

Diagnosis Related Groups: Approval and suitability for the Greek National Health System

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Abstract – The Diagnosis-Related Groups (DRGs), is a method that identifies patients with similar resources use, based on statistical evaluation of hospital records. Statistics provide the Diagnosis related consumed resources and, thus, they enable the calculation of an average patient's case-cost. On the basis of the Hospital activity levels and case mix, the health authorities can allocate the annual hospital budgets, both, prospectively and retrospectively. The purpose of the present study is to determine whether the implementation of the DRGs as a refunding methodology is, both, welcomed and feasible in the Greek National Health System (NHS). The aim was to collect information on the attitude, the knowledge, the experience, and the acceptability of the DRGs, as well as, on the existence of the necessary infrastructure. Two methods were used: First, a questionnaire was designed and sent to the Departments of Administrative and Economic Affairs of 50 Hospitals, corresponding to the 38% of NHS- Hospitals, and to all of the 17 Regional Health Authorities. Second, a semi structured interview was designed for health professionals of the NHS, originating from different disciplines. The collected evidence revealed a relative low percentage of, first, familiarity with the DRGs, i.e. 45% for the questionnaire and 62.5% for the interviews, second, correlation between postgraduate education and familiarity (corr. = -0.66), third, familiarity and acceptability of the DRGs, and fourth, acceptability and suitability for the Greek NHS (corr. = -0.85). The Information Technologies (IT) infrastructure was found to be minimal in the Greek hospitals. The DRGs were ranked as the best method for approaching and refunding Hospital-care cost. The appropriateness of the DRGs approach in the Greek NHS, was criticized on the grounds of personnel resistance, lack of experience, ethical dilemmas, lack of political will to implement the DRGs, high initial investment cost, in both, NHS and health-insurance funds, lack of infrastructure, and finally, the existence of higher priorities for the Greek NHS. The study concluded that the implementation of DRGs in the NHS is a task to be considered, but before introducing it, the government should launch IT and Electronic Patient Record in the Hospitals. On the other hand, the Health-insurance organizations should train their personnel, on both, IT and the DRGs methodology, in order to, first, adapt the DRGs to the Greek settings, second, calculate cost weights and pre test the DRGs in some hospitals, to gain experience, and third, make decisions concerning the real cost of health care. All the above factors contribute to a long term plan for the employment of the DRGs in the Greek NHS.

Keywords: Diagnosis Related Groups (DRGs), Health cost, Prospective-Retrospective budgets, Greek National Health System (G-NHS).

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I. INTRODUCTION

The Diagnosis Related Groups (DRGs) is an internationally applied methodology for funding Health Services. It has been first applied in the USA in the 1980's [1], and has gained popularity ever since.

The Greek NHS (G-NHS), since its last reform in the 1990's has been facing important economic problems due to the fact that the Government has shifted the economic burden from insurance funds, to government funded health services [2]. The G-NHS is funded through taxation and per-diem reimbursement. In contrast, the social insurance funds are only partially funded by the government. Employees and employers contribute in funding insurance organizations.

The current study is trying to establish whether the introduction and application of DRGs in the G-NHS, is both welcomed and suggested by the health professionals. The aim was to collect information on attitude, knowledge, and experience, acceptability of DRGs and existence of supporting IT infrastructure.

II. BACKGROUND

A. History

In the U.S.A. in the early 1970's, Fetter [1] developed the DRG system to compare outcomes between hospitals. DRGs are now widely used as a method for classifying hospital patients, both, in terms of medical condition, and resource use [3]. The information gathered from DRGs is applied to a variety of fields, such as hospital management, health policy, health funding, hospital benchmarking, quality management and patient clinical management.

In 1982 [4], acute-care general hospitals in New Jersey, USA, piloted a DRG-based, prospective payment system. In 1983 the Federal Government introduced nationally a five year transition to the current DRGs. The payment rate per hospital was based on inpatient diagnoses, and considered medical and surgical procedures, length of stay, teaching hospital adjustments, and patient demographic data.

B. USA Medicare DRGs calculation

The assignment of a discharged patient to a specific DRG is based on Major Diagnostic Categories (MDCs) [5].

In principle the price of each DRG is calculated by multiplying the relative cost weight of each DRG with the base rate which is equivalent to the national average cost per case. USA DRGs relative weights range from 0.1524 to 15.4629, where the weight of 1.00 equals the base rate. The relative weights are recalculated annually by considering the historic average costs of each DRG and adjusting charges to reflect current costs [4],[5].

