SANITAS MAGISTERIUM

Received: 05.06.2019
Published: 17.07.2019

https://dergipark.org.tr/ijhadec
June 2019 •

A COMPARISON BETWEEN DIAGNOSIS-RELATED GROUPS AND COMMUNIQUÉ ON HEALTHCARE PRACTICES IN HEALTH FINANCING: A CASE OF CARDIOVASCULAR DISEASES

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Abstract

The gradual increase in health expenditure each year highlights the importance of cost-controlled inpatient prospective payment systems in health financing in Turkey and around the world. Being in current use in many developed countries, the Diagnosis-related Groups (DRG) model is an effective inpatient prospective payment systemused in healthcare institutions with a high case mix index. The present study aims to determine the efficacy of the DRG inpatient prospective payment system model in the funding of cardiovascular diseases, and to reveal the differences between the CHP-basedand DRG-based pricing models. Findings of the present study reveal that DRG pricing changes while CHP pricing remains constant in terms of certain parameters such as emergency or elective surgery, accompanying diseases, newborn birth weight, and length of stay in cases involving procedures and operations used in the diagnosis and treatment of cardiovascular diseases.

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Keywords:

Diagnosis-related Groups, Financing, Inpatient Prospective Payment Systems

Citation:Antep Z, (2019) A Comparison Between Diagnosis-related Groups and Communiqué on Healthcare Practices in Health Financing:A Case of Cardiovascular Diseases, International Health Administration and Education (Sanitas Magisterium), 5(2), 42-51.

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INTRODUCTION

Health policies have recently become the focus of public policies. Today health expenditure has exceeded government expenditure on education inthe total general government expenditure in developed countries and countries like ours which are undergoing demographic transformation. World Health Organization (WHO) data shows that total expenditure on health as % of Gross Domestic Product (GDP) in Turkey was 2.5 in 1995, 5 in 2000, and 5.4 in 2014. Total expenditure on health as % of GDP in the USA, however, was 13.1 in 1995 and 2000, and 17.1 in 2014 (https://www.who.int/gho/en/)The gradual increase in health expenditure each year highlights the importance of cost-controlled inpatient prospective payment systems (IPPS) in health financing both in Turkey and around the world.

In our country, approximately 20% of more than 350 million casesin private and public hospitals collectively are treated by tertiary referral hospitals, and a great majority of these are complicated cases. The structure, scope, service distribution, transaction volume, and thus transaction cost, of tertiary referral hospitals differ from others, and may also be specialized accordingly. In addition, as a duty, tertiary referral hospitals intrinsically have to continue their teaching and research activities, employ more qualified specialists, and maintain a better technical infrastructure and equipment. This in turn increases the operating costs. Furthermore, since the patients referred to these hospitals are more complicated cases, this affects the diagnosis, treatment and monitoring costs negatively.

Communiqué on Healthcare Practices (CHP) is a communiqué which sets out the terms and conditions to receive the SSI-funded health services for people whose health benefits are funded by the Social Security Institution (SSI), as well as the considerations which are determined by the Health Services Pricing Commission and payable by SSI in relation to the said services (http://www.resmigazete.gov.tr/eskiler/2013/03/20130324-3.pdf). The CHP-based inpatient prospective payment system (IPPS) fails to meet the cost of the cases especially in tertiary referral hospitals. Being in current use in many developed countries, however, the Diagnosis-related Groups (DRG) model is an effective IPPS model used in tertiary referral hospitals with a high case mix index DRGmodel is anIPPS system using certain parameters, in addition to the main diagnosis, such as severity of the disease, demographics of the patients, accompanying diseases, length of stay, and complications during the procedures in pricing the treatment procedures.

According to DRG approach, if we can categorize the patients into groups with similar healthcare needs, we can compare the healthcare given to any patient with the healthcare given to all other patients in the group (i.e. average healthcare). Each patient is unique and each patient has a number of different diagnoses, risk factors, family dynamics, and environments. Variety at the patient level is virtually endless. In order to understand this variety, one needs to classify the cases into groups with similar needs. The main starting point is the main diagnosis. Grouping the patients according to their main diagnoses, followed by subgrouping based on the presence or absence of other conditions, is the most important

classification approach used in DRG model.Even though diagnosis-based classification is carried out in this way, procedures and patient demographics contribute to the determination of the groups as well.Assignment of relative values to each group based on the average cost of these patients falling into the groups determined explains the use of this system as an IPPS method. Each hospital receives a share from the budget depending on the DRG codes itcreates for its inpatients and on the relative values corresponding to these codes.

