Original Article

Exploring the Perception of Medical Personnel Regarding Drgs Implementation in Greek Public Hospitals

Charalampos Rigas, MSc
General Hospital of Lamia, Greece

Panagiotis Theodorou, MSc, PhD
Academic Tutor, Postgraduate Course - Health Care Management, School of Social Sciences, Hellenic Open University, Patra, Greece

Roxani Karagianni, MSc, PhD
Center of Planning and Economic Research, Athens, Greece

Maria-Elisavet Psomiadi, MSc
Greek Ministry of Health, Athens, Greece

Charalampos Platis, MSc, PhD
KETEKNY SA, Greek Institute for DRG, Athens, Greece

Correspondence: Psomiadi Maria-Elisavet, 6-8 Makedonias Str., 10433, Athens, Attika, Greece, e-mail: psomiadimarilly@gmail.com

Abstract

Background: The DRGs compensation system has raised numerous concerns and has been met with skepticism, especially among the medical personnel, almost in every country that had been implemented. The adaptation of this specific compensation system in Greece was facilitated by the establishment of K.E.N (Global Unified Hospitalization Rates-KEN), a DRGs version adjusted to the funding the compensation needs of the Greek healthcare system.

Aim: The aim of this study is to identify the weaknesses that emerged from policy reform as well as to reflect on doctors' views, regarding its acceptance.

Methodology: A weighted questionnaire was used to record medical staff's perceptions, as referenced in similar previous international and Greek studies. The study was conducted in the hospitals of the 5th Health Region, located in the Central Greek mainland, with a sample of 245 doctors that work in seven distinct public general hospitals.

Results: Respondents with a basic medical degree had a neutral attitude concerning their intended actions regarding DRGs implementation and their potential benefits while considering that patients' accessibility will be reduced. However, specialization, MSc and PhD holders were more positive in terms of their intentions towards DRGs application, supporting the notion that might be beneficial for the patients, while being less inclined to the idea of a reduction in patients' accessibility.

Conclusions: The results supported that the hospitals included in this study showed signs of responding to the new compensation system, through its gradual acceptance by a significant part of the medical population. Further analysis should consider the reform's long-term effects, along with its effects on all Greek hospitals.

Key Words: Diagnosis Related Groups, Health Policy, Hospital, Medical Staff, 5th Health Region, hospitals' compensation

Introduction

Diagnosis-Related Groups (DRGs) are a part of an internationally recognized hospital funding/compensation system, based on the classification of patients into groups, according to the costs consumed during their hospitalization, which depends on their clinical characteristics and the services provided (Busato& Von Below, 2010; Kaitelidouet al, 2012). DRGs were first applied in 1983 in the United States, when Medicare, the federal health care program for the elderly and disabled, adopted the diagnosis-related groups as the basis for hospitals' compensation (Paris et al, 2010). They have since been adopted by many healthcare systems in developed countries, while presenting a multifold of local variations (Polyzos et al, 2013).

Primary purpose for initiating the DRGs system in Europe was to establish a relative level of pricing and reimbursement for diseases and clinical cases that share similar diagnosis and relative rates among the various hospital systems (Polyzos et al, 2013). Thus, in many European countries DRG-based hospital compensation systems have grown into becoming the sole hospital payment method, aiming mainly in increasing performance, transparency and efficiency, while reducing waiting times, supporting patient selection, and improving the overall quality of care. Withal, they ensure the continuity of care through facilitating hospital health services provision and standardizing budgeting as well as cost and quality control (Sinzobahamvya et al, 2014).

The concentration of multiple patients in a much smaller number of homogeneous diagnostic categories promotes, apart from transparency, a more accurate measurement for hospital activity (Busseet al, 2006; Busse&Quentin, 2011). This facilitates control by the insurance bodies and related hospital financiers while creating a regulatory framework for both medical and administrative staff (Geitona, 2009). The intent to reduce hospitalization days with the application of DRGs can subsequently lead to better outcomes for hospitalized patients, such as the reduction of inpatient infections and disabilities that occur during their stay or the augmentation of patients' satisfaction, among others. DRGs limit waiting lists while increase the number of diagnosed cases

alongside targeting the improvement of the overall quality of health care (Busseet al, 2013; Mathauer&Wittenbecher, 2013).

