



REEVALUATION OF THE DIAGNOSIS RELATED GROUPS SYSTEM IN GREECE: THE EXAMPLE OF CORONARY ARTERY BYPASS GRAFT PROCEDURE

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ABSTRACT

Background. Aim of the current prospective study is to investigate and revise the basic information related to the coronary artery bypass graft (CABG) procedure, in an attempt to reevaluate the current Greek Diagnosis Related Groups (DRGs) system. **Methods.** In a Greek academic cardiothoracic surgical department, implementing clinical therapeutic protocols, we prospectively recruited 75 patients planned to undergo elective CABG. All basic demographic, medical and perioperative data were gathered in an extensive database, so as to be compared with data predicted by the DRG's system. Clinical indicators of performance aiming towards quality control were: perioperative mortality, postoperative myocardial infarct, postoperative stroke, postoperative renal failure, total hospital length of stay, rate of reoperation and rate of readmission. **Results.** None of the study patients deceased. No cases of perioperative myocardial infarct, stroke or renal failure were observed. Two of the patients developed respiratory failure, and one was reoperated for the control of perioperative bleeding. There were no cases of readmission to the hospital. The total length of stay was longer than the DRG's prediction (mean 11.5 vs 7 days), owed partially to the preoperative stay (mean 3.18 days) in the department, due to reasons of medical vigilance and organisatory problems that led to the postponement of the operation. **Conclusions.** A review of the CABG related DRG's in Greece seems appropriate, based on the findings of the current study, suggesting a longer than predicted hospital stay.

INTRODUCTION

Coronary artery bypass grafting (CABG) consists nowadays the most commonly performed heart surgical procedure [1,2]. It represents the culmination of the therapeutic methods offered to patients suffering from coronary artery disease (CAD). Its main indications include grave cases of CAD, in which drug treatment and/or cardiological interventions don't suffice to offer an extended life expectancy and an acceptable standard of living [2-5]. At the end of the day health care provision (either through pharmaceuticals or through surgery) aims at the value of good life and welfare [6,7,8], alongside reproduction of the productive capacity of existing workforce [8, 9]. It should be noted though that the latter is of lesser significance as far as this particular issue is under question due to the mean age of patients' population. As for the former issue one could easily refer to Epicurian and Utopian (More's) ideas as presented by Vic George (2010) [10] who (via Morgan 1992) refers to Epicurus claiming that "when we say that pleasure is the goal we do not mean the pleasures of the profligate or the pleasures of consumption, as some believe but rather the lack of pain in the body and the disturbance of the soul" and he (George) concludes that that happiness is based upon tranquility of mind and freedom from pain. Turning to More and attempting to focus upon health-care itself he (George) points out that it is free and provided by "well staffed large hospitals" to all inhabitants of Utopia. These well relate to J. S. Mill's ideas and ideals about Utilitarian happiness and dignity on the one hand; and disease, illness and pain as obstacles to them being attained by humans on the other. And ultimately on the role of the 'medical art' in the pursuit of the former [11].

Although there is no doubt about the medical indications and the necessity of the procedure, in the modern era of world financial crisis questions have arisen in concern to the cost-effectiveness of this as well as of other currently applied medical interventions. In Greece, a country strongly affected by a financial crisis owed to the international economic environment and deteriorated by domestic, infrastructural weaknesses, the Diagnosis Related Groups (DRG's) system [12-15] for the pricing and billing of medical interventions was introduced in 2012 in the framework of wider organizational changes and austerity cuts related to the then operating Memorandum of Understanding. The system has been implemented as a solution to the problem of extensive and irrational expenditure within both the public health system and the partially publicly supported private health sector. The DRG's system categorizes, based on the ICD-10 list [16], medical diagnoses and the related diagnostic and therapeutic procedures, connecting them to a pricing system, which takes into



account the graveness of each pathology and the possible complications that can occur after a medical or surgical intervention. In this sense DRG's can assist in better management of health-care provision. Management on its part can benefit both tax-payer and recipient of service (or else patient and his/her associates), alongside assist medical and nursing staff. All these relate both to cost reduction and the pursuits of either maintenance of productive capacity (in our case not too related due to age profiles) or of Utilitarian and other goals as briefly presented above. This system has functioned in a satisfactory way since its introduction, however a review appears probably necessary, both due to the elapse of time and the steadily changing financial environment.

