Araştırma / Research Article

Tanı ilişkili gruplara dayalı geri ödeme simülasyonu: Türkiye ve Avustralya karşılaştırması

Diagnosis related groups-based simulation: comparision of Turkey and Australia

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ÖZET

DRG'ye dayalı finansman sistemleri genel olarak; "Şeffaflığı Artırmak, Etkinliği Sağlamak ve Hastanelerin Yönetimini Desteklemek" amaçlarını hedeflemektedir. DRG uygulamasını sürdüren ülkeler ortalama kalış süreleri, yatak sayıları, ortalama vaka maliyetleri gibi göstergelerde verimlilik artışı sağlamayı başarmışlardır. Bu çalışma; Türkiye'ye ait 2009 yılı frekansı en yüksek 20 DRG'ye göre Türkiye ve Avustralya Bağıl Değerleri üzerinden 14 Hastanenin geri ödeme simülasyonu ile karşılaştırmalar yaparak değerlendirmelerde bulunmak amacıyla yapılmıştır. Çalışma sonucu Türkiye ve Avustralya Bağıl Değerleri üzerinden yapılan geri ödemelerin önemli oranda farklılıklar gösterdiği tespit edilmiştir. Özellikle Bağıl Değer farklılıklarının bu sapmada doğrudan ilişkili olması nedeniyle ülkeler arasında sağlık dokusu, maliyet yapıları ile sosyal ve ekonomik farklılıklarının öngörülerek DRG uygulamalarına geçiş süreçlerinin yönlendirilmesi gerektiği değerlendirilmiştir. Ayrıca hastaneler arası karşılaştırmalar da yapılmış, hastane türlerinin DRG çeşitliği ve sıklığında önemli bir etken olduğu görülmüş, ayrıca bu tür karşılaştırmaların yerel sağlık yapılarının değerlendirilmesinde önemli bir kaynak olabileceği düşünülmüştür.

ABSTRACT

The aims of DRG-based financing systems are generally "to improve transparency, to ensure efficiency and to support the administration of hospitals. Countries continuing to the DRG implamantation have managed to make productivity improvements in indicators such as the average length of stay, number of beds, average costs of case. The aim of this study is to make evaluations by comparing the reimbursement simulations of 14 hospitals in Turkey via Turkey's and Australia's DRG relative values, which are obtained by 20 DRGs with the highest frequency in 2009 in Turkey. As a result, it has been found that the reimbursements via Turkey's and Australia's DRG relative values were quite different. Especially, because the differences between relative values are directly related to this deviation, the transition process to DRG implementation should be directed by foreseeing the health status, cost structures, social and economic differences between countries. In this study, it has been also made comparisons of the hospitals, and so it has been seen the types of hospitals are an important factor in DRG diversity and frequency, this kind of comparisons is thought be an important resource for evaluation of local health structures.

INTRODUCTION

Diagnosis related groups; inpatient classification system, which includes grouping patients by using clinical and cost data and assign similar illnesses to similar groups (www.tig.saglik.gov.tr). Briefly, in DRG's, homogenous cases are associated with the resources of treatment that are spent on them. However, the resources of treatment are expressed as "relative value / coefficient" rather than monetary value (Sağlık Bakanlığı, 2011).

Diagnosis related groups were developed by Robert Fetter and his colleagues as a tool on the purpose of quality control of the health services in Yale University, United States of America, in 1970's. Then it was transformed to the reimbursement model by using cost data and started to be used as reimbursement method in Medicare in 1983. In course of time, DRG's have become the main structure of the reimbursement systems in most of the developed countries. (Fetter, 1991; Busse et al. 2011; www.tig.saglik.gov.tr).

The primary purpose of DRG's is to allocate the limited healthcare resources fairly and transparently to services providers. Besides its use for this purpose, DRG's have many areas of use: Measurement of clinical activities, comparison of quality of care in-hospital and inter – hospital, monitoring effectively the healthcare costs, meaningful and systematic data collection, promoting efficiency and effectiveness etc. (Sağlık Bakanlığı, 2011).

In this context, it is the subject of this study to compare and evaluate by reimbursing to 14 hospitals through DRG data of Turkey, which is trying to adapt DRG's

Australia Adaptation to itself, and Australia's DRG data.