Diagnosis-related Groups (DRG)

DRG is an inpatient prospective payment system where cases are classified into groups based on clinical and cost data and comparable diseases are put into similar groups (Akdağet al., 2011).DRG was first developed by the researcher Robert Fetter, of the Yale University,and his friends in 1970s, and its main purpose is to identify the hospital products and measure what hospitals actually do. It is a system which essentially aims for patient classification and inpatient prospective payment for hospitals (Ünalet al., 2014). It was first implemented in 1980 in New Jersey. After a 3-year pilot period, it was put into use in 1983 around the world, and particularly in the USA. It is an actively used system in Australia, the USA, Canada, New Zealand, Singapore, Thailand, Malaysia, Korea, Taiwan, China, Costa Rica, Romania, the Czech Republic, Ireland, Hungary, Slovenia, Bulgaria, and many others. Across Europe, it has been adopted by Austria, Belgium, Denmark, the Netherlands, the UK, Finland, France, Germany, Italy, Portugal, Spain, Sweden, Switzerland, and the Wales within the scope of Euro-DRGproject (Quentin et al., 2013).

DRG data input began in Turkey in 2005 – 2006 with 7 pilot hospitals within the scope of Infrastructure Development for Improving and Reforming the Health Services Financing Management Project carried out by Hacettepe University, and the pilot study continued in 2008 with the participation of 48 hospitals by the end of the year and finished in November 2009, also marking the end of the project ("HÜAP Report D.B.3.1", 2006). The Turkish Ministry of Health took initiative in 2009 and created an institutional body within the Ministry to maintain and establish this system, and gave more weight to creating a national DRG system. First, 50 pilot hospitals were included in the DRG system in 2009. In 2010, 260 hospitals became integrated into the system and this number reached 550 by 2011 (Ünal et al., 2014).

Basic Concepts Concerning DRG

DRGclassifies the diseases based on the main diagnosis first, and then on the procedures. It estimates the treatment costs in relative value rather than in monetary value. Basic concepts concerning DRG, namely *main diagnosis, secondary diagnosis, procedures (ACHI), relative value,* and *case mix index (CMI)* are defined in detail below:

Main diagnosis

It is the diagnosis which, upon analysis, constitutes the main reason for inpatient treatment (or admission to the healthcare institution)(Şencan et al., 2013).

Secondary Diagnosis

It is the diagnosis of a condition or complaint accompanying the main diagnosis or manifesting during inpatient stay or outpatient treatment(Şencan et al., 2013).

Procedures (ACHI)

Procedures are an ACHI (Australian Classification of Health Interventions) classification and grouped as surgical, diagnostic and investigative procedures. The surgical procedures as a whole encompass diagnostic procedures, allied health interventions, and dental procedures. ACHI classification is structured by the anatomical site. ACHI coding is a numerical coding system. The first 5 digits represent the general features and the definition of that particular intervention while the remaining 6^{th} and 7^{th} digits provide information about the specific interventions included (Akdağ et al., 2011).

Relative Value

Relative value is the ratio of the average cost of a single DRG to the average cost of all DRGs. Cost data is required in order to calculate the relative value (Akdağ et al., 2011).

$$\text{Relative Value} = \frac{\text{Average Cost of 1(One) DRG}}{\text{Average Cost of All DRGs}}$$

If a DRG's relative value is greater than that of any other DRG, this means that it requires more resources for treatment. In order to create a relative values list, the above calculation should be repeated for each DRG individually. After normalizing the calculated values, the relative values list is created with 1.0 being the limit (values above and below the limit). The 2012 cost analysis performed by the Turkish Ministry of Health estimated the average case cost per relative value to be TL 1,531.56 (Öztürk, 2014). Since the case mix index of the health services created by hospitals vary from month to month, cost per relative value varies each month as well. Thus, the present study takes the cost per relative value as TL 1,500.

