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Guidelines for Hospital Managers Implementing DRGs

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Abstract

Following an extensive literature review and drawing upon the authors' professional experience as health services researchers and hospital managers, this article sets out the basic guidelines for hospital managers who are called upon to implement DRGs. The authors described ways in which hospital administrations can assess the positive effects of changes of DRGs and reduce the relevant risks accordingly. They highlighted the importance of effective human resource management and the role of education, while describing important changes that should be made in workflows, in the acquisition of new skills and the creation of new roles. Furthermore, this article explored the role of Information Systems and Artificial Intelligence in the context of this transition and proposed ideas for implementing useful tools through the development of new software that increases the accuracy of medical coding and reduces workload. These guidelines can serve as a springboard for hospital management to help them with the first steps of the implementation of the DRG system and its constant evolution. While the proposed guidelines offer practical direction for hospital managers implementing DRGs, their implementation is influenced by various financial and organizational challenges. However, their implementation is affected by various financial and organizational challenges that will have to be taken into account from the hospital managers.

Keywords

DRG, Diagnosis-Related Groups, Guidelines, Hospital Management, Hospital Reimbursement, Hospital Payment System, Patient Classification System, Insurance Payments, Clinical Coding, Case-Mix Index, Hospital Managers

1. Introduction

The DRG's hospital reimbursement system is one of the most significant changes

of the last decades in hospital funding and performance management around the world. This system classifies hospital cases into a number of clinically significant and economically homogeneous groups, based on common characteristics of patients, as well as diagnoses and interventional procedures recorded during hospitalization. In this way, each diagnostic group should ideally contain cases that have a similar cost—*i.e.* consume approximately the same resources during their hospitalization—in order to allow a reliable calculation of the average cost per DRG.

The guidelines presented in this article are intended to have universal applicability across national healthcare systems that implement DRGs, as a basis for hospital financing and performance management. Moreover, these guidelines' scope is to support hospital managers operating within diverse DRG-based systems worldwide, rather than being tailored to the institutional, regulatory, or organizational characteristics of any single country. Therefore, they should be interpreted by readers as generally relevant management principles that can be adapted to different national contexts, policy frameworks, and levels of system maturity wherever DRGs are used.

The implementation of a reimbursement system based on DRGs, outside the scope of hospital financing, is expected to affect several aspects of the health system in the implementing country, such as the degree of freedom of doctors in the management of hospital cases (mainly in terms of resource utilization), the quality of services provided, the competitiveness and financial viability of hospitals.

In addition, there is a common assumption that the implementation of DRGs can shift financial risk from the payer (insurance company) to the service provider (hospital), as the uncertain cost of a hospital case for the provider is compensated by the payer at a fixed price corresponding to the expected cost per DRG [1] [2]. Based on previous studies in the United States, Australia, and Germany, it has been found that this shift in risk to hospitals, increases incentives for cost-effectiveness [3]. Economic theory predicts that in a perfectly competitive market where all hospitals have similar specializations, clinics and departments and offer roughly the same services, hospitals in order to be more competitive should minimize costs and profits. Eventually, this could lead to a cost-effective service for payers, where hospitals are compensated at best for their expected costs. At the end of the day, inefficient hospitals would be exposed to losses since they would not be able to effectively control their cost management and would possibly exit the market. However, hospital markets typically deviate from perfect competition due to information asymmetry about prices and quality, barriers to entry and differentiated services by quality, specialization, location, and reputation [4] [5].

The Yardstick competition could enhance competition among hospitals by incentivizing cost control by linking reimbursement rates to average or best practice costs among comparable hospitals. However, there are significant difficulties in its implementation. For example, hospitals treat heterogeneous pa-

tient populations, and costs vary widely depending on case mix, severity, and complexity of services. Therefore, without adequate risk adjustment and quality safeguards, yardstick competition by criteria can create incentives to avoid high-cost patients or reduce quality [6] [7]. Effective policy design could frame competition with the proper regulatory framework, transparency and benchmarking mechanisms, so that economic incentives are aligned with both efficiency and quality objectives.