DRG REIMBURSEMENT METHODOLOGY

Relative Value and Case Mix Index

Relative value is the ratio of a DRG cost to all DRGs' average coast. In Relative Value formula, cost data are needed to calculate both the numerator and denominator. While calculating relative value, the average cost of a DRG group is calculated by dividing total cost of the patients in that DRG group by total number of patients. After the calculation of a DRG group's average cost, average cost for the whole country or a group of pilot hospitals is calculated; total of costs divided by total number of patients. Average cost of a DRG group divided by general average cost then its relative value is calculated (Yilmaz, 2009: 16).

$$Relative\ Value = \frac{Average\ cost\ for\ a\ DRG}{General\ Average\ Cost\ Representing\ all\ of\ the\ cases\ (DRGs)\ for\ whole\ Country\ or\ pilot\ Hospital\ groups}$$

Case Mix Index (CMI): is a ratio that enables us to compare case productivity of any hospital with another hospital's. It is also an indicator of the complexity of cases and how sick are the patients (Yilmaz, 2009). For example; X hospital has higher case mix index than Y hospital, it shows that X hospital treats higher relative valued (complex) cases. Also it will receive more reimbursement according to patterns of the cases.

$$X\ Hospital's\ Case\ Mix\ Index = \frac{\Sigma\ (DRG\ Relative\ Value\ X\ Number\ of\ cases)}{Total\ number\ of\ cases\ for\ A\ hospital}$$

DRG is the grouping of a patient's admission to hospital. Data on the Table 1 is needed to this grouping (Sencan, Seker & Demir, 2013).

DRG-based Finance Components

DRG-based finance components are obtained from clinical and cost data. By taking the acquired average DRG costs into consideration, Relative Value of each DRG, which is essential to reimbursement, and Case Mix Index (CMI) of health institution are calculated (Busse et al., 2011). DRG has two components of financing. The first component includes coding, grouping, data collection and analysing. The second component includes costing, data collection and analysing (Sencan, Seker & Demir, 2013: 4).

DRG Relative Value Pool: This calculation is made for each DRG to reach Relative Values. After normalisation in weights, relative values are specified as a list, under 1.0 and above.

Coding Effect in DRG Transition: When coding, existence of details of main diagnosis can change the DRG to which cases go. As seen in the example; declaring whether ulcer chronic or perforated can change the possible DRG related to ulcer. Possibly changed DRG means also a different relative. Also additional diagnosis accompanying the main diagnosis can change the DRG and relative values.

Peptic Ulcer	Chronic perforated peptic Ulcer
Main diagnosis: K27.9 Peptic ulcer, perforated or without bleeding	**Main diagnosis: K26.5** Peptic ulcer, with chronic perforation
G63Z → Peptic Ulcer without complication	**G62Z** → Peptic Ulcer with complication
Relative Value: 1,01	**Relative Value:** 1,25

Figure 1. Relation of Relative Value and Clinical Coding (Main Diagnosis) Source: Sencan, Seker & Demir, 2013: 7.

Table 1. Basic Data Needed to DRG

Main Diagnosis	The diagnosis revealed as the main reason for the patient's admission to hospital in the end of the examination, or the main reason of admission.
Procedure (performed)	Generally, only one procedure is operative on DRG assignment. In case of more than one procedure, performed, happens a transition to DRGs, in which more resource is applied.
Additional diagnosis (important comorbidity or complications)	A situation or complaint either coming with the main diagnosis (comorbidity) or emerged (complication) in admission in hospital.
Age	It is enough to take as year except for newborns.
Gender	Male or Female.
Type of discharge (where to go after being discharged.)	It states patient's situation when being discharged and where to go.
Born weight of new-borns	Born weight is a data used in DRG grouping.

Payment and Budgeting Formulation According to DRG

DRG and finance options are applied generally as a Payment System or a Budgeting System (Tchealth, 2008: 15-19):

When applied as a Payment System, it needs a base price, and a set of relative values (Busse et al., 2011). It means that firstly a base price needs to be determined by the reimbursement institution. After the base price is given, relative value of each DRG and this price was multiplied respectively and then the price of the DRG will be calculated (Yilmaz, 2009: 16).

