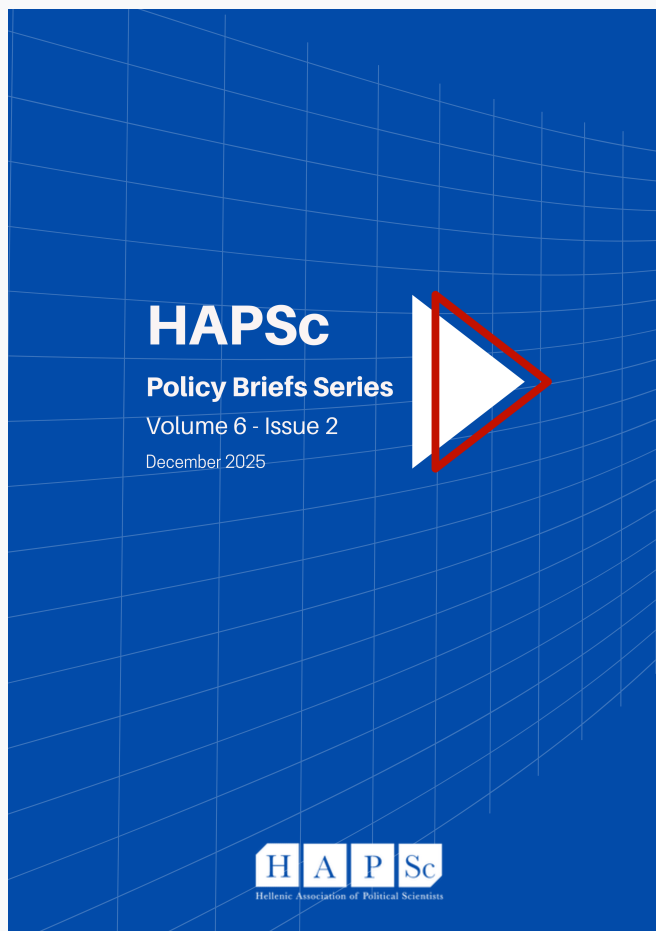


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Evaluating the DRG System in Greece and Germany: Structural Differences, Implementation Challenges and Policy Implications¹

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Abstract

This paper investigates the Diagnosis-Related Groups (DRGs) and how they are implemented in the healthcare systems of Greece and Germany. The study begins with an introduction to DRGs, outlining their fundamental concept, structure and function. DRGs are a classification system for patients according to medical diagnosis, treatment and other factors and are employed in the costing and funding of hospitals. A historical overview is provided, reviewing the development of the DRG systems in European countries, with an emphasis on the reforms and national variations. The challenges and the post-adoption developments of DRGs in Greece and Germany are examined to determine the extent to which the system has been adapted specific to the characteristics of these national healthcare systems. Last, the paper assesses the impact of DRGs on the European level on hospitals' efficiency and resource management and outlines future challenges for extension of their use.

Keywords: Diagnosis-related Group Systems (DRGs); DRG System in Greece (Gr-DRG); German DRG System (G-DRG); DRG-based Hospital Payment; EuroDRG; International Classification of Diseases (ICD)

Introduction

Diagnosis-Related Groups are a valuable tool in healthcare policy-making, as they are intended to promote more efficient and high-quality healthcare, support data-driven decision-making and contribute to the evolution of healthcare payment systems (Böcking and Trojanus, 2008). According to Ren et al. (2024) the importance of DRGs lies on their ability to align financial incentives with desired outcomes in healthcare. Thus, since their inception, DRGs have been widely adopted and have undergone many reforms, implementations and practices. However, the effects of implementing a DRG-based payment system in different countries are not the same.