DRGs have the effect to reduce length of hospital stay and cost per case and they provide a rational basis for allocating budgets and setting hospital prices

In addition they provide information to health professionals to identify performance indicators [3], and thus measure hospitals efficiency. If *DRGs* are implemented regionally or nationally, then direct comparison between hospitals is possible. *DRGs* are also used to measure quality of care [3] by assessing activity profiles to define the optimum medical treatment.

DRGs have been criticized for a number of factors. While inpatient cost has fallen rapidly, costs may have been shifted to other areas of health care. If not carefully designed, *DRGs* may not accurately consider the case severity referred to as casemix complexity [6], [7], leading hospitals that dealt with severe patient episodes to loss of financial income [8]. Wherever budgets are not in line with resources related severity of illness, ethical dilemmas about patients' equity may be posed.

DRGs have also been criticized for supporting inappropriate discharge and referral, and providing pervert incentives to misclassify cases. Imposing strict clinical pathways in relation with *DRGs* may not be considered compatible with individual patient needs, thus, resulting in patients obtaining inferior medical treatment [6], [7]. Furthermore *DRGs* have been criticized that they do not account sufficiently for all patient groups, and they reflect only inpatient groups.

C. International Application

Australia was one of the first countries that followed the USA paradigm, and has adapted to its own health system specific *DRGs*. The current *AR-DRG* classification has 667 categories [8]. Nordic countries [9], which include Norway, Sweden, Finland and Denmark, introduced the Nordic *DRGs* (*NordDRGs*) based on a refined *DRG* from Health Care Financing Administration (*HFA-DRGs*), [10]. Estonia [11], has introduced *NordDRGs* in the year 2003 gradually (50% of case cost). Iceland [8], has been using on a trial basis in Landspítali University Hospital since 2001 the *NordDRGs*. Portugal [8], [9], in 1989 introduced "Foltha de Admissao e Alta", which is a basic information system that is now used by all *NHS* hospitals. Ireland [9], has adapted Portugal's methodology and in 1993 introduced a similar method of hospital reimbursement based on *DRGs*. Currently (2002 data), 15% of hospitals budget is covered by case-mix and 85% based on historical cost. Italy has introduced in 1999 [8], prospective payments for hospitals based on *DRGs*. The Italian tariff system [9], is based on *DRGs* to constrain budgets. In 2003 German Hospitals introduced a payment system for hospitals based on *DRGs* (mandatory from 2004) [12], which is based on an adaptation and further development of the refined Australian *AR-DRGs* [13],[14]. French *DRGs* were initially developed in 1986. *DRG*-like hospital payment system is called "Tarification à l'Activité" was introduced in 2004-2005 health care reform.

D. Greek NHS

In 1983 the Greek government [15], [16], established the Greek National Health System (*G-NHS* or *ESY* as called in Greek language), as a government funded health service similar to the British *NHS*. In 1992 [15], [16], reforms strengthened management structures in hospitals and gave social insurance organizations the autonomy to contract with preferred providers. Peripheral centers regional health authorities called *Pe.S.Y* (*Peripheral Health Systems*), were assigned with administration, management and budgeting tasks of hospitals.

The overall health care budget is allocated annually by parliament. *G-NHS* includes 132 hospitals and 17 *Pe.S.Ys*. Public hospitals are reimbursed on a per diem basis by social insurance organizations [2]. Per Diem reimbursement accounts (1992 and 1993) for approximately 34% of hospital revenue, while the rest is funded through taxation [15].

III. AIMS and METHODS

The study aims to support decision making on whether the *DRG* system should be introduced to the Greek *NHS*. It aims to assess the attitudes of health professionals towards *DRGs*, as well as their knowledge level on the subject. Furthermore the study investigates whether health professionals consider the current *G-NHS* funding approach adequate, and whether a change in funding systems is considered as a priority for the *NHS*.

Specific objectives include the assessment of

- ⊕ Attitudes towards scientific hospital management and towards the introduction of large scale informatics in health systems,
- ⊕ appreciation of the current health financing system, knowledge of the *DRGs* methodology and experience on the application of *DRGs*,
- ⊕ acceptability of *DRGs* as appropriate for the *G-NHS*, factors that could act against the introduction of *DRG*, the current informatics infrastructure of hospitals as a starting point for introducing *DRGs*
- ⊕ staff familiarity with information technologies.

A questionnaire, was sent to 50 Hospitals (37.8% of *G-NHS* hospitals), both, rural and urban in Greece, as well as to all the Peripheral Health Administration Organizations in Greece (17 *Pe.S.Y.*).