DRG A Price = Base Price * DRG A Relative Value

Payment for DRG A = DRG A Price * DRG A Frequency

Payment is structured according to the base price and relative values that are calculated depending on the DRGs, which were constituted according to the cases reported by the hospital.

When applied as a Budgeting System, it needs a base price, the number of cases accordign to DRG, taken from previous year, and Case Mix Index taken from previous year. (Busse et al,, 2011).

Health Institution's Budget = Total Cases * Base Price * CMI

Contract/Convention and budgeting system are constituted through the previous year's number of cases and Case Mix Index (CMI) with the actual number of cases and Case Mix Index.

Base Price; gives us the current price for an average patient by dividing the number of patients arranged according to Case mix (number of cases) (Busse et al., 2011).

METHOD

Objective of the Study

Primary objective of the study is to compare, to evaluate and to make an inference from the data of Australia and the data of pilot study of Turkey that is applied according to the Australian version of DRG-based reimbursement model, which is thought to be the new reimbursement model in Health Sector and also still applied in the hospitals of Board of Health, through the DRG Reimbursement Methodology.

Assumptions

It is assumed that the data of Turkey and Australia, collected with the official letter by getting permission from the Board of Health and used in the study, are

true. It is supposed that the data of 14 hospitals, obtained from the Board of Health, represent Turkey. It is supposed in the coming data analysis that the first 20 DRGs, which have most frequency from the 14 hospital's DRG data, which represent Turkey among the 665 DRGs, represent all of the DRGs constituted in health institutions. Virtual Global Budget, which will be handed out to health institutions, is constituted from Turkey's first 20 DRG Total Cost data.

Scope and Limitations

Study data contain the data of the inpatients of 2009, which is first implementation year of DRG's in Turkey. Australia's DRG data are on a country basis (public), Board of Health's DRG data are contain 14 hospitals. These 14 hospitals are chosen, because they are in the scope of the "Development of Infrastructure Project for the Consolidation and Reconstruction of the Finance Structure of Health Services" project and being the common ground of Board of Health, Department of Finance, Social Security Institution and Hacettepe University, which conduct pilot scheme in these institutions.

DRG Analysis are the analysis that are conducted through the calculated cost of DRG (Tchealth, 2008: 18);

- 20 DRGs, which have the most and the least total cost,
- **20 DRGs, which have the most number of cases (frequency),**
- 20 DRGs, which have the most and the least profit ratio,
- 20 DRGs, which have the most and the least average cost per discharged.

DRGS above are the most used analysis during this process. The reason why the ones with the highest frequency are chosen among the first 20 DRGs is that they are the data package that can represent the disease pattern of the hospital or country the most. Because the 14 hospitals that represent Turkey were chosen the mentioned "project" before, they all are included in the study. Types of the hospitals; 2 Training and Research hospital, 1 Private Hospital, 9 Public Hospital, one of them is specific branch, 2 University Hospital. These are indicated below and in the findings, assessment and conclusion chapters the hospitals named after H1, H2…H14.

Data

Permission is received for data supply from the Board of Health. As stated under the title of Scope and

Limitations, one of the analysis conducted with the DRGs is the analysis of the most case numbered 20 DRGs. In this scope, hospital data are gathered by taking the 14 Hospital's data in Turkey into consideration, for the purpose of finding the 20 DRGs having the most frequency. Then the first 20 DRGs, which have the highest frequency, are determined from the Turkey data (Table 2).

Later on, data of 20 DRGs having the highest frequency of Turkey are processed according to the steps of DRG Reimbursement Methodology. In this scope, firstly the "Relative Value" of each hospital is calculated for Turkey (according to the Relative Value Formula), then the Relative Values that represent Turkey for each of this 20 DRGs are found. The same calculation as Turkey's first 20 DRGs is made for Australia.

Base Price is determined to be used in calculation of the price of each DRG, after the Relative Values of each of the DRGs on the country basis are determined. In this process the "Base Price" is determined after the detection of the total cost of 14 hospitals in the Global Budget (Virtual Budget) and dividing this by total relative value. Thus the differences between Turkey and Australia DRG relative values are provided to be processed in the manner that reveal the effect on the profit/loss situation of the hospitals.