However, they might pose a potential threat to the quality of health care, since hospitals are motivated dominantly either by the retrenchment of costs per patient, regardless of the health outcome, or by omitting necessary diagnostic and therapeutic procedures[9]. The likelihood of resorting to malpractice, such as premature discharges that entail complications to patients' health (bloody, "bloody exits"), incorrect coding, selection of 'healthy' patients ("cherry - peaking") or patients with lucrative DRGs ("cream skimming") is also significantly increased (Fässleret al, 2015).

Until 2011, in Greece, a retrospective compensation system was implemented, that apart from being inflationary, it had been accountable for many problems, including the high administrative costs, the lack of control over hospital expenses, the increasing average duration of hospitalizations and the generation of budget deficits (Xenos et al, 2014). During the first Economic Adjustment Programme for Greece, the Ministry of Health estimated that DRGs system implementation will result in significant benefits regarding time and managerial costs, for both hospitals and insurance organizations. In particular, the main purpose of the DRGs implementation in Greece was to control costs, by reducing state funding to public hospitals, as well as to enhance transparency and ameliorate the aggregated hospital efficiency (Polyzos et al, 2013).

At the end of 2011, the Greek Ministry of Health, along with a scientific committee specialized in Health Economics, decided that the most adequate solution was to adapt the Australian DRGs system (AR-DRG, 6th edition) to the Greek actuality, considering the strengths, weaknesses and priorities of the Greek social security and healthcare system. According to the international literature, among the available models, AR-DRG had received wide acceptance, as it had already been successfully adopted by several countries (Xenos et al, 2014).

In this context, the first Greek version of the DRGs system (Global Unified Hospitalization Rates-KEN) was a generalized hospital price list with 700 compensation packages, grouped into 25 main

diagnostic categories that determined the hospitalization cost and average duration for each patient. These data corresponded theoretically to each patient category average that was used to charge episodes of care directly to the insured, regardless of individual charges and the actual hospitalization cost[4]. Patient cases' classification using the KENcodes, is based on the diagnosis describing patient's condition [International Classification of Diseases, tenth revision codes (ICD-10)], as well as the surgical procedures and health interventions performed [Greek Coding of Medical Procedures Codes (ELOKIP)]. To map completeness, 81% of KENwas assigned to ICD-10 codes, while the corresponding correlation rate of surgeries and health intervention codes was lower than 65% (Kaitelidouet al, 2012).

However, a major weakness in implementing KENin Greece was that the specialized software for classifying incidents into the KEN, grouper, was not acquired by the Greek government. For this purpose, the Ministry of Health developed a dedicated application that was characterized by significant shortcomings, which resulted in the manual classification of patients into diagnostic categories based on billing offices' subjective assessment.

This system that was enforced in the first year of its deployment led in medicines and health services pricing that was not based on the actual costs(Christoforidouet al, 2021) and clinical protocols applied, but on a combination of activity-based costing, data from selected public hospitals and "imported" cost stations. Finally, KEN does not incorporate hospital employees' wages costs. Therefore, reducing input costs, including the cumulative cost of hospital procurement (pharmaceuticals, medical supplies, orthopedic and chemical reagents), as they account for 68% of the total hospital operating costs, is a major objective (Siskou et al, 2014).

Aim

The aim of this study was to imprint the opinions of doctors working in the hospitals of the 5th Health Region of Greece, implementing the KEN-DRGs system. Apart from exploring the acceptance of this new policy, its connection to the quality and effectiveness of the health services provided was investigated as well.

Material and method

Study design and participants: In this study, data regarding medical personnel's perceptions concerning the application of KEN-DRG's as a contemporary method of health services compensation were collected from the hospitals of the 5th Health Region. The sample was comprised by doctors currently working in the General Hospitals of Chalkida, Karpenisi, Lamia, Trikala, Theba, Volos and General University Hospital of Larissa. 335 questionnaires were distributed and 245 of which were answered (73.1% response rate). The survey was conducted over a three-month period from January to March 2020.The questionnaire applied in this study was based on analogous ones that were previously used in national (Fostiropoulou, 2013; Giannakides, 2016) and international research projects(Fässleret al, 2015;Tummers& Van de Walle, 2012) and its questions comprise four distinct domains. The first two domains address samples' demographic and professional characteristics respectively (8 questions). The third poses questions regarding accessibility after DRG's implementation, as well as their potential actions due to this new policy while the fourth domain concerns doctors' opinions on patients' benefits from DRG's implementation (12 closed-ended questions, answered through Likert scale, where 1 = completely disagree and 5 = completely agree). The questionnaire was approved by the scientific and ethics committees of the Hospitals and administered to doctors who consented by signing a written survey participation consent form.