However, while DRGs have been successfully implemented for decades in several countries, many health systems are still in the process of adopting DRGs or improving them. For hospital managers, the transition is not just an administrative adjustment but rather a process that requires deep operational, cultural and strategic change. The purpose of this article is to provide hospital management basic guidelines that would facilitate during the first steps of the implementation of the DRG system, with a view to maintaining the quality of care, while ensuring the financial sustainability of hospitals.

2. Methodology

The methodological approach was designed to ensure the transparency and reliability of the proposed guidelines, while allowing readers to assess the validity of the guidelines in order to adopt those that best suit their own needs. The recommendations outlined in this article are based on an extensive review of the scientific literature on DRGs, combined with the authors' professional experience in hospital management and health system governance.

More analytically, a structured, non-systematic literature review was conducted to identify relevant publications related to the implementation of DRGs in different countries, the impacts of this implementation on hospitals and their staff, the different approaches to change management, the organizational impacts on hospitals and the funding based on the DRG system. Searches were carried out in large academic databases commonly used in health services research but also on the internet in general with key phrases. As a result, a broader set of publications emerged, which were evaluated on the basis of the title and abstract in terms of relevance to the objectives of the study.

In addition to the literature review, the guidelines were adapted based on the authors' cumulative professional experience in hospital management, reforms in the financing of hospital services, and the implementation of DRG in public and private hospitals, while compared with real operational insights. This experiential knowledge was used to frame findings from the literature, identify practical challenges that are not fully captured in academic studies, and translate the evidence into actionable management proposals.

This combination of structured literature analysis and professional experience was judged to be the most appropriate for the objective of the article, *i.e.* to offer practical guidance to hospital managers who are called upon to implement or who are already compensated under the system of DRGs.

3. Understanding the Regulatory Framework and Implementation Policy of the New System

The regulatory framework and policy for implementing a DRG system differs from country to country, *i.e.* it defines differently the number and categories of DRGs, as well as the weight and adjustment factors. As a result of the above diversity, each DRG system is adapted according to the specificities of the health system or health authority of each country [8]. Key preparatory steps for hospitals can include:

3.1. Country Policy Analysis

The challenge for hospital managers when it comes to implementing DRG is how to improve hospital efficiency while limiting the generated operating costs. In this direction, hospital managers should investigate in depth the impact of the policy behind the implementation of DRGs on the hospital services they already offer and the operation of the hospital in general [9]. More specifically, the legal basis and regulatory framework governing the implementation of DRGs/the DRG system in each country should be meticulously checked, the classification version of DRG (e.g. GR-DRG, MS-DRG, APR-DRG) should be studied and the payment algorithm applied by the respective Grouper software should be analyzed [10].

3.2. Cooperation with Stakeholders and Authorities

Hospitals should engage in stakeholder consultations in order to influence developments and ensure the smooth transition to the new reimbursement system. In this context, hospitals also have the opportunity to discuss issues related to the implementation of DRGs, the mechanisms for implementing the first application, as well as issues related to the cost-effectiveness of hospitals and the reallocation of resources [11]. In addition, through such a communication channel, hospitals have the opportunity to make recommendations on the policy followed in order to facilitate hospitals in the implementation of the new reimbursement system.

3.3. Compliance Strategy

Hospital management will have to draw up a detailed compliance plan to determine the mechanism and the steps by which the existing services and procedures of each hospital department will be aligned with the rules of the new DRG reimbursement system [12]. This includes internal controls, documentation standards, and monitoring processes to ensure ongoing regulatory compliance.

4. Communicating the Broader Purpose & Manage Change Strategically

A very important step for a successful transition to a DRG system is to inform those involved about the changes, benefits and effects it will carry. An effective communication strategy could ensure that such changes can be understood and accepted by all teams of staff, as long as the right message is communicated to the

right people, at the right time [13]. Employee questions such as, why is the change to the DRG system necessary, what changes will be implemented as part of this transition and what would be the impacts on employees, should be answered by hospital management before they are even raised by staff.