Later on, the results, which were found to determine the number of Reimbursement for each of the hospitals, of the "Base Price * Related Turkey DRG Relative Value * Case Frequency" and "Base Price * Related Australia DRG Relative Value * Case Frequency" are calculated in order for a comparison.

ANALYSIS, FINDINGS AND COMPARISON

Calculation of Relative Values

As remembered Relative Value of a DRG is determined with the ratio of the average cost for that DRG to the general average cost that represents all of the DRGs. In this framework, related Relative Value calculations are shown on the Table 3.

Relative Values calculated as average cost of each DRG divided by general average cost, Relative Value of the general average cost is 1. Because the calculation of Relative Value is related to rational relation between the costs, each DRG Relative Value on the country basis shows the rational relation of cost structure of its own country, so it is not related with Turkey's average costs' being low or Australia's being high. For example, when we look at the DRG of K60B, on the 18th Place, (diabetes, catastrophic, without KK) there is a nearly meaningless difference between Relative Values, although Australia's average cost is 3.9 times more than Turkey's (K60B Relative Value for Turkey is 1, 01 and for Australia it is 1, 02).

When looked at the findings of Table 3, the lowest Relative Value for Turkey is P67D with 0, 45 (new-born controls), the highest Relative Value is F42B with 1, 63 (circulatory system diseases). When looked at the Australia's Relative Values, the lowest DRG is G67B with 0, 44 (various digestive system diseases) and the highest DRG is G09 (hemi (hernia) process) with 2,2. Height of the DRG Relative Values is directly related to the reimbursement, because it is the multiplier in the reimbursement formula, so the hospital with the higher DRG Relative Values can get more reimbursement.

Determination of the Declared Global (Virtual) Budget

In this section, the Declared Global (virtual) Budget that and the Base Price of a Relative Value for the handling to the hospitals. In the determination of the declared global budget, 14 hospitals' total cost data are taken into consideration. So, it is aimed that the relation of the difference of reimbursement between countries with the profit/loss situations of the hospitals to be revealed. Multiplying of hospital DRG average costs and frequencies gives the total cost on a hospital basis and with the cumulative total of the 14 Hospital's total costs, the virtual Global Budget (General Total Cost) is determined and shown on Table 4.

In Table 4, declared global budget is determined as 145.331.718 TL, and this states the total costs of all

Table 2. Turkey's 20 DRGs with The Highest Frequency and The Explanations.

Sequence	DRG Code	Sequence	DRG Code	Sequence	DRG Code	Sequence	DRG Code
1	F42B	6	J11Z	11	D11Z	16	B81B
2	E65B	7	O60B	12	X62B	17	F62B
3	O01C	8	I68B	13	D10Z	18	K60B
4	G09Z	9	G67B	14	H08B	19	H63B
5	C16A	10	G07B	15	E62C	20	P67D

Table 3. The Calculation of DRG Relative Values of Tukey and Australia

Sequence	First 20 DRG Code	Turkey Average Cost (TL) (A) 1.659	Australia Average Cost (TL) (B) 6.489	Turkey Relative Values (DRG / A) 1,00	Australia Relative Values (DRG / B) 1,00
1	F42B	2.700	9.897	1,63	1,53
2	E65B	1.684	7.907	1,02	1,22
3	O01C	1.223	14.061	0,74	2,17
4	G09Z	1.399	14.303	0,84	2,20
5	C16A	1.183	3.734	0,71	0,58
6	J11Z	1.009	3.463	0,61	0,53
7	O60B	942	7.308	0,57	1,13
8	I68B	2.294	6.228	1,38	0,96
9	G67B	1.080	2864	0,65	0,44
10	G07B	1.865	9.048	1,12	1,39
11	D11Z	1.665	4.485	1,00	0,69
12	X62B	1.586	3.501	0,96	0,54
13	D10Z	1.424	6.080	0,86	0,94
14	H08B	1.304	9.857	0,79	1,52
15	E62C	2.065	5.528	1,24	0,85
16	B81B	2.557	5.994	1,54	0,92
17	F62B	1.740	7.862	1,05	1,21
18	K60B	1.686	6.543	1,02	1,01
19	H63B	1.894	4.596	1,14	0,71
20	P67D	746	4.259	0,45	0,66

Note: TL: Turkish Liras

the hospitals. When the DRG average costs evaluated, the average costs of the cases, which are chronic and more severe than others, are higher, like cardiovascular diseases (F42B, F62B), nervous system diseases (spinal cord) (B81B), respiratory disorders (E62C, E65B).