In his speech to the Philadelphia County Medical Society, Dr. Eugene Codman addressed the major problem of hospitals: the lack of documentation and the failure to follow up on clinical cases. Specifically, he pointed out that a method for reporting clinical data should be developed to accurately reflect the outcomes of treatment

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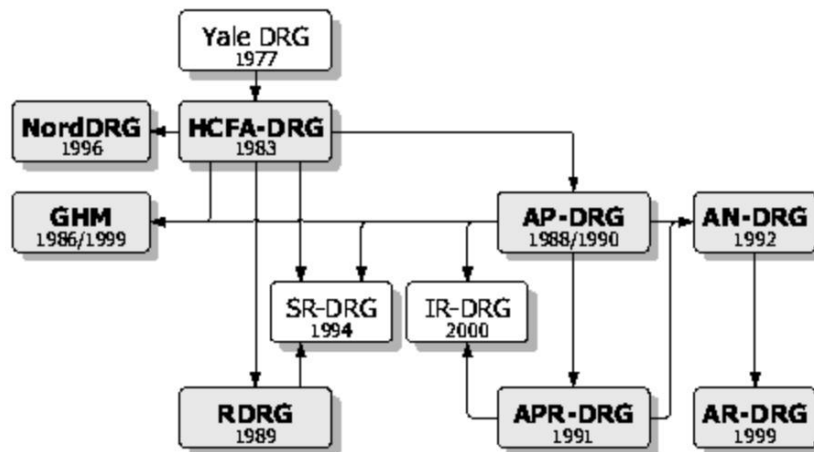
across various healthcare institutions. Dr. Codman suggested that each hospital should publish such reports to allow comparisons of hospital management and efficiency (Codman, 2013). Busse et al. (2013) report that the 'hospital problem' as presented by Dr. Codman, a surgeon at Massachusetts General Hospital, at the beginning of the 20th century continued to be a challenge until almost 100 years later.

The original initiative emerged from the implementation requirements of the Medicare Program; the federal health insurance program in the United States, established in 1965, which provides health insurance to individuals over the age of 65, as well as to those with disabilities or serious medical conditions. In 1983, the Diagnosis-Related Groups (DRG) system were implemented, following a long process of research and development. While it is clear that most countries have introduced DRG-based hospital payment systems with the aim of increasing transparency, improving efficiency and ensuring quality in hospitals, it remains relatively difficult to ascertain whether they are actually making progress towards these goals (Busse et al., 2013). The first DRG system was developed at Yale University in the late 70s and was originally intended to measure resource use in healthcare sector. According to research (Geissler et al., 2011) HCFA (Health Care Financing Administration) in the US adapted the system for monitoring and reimbursing the care of elderly Medicare patients, creating the HCFA-DRG system, which formed the basis for the creation of later systems. Figure 1 provides an overview of the historical development of DRG systems, illustrating their evolution from the Yale DRG model in 1977 to various adaptations, including the HCFA-DRG, NordDRG and others. As shown in Figure 1, the diagram highlights key milestones and structural changes across different healthcare systems (Fischer, 1999).

Regardless of the type of national healthcare system, Diagnosis-Related Groups were introduced globally for similar reasons. First, to increase the transparency of healthcare services provided in hospitals, through the categorization of patients and the measurement of hospital efficiency. Second, to incentivize the efficient use of resources by paying hospitals based on the number and type of clinical cases treated and released. In addition, the combined increase of transparency and efficient use of resources helps to improve - or at least ensure - the level of quality of the provided care (Geissler et al., 2011). The case mix (i.e., the sum of the cost-weighting factors of all DRGs produced by a hospital) and the case mix index (CMI-Case Mix Index), i.e., the case mix divided by the number of discharges, are usually the determinants of budget allocation.

Although DRGs have been introduced in an increasing number of countries around the world, a complete understanding and implementation of DRG systems is still limited (Kimberly et al., 2008). The original idea was the clinical separation of patients into related diagnostic categories and groups with the aim of categorizing and costing their hospitalization and recording the work produced. Diagnosis-Related Groups categorization is determined by a grouping program (grouper) which is based on diagnoses and procedures coded with various standards such as patient demographics (age, gender), length of hospitalization, medical interventions, hours of intensive care and mechanical ventilation (Patients in ICU), length of hospitalization and hospital outcome (cure, improvement, stable, death) (Messaropoulos, 2024).