Case Mix Index (CMI)

CMI is the ratio enabling us to compare a particular hospital's case production to that of another hospital. It is a value used to measure the complexity (comorbidity) of the diseases treated by a hospital (Kurşun &Yümsel, 2017). Following are the uses of CMI method:

- Measuring the clinical activities,
- Evaluating the inter-hospital performance,
- Financing,
- Intra-hospital management tool,
- A tool to begin quality assessment with,
- Making clinical and financial decisions in the hospital,
- Comparison statistics between physicians and determination of healthcare giver profiles,
- Intra- and inter-hospital healthcare quality comparison,
- Supporting the clinical guidelines, protocols and sustainable quality projects, and
- Creating data and identification standards.

CMI Calculation

The following formula is used for CMI calculation(Kurşun &Yümsel, 2017):

$$\frac{\sum (DRG\ Relative\ Value\ X\ Number\ of\ Cases)}{Total\ Number\ of\ Patients\ for\ Hospital\ A}$$

Therefore, a hospital's having a higher CMI compared to another hospital suggests that it has treated cases with higher relative values (complicated cases).

AIM AND METHOD

The present study aims to find out the quality and efficacy of the DRG inpatient prospective payment system model for cardiovascular diseases, which is an inpatient classification method involving classification of diseases based on clinical and cost data, and to present recommendations based on the results of the evaluations of financial differences between CHP and DRG.

This study analyses the case simulations where cardiovascular disease diagnoses and procedures were performed since these case simulations have a high case mix index. Of the procedures used in diagnosis and treatment of cardiovascular diseases, this study includes case simulations of coronary angiography, coronary artery bypass graft, surgeries for aneurysm and dissection, and congenital heart surgery. The study compares the DRG and CHP pricings for these cases based on certain parameters such as main diagnosis, secondary diagnosis, age, birth weight (if a newborn), personal history of other diseases, type of hospitalization (emergency/elective), and length of stay.

The present study hypothesizes that DRG-based IPPS system involves, based on objective and measurable data,a higher paymentto the hospitals treating complicated cases, a lower payment to the hospitals treating less complicated and more costly cases, and allocating budget to each hospital based on the relative values they create for their inpatients. Based on this hypothesis, the present study is restricted to the field of cardiovascular diseases with a high case mix index.

FINDINGS

This part of the study includes the analyses of case simulations comprising of procedures performed in diagnosis and treatment of the cardiovascular diseases.

Table 1. DRG and CHP Pricing Comparison for Coronary Artery Bypass Graft (CABG) Cases

	Diagnosis	Procedure	Relative Value	DRG Pricing	CHP Pricing
Case 1	Coronary artery disease	Coronary Artery Bypass Graft	5.33	TL 7,995	TL 7,428
Case 2	Coronary artery disease Congestive Heart Failure	Coronary Artery Bypass Graft	7.18	TL 10,770	TL 7,428

As can be seen in Table 1, both cases underwent coronary artery bypass graft, and since Congestive Heart Failure (CHF) accompanying the second case's main diagnosis Coronary Artery Disease would change the episode of care, the pricing (financial cost) of the second case increased by 35%. The DRG-basedIPPS model priced the procedures at TL 7,995 Case 1, whereas the pricing for Case 2 was TL 10,770 because the cost of healthcare would be increased by the changes in length of stay, treatment type, and healthcare services due to CHF, which was the secondary diagnosis. On the other hand, the CHP system priced both procedures at the same amount, i.e. TL 7,428, for both cases.

Table 2. DRG and CHP Pricing Comparison for Coronary Angiography Cases

	Diagnosis	Procedure	Relative Value	DRG Pricing	CHP Pricing
Case 1	Coronary Artery Disease	Coronary Angiography	0.92	TL 1,380	TL 415
Case 2	Myocardial Infarction (MI)Coronary Artery Disease	Coronary Angiography	1.46	TL 2,190	TL 415
Case 3	Coronary Artery DiseaseCongestive Heart Failure	Coronary Angiography	1.7	TL 2,550	TL 415
Case 4	Myocardial Infarction Coronary Artery DiseaseCongestive Heart Failure	Coronary Angiography	2.53	TL 3,795	TL 415

Table 2 shows that all of the four cases underwent Coronary Angiography.The DRG-based IPPS model priced the elective coronary angiography at TL 1,380 for Case 1, the emergency coronary angiography due to MI at TL 2,190 for Case 2, the elective coronary angiography at TL 2,550 for Case 3 since the cost of healthcare increased due to CHF-induced changes in length of stay and healthcare services, and the coronary angiography at TL 3,795 for Case 4 since both the emergency procedure and the secondary diagnosis, CHF, increased the cost of healthcare. On the other hand, the CHP system priced the procedures at the same amount, i.e. TL 415, for all of the four cases.

