

Review article

Hospital manipulations in the DRG system: a systematic scoping review

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Background: In the Diagnosis Related Group (DRG) payment system, hospitals are usually suspected of ‘DRG creep,’ which has been narrowly regarded as reporting diagnostic and procedural codes that result in larger reimbursement.

Objective: This review was aimed to systematically explore ways in which hospital manipulations of DRG coding may occur.

Methods: A systematic scoping review was conducted using MEDLINE, EMBASE, Web of Science, EconLIT, Proquest Digital Dissertation and Theses, Conference Proceedings, and Thai Index Medicus, using appropriate search strategies. Based on predefined criteria, each article abstract was screened by two screeners with good inter-rater reliability. The included articles were qualitatively explored using thematic content analysis.

Results: Hospital manipulations of the DRG system can be categorized into three groups: corporate, clinical, and coding practices. Corporate includes all activities not directly related to patient care; possible manipulations are focused on hospital management, administration, or finance and therefore are the responsibility of the executive board or hospital director. Clinical manipulation deals with activities in the care process and is the responsibility of health care professionals. The last group covers conventional definition of DRG creep that focuses on documentation and coding.

Conclusion: Hospital managers who deal with the DRG payment system should be aware that DRG creep is not merely about upcoding. Indeed, the DRG system can be manipulated by hospitals in three different approaches, the so-called “3C”: corporate, clinical, and coding practices.

Keywords: Diagnosis related group, DRG creep, hospital coding practice, upcoding, provider payment

The Diagnosis Related Group (DRG) “is a system to classify hospital cases into groups, expected to have similar resource use” [1]. The DRG was first introduced in the USA and then was adopted in many developed and developing countries around the world. A more detailed comparative discussion on its implementation in various countries can be found elsewhere [2]. Similar to other case-mix systems, the DRG was created by “combining physician judgment with statistical analyses” [3]. A DRG is assigned based mainly on diagnosis and procedure coding—using the International Classification of Diseases (ICD), developed by the World Health Organization [4], and

other important information such as age, gender, weight at admission, length of stay (LOS), discharge status, co-morbidity, complication, and hospital expenditure of individual patient admissions. Although the primary intent of the DRG is to ensure adequate payment to the provider on average, the system has also been anticipated to change hospital management and physician practice [5].

As an imperfect system, however, complaints from hospital or physician providers on DRG implementation have been common. It was of concern that the DRG did not fully reflect resource-intensity differences in severity of illness [3, 6]. Some physicians did not think that important clinical attributes were satisfactorily reflected. For instance, when a patient has multiple conditions, the sequence and choice of the codes may not be reliable [7]. Critics also commented on the DRG coding algorithm because

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the choice of codes “depends on the ICD codes appropriate for a hospital stay, the sequencing of the codes, whether complications and/or co-morbidities exist, and other factors” [8].

The ambiguity of the DRG coding system has generated concerns about potential DRG manipulations [7, 9-11]. It has been anticipated that hospitals are more likely to report diagnostic and procedural codes that result in larger reimbursements, while some data might be ignored if its inclusion provides no financial benefits. Doing so is acceptable if the coding reflects patients’ actual conditions that may consume more hospital resources. However, it is possible that some changes in hospital coding practices do not focus on patients’ needs but rather manipulate diagnostic coding to maximize reimbursements. This phenomenon is called DRG creep, defined as “a deliberate and systematic shift in a hospital’s reported case mix in order to improve reimbursement” [12].

DRG creep has been commonly referred to by its narrower definitions like ‘upcoding’, ‘overcoding’, or ‘miscoding’. For example, in a cross-sectional analysis of the Cardiovascular Health Study cohort, Psaty et al. used physician’s diagnosis of heart failure plus confirmatory evidence to determine the extent of DRG creep. The three words were used interchangeably in their article [13]. Other studies indirectly use broader definitions of DRG creep. In their study on upcoding and hospital ownership, Silverman and Skinner distinguished between upcoding and DRG creep based on whether ex post examination of the medical record by expert coders would cause revisions to the DRG [14]. They referred to the study by Psaty et al. as an example of upcoding in their article.

