from the true opportunity cost of utilised resources. For example, the pricing of doctor's fees, drug prices, x-rays and laboratory tests is based on governmental tariffs, especially in European countries, which in turn depend on political and social factors⁸.

What is the nature of DRG costs, the objective of DRG system is most often to approximate the true economic cost of a hospital stay for a particular diagnosis, with the aim of improving the billing system to patients or to health insurance funds. In this sense, DRG costs may more accurately represent opportunity costs than alternative methods of estimating the cost of hospital stays. However, in some European countries in which hospitals are funded by public health insurance funds, DRG costs may significantly diverge from real opportunity costs. This is because their cost components are heterogeneous; they are partly computed from market prices and partly from regulated prices⁹.

For example, in France, drug or medical device prices for hospitals are based on market prices, whereas hospital doctors' and nurses' wages are state-regulated. As DRG costs incorporate both of these components, it is unclear what their final nature is. This point may have practical importance when one needs to compare ambulatory and hospital costs, or even 2 DRG costs which are heterogeneous in this respect. In the French DRG system, regulated doctors' wages account for about 10% of the total cost of DRG 663 (extended burns) and for less than 1% of the cost of DRG 682 (radiotherapy). Conversely, drug and medical device costs represent 21.5% of DRG 152 cost (cardiac valve replacement with extracorporeal circulation, cardiac catheter or angiography) whereas they represent only 1.1% of the DRG 714 cost (complicated delivery with other surgery interventions)¹⁰.

It follows from this point that using DRG costs in a regulated environment is not a simple way to escape the cost charge dilemma which is familiar to health economists. To some extent, it complicated the dilemma since the cost to charge ratio is not the same across all DRGs. Adjustments could theoretically be made, but often no practical basis for such a procedure exists. Furthermore, conclusions from comparisons between DRGs with very different structures should be made with caution.

3. VARIABLE COSTS VERSUS ATTRIBUTABLE COSTS

From a genuine opportunity cost perspective, reduced hospital admissions or length of stay have the beneficial effect of making extra resources available to society for other uses, including those outside the healthcare system. However, from a health planning perspective, the notion of opportunity cost is generally used in a restricted sense i.e. limited to resources that are freed for other patients within the healthcare system.

Thus, the opportunity cost measures the benefit drawn by patients from the use of extra resources placed at their disposal. As this benefit cannot readily be measured, it is an admitted practice to assess the amount of cost saved. Published DRG costs are "complete" costs in that

they incorporate all cost components. The French system distinguishes between costs that are directly attributable to a DRG and costs that are not [i.e. essentially financial costs and depreciation of physical assets (together about 3% of the DRG total cost on average)]. However, this distinction does not match with the usual accounting distinction between fixed and variable costs, where variable costs are defined as those which vary with the level of activity while fixed costs do not. Some attributable medical costs are also fixed costs (e.g. operating ward costs) while others are true variable costs (e.g. drug therapy cost). Salaried doctors' and nurses' wages which account for an average of 25% of the DRG total cost can be considered as attributable quasi-fixed costs.

In terms of measuring the resource costs that would be freed for use by other patients, the concept of attributable cost used in the French DRG system may seem appropriate. As the number of patients in a specific DRG decreases, potential resources are made available to other patients, even if the global budget is kept constant. However, the situation is much more complicated when the evaluated treatment results in a reduced average length of stay rather than a reduced rate of admission. In this case, DRG costs are, for practical purposes, not usable. Attributable costs are not necessarily variable costs; it is misleading to make a proportionality assumption between DRG cost and average length of stay. Besides, hospital costs are not linearly distributed in time and a large share are concentrated at the beginning of the stay. This is especially the case for laboratory tests, x-rays and surgery costs. Finally, DRG attributable costs should be used to assess the effect of a medical treatment on hospital cost only when the treatment avoids full hospitalisation.

4. HOSPITAL PERSPECTIVE VERSUS SOCIETAL PERSPECTIVE

From which viewpoint should DRG costs be used ? When providing the basis for billing patients, DRG costs could clearly be considered from the payer viewpoint, irrespective of the fact that patients might be reimbursed later by their health insurance funds. This perspective is, and only if, DRG costs were marginal costs. However, as DRG costs are average costs, this is clearly not the case. For instance, if an (average) DRG cost for a procedure is \$US 1 000 but the marginal cost is only \$US 600, a new admission would provide a \$US 400 economic profit to the provider. This \$US 400 could then be analysed as a transfer payment from the payer to the provider, the net societal cost being only \$US 600.

If the ultimate goal of the system is to use DRG costs to allocate public financial resources among hospitals in a way that better reflects their genuine level of activity, there is a potential source of ambiguity; DRG costs will not determine the total amount of money devoted to the hospital sector.

There will remain a global budget and only the allocation of this budget among hospitals will be affected by the introduction of a DRG-based system. The hospital budget is predetermined and DRG costs denote, in a specific hospital setting, the amount of resources to be made available to other people if the admission of 1 patient belonging to a definite DRG is prevented. In fact, the DRG cost perspective is complex. From the restricted opportunity cost point of view, as stated in section 3, the resources saved are shared between potentially admitted patients (whom presently bear the real costs of not being admitted) and the hospital; if the new patients' costs are lower than the avoided admission, the hospital actually experiences a potential loss. This viewpoint coincides neither with the societal point of view nor with the health insurance point of view, which are the current perspectives used in pharmacoeconomic evaluations.