By following an effective communication strategy, managers act proactively in responding to their employees' concerns from day one.

It must be clear that DRGs do not only deal with hospital revenue, but affect many more things such as resource allocation, transparency, quality of healthcare, etc. [4]. It is fundamental that hospital management explains to staff the ways and the mechanism by which the DRG system works, supporting fair funding and sustainability of the health system, while making it clear that the ultimate goal for the hospital remains to provide high quality health care services. It should therefore be understood by everyone that the transition to DRGs is a project of change management process for hospitals but also of acquiring the necessary technical competencies [9].

5. Emphasizing Effective HR Management

The success in the implementation of a DRG system is inextricably linked to the human resources of the hospitals. The identification of deficient education as a major challenge is in line with Dong's [14] assessment of the inadequacy of integrated training programs for the implementation of DRGs. In particular, hospital managers in the context of the transition to the DRG system will have to make significant reforms in workflows, emphasize the acquisition of new skills from their human resources, create new roles such as coders, and generally change their organizational culture.

5.1. Design New Roles and Jobs

In the course of the transition to DRGs, new roles are opening up with enhanced responsibilities within hospitals, such as the role of coders, data analysts, clinical documentation specialists, and financial analysts who play a critical role in the revenue trajectory. Consequently, hospital HR is required to develop new job descriptions, devise recruitment strategies, and map out career paths for these roles necessary for the successful implementation of the DRG system in the hospital [15].

Fahlevi *et al.* [16] mention the creation of new roles and the need to acquire skills with the aim of effective management, emphasizing financial management and the efficient use of hospital resources.

Additionally, the pressure to use resources efficiently in DRG-based payment systems can impact workforce planning and management. According to Graban [17], hospital administrations should increase efficiency but without negatively affecting the quality of care or staff satisfaction. This could necessitate redesigning workflows, adopting flexible staffing models, and capturing incentive-focused performance metrics based on the implementation of DRGs.

5.2. Create a DRG Specialized Implementation Team

The adoption of a DRG system and its successful implementation by the hospital requires interdepartmental collaboration and the establishment of a dedicated team within the hospital. Such team would consist of various categories of staff, such as senior managers (role: strategic supervision), medical directors (role: clinical practice supervision & coding expertise), hospital data analysts (role: analysis of health indicators and other clinical data), financial analysts (role: cost modeling) and specialized computer scientists (role: information system upgrade) [8].

The role of this multidisciplinary team should be to oversee the integrated transition plan to the new DRG reimbursement system, assess the risk before any significant change, and measure efficiency while recording the hospital's revenue trajectory [12]. By coordinating across hospital departments, the DRG implementation team can support consistent application of coding standards, timely identification of operational bottlenecks, and informed managerial decision-making during and after the transition.

5.3. Develop Clinical Coding and Documentation Capacity

The hospital administration can also provide training, along with appropriate support in terms of strengthening the clinic's infrastructure and the good practice of medical coding. It is well known that the matching of cases with the appropriate DRGs is based on the accurate and complete recording of hospital data. Improving education, medical screening, and resource allocation could ensure the correctness of coding, thus leading to better reimbursement and improved quality of healthcare.

The results of one study highlighted the critical role of targeted HR strategies in the successful implementation of DRG systems. More specifically, the targeted training programs related to clinical coding and case documentation significantly affected job satisfaction and boosted the morale of coders and hospital doctors. These training programs should address the specific challenges of coding and documenting the DRG system, ensuring that healthcare professionals have the necessary skills to address the specifics of the system. Hence, hospital administrations could increase efficiency and improve overall HR satisfaction by aligning HR strategies with the requirements of DRG implementation [18].