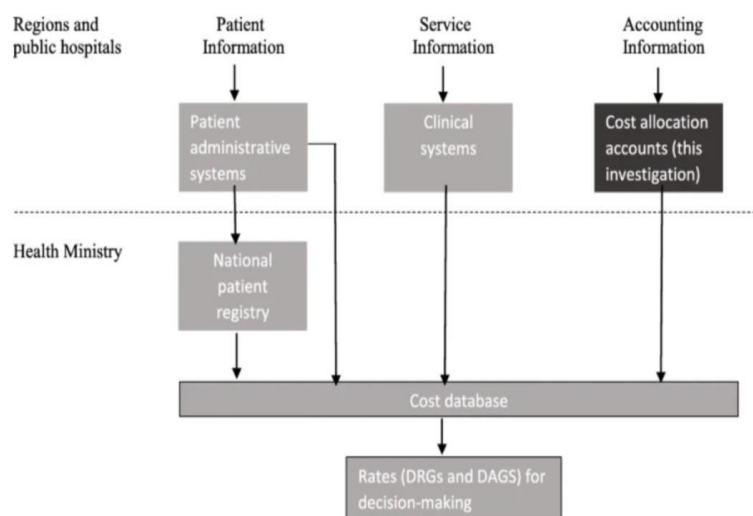
Figure 1. Development of different DRG systems from 1977 to 1999



Source: Fischer, 1999

In general, two main models of DRG-based hospital payment systems can be distinguished. The first category includes case-based payment systems - such as those in Germany and Finland - where each discharged patient is assigned to the corresponding base rate and hospitals receive a case-based payment determined by the DRG cost weight, after monetary conversion and related adjustments. In the second category, DRG-based budget allocation systems are used, where the available regional or national healthcare budget is distributed to individual hospitals based on the number and type of DRGs that those hospitals produced in the previous year or are expected to produce in the following year. Figure 2 below illustrates the data flow process for DRG cost calculations in public hospitals in Denmark, showing how patient information, clinical service records and accounting data are integrated into a central cost database for financial decision-making (Malmlose and Lydersen, 2021).

Figure 2. Data flow process for DRG cost calculations in Danish public hospitals



Source: Malmlose and Lydersen, 2021.

Methodology

The study comprised official reports by health ministries, hospital records and studies on DRG implementation so a comparative analysis to study the implementations of the DRG system in Germany and Greece could be applied. The paper combines both qualitative and quantitative analyses of data to assess the effectiveness and challenges though applying DRGs in the two discussed countries. In the conduct of this research, to provide background information on DRG systems in Greece, Germany and other European nations, a broad literature review including historical and contemporary information was undertaken. Such information was collected from published works including academic journal articles, government reports and publications from international health organizations.

Diagnosis-Related Groups

Hospitals are the core in the delivery of healthcare services and usually 40% of the total healthcare expenditure in OECD (Organization for Economic Co-operation and Development) countries. Hence, it is understandable that hospitals are a focus of reform in healthcare policies. One of them was the introduction of the DRGs. In the initial phase, many countries adopted the DRG system to assess the performance of hospital management. However, gradually, many nations paid more attention to the hospital reimbursement and financing and designed the systems according to their requirements. Among the European countries, Portugal was the first to introduce the DRGs in 1988, Norway (1991-1993) in a number of hospitals and Ireland in 1993. Within a decade, the DRG systems were adopted in many countries of the region. The majority of these countries, including Germany, France, Finland and Estonia, adapted the DRGs used in the United States and Australia and further developed them for their own systems. On the other hand, England and Austria developed their own systems from scratch based on similar diagnostic categories, while Poland used the English version as a basis for the development of its own system. Greece used the German system to develop its own, which is currently being transformed to suit the Greek insurance and healthcare environment. Differences in DRG systems across European countries can be attributed to: Healthcare regulations, Economic status and Hospital facilities structures. Countries also differ in the number of DRGs they have defined. For example, the German G-DRG system includes about 1200 DRGs, while the French GHM system has almost 2300 groups. In contrast, Poland has fewer groups (518), which may affect accuracy and payment efficiency. Furthermore, the frequency and process of updating DRG systems varies. Countries with integrated health IT systems and software are better able to update more frequently, process data more easily and respond to changes in medical practice and technological innovations, which can improve the system and subsequently the quality of care (Busse et al. 2013; Geissler et al., 2011).