Calculation of the Base Price of the Relative Value 1,0

Calculated DRG Relative Values on the country basis are multiplied with the DRG's total number of cases and it gives the Total Relative Value data, then Global Budget value (145.331.718 TL) is divided by total Relative Value and this gives the price of 1 Relative Value. Turkey's total relative value is calculated as 87.585,03 and Australia's is 100.030,52.

$$\text{Base Price of the Country DRG Relative Value} = \frac{\text{Global Budget}}{\text{Country Total Relative Value}}$$

Base Price of Turkey Relative Value = 145.331.718 / 87.585,03 = 1659,32 TL

Base Price of Australia Relative Value = 145.331.718 / 100.030,52= 1452,87 TL

Calculation of the DRG Prices

After the calculation of the price (base price) of 1,0

Table 4. Global Budget Determination

(A) General Average Cost (TL)	(B) Number of Cases	(A x B) Total Cost (Global Budget)
1.659	87.602	145.331.718

DRG Relative Value, the stage before the last one is the calculation of the prices of each DRG. For this purpose, Relative Value of each DRG will be multiplied with the calculated Base Price. In the end of the calculations DRG prices on the country basis are found.

Reimbursement to Hospitals and Evaluations

Here, the reimbursements, that were given to hospitals in line with the DRG frequencies, which were given according to the DRG prices of Turkey and Australia that were calculated on previous stage, are calculated on the country basis and the formula is like that: "Payment for DRG A = DRG A Price * DRG A Frequency". As a result of the calculations, the reimbursements on country and hospital basis and profit/loss situations are shown in Table 5.

The total reimbursement amounts for each DRG on a hospital basis are given in Table 5 according to the countries. In Table 5, hospital-based total reimbursement amounts, their share within the global budget and their share in total cost, and again the

profit / loss and profitability of hospitals are compared on a country basis. The distributed global budget was derived from the total cost of the hospitals. When the hospitals are evaluated in this context, the hospitals that take reimbursement higher than total costs are for both of the countries are: H2, H3, H4, H7, H10, H11, H12, H13 and H14. The profitability ratios of these hospitals show significant differences between Turkey and Australia. This shows that DRG types and frequency differences are present in hospitals and DRG price differences between Turkey and Australia are very important.

The most profitable hospital in both countries is H13 Hospital. When the overall average cost was evaluated, it was seen that the hospital with the lowest cost average (414 TL) among hospitals was H13. Compared to the average cost of all hospitals (TL 1659), the main reason for the difference between the other hospitals is that the H13 hospital produced DRG at much lower average costs.

Compared to the general average cost (TL 1,659) for

Table 5: Results of the Reimbursements of Turkey and Australia and its influence on the profitability of hospitals

Hospitals	Turkey Reimbursement		Australia Reimbursement		Total Costs		Turkey Reimbursement Profit/loss Situation		Australia Reimbursement Profit/loss Situation	
	(A) Price (TL)	Global Budget Share (%)	(B) Price (TL)	Global Budget Share (%)	(C) Price (TL)	Total cost share (%)	(D)=(A-C) Price (TL)	(D/C) Profitability (%)	E=(B-C) Price (TL)	(E/C) Profitability (%)
H1	7.352.777	5,06	8.253.958	5,68	15.788.340	10,86	-8.435.563	-53,43	-7.534.382	-47,72
H2	16.061.604	11,05	13.916.721	9,58	11.356.159	7,81	4.705.445	41,44	2.560.562	22,55
H3	6.083.630	4,19	6.476.522	4,46	5.393.750	3,71	689.880	12,79	1.082.772	20,07
H4	13.305.400	9,16	15.239.915	10,49	9.124.920	6,28	4.180.480	45,81	6.114.995	67,01
H5	9.087.642	6,25	10.499.779	7,22	18.376.063	12,64	-9.288.421	-50,55	-7.876.284	-42,86
H6	11.630.097	8,00	9.658.108	6,65	9.900.289	6,81	1.729.808	17,47	-242.181	-2,45
H7	14.771.686	10,16	12.561.464	8,64	7.765.230	5,34	7.006.456	90,23	4.796.234	61,77
H8	16.132.154	11,10	17.282.850	11,89	29.520.661	20,31	-13.388.507	-45,35	-12.237.811	-41,46
H9	6.697.926	4,61	6.283.673	4,32	10.005.768	6,88	-3.307.842	-33,06	-3.722.095	-37,20
H10	7.692.446	5,29	7.781.579	5,35	4.732.384	3,26	2.960.062	62,55	3.049.195	64,43
H11	16.881.564	11,62	15.074.319	10,37	13.241.250	9,11	3.640.314	27,49	1.833.069	13,84
H12	2.428.699	1,67	3.271.288	2,25	1.482.644	1,02	946.055	63,81	1.788.644	120,64
H13	7.331.751	5,04	9.671.345	6,65	2.205.196	1,52	5.126.555	232,48	7.466.149	338,57
H14	9.874.343	6,79	9.360.198	6,44	6.453.838	4,44	3.420.505	53,00	2.906.360	45,03