Based on the above, the authors of the paper have decided to investigate the current medical parameters of the CABG procedure (medical course, complications, length of stay) in a modern Greek Teaching Hospital, that implements for the treatment of its patients clinical therapeutic protocols. The application of these protocols is believed to guarantee the *lege artis* performance of a procedure and improve clinical indicators of quality and performance [17-20]. Basic aim of the study is to compare the aforementioned characteristics with the ones predicted and described by the DRG's, so as to conclude whether a review of the CABG related DRG's chapter is necessary.

METHODS

In the period between September 2014 to June 2015 we prospectively included in the study 75 patients planned to undergo elective CABG surgery at the University Hospital of Thessaly in Larissa. The related database that was created included all significant baseline demographic and medical characteristics, as well as information regarding the procedure and the postoperative course of the patients. All study participants were operated and handled under the same clinical therapeutic protocols and by the same surgical and anesthetic team. The clinical indicators selected for the quality control included perioperative mortality, postoperative myocardial infarct, postoperative stroke, postoperative renal failure, rate of reoperation and rate of readmission to the hospital [21,22]. The furthest follow-up point of the patients was one month postoperatively, with the exception of patients who were still hospitalized at this time setting and were followed up until discharge. As this was a clearly observational study without any form of pharmaceutical or other sort of intervention to the patients, the approval of the local Ethics committee was not deemed necessary.

RESULTS

The mean age of the patients recruited in the study was 64.29 ± 9.3 years. The majority of the patients (64 or else 85.33%) were male. The average number of bypasses performed was 3.01 per patient. The mean Euroscore of the patients was 6.0, which is higher than the European average [23]. None of the patients included in the study deceased and no cases of myocardial infarct, stroke or kidney failure were reported. One patient (1.33%) was reoperated for the control of perioperative hemorrhage. There were no cases of readmission to the hospital until March 2016.

Apart from the complications directly related to the clinical indicators, other complications observed included respiratory insufficiency (2 patients-2.66%), postoperative delirium (2 patients-2.66%) and atrial fibrillation (5 patients-6.66%), which was pharmaceutically (with amiodarone) converted to normal sinus rhythm in all cases. Mean total length of stay in the department was 11.5 days ($SD \pm 2.32$), while the mean preoperative stay was 3.18 days ($SD \pm 1.36$) and the mean postoperative stay 8.37 days ($SD \pm 1.89$ days). Mean length of stay in the Cardiac Advanced Care Unit was 2.25 days (± 0.57). Related information is depicted in Table 1.

DISCUSSION

The Greek DRG's system related to the CABG procedure predicts a total length of stay of 7 days for patients submitted to CABG. This corresponds to an expenditure of 4,276 Euros [14]. In cases of 'catastrophic' complications or severe comorbidities an extended length of stay of 10 days is justified, corresponding to a total hospitalization cost of 5,924 Euros [14].

The current study was performed in a modern Greek Teaching Hospital following clinical therapeutic protocols. The risk characteristics of the group were comparable to the European average, based on the Euroscore scale. The high level of care offered to the patients is obvious if one takes into account the zero mortality (international margins 0%-3%) within the study group, as well as the excellent results in concern to the clinical indicators and the low rate of complications in general, compared to the internationally accepted [24-28]- Table 1. Despite that, the hospital length of stay reached an average of 11.5 days. This is significantly longer than the period predicted by the DRG's system, even for patients who suffer from catastrophic complications. If one considers that the daily cost in the ward (most of our prolonged hospital stay was in the ward) of a Greek hospital varies with the most conservative estimations between 350 to 450 Euros [29], the extra stay of 4.5 days increases the true cost for a CABG patient to about 5,800 to 6,300 Euros.



Although the postoperative length of stay was by itself longer than the one predicted by the DRG's, the extended hospitalization period can also be attributed to the, at first sight, unjustified long period of hospital stay prior to the operation (mean of 3.18 days). This stay can be justified by medical as well as organisatory/administrative reasons, which are also interrelated: a patient awaiting a major heart operation is a gravely ill patient, who must be subjected to medical care and monitoring in the fear of an adverse event prior to the revascularization. As the capacity of cardiology departments that might undertake this task is limited, and as the surgical capacity of a modern Greek hospital is severely damaged by profound organizational problems mainly related to the financial and fiscal crisis (shortage of anesthetic and nursing staff, suboptimal usage of surgical theatres etc), the only medically and ethically acceptable solution is to keep the preoperative heart surgical patients in the safe environment of the heart surgical ward until they are securely operated.