Although DRGs can vary significantly between countries, they are largely based on the same characteristics. For example, all Diagnosis-Related Groups include both diagnoses and procedures as key clinical characteristics. As previously mentioned, most countries use the International Classification of Diseases (ICD-10) system when coding diagnoses. In 2019, the ICD-11 (International Classification of Diseases, 11th

Revision) was developed and released and is the latest revision of the International Classification of Diseases system by the World Health Organization (WHO, 2022), designed to incorporate new scientific and medical developments, offering more accurate and flexible coding.

Since 1990, the Nordic countries (Finland, Sweden, Denmark, Norway and Iceland) have been collaborating to develop a common DRG system (NordDRG), which enhances data consistency and comparability. The system is subject to maintenance and updating according to a defined protocol and a fixed schedule. The update process aims to meet the emerging needs of the main system stakeholders in the Nordic countries. Amendments are validated with clinical and economic data to ensure that economic and medical (clinical) homogeneity is maintained or better improved. Each country tests and implements these modifications individually, using its own data analysis (Geissler et al., 2011).

The European Commission introduced the EuroDRG project (Diagnosis-Related Groups in Europe: Towards Efficiency and Quality) which conducted a detailed review of the DRG systems across Europe, carrying out comparative studies and quality analyses. The project was implemented between 2009 and 2011, with the aim of identifying opportunities to harmonize the DRG system at a European level. This was particularly important because the principles of the DRG system would support the implementation of cross-border healthcare, which has been in effect within the European Union since 2013. The EuroDRG project did not result in the complete and direct unification of DRG systems in Europe, but it made a significant contribution towards harmonizing and improving the comparability of national DRG systems. The outcomes of the project provide a clear framework for the future development of a commonly accepted European DRG system, which could integrate cost, quality and efficiency parameters to ensure more standardized and efficient financing of hospitals across the European Union (European Commission, 2013; Paat-Ahi, 2015).

Benefits of the DRGs System

Several key benefits characterize the DRGs system in terms of its impact on hospital financing, resource management and quality of care. Since DRGs are a basis of patient classification according to their diagnoses and treatments, they help increase the transparency of health care services. Better data is available for hospital performance and cost-effectiveness; data that can be used by the hospitals themselves in understanding the financial consequences of treatments. Furthermore, DRGs ensure a standardized method of hospital payment and contribute to reducing the discrepancies that exist in different systems of reimbursement. In countries such as Germany, where payments based on DRGs constitute a large share of hospital remuneration, the system has streamlined the payment process. This allows for more accurate financial predictions and ensures equitable finance.

The DRG system not only ensure an efficient resource utilization without compromising the quality of healthcare provided but also establishes a more structured framework. Since the process of categorization and documentation requires hospitals to meet certain standards of care and reporting, it prompts them to allocate their resources more effectively. For example, in Germany this has led to a greater transparency in healthcare

services as well as improved cost structures. Moreover, DRGs play a very important part in the continuing healthcare reforms, as seen in Greece gradually adopting the DRG system. Through ongoing reforms governments can gain more control over their healthcare reimbursement while creating a better organized and flexible healthcare system.

DRGs enable the comparison of international healthcare data. The knowledge-sharing between countries provide benchmarking information that would help to identify best practices and improve overall healthcare management at the European level. Cross-border initiatives such as the EuroDRG project can be taken as illustrative evidence to foster the framework for improving and harmonizing DRG systems across Europe towards efficiency and equity in financing hospitals at a continental level.