5. CONCLUSION

The purpose of this article was to emphasise some of the limitations of the pharmacoeconomic use of DRG hospital costs in a regulated environment, especially when hospitals are financed through global budget procedures. We focused essentially on the limitations of using DRG costs to reflect the true use of resources.

Other technical limitations exist, for instance, the changes that have been made in various countries to the WHO International Classification of Diseases, clinical modifications (ICD-CM) or ICD, version 10 (ICD-10) diagnoses in a particular DRG. While the French DRG system is based on the ICD-10, some modifications have been made to that classification. Moreover, the way disease codes are grouped into one definite DRG may greatly differ from one country to another (technical details for the French system are presented elsewhere¹¹).

While DRG costs are largely used because they are easily available and because they are an improvement over other methods of computing hospital costs such as multiplying an average length of stay by an average daily cost, results obtained from such information should be used with care. When using DRG costs, limitations and possible biases should be made clear. This is especially important in comparative studies in which hospital costs are compared across different countries or even between different pathologies.

ACKNOWLEDGEMENTS

We would like to thank 3 anonymous referees for their valuable comments. Some of their comments were included in the final version of this article.

REFERENCES

¹ US Department of Health and Human Services. Cost-effectiveness in health and medicine ; report to the US Public Health Service by the Panel on Cost-Effectiveness in Health and mEDICINE, Washington, DC ; US Department of Health and Human Services, 1996.

² Siegel JE, Torrance WG, Russel LB, et al. Guidezlines for pharmacoeconomic studies. Recommendations from the panel on cost effectiveness in health and mediicine. *Pharmacoeconomics* 1997 ; 11 (2) : 159-68

³ Launois R, Reboul-Marty J, Henry B, et al. A cost-utility analysis of second line chemotherapy in metastatic breast cancer docetaxel versus paclitaxel versus vinorelbine. *Pharmacoeconomics* 1996 ; 10 (5) : 504-21.

⁴ Recommandations de bonnes pratiques des méthodes d'évaluation économique des stratégies thérapeutiques. Paris : La Lettre du Collège des Economistes de la Santé, 1997.

⁵ PMSI. Manuel des DRG, version 1. Paris : Ministère des Affaires Sociales et de l'Emploi, 1992. Bulletin officiel n° 92-2 bis.

⁶ Cour des Comptes. La sécurité sociale. Paris : Editions des journaux officiels, 1998.

⁷ Echelle nationale 1998 de coûts par GHM. Paris : Ministère de l'emploi et de la solidarité, 1998.

⁸ Wallerstein KRB. Pharmaceutical pricing and reimbursement in Europe. London : PJB Publications Ltd ; 1997. In *Scrip Reports Version 1.0*, Lausanne : Institut de Santé et de l'Economie, 1998.

⁹ Barbier M, Guillain H, Rey JC, et al. Manuel APDRG Suisse. Version 1.0. Lausanne : Institut de Santé et de l'économie, 1998.

¹⁰ L'échelle nationale des coûts relatifs par Groupe Homogène de Malades. Paris : Ministère des Affaires Sociales et de l'Emploi, 1995. Bulletin officiel n° 95-5 bis. ¹⁰ US Department of Health and Human Services. Cost-effectiveness in health and medicine ; report to the US Public Health Service by the Panel on Cost-

Effectiveness in Health and mEDICINE, Washington, DC ; US Department of Health and Human Services, 1996.

¹⁰ Siegel JE, Torrance WG, Russel LB, et al. Guidezlines for pharmacoeconomic studies. Recommendations from the panel on cost effectiveness in health and mediicine. *Pharmacoeconomics* 1997 ; 11 (2) : 159-68

¹⁰ Launois R, Reboul-Marty J, Henry B, et al. A cost-utility analysis of second line chemotherapy in metastatic breast cancer docetaxel versus paclitaxel versus vinorelbine. *Pharmacoeconomics* 1996 ; 10 (5) : 504-21.

¹⁰ Recommandations de bonnes pratiques des méthodes d'évaluation économique des stratégies thérapeutiques. Paris : La Lettre du Collège des Economistes de la Santé, 1997.

¹⁰ PMSI. Manuel des DRG, version 1. Paris : Ministère des Affaires Sociales et de l'Emploi, 1992. Bulletin officiel n° 92-2 bis.

¹⁰ Cour des Comptes. La sécurité sociale. Paris : Editions des journaux officiels, 1998.

¹⁰ Echelle nationale 1998 de coûts par GHM. Paris : Ministère de l'emploi et de la solidarité, 1998.

¹⁰ Wallerstein KRB. Pharmaceutical pricing and reimbursement in Europe. London : PJB Publications Ltd ; 1997. In *Scrip Reports Version 1.0*, Lausanne : Institut de Santé et de l'Economie, 1998.

¹⁰ Barbier M, Guillain H, Rey JC, et al. Manuel APDRG Suisse. Version 1.0. Lausanne : Institut de Santé et de l'économie, 1998.

¹⁰ L'échelle nationale des coûts relatifs par Groupe Homogène de Malades. Paris : Ministère des Affaires Sociales et de l'Emploi, 1995. Bulletin officiel n° 95-5 bis.

¹¹ Manuel des Groupes Homogènes de Malades. Paris : Ministère des Affaires Sociales et de l'Emploi, 1998. Bulletin officiel n° 95-2.