Table 3. DRG and CHP Pricing Comparison for Aneurysm and Dissection Cases

	Diagnosis	Procedure	Relative Value	DRG Pricing	CHP Pricing
Case 1	Thoracic Aortic Aneurysm	Ascending Aorta Graft+ Replacement of the Aortic Valve	6.55	TL 9,825	TL 14,323
Case 2	Thoracic Aortic Aneurysm, Ruptured	Ascending Aorta Graft+ Replacement of the Aortic Valve	12.57	TL 18,855	TL 14,323
Case 3	Thoracic Aortic Dissection	Ascending Aorta Graft+ Replacement of the Aortic Valve	27.19	TL 40,785	TL 14,323

Table 3 shows that all three cases underwent the same procedure. The DRG-based IPPS model priced the elective surgery for aneurysm atTL 9,825 for Case 1, the emergency surgery for aneurysm due to rupture at TL 18,855 for Case 2, and the emergency and high-risk dissection surgery at TL 14,323 for Case 3. On the other hand, the CHP system, which priced all the procedures at TL 14,323 for all of the three case simulations, did not take the changes in episode of care and healthcare costs into consideration in the pricing process.

Table 4. DRG and CHP Pricing Comparison for Congenital Heart Surgery

	Diagnosis	Procedure	Birth Weight	Relative Value	DRG Cost	CHP Cost
Case 1	Patent Ductus Arteriosus (PDA)	PDA Division	3,000 gr	4.92	TL 7,380	TL 4,747
Case 2	Patent Ductus Arteriosus (PDA)	PDA Division	750 gr	28.61	TL 42.915	TL 4,747

As shown in Table 4, both case simulations underwent PDA ligation. The DRG-basedIPPSmodel priced the PDA ligation at TL 7,380 for the 3,000 gram newborn in Case 1, and the PDA ligation at TL 42,915 for the 750 gram newborn in Case 2 since the low birth weight increased the length of stay, episode of care, and cost of healthcare.

DISCUSSION

Findings of the present study show that DRG-based pricing changes while CHP-based pricing remains constant in terms of certain parameters such as emergency or elective surgery, accompanying diseases, newborn birth weight, and length of stay in cases involving procedures and operations used in the

diagnosis and treatment of cardiovascular diseases. Based on the results of this study, especially the tertiary referral hospitals treating more complicated cases such as cardiovascular diseases and maintaining their teaching hospital status have higher case pricings since they employ more qualified and professional specialists, and have better medical materials and equipment. Therefore, the present study concludes that case pricing process would be more just and fair if the differences between the types of hospitals were taken into consideration in the inpatient prospective payment process.

Just like all the other businesses in the service industry, healthcare institutions meet their costs by selling services and receiving a certain amount of payment in return for these services. Currently, healthcare institutions are refunded for their services based on the amounts determined by CHP pricing. The results of the present study, however, show that the healthcare services provided by healthcare institutions do not meet the costs within the CHP pricing system. It can always be argued that each payment system has its own weaknesses and strengths compared to others. What is important here is to find and implement a system with maximum benefit by properly analyzing these weaknesses and strengths.At this point, the DRGsystem stands out from the other inpatient prospective payment systems. Since some current payment systems do not take the severity and type of disease into consideration, they have caused great losses of right and suffering in terms of inpatient prospective payment. As with any other business, this hinders the proper operation of the healthcare institutions and affect their financial capabilities negatively. The DRG system, on the other hand, bases the case pricing for the patients treated by healthcare institutions and the inpatient prospective payment these institutions will receive on the severity of disease, and it also involves paying different amounts depending on the type of disease. From this perspective, it can be said that the DRG system's most important strength compared to other systems is this fundamental feature.

In conclusion, a DRG-based pricing model creates its pricing schemes upon extensive analysis of the demographic, clinical, and cost data. The present study recommends the use of the DRGinpatient prospective payment system not only as a financial instrument but also as an effective tool in research, planning, process and output evaluation in health services, quality assessment, and institutional and clinical performance assessment to support administrative and clinical decisions.

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