The choice of hospitals was based on simple random sampling [17], where every 3rd hospital in the list was chosen until 50 hospitals were identified (circle counting). In this way, hospitals both from urban and rural areas participated. Size, casemix, Urban/Rural, academic/general hospitals could have been confounding factors. Randomization was used to minimize their effect.

The overall response rate for the questionnaire was approximately 30% (28% of the hospitals and 35% of the *Pe.S.Y.*). Answers were coded and analyzed statistically with the use of a statistical software package [18]

Second semi structured interviews were performed with 8 key informants from the Ministry of health, academic staff (medical informatics, health system management and biomedical technology fields), doctors in administrative

positions and Hospital Managers (head of Hospital boards). The interview appointment was arranged by phone. The choice of interviewees was based on referencing by Academic colleagues. Interviewees were asked to sign an "Informed Consent" letter, and were informed that the interview would be recorded.

The interview was designed with open questions, of similar context to the questions of the questionnaire. The answers were coded into key concepts.

In order to validate the questionnaire, one of the interviewees was asked two weeks after his interview to answer the questionnaire and similar results were obtained.

IV. RESULTS, DISCUSSION

A. Questionnaire Results

The questionnaires were answered by 14 hospitals and by 7 *Pe.S.Ys*. Respondents revealed that 45% of answers had no knowledge or basic knowledge of *DRGs* (Figure 1). The percentage is quite high and subsequently one could argue that insufficient knowledge of *DRGs* was not a prohibiting factor for answering the questionnaire.

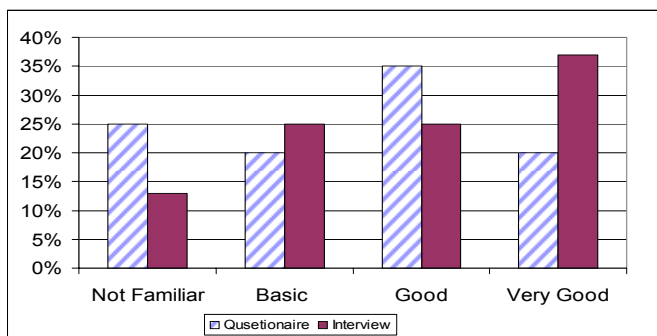


Figure 1: Familiarity with DRGs

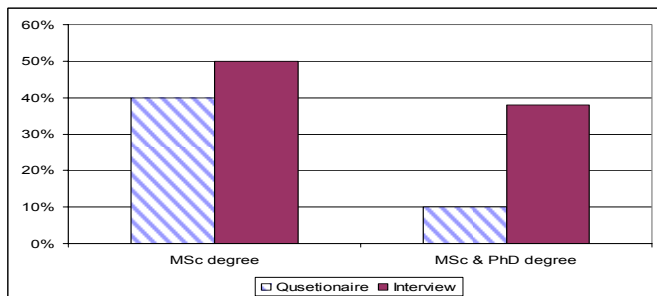


Figure 2: Responders postgraduate education.

Age, gender, and work experience appeared not to be correlated with knowledge about *DRGs*. Only postgraduate education was found to have a strong relationship with knowledge of *DRGs* indicating some acquaintance with the methodology. Of the 50% of the respondents with an MSc or/and PhD degree (Figure 2), 55% stated to have a good or very good knowledge of *DRGs*, while 25% were not familiar with the methodology, and 20% had only basic knowledge.

Preferences and attitudes relating to hospital financing methods were elicited by asking respondents to rank different approaches (Figure 3). *DRGs* as a financing methodology, were ranked with the highest mean of 7.06 (scale 0 to 10), followed by fee for service, while the current

flat rate was ranked with the lowest score close to the capitation method.

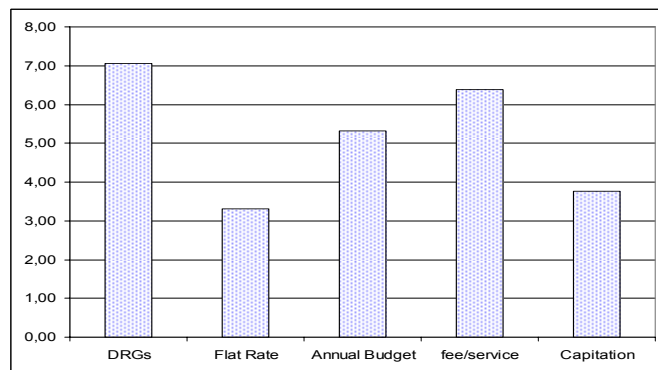


Figure 3: Ranking of Health Care funding Methodologies.