Exactly this part, the prolonged hospital stay caused by the aforementioned reasons, has not been predicted by the DRG's. The task to logistically justify this extended preoperative stay, is a frequent problem of both the discharging physicians and the hospital administration in Greece. The most common solution found is to falsely report extra complications that will comply with the system and allow the administratively "proper" discharge of the patient. It is therefore our proposal that a certain period of a preoperative stay is added to the related chapter, at least until the current financial environment improves to such an extent that will allow the flawless operation of the Greek hospitals. After all, DRG's and protocols are supposed to be the outcome of research on existing cases and are intended to assist better use of manpower and other means in timetables, or else better use of (often limited) resources, viz. better management in the pursuit of the social goal of health and the financial and fiscal goal of cost containment.

The study's main limitations consist in the relatively small number of patients involved and the fact that all participants were recruited in the same centre. However, these shortcomings are, at least partially, outbalanced by the fact that even with the excellent perioperative results reported, the hospital stay length was found to be longer than the one predicted by the DRG's. The involvement of more centres and the recruitment of a larger sample of patients with potentially "worse" surgical results would probably just overemphasize this finding and dictate a reevaluation of the related DRG's in more imperative way.

CONCLUSIONS

The main conclusions of the study are:

1. The implementation of clinical therapeutic protocols is associated with excellent clinical results as shown by the clinical indicators of quality and performance.
2. The total hospital length of stay of patients submitted to CABG and operated according to clinical therapeutic protocols is longer than the one predicted by the corresponding Greek DRG's chapter.
3. This prolonged hospital stay is also partially owed to a prolonged preoperative stay. This can be attributed to interrelated medical and organisatory/administrative reasons, connected with the current capacity of the Greek hospitals and the need for augmented medical vigilance of the heart patients until their secure entrance to the operating room.
4. It is therefore recommended that the current Greek DRG's are modified in a way that will include an extension of the hospital length for the CABG procedure, also predicting a longer stay of a few days prior to the operation. This will also lead to a reevaluation of the treatment costs covered either by the patient or by the insurance funds (either public or private) and/or the national exchequer in the first case.

Table 1. Cumulative data regarding the patients of the study group compared to international and Greek DRG's data.

	Study Patients (Number-Percentage)	International Margins [24-28]	DRG's prediction
Gender (Male)	64 (85.33%)		7 days, 10 days with catastrophic complications or severe comorbidities
Age	64.29±9.34		
Euroscore II	6%	3.3% European Average	
Perioperative Mortality	0%	up to 3% for elective cases	
Perioperative MI	0%	2%-4%	
Perioperative Stroke	0%	0%-3%	
Perioperative Renal Failure	0%	0%-7%	
Postoperative Respiratory Failure	2 patients (2.66%)	0%-5%	
Reoperation for Bleeding	1 patient (1.33%)	0%-2%	
Atrial Fibrillation	5 patients (6.66%)	up to 40%	
Rate of readmission	0%	0%-2%	
Trauma Dehiscence	0%	0%-1.5%	
Postoperative delirium	3 (4%)	7%-32%	
Total hospital stay (in days)	11.5±2.32		
ICU stay (in days)	2.25±0.57		None
Preoperative Stay (in days)	3.18±1.36		None
Postoperative stay (in days)	8.37±1.89		None

The table depicts basic demographic, medical and perioperative data of the study group, also in comparison with the internationally reported. It also provides data regarding the hospital length of stay predicted by the Greek DRG's system.

REFERENCES

1. Costa F, Ariotti S, Vavgimigli M, Windecker S et al. Perspectives on the 2014 ESC/EACTS Guidelines on Myocardial Revascularization: Fifty Years of Revascularization: Where Are We and Where Are We Heading? J Cardiovasc Transl Res. 2015 May 19
2. Epstein AJ, Polsky D, Yang F, Yang L, Groeneveld PW. Coronary revascularization trends in the United States, 2001-2008. JAMA. 2011 May 4;305(17):1769-76
3. Xue ZM, Li WJ, Ma CS, Nie SP, Dong JZ, Liu XH et al. Coronary stenting versus bypass surgery in heart failure patients with preserved ejection fraction. Chin Med J (Engl). 2012 Mar;125(6):1000-4
4. Kappetein AP, Head SJ. Eurointervention. CABG, stents, or hybrid procedures for left main disease? 2015 May 19;11 Suppl V:V111-V114