Global Budget: 145.331.718 TL

hospitals with joint profit in terms of both countries; H3, H4, H7, H10, H11, H12, H13 and H14 hospitals produced DRG below the overall average cost. Although the average cost of the H2 hospital is less than 4.5% of the overall average cost, H2 Hospital is seen profitable in terms of both countries with the profitability rates of %41,44 for reimbursement Turkey and %22,55 for Australia reimbursement. This suggests that the hospital is related to the DRG type and frequency structure, as well as that it receives a share of revenue losses from excessively damaging hospitals. It has been found that the average cost of hospitals is not a determinant factor in affecting the profit / loss ratio of the proportional constructions but it is understood that DRG structures (types and frequencies of DRG) of hospitals are important factors.

According to the results shown in the Table 5, the lowest profitability ratios of the hospitals compared to the country-based profitability ratios are 1.88% at H10 Hospital (62.55% profitability with Turkey and 64.43% with Australia) and the highest profitability difference at H12 Hospital With a profit of 106.09% (profitability with Turkey 232.48%, profitability with Australia 338.57%). Profitability ratios differ significantly by hospital and country. The biggest reason for this is the DRG Price differences between the two countries. Because DRG Prices are a direct multiplier of the reimbursement formulation, the types of DRGs produced in hospitals and their frequencies are the basis for determining the amount of reimbursement. Differences in Relative Value Differences between countries (also related to cost structure) led to large differences in terms of the types and frequencies of DRGs produced by DRG Prices in reimbursements.

The results of the H3 Private Hospital included in the study are also important. It is also aimed to assess the results of private hospitals receiving DRG reimbursement under the global budget. In this context, when Table 5 was evaluated, H3 Hospital was profitable in terms of reimbursement of both countries, but it was ranked back in terms of profitability. Hospital case diversity, which generates DRG below the overall average cost (1.563 TL), has been shown to concentrate on F42B, P67D, O01C and D10Z DRGs, respectively.

H6 Hospital had a profitability ratio of 17.47% with Turkish Reimbursement, while it received -2.45% with Australian Reimbursement. The rate at which DRG frequencies are high and low is one of the main factors affecting the amount of reimbursement. This is because the difference in price between 1 DRG type of countries will cause the amount of reimbursement by frequency to vary on the basis of country and other hospitals. H1, H5, H8 and H9 Hospitals have been in loss in

terms of both countries. In terms of these hospitals, the differences in the rates of loss according to the countries were in the band of 4% to 8%. All of these hospitals provide services at the tertiary level.

Although the H2 Hospital is a Special Branch Training and Research Hospital that provides services at the tertiary level, when evaluated in terms of DRG type and frequency; Because F42B DRG type (Circulatory System Diseases) has 78.6% of all DRGs it produces and it is advantageous position in terms of cost and DRG price over this DRG, it has a profitability of 41.44% with Turkey Reimbursement and 22.55% profitability with the Australian Reimbursement. H2 Hospital has long been a specialized hospital for Cardiovascular Diseases, suggesting that diagnostic and treatment procedures can be standardized and thus avoid unnecessary transaction costs. Other 3rd Level Hospitals were in great loss. In terms of these hospitals, the loss of two countries are at nearly the same level. Since the cases of these hospitals are heavier than the other hospitals, it is natural that the case costs are high and the average costs are high.