This review was aimed to systematically identify a number of ways in which hospital manipulations may occur.

Methods

We performed a systematic scoping review of literature to explore various ways in which hospitals can manipulate the DRG system. We developed a conceptual model based on our initial literature review, which was then refined by the finding from the qualitative interviews with 10 hospitals in Thailand [15], to help define areas of literature that contained articles relevant to our objective. Articles relevant to hospital coding practice, data quality, and DRG-based reimbursement were identified. This study is not a

traditional systematic review as the aim is only to create a list of possible hospital manipulations; we decided not to perform quality assessment or data abstraction of the included articles.

Data sources

We include the following literature databases: MEDLINE, EMBASE, Web of Science, EconLIT, Proquest Digital Dissertations and Theses, Conference Proceedings, and Thai Index Medicus, using validated search strategies (see Appendix). Thai Index Medicus is a collection of documents published in Thai medical journals from 1918 to the current year. It is a bilingual (Thai/English) database and maintained by the Medical Library, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand. We also scanned reference lists of the papers obtained. We included the oldest possible literature up to December 2010. English and Thai were the two main languages.

Data collection and analysis

Any article that focused on reimbursement or provider payment with at least one of the following domains was included: DRG/casemix, discharge summary, coding quality, or medical audit. An article was excluded if it met any of the following criteria: Duplicates; No English or Thai abstract AND No Full text; Not relevant to health service provision (e.g. clinical research); Focus only on dental, preventive, emergency, outpatient services that do not need hospitalization; Non-hospital setting (e.g. nursing facilities, home health care, hospice, long-term care, physician practices); Payment systems, economic evaluation, disease assessment, public health assessment, quality of care, quality of life studies without reimbursement component; Overall not about DRG manipulations (e.g. systems description, cost calculation, pay for performance, quality-based purchasing, data quality). Opinion pieces, letters to the editor, and other non-research articles were also included unless one of the exclusion criteria was met. The selected articles were retrieved and assessed in full text where available. The literature was searched from respective websites using the detailed search strategy presented below. The search strategy and systematic review protocol were based on thorough consultations with the medical informationist of Johns Hopkins University.

Four graduate students of the Department of Preventive and Social Medicine, Faculty of Medicine,

Chulalongkorn University, Bangkok, Thailand were recruited as article screeners. They were trained to understand the objectives of this review, the conceptual framework, and the inclusion and exclusion criteria for article screening.

The title and abstracts of the references uncovered by the search were scrutinized and classified into “included”, “excluded”, and “not sure”. Inter-rater reliability was tested against 100 randomly selected articles, using Kappa statistics. An article was selected only if both screeners agreed to classify it as “included.” Articles with disagreement were reassessed and the first author made the final decision for inclusion or exclusion. Thematic content analysis was used to analyze the qualitative data.

Results

The search strategies identified 4,702 articles from the literature databases as presented in **Table 1**. We excluded 4,642 articles based on the following criteria: 1,093 duplicated articles, 666 articles with no English or Thai abstract AND no full-text, 42 articles not relevant to health service provision, 98 articles focusing only on services that do not need hospitalization, 439 articles about non-hospital settings, 1,249 articles with no reimbursement component, and 1,055 articles irrelevant to DRG manipulations.

Figure 1 shows possible hospital manipulations revealed from the systematic review, which can be categorized into 3 kinds of practices: Corporate, Clinical, and Coding Practices.

Table 1. Distribution of number of articles from literature databases

Literature database	Number of articles*
EMBASE	1,833
Medline	1,393
Web of Science (Inc. Conference Proceedings)	1,007
Thai Index Medicus	205
Proquest Digital Dissertations and Theses	176
EconLIT	88
Total	4,702

*As of December 31, 2010 (before exclusion criteria was applied)