Incomplete documentation can lead to incomplete coding and loss of revenue, or to too much risk of coding and compliance. One strategy that hospitals could implement is to assign Clinical Documentation Improvement (CDI) specialists to review medical documentation of cases before discharge. A key role of CDI specialists is to offer on-the-job training of CDI doctors and other healthcare professionals in order to improve their skills in clinical documentation of cases to the point where they no longer need questions to the CDI team and additional corrections [19]. Of course, considering the challenges that traditional CDI programs currently face as a result of advances in technology and changes in physician culture, new approaches using specialized software and artificial intelligence will be

needed to keep CDI programs relevant [20].

5.4. Engage and Motivate Clinicians

The second factor that affects the success of a DRG system is the clinicians themselves. Doctors and nurses should improve the way they are documented and provide all relevant clinical data to support the classification of cases in the appropriate DRGs that cover the cost of hospitalization. This often requires a shift of clinicians in the way they document from a narrative to a more structured way of medically documenting cases, creating the need to implement new change management strategies and targeted education initiatives [21].

Without the positive response of clinicians, the implementation of DRGs risks may be perceived by them as a cost-cutting measure and not as an initiative to increase efficiency and improve quality. Therefore, it is important that doctors, together with nursing staff, have a deep understanding of the new terminologies, coding guidelines, specificities, but also the goals and potential benefits of implementing the DRG system.

6. Upgrading Information Systems & Leverage Artificial Intelligence (AI)

As far as the hospital information system (HIS) is concerned, it should support a complete medical record of patients, integrate the coding of the DRG system and have DRG grouper software, while at the level of data interoperability it is necessary to be able to seamlessly exchange data with national health databases and payer information systems.

The transition to DRGs could, in itself, be an opportunity for hospitals to upgrade their information systems by integrating control tools such as automated control of registered codes of diagnoses and invasive procedures [22]. Similar tools could be developed as well for real-time monitoring of Case Mix Index (CMI), mean length of stay (LOS) and DRG-based revenue.

Consequently, upgrading hospital information systems is a critical prerequisite for effectively leveraging artificial intelligence (AI) in DRG-based management and decision-making. AI applications are inextricably linked to the quality and availability of medical and other data [23]. Therefore, hospitals must ensure the developing and use of structured electronic health records (EHRs) that record clinical, administrative, and financial information in standardized formats. On the contrary, fragmented systems, unstructured free-text data, and inconsistent coding practices, can adversely affect the reliability and usefulness of AI-based analyses [24].

For example, as a way to effectively monitor and manage a DRG system, a subsystem should be incorporated in the main information system to monitor the hospital's services and the use of resources related to each service provided. This subset should include key indicators of follow-up of hospitalizations related to irrational diagnoses, reckless use of medications, excessive consumption of med-

ical supplies, high frequency of tests, undocumented readmissions, and repeated hospitalizations. The results of the measurement of the above indicators should be made public on a regular basis to all hospital employees, in order to prevent unacceptable practices and behaviors [25].

A next step in upgrading hospital information systems could be the development of AI software that, by applying coding logic, will highlight cases where a specific invasive procedure would not normally be performed in combination with a specific ICD-10 medical diagnosis, prompting the encoder to reconsider the specific case. Such sophisticated software could accordingly be created by checking the medical materials used during a hospitalization in relation to the invasive medical procedures performed or even the medical diagnoses recorded. For example, if medical material is used, but no corresponding medical procedure is coded, this software will be able to block the submission of the case until the correct invasive act is re-checked or registered. In conclusion, filtering medical data, adding automated rules and quality checks to the information system, could lead to higher-quality coding and consequently higher-value DRGs [26].

In this context, hospitals by leveraging Artificial Intelligence (AI), could improve the accuracy of coding and the efficiency of case categorization into DRGs, ensuring appropriate reimbursement while reducing the workload of their staff by automating large parts of workflows. The use of artificial intelligence would allow coders to make more correct case groupings in DRGs much faster and with less chance of error by analyzing medical data of hospitalizations using advanced algorithms. AI is also constantly learning from previous case coding cases and records of different medical data, so as time goes by, the smarter and more accurate the system will become in its predictions.