Calculation of Case Mix Index (CMI): Comparison between Countries and Hospitals

For the calculation of the Case Mix Index, case numbers are required for each hospital separately reported for each DRG. The number of cases in the DRGs is multiplied by the relative value of those DRGs and their sum is taken and divided by the total number of cases in the hospital. This formula is shown in the previous chapters.

As a result of calculations made with the related formula, Hospital Case Mix Indexes of hospitals based on Turkey and Australia were found. The results obtained are shown in Table 6 on a country basis. Australia's CMI average was 1.14 and Turkey's was 0.99. According to this result, the cases in Australia are more complex than those in Turkey.

According to Table 6, H2 Hospital has the highest Case Mix Index (CMI) according to both Turkey and Australia relative values; this indicates that it treats the higher relative value (complicated / complex) cases. It is also expected that there will be more reimbursement according to the DRG structure. In this context, when related to Table 5, H2 Hospital was the only hospital with the highest reimbursement of which profitability rate is positive, in its own type of hospitals (3rd Level Hospital) on the basis of both countries. In addition, when evaluated in terms of 14 hospital-based reimbursement, it is in the first 3 ranks in Turkey, in terms of the amount of reimbursement (the first 3

Table 6. Turkey and Australia CMI Comparison

DRG Code	(A) Total DRG Frequency (Case Numbers)	TURKEY		AUSTRALIA	
		(B) Weighted Case	(B / A) CMI	(C) Weighted Case	(C / A) CMI
H1	5.736	4.430,09	**0,77**	5.679,97	**0,99**
H2	6.551	9.677,21	**1,48**	9.576,80	**1,46**
H3	3.452	3.665,42	**1,06**	4.456,82	**1,29**
H4	8.995	8.016,58	**0,89**	10.487,35	**1,17**
H5	5.465	5.475,36	**1,00**	7.225,43	**1,32**
H6	7.054	7.007,20	**0,99**	6.646,23	**0,94**
H7	9.283	8.900,02	**0,96**	8.644,18	**0,93**
H8	8.922	9.719,71	**1,09**	11.893,20	**1,33**
H9	3.888	4.035,54	**1,04**	4.324,11	**1,11**
H10	4.927	4.634,74	**0,94**	5.354,90	**1,09**
H11	9.900	10.171,24	**1,03**	10.373,40	**1,05**
H12	1.807	1.463,30	**0,81**	2.251,14	**1,25**
H13	5.333	4.417,42	**0,83**	6.655,34	**1,25**
H14	6.275	5.949,35	**0,95**	6.441,22	**1,03**
Total Average	**87.602**	**87.563**	0,99	**100.010**	1,14

are very close together (with H8 and H11)); and 4th in Australia. The fact that two university hospitals, H5 and H8 Hospitals, received 2nd and 3rd rank in terms of Australian CMI, confirmed that university hospitals were associated with more complicated cases. In this context, when the Australian refund amounts were examined, H5 Hospital was in the 1st place and H8 Hospital was in the 6th place. When the CMI of 3rd Level Hospitals in Turkey were evaluated, CMIs of H5, H8 and H9 hospitals, excluding H1, were included in the first 5 Hospitals. When the CMIs were examined, H1, H12 and H13 hospitals were the ones with the lowest CMI according to the Turkish data, and when they were associated with the reimbursement amounts, it was seen that H12 had the lowest, H3 had the worst 5. Although H1 Hospital is a tertiary-level hospital, VKI is not high like university hospitals nor Private Branch Hospitals. When hospital DRG data were examined, it was found that there was no accumulation in any case and that the average hospital cost was the highest with 2,753 TL after two university hospitals (H5 and H8).

When H3 Private Hospital was evaluated in terms of CMI, it was 3rd in Turkey with a value of 1.06 after H5 and H8 University Hospitals. We can say that this is similar to the evaluation of the hospital for reimbursement, and that the cases of the hospital generally have a complexity between the tertiary hospitals and the general public hospitals. In conclusion, "Case Mix Index" revealed a significant relationship between case complexity and reimbursement amounts.