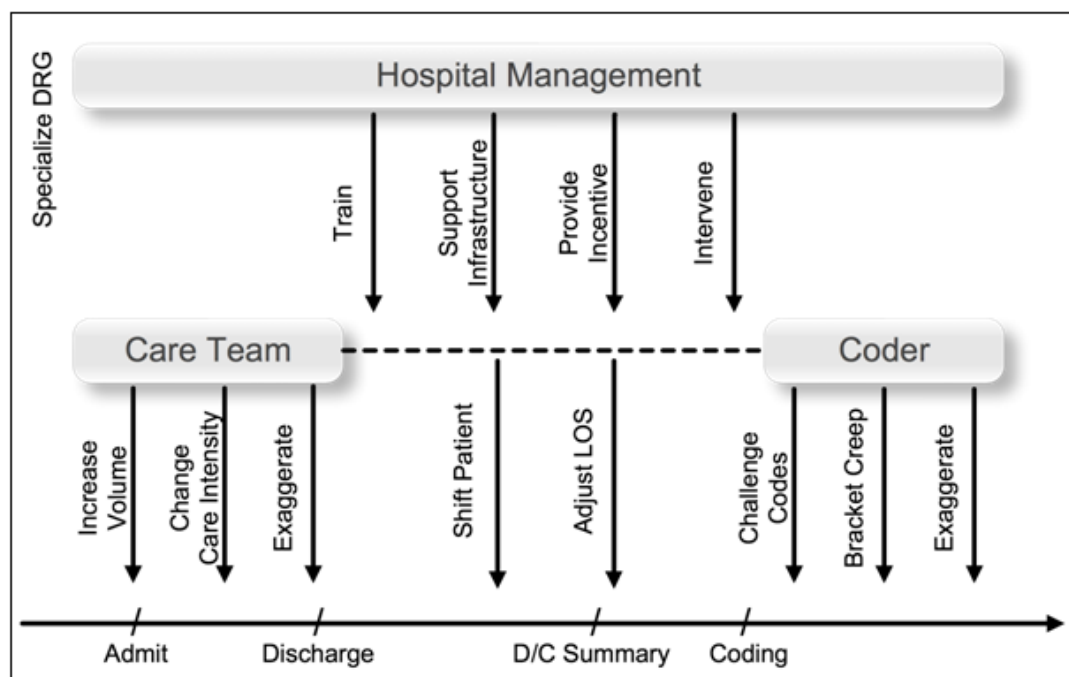


Figure 1. Hospital manipulations of DRG-based inpatient reimbursement

Corporate practice

This category includes all activities that are not directly related to patient care. Here, possible manipulations of the DRG system are focused on hospital management, administration, or finance and are therefore are the responsibility of the executive board or hospital director.

“Many hospitals have already begun to change not only the way they do business but also the business they do” [16]. Hospitals are likely to specialize at what they do best and most cost-effectively [16]. Dranove argued that “profit-maximizing hospitals will produce those DRGs for which the reimbursement rate exceeds their costs” [17]. Farley and Hogen empirically tested this and found that hospitals specialized in some DRGs to reduce costs [18].

The hospital management may also provide training and/or infrastructure support to its clinical and coding practice, especially in response to negative audit results. In 1980, at least 20% of patients at the Johns Hopkins Hospital were found to have had permanent pacemakers inserted unnecessarily, based on the Health Services Cost Review Commission (HSCRC) data. However, the hospital conducted their own follow-up review and found that “improper coding, incorrect ordering of procedures and diagnoses, and transcription errors, coupled with an inability or failure to describe our patients adequately, caused problems for the group analyzing the HSCRC data.” As a consequence, the hospital management decided to add more computer terminals to allow physicians to access reference material when completing the discharge data sheet and to help medical record coders during diagnostic and procedure coding [19]. Another hospital decided to implement an intranet-based database and personal digital assistants (PDAs) to improve the process of recording charges of nonoperative services, because some pediatric surgeons believed that the reimbursement provided for such care is negligible [20].

Providing some forms of incentive to either physicians or coders is another way that hospital management might manipulate the DRG system. A few studies proposed that significant incentives for hospitals exist [21, 22]. The extent to which such incentives affected the quality of care, however, is not as well understood [14]. Incentives to physicians may be in the form of equity ownership [23] or paid vacations for physicians and their families [24]. Some hospitals may allow their physicians to share in savings

resulting from their DRG decisions or other kinds of monetary incentive plans [16].