A recent study examining the performance of a Deep Learning (DL) model used to predict the primary diagnosis concludes that Deep Learning models can achieve high accuracy in predicting the main diagnosis in a DRG system. The implementation of such an automated DRG coding system could significantly reduce the rate of incorrect codings, potentially increase hospital revenue, improve resource allocation, and improve overall hospital performance [27] [28]. In any case, it could be used as an alternative to the traditional manual coding of the DRG system and the automatic identification of codes in addition to the main diagnosis, secondary diagnoses and invasive procedures [28].

Of course, a robust data infrastructure also requires strong data governance mechanisms. This includes clear data ownership, standardized data definitions, and routine data quality checks to ensure completeness, accuracy, and consistency across departments. Harmonization of coding systems—such as ICD classifications, procedure codes, and DRG groupers—is particularly important in DRG-based environments, as AI models rely on these structured inputs to generate meaningful predictions related to resource use, case mix, and reimbursement amount [8]. Without the above governance frameworks, AI tools risk amplifying

existing data errors rather than improving managerial insights.

Finally, hospitals will need to think about ways in which they will be able to monitor, evaluate and adapt AI systems to identify and address issues such as data drift or reduced model reliability, with the ultimate goal of integrating updated versions into their information systems. In addition, the existing regulatory processes of AI systems, if any, should be adapted in such a way that they are able to cope with the rapidly evolving course of AI systems, protecting the integrity and coherence of medical data [29].

7. Reviewing Contracts with Payers

According to a study conducted in the Netherlands, the percentage of contracts with a ceiling value between insurance companies and hospitals raised from 67% in 2013 to 80% in 2018, with a simultaneous decrease in the percentage of contracts with a total contract value. The study revealed that after a period of 5 years hospitals were exposed to greater financial risk over time, which forced them to modify their contracts with payers, even though the increase was largely offset by the increasing use of financial risk mitigation measures between 2016 and 2018. During the study period, fee-for-service contracts on a case-by-case basis were virtually absent on the Dutch hospital market. Second, performance-based agreements were hardly used throughout the study period. Third, multiannual contracts have been increasingly used over time and have been used in particular, in conjunction with overall budgets. Fourth, the financial risk allocation was correlated with (the interaction between) the market power of insurers and the market power of hospitals and health insurers [30].

On the other hand, with regard to the attitude of payers (insurance companies, insurance organizations, etc.), it seems that payers offer policies with lower financial risk to hospitals in which they have a higher market share. As such, payers do not appear to be using their market power to shift more financial risk to hospitals. On the contrary, they seem to want to support the hospitals in which the largest percentage of their insured people are treated, reducing the financial uncertainty for these hospitals. It is also important to mention that beyond the degree of concentration of insured people in a hospital, the support of payers is greater when hospitals have greater market power, *i.e.* larger size or provide a higher quality of care, which may reflect the strong mutual dependence and the desire of both sides to further develop cooperation. This conclusion emerges from various studies that show that insurance organizations and insurance companies conclude multi-year contracts with hospitals, especially in areas where they hold a high market share and there is a significant concentration of hospitalizations of their insured [31]. This contract model shows that there are relationships of trust between payers and hospitals, thus creating the conditions for long-term investments on the part of hospitals in innovation and efficiency (e.g. replacement of equipment with more modern ones, use of new surgical methods with greater effectiveness, increase in efficiency) as the level of economic uncertainty [31] [32].

8. Improving Patient Experience

Although the implementation of DRG is primarily a management and funding mechanism, its effects are often immediately perceived by patients through changes in care pathways, length of stay, and discharge scheduling [9]. Managing these impacts requires special attention at the management level so that modifying hospital processes to increase efficiency does not impact the overall patient experience. Standardization of care and stricter resource controls, if not properly managed, can be perceived by patients as rushed care or early discharge. Therefore, hospital managers should ensure that efficiency goals are balanced with patient-centered practices that ensure continuity of care, comfort, and perceived quality.