The Case of Greece

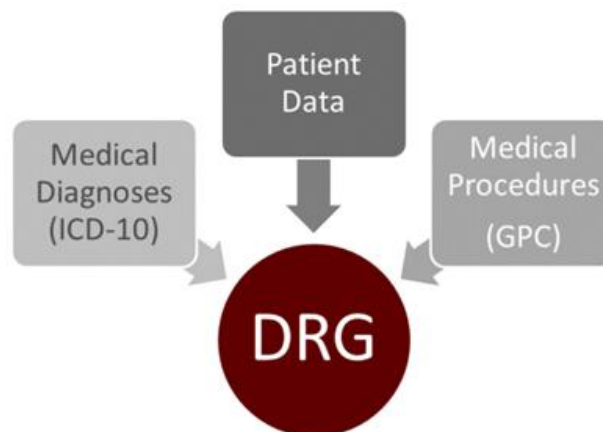
The National Health System (NHS) in Greece was established in 1983 under Law 1397/1983. In the late 2000s, it underwent reforms aimed at decentralizing the system. According to Tountas et al. (2002) these reforms included the creation of a unified system for financing social security funds, the establishment of a new management structure for public hospitals, the organization of a Primary Health Care System in urban areas and the strengthening of Public Health and Health Promotion. Furthermore, secondary and tertiary care services are provided by public hospitals, as well as private NHS and non-NHS clinics (Polyzos et al., 2013). The use of DRGs requires the existence of up-to-date statistical data in hospitals for at least five years, which based on reports (Berler et al., 2005) at that point was not available in Greece, making the adoption of DRGs unfeasible. For this reason, the exploration of the feasibility of DRG implementation in public hospitals in Greece was delayed compared to other European countries, beginning only at the end of 2010. In 2012, an effort was made to upgrade the private sector with the aim of increasing financial resources. As part of the ongoing reforms, the KEN-DRG system was introduced (Government Gazette 1702/b/2011) as a new method for reimbursing hospitalization costs in public hospitals. Despite its shortcomings, it contributed to the functionality and efficiency of the healthcare sector. Findings indicate that the main difference between the KEN and DRG systems is that KEN is based on the patient's primary medical diagnosis, without considering medical procedures (Platis et al., 2024). Additionally, KEN classification is performed manually due to the lack of available software, resulting in KEN-related costs not being systematically updated.

For these reasons, the Ministry of Health in Greece established a committee in 2014, the CDC (Central Committee for Health Technology and Health Disease Coding), which, in collaboration with experts, adapted the DRGs to the Greek language and developed proposals for the system's development and rapid implementation, taking into account the strengths, weaknesses and opportunities of the Greek social security and healthcare systems. The initial goal was to develop a DRG list that would be applicable in the Greek context, drawing on the experiences of other countries in their efforts to adopt DRGs. Of course, emphasis was placed on countries with health systems similar to that of Greece, in terms of service delivery and financing mechanisms. For this reason, the CDC turned to the Australian (AR-DRG version 6.0 2008-2009) and the

German (GDRG version 2011) classification systems, which were considered the most suitable starting point for implementing similar mechanisms in Greece (Polyzos et al., 2013). The CDC secured the rights to implement the Greek DRG (Gr-DRG), based on the German model G-DRG (Platis et al., 2024). The implementation of the DRG system in Greece started in 2021, the University General Hospital of Heraklion being the first one to adopt it. The system was extended to all hospitals on the island of Crete and later to other regions of the country. The last public and private hospitals adopted the system after a final decision of the Health Ministry on December 2023 (Sarivougioukas & Vagelatos (2020). The implementation of a DRG system in a country raises concerns about the accuracy of medical coding. According to the WHO report (2022), the various causes of incorrect coding can be identified through an effective audit mechanism. The causes of errors can be both incorrect coding practices and subjective errors in coding practices that require more intensive staff training.