The management of some hospitals may decide to intervene in clinical and/or coding practice to some extent, especially when the practices do not financially correspond with what the hospital management wants to see. In case of upcoding (discussed later), “it requires not simply administrators who direct coders to target profitable DRGs, but also physicians responsible for filling in the medical charts with the critical clinical information (whether included or excluded) that can be used to claim the more generous DRG” [14].

Instead of making direct requests to clinical staff, hospital management may analyze clinical practice patterns in order to improve decisions relating to the cost-effectiveness and quality of care delivered to patients in the hospital [25]. This has actually been considered as a new kind of business in the form of development of computerized systems for analyzing physicians’ practice patterns. “These analyses are so sophisticated they can tell a hospital which physician is going to turn the hospital a profit (or loss) by his practice patterns” [16]. Some systems are so precise that they can show how dramatically the hospital costs can vary depending on some variables such as the amount of antibiotics used and whether surgery is done in the morning or afternoon [16].

The management of some hospitals may decide to ask for cooperation from hospital staff. A US national survey, conducted in 1998 to assess if health information managers are influenced by superiors to manipulate coding and classification of patient data, found that “a total of 43.5 percent of respondents indicated that senior management sought to promote coding optimization often or sometimes” [26].

Another hospital case study demonstrates a good example of how hospital management might ask clinicians to do things relevant to coding practice. “We are asking physicians to get more involved in refining patient group definitions to get more closely relate to specialty practice and in developing severity of illness markers for their patients. They [physicians] will be asked to telegraph, early on, any change in practice with resource implications in either direction, e.g., use of an expensive new pacemaker, artificial hip, drugs, etc. We are working with clinical services to analyze specific patient subgroups in order to determine how current management strategies affect costs” [19].

Clinical practice

This category includes all clinical activities that are the responsibility of health care professionals, who are also influenced by the DRG system [27, 28].

We propose that clinical manipulations can be classified into three groups: increasing admission volume, changing intensity of care, and exaggeration of patient clinical conditions. The first two categories were similar to what Dafny described as ‘real responses’ of hospitals to price changes, whereas ‘nominal response’ referred to hospital coding practice as discussed in the next section [29]. Because Dafny’s classification did not capture the phenomenon where clinical staff intentionally make patient conditions look more complicated in the medical record than they actually were, the third category is added.

When the DRG system was launched, it was believed that hospitals could game the system by increasing admissions and readmissions [30]. A number of studies attempted to confirm such phenomenon and found that hospitals actually did not increase the volume of patients [3, 29, 31-35].

The hospital, may instead, try to alter the intensity of patient care, which is usually measured by total costs, length of stay (LOS), number of surgical procedures, number of intensive care-unit days, and/or death rates [29]. When different treatments are available for a particular diagnosis, the type of treatment provided is determined by the care team acting as the agent for the patient [36]. For example, Greenberg et al. found that hospitals have no economic incentive to adopt new technology as benefits occur only to society [37]. When medical and surgical approaches are equivalently beneficial, a surgical option may be chosen because of higher reimbursements [38]. Hospitals may eliminate some services or stop treating certain conditions [30, 39], dump high-cost patients [40], shift from inpatient care to ambulatory care for high-risk procedures [41], take some complication-prone short cuts [41], use fewer staff to complete ancillary services [42], or effect premature discharges from the hospital [41]. It is obvious that changing care intensity is a way for hospital to manipulate DRG system.

In a survey of 1,124 US physicians in 1998, to determine how many physicians use the three tactics (exaggerating the severity of patients’ conditions, changing patients’ billing diagnoses, and reporting signs or symptoms that patients did not have) to manipulate reimbursement rules, Wynia et al. found that 39%

reported using at least one out of the three tactics sometimes or more often in the preceding year [43].