There was a strong correlation between flat rate ranking and knowledge of *DRGs* (-0.57), showing that the higher the acquaintance with *DRGs*, the lower the score of flat rate (Table I). Those familiar with *DRGs* did not consider the flat rate suitable for the Greek *NHS*.

The answers also suggest that mostly the negative aspects of the flat rate methodology were seen in the failure to reflect the *true costs* of health services (mean score 7.9), the failure to *distribute resources rationally* and according to *population's needs*, and the lack of personnel *motivation* (Figure 4).

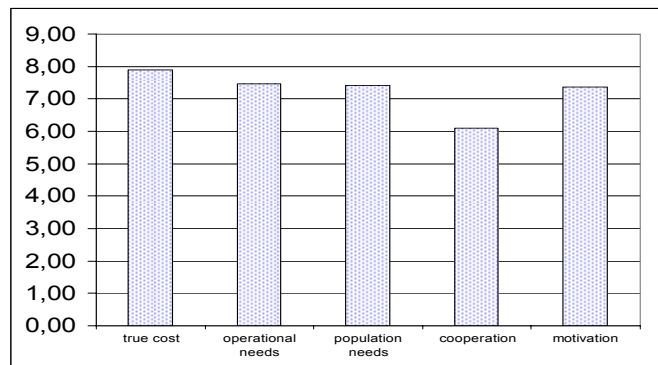


Figure 4: Ranking of negative factors of flat rate methodology.

The main problems of introducing *DRGs* into the Greek *NHS*, were seen as related to the overly bureaucratic procedures of Greek government which are not *compatible* with the methodology. Personnel resistance to change was scored with the second highest mean. Financing (*investing*) in Information Technology (I.T.) was also scored as one of the most negative factors for the application of *DRGs*.

Lack of staff *experience* and training and difficulty to *adapt* to new technologies were ranked as less significant factors (Figure 5).

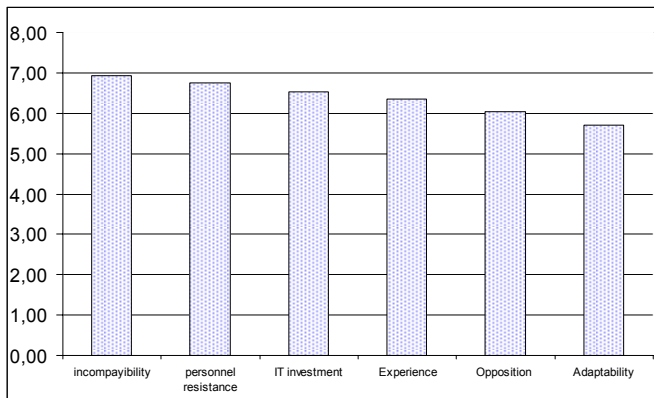


Figure 5: Factors thought to oppose DRGs application.

TABLE I
Correlation Coefficients

Parameter 1	Parameter 2	Correlation coefficient	Significant level of T-test
DRGs Knowledge level	Sex	-0,0548	0,8200
DRGs Knowledge level	Age group	0,3856	0,1695
DRGs Knowledge level	Educational background	0,1605	0,4991
DRGs Knowledge level	Postgraduate degree	-0,6577	0,0016
DRGs Knowledge level	Working experience	0,1157	0,6272
DRGs ranking of flat rate methodology	DRGs Knowledge level	-0,5709	0,0107
DRGs Knowledge level	DRGs ranking	0,3615	0,1856
DRGs Knowledge level	Acceptability of DRGs for G-NHS	-0,8554	0,0000
DRGs acceptability	Acceptability of DRGs for G-NHS	0,6525	0,0018
DRGs ranking of flat rate methodology	Acceptability of DRGs for G-NHS	0,4183	0,0664
DRGs Operation of el.patient rec.	Acceptability of DRGs for G-NHS	0,0802	0,7946

Lack of I.T infrastructure, such as electronic patient records, and software hospital management and accounting systems, aggravate the problem of investing and training personnel in new technologies. 57% of hospitals do not have electronic patient records (EPR) while of those that have (35%), only 60% have it in operation, which represents 17% of all hospitals that responded to the research. Answers revealed that only administration, logistics and pharmacy departments make use of informatics. An attempt was made to investigate whether those hospitals that have EPR in operation, have developed a culture that would be in favor of DRG methodology, but no correlation between the two variables was found (Table I).