Statistical Analysis: Initially, Kolmogorov-Smirnov test was carried to investigate variables' distribution, finding no sample variables following the normal] distribution ($p<0.05$). A factor analysis was then performed, which resulted in deeming the questionnaire suitable for this study, due to its validity and adequacy to provide reliable results. In particular, the first pre-selected criterion, KMO test, was KMO=0,851, while the second, Bartlett Test, was also positive, as $p<0,001$ IE $<0,05$. Three factors emerged from the analysis, physician intentions, patient benefits and accessibility, with Cronbach's a Reliability Index calculated >0.7 for each one of them; physician intentions: 0.804, patient benefits: 0.890 and accessibility: 0.749. The investigation of comparisons between categorical

variables, such as educational level, age, marital status, position of responsibility, and quantitative variables, was conducted with the non-parametric Mann-Whitney test and Kruskal-Wallis test.

Results

Demographics

Sociodemographic and professional characteristics of the sample are summarized in Table 1. Most participants were male (69%), married (66.6%), had 1-2 children (55.9%) and holded solely a medical degree (66.5%). Most respondents were interns (26.9%) and medical directors (26.1%) while 48.9% of them were currently employed in the surgical sector and 40% in the pathological. As for their age, 29.7% were 40-50 years old and 24.2% were 50-60 years old. The average years of service were 14.7 with a standard deviation of 10.6 years.

Factor Analysis

Below are presented the factors that emerged from the factor analysis. All three of them are named following the conceptual framework they formulate, while the results were based on the extraction of location and variability measures. As featured in Table 2, doctor's intentions present the greatest mean value concentration, with an average of 3.12 and a median of 3, followed by accessibility with an average of 2.91 and a median of 3; patients' benefits present an average of 2.68 and a median of 2.75. What is inferred is that respondents have a neutral attitude towards KEN, as they neither agree nor disagree with the view that KENcontribute negatively or positively to hospital services.

The first factorial structure encompasses questions concerning physicians' perceptions of what they intend to do to implement KEN. It was named "Doctors' intentions" and addresses their individual intentions, time dedication, the intention to influence their peers positively as well as their personal effort to implement KEN-DRGs successfully. In Table 3 are listed the location and variability measures for each distinct question that comprising doctors' intentions. With the average values ranging from 3.08 to 3.13, the dominant trend in all variables is doctors' neutral stance.

The second factorial structure concerned the potential benefits that derive from KEN application for patients, therefore was named "Patients' benefits". The questions included addressed facilitating problem solving, contributing to patient well-being and satisfaction, effective assistance, and the overall positive effect. All relevant location and variability measures are depicted below in Table 3. The medical personnel expressed a neutral attitude towards the potential benefits that patients may accrue; the dominant trend is to disagree, with an inclination to maintaining a neutral stance, as the average values range from 2.62 to 2.81.

Correlations between the three Factors and Sample's Demographics

To investigate potential correlations among the three aforementioned factors and samples' demographic characteristics, the non-parametric Mann-Whitney test was performed. No statistically significant correlations between them and gender were identified as $p>0.05$ for all three factors. However, educational level presented with a statistically significant correlation to all 3 factors as Table 4 demonstrates.

Thus, we observe that people holding solely a medical degree maintain a neutral stance in terms of the physician intentions factor (M= 3.03) (p=0.012) as well as to the decrease in patients' accessibility (M=3.01) (p=0.002), while disagree with the notion that there are benefits for the patients (M= 2.60) (p=0.034). Physicians with specializations, master's, and doctoral degrees express are a slightly positive stance regarding the intentions factor (M=3.29), consider that there are benefits for patients (M= 2.84) while believing less that patients' accessibility may be decreased (M= 2.70).A statistically significant alteration occurs after the provision of adequate information and training to part of the investigated medical personnel in the correct selection of diseases' codes according to ICD-10, with the goal of registering patients to KEN properly, as featured in Table 5. Becomes apparent that physicians who have received training / information present with a more neutral or slightly positive tendency to contribute to the KEN-DRGs reform (M=3.49) (p<0.001), as well as maintaining a neutral stance regarding patients' benefits (M= 2.87) (p=0.031) while having a negative attitude towards the notion that there is a decrease in patients' accessibility (M=2.76) (p=0.001). Doctors who have never been informed or trained on ICD-10 express a neutral tendency to contribute to the KENreform (M= 2.97), being negative considering the existence of benefits for patients (M= 2.58) while they regard the potential decrease in accessibility neutrally (M=3.01).