For these reasons, the CDC (2015) has developed a digital platform in response to those concerns about the accuracy. Through a systematically recording and analyzing medical information from patient records according to the Greek Coding Guidelines, the platform aims to identify and correct coding errors. In addition, it acts as a comprehensive tool to improve medical coding practices by providing real-time auditing, enabling targeted training and facilitating the implementation of new rules and coding guidelines. The ICD-10-GrM classification is the Greek translation of the German Modification of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10-GM, 2013 edition). The translation was initially completed in 2014 as part of a preparatory project for the introduction of the DRG system in Greece, within the framework of the European Health Reform Support Programme (Ministry of Health, 2017).

Figure 3. Key components of the DRG system



Source: Hellenic DRG Institute, 2015.

The Case of Germany

The German healthcare system follows the Bismarck model, with revenues derived from contributions by employers and employees. The country's insurance funds are non-profit organizations and health insurance is compulsory for individuals whose annual income is below a certain threshold. For those whose income exceeds this threshold, there is the option to choose between public and private insurance (Schreyögg et al., 2006). In 2004 Germany adopted DRG-based payments as the almost exclusive financing mechanism for all acute care hospitals. The aim was to rationalize costs and modernize the previous system, which was based on a per day hospitalization fee, meaning that hospitals were reimbursed a fixed amount for each day a patient was hospitalized, regardless of the services provided or the length of stay.

The German ICD-10-GM Modification has been used since 2000 in Germany for medical resource management purposes, both for primary and secondary care. To better serve this purpose, it is updated at regular intervals. The G-DRG system is generally applicable to all public and private hospitals, except for certain types of healthcare services. It also applies to all clinical departments, excluding facilities or services that provide psychiatry, psychosomatic medicine, or psychotherapy. The G-DRG system is based on the Australian AR-DRG Improved Diagnostic Groups and has served as a model for the Swiss and Greek DRG systems, as discussed in relevant literature (Schreyögg et al., 2006).

Messerle et al. (2023) point out that Germany stands out as the only country where DRG-based payments are the sole basis for hospital billing, charging and budgeting, accounting for 80% of total hospital reimbursement, in contrast to other countries where DRG-based payments are combined with other payment systems, resulting in these payments representing only a small percentage of hospital revenues. Although it should be noted that the G-DRG system has not been able to achieve all legitimate results over the last 20 years, a view that is supported by recent research (Kaiser and Decker, 2022). On the one hand, the primary objectives of stabilizing healthcare expenditure and introducing payments to increase transparency about hospital services and costs seem to have been achieved.

On the other hand, according to the study by Messerle et al. (2022), there is insufficient evidence to demonstrate that there is an accelerated reduction in length of stay after the introduction of the G-DRGs. On the contrary, the volume of services has increased affecting the efficiency of health facilities. Despite the experiences of other countries, it seems that the possibility of increasing hospital activity has not been overly focused on in the legislative process (Kaiser and Decker, 2022). There is therefore a need for changes or reforms in hospital financing, with a greater concern for ensuring healthcare quality and maintenance costs of the hospitals.

Conclusions

Implementing the DRG system has been challenging for both Greece and Germany. The German DRG system has been applied for more than twenty years and it has already become a part of the hospital financing system

and is supposed to have increased transparency and efficiency in resource allocation, but still not completely able to reduce the average length of stay and to achieve cost reduction in hospitals. In Greece, the DRG system has been recently implemented and experiences problems at an early stage, such as low data availability and problems with the accuracy of coding and how well the international DRG models can fit into the Greek healthcare system; however, the first results point to an improvement in hospital performance and financial sustainability.

The EuroDRG project brought out the prospect for harmonizing DRG systems across Europe towards better efficiency and equity in the financing of hospitals. A unified European DRG system may not have been achieved, but this framework, as developed by the project, would be a very good road map for future cooperation and standardization. As DRG systems progress in both countries, it is important to note that priority should be given to continuous update of the DRG systems on a regular basis to incorporate the technological improvement, treatment methodology and demographic characters of patients reinforcing the point on preserving the flexibility of DRG systems. In conclusion, it asserts that the DRG system would be effective in improving efficiency and transparency in the implementation of hospital funding, but it can work efficiently when introduced according to specific strategies based on national healthcare contexts, regular revisions and supportive stakeholder participation.

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