CONSLUSION AND SUGGESTIONS

Primary objective of the study is to compare, to evaluate and to make an inference from the data of Australia and the data of pilot study of Turkey that is applied according to the Australian version of DRG-based reimbursement model. When the results of the study were evaluated, differences between countries as geography and disease types, as well as the differences in accessing to health resources, were reflected in DRG Relative Values. These Relative Value Differences have been found to cause significant differences in the finance of hospitals. Along with the diversity and frequency differences in DRG among countries, Australia is also constantly updating in the AR-DRG, the Australian Adaptation of DRG, which it has developed peculiarly. In this context, it is the nature of the DRG-based practices that Turkey adopts the Australian Adaptation in DRG implementation but develops it dynamically in its own way. For this reason, it is thought that Turkey should take a sample of a more similar country for DRG application and develop a custom adaptation afterwards. Furthermore, diversification and shaping of the DRG types according to the health status of the country will ensure that the DRGs are placed more realistically. Thus, it can be said that the relations between the costs will be more accurate and, as a result, will more accurately reflect the case complexity.

Case Mix Index, one of the important indicators for hospitals in terms of DRG reimbursements, reflect the case complexity. Australian CMI (1.14) was higher than

Turkey (0.99). With the ease of access to health services in Australia and the more intensive use of diagnosis and treatment processes, it can be said that more intensive diagnosis and treatment procedures have been applied to the same or similar cases. Of course, the severity of the diseases of the patients should not be ignored. When the hospitals were evaluated for CMI, it was also found that, in terms of both countries, mainly the University Hospitals, the 3rd Level Hospitals had higher CMIs in accordance with the function assigned to them. However, with the exception of one of these hospitals, all of the reimbursements resulted in significant loss in these hospitals.

As a result, it has been found that the reimbursements made on Turkey and Australia Relative Values show significant differences. Especially, since the Relative Value Differences are directly related to this deviation, it has been evaluated that the transition process of countries to DRG applications should be directed by foreseeing the health status, cost structures and social and economic differences among the countries. When we look at hospitals, it has become clear that a more accurate and equitable DRG financing application should be evaluated according to the types of hospitals.

REFERENCES

1. Busse. R., Geisler. A., Quentin, W. & Wiley, M. (2011). Diagnosis-Related Groups in Europe: Mowing Towards Transparency, Efficiency and Qaulity in Hospitals. New York, NY: Open University Press.
2. Fetter, R. B. (1991). Diagnosis-related Groups – Understanding Hospital Performance. Interfaces, 21, 6–26.
3. Marshall, R. P. (2009). Uluslararası TİG Çalışmaları: TİG Ortamında Ürün Maliyetlendirmesi. Tanı İlişkili Gruplar (TİG) e-Bülteni, 7, 4-6.
4. Tchealth. (2008). Hacettepe Universitesi Arastırma Projesi, GSS Sağlık Bakım Hizmetleri Ödemeleri için Altyapı Geliştirme Calışması Raporu: E.4.3.3- Klinik Maliyetlendirme Kalite Süreçlerinin Tanımlanması.
5. Tchealth. (2008). Hacettepe Universitesi Sağlık Hizmetleri Finansman Yapısının Güçlendirilmesi ve Yeniden Yapılandırılması Projesi Raporu: D.B.7.2- Hacettepe Universitesi Hastanelerinde Mevcut ve Sanal Bütce Uygulamalarının Karşılaştırılması.
6. Sağlık Bakanlığı. (2011). TIG Uygulama Rehberi. Tedavi Hizmetleri Genel Müdürlüğü Performans Yönetimi ve Kalite Geliştirme Daire Başkanlığı. Ankara: Pozitif Matbaa.
7. Sencan, I., Seker, M. & Demir, M. (2013). Teshis İlişkili Gruplar İleri Klinik Kodlama Standartları. Sağlık Bakanlığı. Ankara: Pozitif Matbaa.
8. Yilmaz, A. (2009). Maliyetlendirmeye Iliskin Sıkca Sorulan Sorular [Frequently Asked Questions About Costing]. Tanı Iliskili Gruplar (TIG) e-Bulteni [e-Bulletin of Diagnosis Related Groups], 7: 16.
9. www.tig.saglik.gov.tr, Access Date: 07/03/2014