Regarding the correlations among the three factors with participants' age, the non-parametric Kruskal-Wallis Test resulted in no statistically significant relations apart from the one between accessibility and age. Doctors aged between 25-29 years (M=3.07), 40-49 years (M=2.93), 50-59 years (M=2.97) and 60+ years (M= 2.91) maintain a neutral stance towards the subsequent reduction in patients' accessibility while doctors aged between 30-39 years (M= 2.63) mainly present as well with a neutral stance, but several within the group disagreed. Therefore, there has been a differentiation doctors' attitude from the ones aged between 30-39 years old against the rest of the age groups, as depicted in Table 6.

Correlating the three factors with participants' marital status with the Kruskal-Wallis Test resulted in no statistical significance relations apart from the one between married physicians and the notion of potential benefits for the patients following the KENimplementation (p=0.025). Hence, we observe that married doctors (M=2.77) present with a neutral attitude towards this idea when unmarried ones (M=2.46) disagree. As presented in Table 7, the other categories include a few doctors, with differentiation being attainable between the married and unmarried groups.

From the correlation between responsibility position and the three factors, with the non-parametric Kruskal-Wallis Test, emerged solely a statistically significant relation with patients' benefits (p=0.037). We observe that resident doctors (M= 2.55) mainly present with a neutral stance regarding patients' benefits, while several of them disagree. However, physicians within the other responsibility positions groups, tend to maintain a neutral position (averages ranging from 2.62 to 2.93) more clearly in relation to residents as featured in Table 8.

Table 1: Sample's demographic and professional characteristics

	N	%
Gender		
Male	169	69
Female	76	31
Age		
25-29	49	20
30-39	34	13.9
40-49	73	29.7
50-59	59	24.2
60+	30	12.2
Marital Status		
Unmarried	70	28.6
Married	163	66.6
Divorcee	3	1.2
Other	9	3.6
Number of Children		
0	89	36.4
1-2	137	55.9
3+	19	7.7
Educational Level		
Medical Degree holder	163	66.5
Specialization holder	19	7.7
MSc holder	46	18.9
PhD holder	17	6.9
Responsibility Position		
Medical Director	64	26.1
Attending (A)	48	19.6
Attending (B)	46	18.8
Resident	66	26.9
Faculty Member	10	4.1
Other	11	4.5

Employment Sector

Pathological	98	40
Surgical	120	48,9
Emergency and Intensive Medicine	8	3.3
Psychiatric	7	2.8
Other	12	5
Hospital		
General Hospital of Lamia	61	24.9
General University Hospital of Larissa	56	22.9
General Hospital of Volos	28	11.4
General Hospital of Chalkida	25	10.2
General Hospital of Trikala	23	9.4
General Hospital of Karpenisi	21	8.6
General Hospital of Theba	18	7.3
General Hospital of Amfissa	13	5.3

Table 2: Factors' location & variability measures

	Minimum	Maximum	Mean	Median
Doctor's Intentions	1.00	5.00	3.12	3.00
Patients' Benefits	1.00	5.00	2.68	2.75
Accessibility	1.00	5.00	2.91	3.00

Table 3: Factors' location & variability measures per question

1stFactor:Doctors' Intentions	Minimum	Maximum	Mean	Median
I intend to try and convince my peers of the KEN-DRGs reform positive effects.	1.00	5.00	3.13	3.00
I intend to try and mitigate my peers' reactions the KEN-DRGs reform currently implementing.	1.00	5.00	3.08	3.00
I intend to dedicate time for implementing KEN-DRGs properly.	1.00	5.00	3.13	3.00
I intend to dedicate efforts for the KEN-DRGs reform to be successful.	1.00	5.00	3.13	3.00
2ndFactor: Patients' Benefits				
I am able to resolve the clinical problems of my hospitalized patients more comfortably than before.	1.00	5.00	2.62	3
They enhance the well-being and satisfaction of my hospitalized patients.	1.00	5.00	2.63	3
I am able to assist my hospitalized patients more effectively than before.	1.00	5.00	2.65	3
KEN-DRGs application will contribute to my hospitalized patients positively in the end.	1.00	5.00	2.81	3
3rd Factor: Accessibility				
KEN-DRGsimplementation has already reduced accessibility to the patient-selected hospital.	1.00	5.00	2.83	3.00