5. Fetter RB, Freeman JL. (1986) Diagnosis related groups: product line management within hospitals. *Academy of Management Review* 1986; 11(1):41–54
6. Allsop Judith. *Health Care in Alcock P., Erskine A. & May M. The Student's Companion to Social Policy*, Blackwell, Oxford UK, 2003 pp348 ff
7. Pascall Gillian. *Health and Health Policy in Badlock J., Manning HN., & Vickerstaff S. Social Policy Oxford University Press, Oxford UK pp 387 ff (398 ff in particular)*
8. McBeth Mike. *Traditional theories of Welfare in Alcock C., Payne, S., & Sullivan M., Introducing Social Policy*, Pearson Education Limited, Harlow 2004 pp 105 (108 in particular)
9. Dikeos Konstantinos *Capitalist Relations and State Policy: The Development of the Mode of Health Maintenance in Contemporary Britain 1948-89; a case study. Ph. D. Thesis , The University of Edinburgh, 1992 . pp 170 ff in particular.*
10. George Vic. *Major Thinkers in Welfare. Policy Press , Bristol 2010 pp 23 (Epicurus) and 69 (More).*
11. Mill, John-Stuart. *Utilitarianism, in Mill, John-Stuart Utilitarianism, Liberty and Representative Government, Everyman's Library London 1910 (1925 reprint) pp 1-60*
12. Polyzos N, Karanikas H, Thireos E, Kastanioti C, Kontodimopoulos N. *Reforming reimbursement of public hospitals in Greece during the economic crisis: Implementation of a DRG system. Health Policy 109(2013):14-22*
13. Ghaffari S, Donan S, Aisbett C, Jackson T. *Investigating DRG cost weights for hospitals in middle income countries. Journal of Health Policy and Management. 2009;24:251-64*
14. www.Moh.gov.gr/.../709-kleista-enopoihmena-noshlia.
15. Schmid A, Goetze R. *Cross-national policy learning in healthcare system reform: the case of diagnosis related groups. International Social Security Review 2009;62:21-40*
16. *16. International Classification of Diseases, ICD-10, World Health Organisation, 2010*
17. Mulley A. *Learning from differences within the NHS. Clinical indicators should be used to learn, not to judge. Br Med J 1999, 319:528–530*
18. Reid CM, Solterbeck A, Buxton BF, Skillington PD, Shardey GC, Smith JA, Rosenfeldt FL. *Developing performance indicators for cardiac surgery: a demonstration project in Victoria. Hear Lung Circ. 2001;10(1 Suppl):S29-33*
19. Sonnad SS, Matuszewski K. *Control mechanisms for guideline implementation. Qual Manag Health Care 2006, 15:15–26*
20. www.eof.gr/web/guest/protocols
21. Tagarakis G, Dikeos C, Tsolaki F, Daskalopoulos M, Bougioukakis P, Tsilimingas N, Polyzos N. *The significance of clinical protocols in surgical disciplines. Journal of Social Sciences Research. Vol. 6, No 1, Nov. 2014*
22. Tagarakis G, Dikeos C, Tsolaki F, Daskalopoulos M, Bougioukakis P, Tsilimingas N, Polyzos N. *Quality Management in Surgical Disciplines. Vol7, No2, March 2015*
23. Nashef SA, Roques F, Michel P, Cortina J, Faichney A, Gams E et al. *Coronary surgery in Europe: comparison of the national subsets of the European system for cardiac operative risk evaluation database. Eur J Cardiothorac Surg. 2000 Apr;17(4):396-9*
24. Serruys PW, Morice MC, Kappetein AP et al. *Percutaneous coronary intervention versus coronary artery bypass grafting for severe coronary artery disease. N Eng J Med 2009;360:361*
25. Biancari F, Ruggieri VG, Perrotti A, Svenarud P, Dalen M, Onorati F et al. *European Multicenter Study on Coronary Artery Bypass Grafting (E-CABG registry): Study Protocol for a Prospective Clinical Registry and Proposal of Classification of Postoperative Complications. J Cardiothorac Surg. 2015 Jun 30;10:90*
26. Chikwe J, Cooke DT, Weiss A. *Handbook of Cardiothoracic Surgery, Oxford University Press, 2013*
27. Tagarakis GI. *Neurological disorders and neuroprotection after heart surgery. Recent Pat CNS Drug Discov. 2008 Nov;3(3):226-9*
28. Zhang WY, Wu WL, Gu JJ, Sun Y, Ye XF, Qiu WJ et al. *Risk factors for postoperative delirium in patients after coronary artery bypass grafting: A prospective cohort study. J Crit Care. 2015 Jun;30(3):606-12*
29. www.esynet.gr