Overall 55% of the respondents believed that DRGs are suitable for the Greek NHS. Only 5% were opposing the application of this system, 35% had no opinion and 5% did not answer, there was strong evidence of a relationship between knowledge of DRGs and the attitude that DRGs were considered suitable for the NHS (correlation of -0.85).

B. Interview Results

DRGs require that hospitals have mechanisms to monitor and control their own financial performance. All interviewees agreed on the need of improving management capacity in hospitals due to organization size and complexity. Most of them stressed the necessity of employing both experienced and specialized personnel. It was also pointed out that the required experience and knowledge is currently not available on the Greek labor market, and that other health professional groups oppose the work of managers.

Most interviewees also stressed that management without informatics is impossible due to the high volume of factors that should be taken into account, but it was also pointed out that informatics is just a tool, and not the solution to health organization problems. Also, information pollution was identified as a pitfall of informatics and suggestions of good planning of informatics tools was made.

Respondents agreed that "inertia" is the main reason for opposing the introduction of IT and employee's age is a strong parameter of "inertia" ("inertia" was used to describe the fact that sudden changes in the way people perform their tasks is not feasible). It was also argued that it could be overcome with training, pressure, persuasion and motivation.

Some respondents suggested that IT application in hospitals may pose ethical issues. This was further analyzed into personal medical data access issue (security), efficiency of health services versus quality, backup procedures in case of IT breakdown - loss of patient medical record.

Interviewees suggested that application of IT could also find resistance due to extra work of employees, especially during the introduction time, when both systems will run in parallel and because of the greater degree of transparency to financial transactions and processes in hospitals that may expose hidden actions

Electronic patient record (EPR) was accepted by all interviewees because it is expected to relate cost with activity and this is an important parameter in DRGs, and because it is expected to improve health service quality due to availability of patient history. It was also pointed out that the application of the electronic patient record will help in minimizing medical errors.

Interviewees suggested that negative factors of EPR are the decision on the content of the records and the choice of the right medium for long term storage. The hospital's administrative staff claimed, based on experience, that EPR was tried in some hospitals and failed for no apparent reason.

Those in favor of DRG introduction suggested that it is the best model currently available and has contributed in an international debate on health costs. Only one of the interviewees that exhibited good knowledge of DRGs was skeptical of the introduction in Greece. He suggested pilot applications for examining the suitability for the G-NHS.

Interviewees that had no knowledge or little knowledge of DRGs, suggested that the method should not be used as the only method for funding health services, and were skeptical about the success of the application.

These answers reinforce the conclusion drawn from the questionnaires, that there is a strong relationship between knowledge level of *DRGs* and acceptability as a costing/funding methodology for health systems.

Interviewees argued that an attempt to apply *DRGs* in the G-NHS would be opposed by the lack of political will and culture. Implementing such a system will shift the economic burden from Health sector to public insurance funds. Arguments, such as, that multiple sources of funding of health sector opposes to the application, that the state pays both insurance organizations and hospitals deficits, and that the personnel structure and knowledge background does not favor the application, have supported this point of view.

Sixty percent of the interviewees familiar with *DRGs*, preferred the flat rate (*per diem*) method as the best alternative to the *DRG* methodology with changes to accommodate severity, surgery etc. The rest suggested fee for service and global budgets as an alternative.

Respondents with some knowledge of the *DRG* system emphasized also its advantages, such as, the good estimation of health service cost, the correlation of activity to cost, the resources distribution, that the doctors become cost conscious, and the consideration of case mix.

Factors thought to oppose *DRGs* application included the following:

- ⊕ That the health system is not yet mature for such a move due to the lack of an appropriate political culture,
- ⊕ That other health issues should be given higher priority.
- ⊕ That in a doctor centered system there is lack of management capacity to implement it.
- ⊕ Preservation of status quo.

It was also mentioned that insurance institutions may oppose the implementation of the *DRGs* due to higher fees to hospitals, and because of the ethical dilemmas related to the quality of health services, when *DRGs* do not perform adequately in some areas of health services. For these reasons alternative policies should be in place.

Interviewees' were asked to give their personal estimation on whether administrative staff and politicians are familiar with *DRG* methodology. Those who answered the question stressed that there is no practical experience with *DRGs* (62%) and before any application a Greek *DRG* version should be prepared and be applied in a group of hospitals to gain experience. Initial training in IT systems and logistics is required. Interviewees argued (40%) that the method is well known to policy makers but it has been decided not to apply it since insurance institutions will face an economic problem.