KEN-DRGs application gradually contributes in reducing accessibility to the patient-selected hospital.	1.00	5.00	2.85	3.00
The forthcoming KEN-DRGs review to approach the actual cost, will reduce accessibility to the patient-selected hospital in the long term.	1.00	5.00	3.05	3.00
KEN-DRGs implementation contributes to patients turning to private hospitals.	1.00	5.00	2.92	3.00

Table 4: Factors' correlation to Educational level

Educational Level		Doctors' Intentions	Patients' Benefits	Accessibility
Medical Degree holder	Valid	161	158	156
	Mean	3.03	2.60	3.01
	Median	3	2,75	3
Specialization, MSc PhD Holder	Valid	77	72	70
	Mean	3.29	2.84	2.70
	Median	3	3	3

Table 5: Factors' correlation with ICD-10 coding training/ information

ICD-10 coding training/ information		Doctors' Intentions	Patients' Benefits	Accessibility
	Valid	67	67	66
Yes	**Mean**	3.49	2.87	2.67
	Median	3.50	3.00	2.75
	Valid	164	156	155
No	**Mean**	2.97	2.58	301
	Median	3	2.75	3

Table 6. Factors' correlation with participants' age

Age		Doctors' Intentions	Patients' Benefits	Accessibility
	Έγκυρες	47	46	46
25-29	Mean	2.96	2.6	**3.07**
	Median	3	2,50	3
	Valid	33	33	33
30-39	Mean	3.11	2.51	**2.63**
	Median	3	2.50	2.75
	Valid	70	68	66
40-49	Mean	3.19	2.8	**2.93**
	Median	3	3	3
	Valid	55	51	49
50-59	Mean	3.19	2.75	**2.97**
	Median	3	3	3
	Valid	27	27	26
60+	Mean	2.98	2.51	**2.91**
	Median	3	2.50	3

Table 7. Factors' correlation with marital status

Marital Status		Doctors' Intentions	Patients' Benefits	Accessibility
	Valid	155	147	146
Married	Mean	3.16	**2.77**	2.87
	Median	3	3	3

Unmarried	Valid	67	66	64
	Mean	2.99	**2.46**	2.98
	Median	3	2,5	3
Divorcee	Valid	3	3	3
	Mean	3.67	**3.17**	2.83
	Median	3.5	3.25	3
Other	Valid	8	9	8
	Mean	3.38	**2.75**	3.22
	Median	3.375	2.75	3.375

Table 8. Factors' correlation with responsibility position

Responsibility Positions		Doctors' Intentions	Patients' Benefits	Accessibility
Medical Director	Valid	62	62	60
	Mean	3.08	**2.2**	2.91
	Median	3	2,75	3
Attending (A)	Valid	45	40	40
	Mean	3.19	**2.66**	2.84
	Median	3	3	3
Attending (B)	Valid	46	44	42
	Mean	3.15	**2.66**	2.81
	Median	3.25	2.875	2.875
Resident	Valid	65	64	64
	Mean	3.01	**2.55**	3.03
	Median	3	2,5	3
Faculty Member	Valid	10	10	10
	Mean	3.4	**2.65**	2.95
	Median	3.5	2.625	3.125
Other	Valid	11	11	11
	Mean	3.2	**2.93**	2.84
	Median	3	3	2.75

Discussion

According to the results of the study, doctors' perceptions of what they intend to do for the KENapplication, doctors' intentions as the first factorial structure examined, remain mainly neutral, similar to patients' benefits, the second factorial structure investigated. Medical personnel maintain a neutral stance concerning the effect of KENon reducing accessibility for patients as well.

Doctors holding a basic medical degree have a neutral attitude regarding the physician intentions factor and the idea of a subsequent reduction in patients' accessibility while disagreeing with the notion that there are potential benefits for patients. Physicians holding specializations, master's and doctoral degrees are slightly more positive in their intentions also regarding the benefits the patients may accumulate. On the contrary, they believe a little less that patients experience a decrease in accessibility.