Effective communication with the patient plays a central role in mitigating potential negative perceptions associated with the implementation of the DRG reimbursement system. It is logical that patients do not know exactly how the reimbursement mechanism works and how the hospital's operations are affected, however they may experience some negative effects. Clear and empathetic communication about treatment plans, expected length of stay, and discharge arrangements helps align patient expectations with clinical and organizational reality [33]. At the same time, training clinical and administrative staff to communicate with patients consistently and transparently can reduce stress, improve trust, and enhance overall patient satisfaction, particularly during care transitions.

From a management perspective, the integration of patient experience indicators into performance monitoring frameworks is essential in the context of DRG-based reimbursement. Data derived from patient surveys, complaints, and experience measures can help identify unintended consequences of DRG-related process changes [34]. By systematically integrating patient feedback into continuous quality improvement initiatives, hospital managers can enhance workflows and communication strategies to ensure that the efficiency gains and benefits achieved through implementing DRG do not compromise patient understanding, engagement, or perceived quality of care.

9. Discussion

While the proposed guidelines offer practical direction for hospital managers implementing DRGs, their implementation is influenced by various financial and organizational challenges. The hospital's financial budget is directly impacted, as many of the recommended actions—such as upgrading information systems, investing in data analytics, or enhancing clinical documentation—require committing financial resources that may not be readily available in advance, particularly in hospitals already under financial pressure. In such circumstances, managers may decide to gradually implement the proposed actions or to prioritize some of them or to seek external funding or even state aid [8].

Another limitation that hospital managers should take into account is pre-existing data quality and hospital infrastructure issues. As we mentioned in a previous section, hospitals transitioning to or operating DRG-based systems often rely

on legacy information systems, fragmented data sources, or inconsistent coding practices. These deficiencies can undermine the effectiveness of guidelines related to performance monitoring, benchmarking, and the use of advanced analytics or AI. Addressing these issues typically requires ongoing efforts in data governance, staff training, and system integration, which may extend beyond direct control of hospital management [35].

Finally, resistance from clinical staff can impact the successful implementation of DRG-related management guidelines. In particular, clinicians may perceive DRGs and related management practices solely as cost-cutting actions or as threats to professional autonomy and clinical judgment. Without adequate engagement, communication, and involvement of clinical leaders, such perceptions can limit compliance with standardized pathways, documentation requirements, or efficiency initiatives [36]. The recognition of these challenges by hospital administrations requires the implementation of a broader adaptation strategy while at the same time reinforcing the view that the guidelines should be understood as flexible principles and not as regulatory solutions.

10. Conclusions

The implementation of DRGs has triggered significant changes in the way hospital care is managed. Greater emphasis was placed by hospital administrations on clinical coding and accuracy of documentation, which in turn led to the need for further development of health information systems and greater analysis of hospitalization data. Furthermore, the use of the DRG reimbursement system has led many hospitals to reconsider the allocation of available resources and to take the necessary corrective actions to balance cost-effectiveness and quality of care. If one considers that for each DRG there is a specific compensation, then the hospital managers are motivated by the use of more effective treatment protocols (which could be standardized) and the abolition of unnecessary procedures to reduce the consumption of resources and gradually the average duration of hospitalization. In recent years, clinical pathways and standardized treatment protocols have been developed in this direction [22].

The implementation of a DRG system is complex and multifaceted. Success requires strong leadership, dedicated clinicians, robust systems, and a commitment to data quality. When executed carefully, DRGs can drive both operational efficiency and clinical excellence, supporting hospitals to deliver greater value to both patients and healthcare systems.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviations

AI	Artificial Intelligence
CDI	Clinical Documentation Improvement
CMI	Case Mix Index
DL	Deep Learning
DRG	Diagnosis-Related Group
HIS	Hospital Information System
LOS	Length of Hospital Stay