Concerning the infrastructure, it was suggested that software tools would be more important than training, and it would be wise to adapt tools already tested in other countries. It was also argued (50%), that there is no sufficient infrastructure at this point to apply *DRGs*.

V. CONCLUSIONS

In this study we investigated familiarity of health related personnel with the *DRGs* methodology, preference in methods of costing and financing health systems, possible dilemmas and difficulties in an attempt to apply *DRGs* for

the Greek *NHS*, attitude towards *DRGs* application and extend of *DRGs* experience and Infrastructure in the Hospitals that could support the application of the methodology.

The study has shown that people with higher education (MSc and/or PhD degrees), are more familiar with *DRGs* methodology. It was also pointed out that the higher the acquaintance of a person with *DRGs* the most likely he is to accept it as a preferred method for financing health systems. Acquaintance was relatively low in Economic Administration personnel (45%). As expected, acceptability of *DRGs* for health systems is related to positive opinion on introducing it to the Greek *NHS* (suitability for the *NHS*). Most of the responders especially those familiar with the method, accepted the methodology as suitable for applying it to the Greek *NHS*.

As discussed in the interviews and scored in the questionnaire, several factors will act against the introduction of *DRGs*. The most important factor identified is that Greek Health System is not believed to be ready to apply *DRGs*. This was supported by several arguments such as incompatibility between organizations, different priorities for the Greek *NHS* and lack of political will to introduce methods that could indicate the real cost of health services. Also personnel resistance to new methods, lack of training and experience of employees and ethical issues related to the use of health informatics are likely to oppose the application of the methodology.

Interviews have revealed a positive attitude towards strengthening managerial capacity and introduction of IT systems including electronic patient records. However, hospital management requires more specialized and experienced personnel, which is thought as currently unavailable on the Greek labor market. While IT is considered as a necessity for management, and likely to improve service quality, it may find opposition from employees, due to first, lack of readiness in embracing technological innovations, second, because of the prevailing organization culture, and third, due to ethical issues.

Infrastructure that could support *DRGs* application is currently not available in hospitals, as indicated, both, from the questionnaire, and the interviews. IT investment was considered an important challenge concerning the application of *DRGs*. This is even more important as insurance institutions have to adopt appropriate technologies to be able to monitor and control hospital finance.

As this study suggests, it appears important for policy makers to consider several factors prior to introducing *DRGs*. The most important factor is resistance to change which appears to be greater in staff groups with low level of knowledge about the new funding approach. To keep personnel motivated and committed to the application of *DRGs*, it is important to overcome their opposition.

Organization culture cannot be changed overnight. While the attitude of the higher ranks of staff towards *DRGs* is positive, in the lower ranks of the hierarchy a more negative attitude prevails. These declivities indicate that some effort is needed to overcome resistance through training, leadership and persuasion from the top of the organization.

Prior to the introduction of *DRGs*, the benefits of this system should be clearly communicated and IT systems, which are a prerequisite for using patient classification systems, should be in place. IT application in such a large scale project would pose a considerable challenge to the Greek health system. Software tools are not mature enough in health informatics in the Greek market, and companies have not undertaken such a large-scale project in the past. A trial application in a few hospitals is recommended, so that both *NHS* and Companies will gain experience.

Another important issue that should be considered is the lack of specialists with professional experience on *DRGs*. Also, during the interviews it was suggested that *DRGs* should not be adopted from other countries. A Greek version of *DRGs* should be developed, and *DRG* weights should be calculated from Greek *NHS* data. A first effort have been made by our research group, in developing software tools for assessing hospital costs for the Greek *NHS* at departmental level, but there is still no wide scale application of such tools [19-23].

Current policy accepts the burden in Hospital Financing and shifts the burden from Public Insurance Organizations. Strong political will should be in place before deciding to charge insurance organizations with the real cost of health services. A pilot study has shown that medical cost of 175 surgical procedures ranges from 170 to 23000 Euro, while the official maximal nominal reimbursement is 100 Euros [23]. Since Insurance Organizations are mainly funded through employees and employers, an increase in health costs would eventually be shifted to individuals' income.

All the above factors contribute to a long term schedule of important innovations in the Greek *NHS* before the application of *DRGs* as a financing methodology of the *NHS*. Lack of Acquaintance, lack of experience, lack of IT infrastructure, lack of political will, professional interests, and lack of an appropriate cultural environment that supports change, are the main factors that strongly inhibit the immediate application of *DRGs* in the Greek *NHS*.

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