It is observed that physicians who have been previously informed or trained in the adequate selection of disease codes according to ICD-10 present with a slight positive tendency for contributing to the KENuse, maintain a neutral attitude towards patients' benefits but express a negative stance concerning the decrease in accessibility. Interestingly, those who have not received information or training in the ICD-10 coding system remain neutral on contributing to the KENreform and the parameter of decreased accessibility while being negative on the existence of probable benefits to patients.

Doctors of all ages remain neutral towards the accessibility factor, when several of those aged between 30 and 40 years old disagreed. Married doctors maintain a neutral attitude considering the existence of benefits for patients, while unmarried ones express their disagreement. Similarly, enough, several residents disagree with this idea as well, when in all responsibility position groups, a neutral attitude towards patients' benefits is expressed.

As pointed by a previous Greek study, physicians were inclined to a more neutral attitude regarding contributing to the successful implementation of the KEN reform, both at an individual and a collective level (Giannakides, 2016). However, it has been highlighted that, on an individual level, Greek doctors are more receptive in trying to

dedicate their time, unlike Dutch ones who are negative about it (Tummers& Van de Walle, 2012). The negative attitude of doctors against the DRGs application has been identified in other studies as well (Aasland et al, 2007; Shon & You, 2020).

Greek doctors appear to not accept the idea that the application of a new compensation system will affect the patients positively by helping them effectively (Giannakides, 2016). Similar are the views of Dutch (Tummers& Van de Walle, 2012) and Swiss doctors, with the latter associating

DRGs application with malpractice related to premature discharges and incorrect encoding from the low calculated ADH(Fässler et al, 2015). Physicians approach the effects of accessibility reduction with a neutral to positive stance, as they consider that neither the gradual nor the future KEN revision, to approach the actual costs, can negatively impact accessibility. Between the current circumstances and the future review, there is a trend in favor of the view that KEN can reduce accessibility.

Medical personnel holding a basic medical degree present with a neutral attitude towards a subsequent accessibility improvement, contrary to doctors with a specialization, masters and doctoral degrees who have a more positive attitude (Giannakides, 2016). Doctors who have received training or information in the adequate selection of disease codes according to ICD-10 express a slightly positive tendency to contribute to the KENreform, as opposed to those who have never been informed or trained accordingly. Neutral opinions are observed among doctors who have a permanent job position, medical directors and attendings, in contrast to those who occupy positions temporarily; residents and believe that accessibility will not be affected, keeping a more positive attitude (Giannakides, 2016).

Doctors' positive attitude towards the KEN implementation, expressed through the acceptance of this new compensation policy along with their intention to contribute to its application (Fostiropoulou, 2013). This finding, that is opposed to a previous one where Dutch doctors appeared more negative to DRGs application (Tummers& Van de Walle, 2012), may be explained by samples' sociodemographic characteristics, as it was mostly comprised by people of young age that embrace changes with

much greater ease. In addition, they are not opposed to the objectives set by the KEN application, while their express disbelief in the idea that KEN implementation will improve the quality of care and patient's ability to make choices regarding his care, considering that many decisions are based on economic and not medical criteria stating their concern that patient may receive hospital services of poor quality in order to reduce the costs(Fostiropoulou, 2013).

Health professionals with master's and doctoral degrees seem more familiar and positively attached to the KEN compensation method (Fostiropoulou, 2013), a finding consistent with previous studies where the main problems identified were related to excessive bureaucratic procedures (Tzavaras et al, 2006). Despite the doctors in the sample suggesting that KEN implementation does not improve patients' social and personal benefits, they embrace this new policy and intend to strive to satisfy its objectives (Fostiropoulou, 2013).

Limitations: The major limitation of this study was the difficulty to access the hospitals of the 5th Health Region because of the visit ban, a containment measure taken early after the Covid-19 pandemic outbreak. Furthermore, the exhausting hours doctors had to work in order to treat Covid-19 patients made impossible the completion and analysis of an additional number of questionnaires to conduct this study.

Conclusions: This study focused on highlighting the concerns raised and the weaknesses emerged from the KEN-DRGs implementation through the perspective of doctors currently working in the hospitals of 5th Health Region. Future research could focus on the perceptions and attitudes of both nursing and administrative staff, which are involved as well as affected, directly and indirectly, by the new compensation system. In addition, perceptions of patients receiving KEN-based health services should also be investigated. An analogous study, at national level, is required for the provision of an overall picture of hospital doctors' views; however, it would be rather interesting to conduct said study, after a predetermined time period when KENimplementation and the assessment of both their economic and quality results will have been further organized.

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