Increasing length of stay seems to be easily manipulated; however, it has been unclear if increasing or decreasing length of stay is better for the hospital providers. On the one hand, it was speculated that hospitals had every incentive to increase length of stay [33]. “The longer they could encourage patients to stay, the higher their profits, and the more willing third party payers were to extend themselves to pay” [44]. Gilman found that the length of stay increased in procedure-based DRGs [45]. On the other hand, some believe that hospitals are feeling intense pressure to get patients out of high-cost hospital beds as soon as they can [16], even if it might be premature [41]. There was a legal case in which a jury awarded \$500,000 to a patient whose leg had to be amputated as a consequence of premature discharge by a hospital utilization review nurse [16]. Sloan et al. showed an increased rate of discharges to longterm care facilities across all DRGs [46]. This belief has been supported by more recent studies [29, 47]. For example, a DRG experiment in Shanghai, China suggested that the DRG system induced physicians to decrease length of stay instead of inpatient expenditure [47].

Shifting patients into the alternate health care field is a means to reduce length of stay [3, 28, 41]. Newhouse found some evidence that private hospitals succeeded in shifting patients in unprofitable DRGs to public hospitals [48]. Likewise, Sheingold reported that less severely ill patients were treated in outpatient facilities because outpatient care did not fall under DRG payment system [49].

Coding practice

Like the Corporate Practice, the category of Coding Practice includes all activities that do not directly relate to patient care. This kind of possible manipulation of the DRG system focuses on documentation and responsibilities common to the hospital coder. This category is similar to what Dafny referred to as “nominal change” [29].

Coding manipulation practice is usually referred to as upcoding, overcoding, miscoding, coding optimization, coding practice change, or code manipulation in the literature. Upcoding was defined as “the practice of miscoding and misclassifying patient data to receive higher reimbursements for services provided” [26] or “switching patients from lower-paying DRGs into higher-paying DRGs” [29]. This

definition makes a clear distinction that upcoding is just one form of DRG creep. However, it is not uncommon to see some authors conflate the term upcoding and DRG creep [13].

Given that chart review by an external auditor is a criterion standard [29, 50], upcoding happens when a presumptive diagnosis is used despite no documentation that the patient actually has the disease, so long as the physician is willing to go along with the diagnosis [14]. It was therefore suggested that the purpose of the DRG system to control costs might fail because of a hospital's incentive to upcode [29, 35]. Reports from various countries showed different extents of upcoding. Upcoding was estimated in roughly up to 1% of the payments for inpatient care in Germany [51]. In Australia, a coding audit on 1995–1996 data revealed that 5.2% and 6.5% of the records that were audited were upcoded and under-coded, respectively [52].

In the USA, Carter et al. reported that one-third and one-half of the case-mix increase was attributable to upcoding in 1986–87 and 1987–88, respectively [53, 54]. Likewise, Psaty et al. estimated that upcoding contributed to over one-third of admissions assigned to the heart failure DRG and that upcoding just for cardiovascular disease accounted for nearly US\$ 1 billion in additional annual Medicare costs [13]. Dafny analyzed Medicare data in 2003 to see hospitals' responses to price change and found that upcoding was associated with as much as \$330–\$425 million in extra reimbursement annually [29]. Approximately 25% of not-for-profit hospitals and 32% of for-profit hospitals practice upcoding [14]. "The inherent uncertainty in diagnosis provided fertile ground for consultants advising hospitals on how to maximize Medicare billing" [14].

In their comparative analysis of American, Australian, and Dutch case-mix systems, Steinbusch et al. suggested that upcoding is influenced by (1) market characteristics (for-profit ownership, hospital size, and financial situation), (2) control system characteristics (internal and external control mechanisms), and (3) case-mix system characteristics (ambiguity of classification criteria, point in time of initial registration, incentive of the medical coder, and possibility to change the coding after initial registration) [50].

"Classification criteria are at times ambiguous, and presuppose an ideal environment of complete, accurate, and legible supporting documentation, which

gives rise to the correct choice of a given classification code. Beyond this uncertainty, however, lies a far greater culture of strategic, reimbursement-based data manipulation. Practices inherent in such a culture may operate in combination, magnifying the overall level of error within any defined dataset or system" [26].

We propose that upcoding can be categorized into three groups. First, instead of coding exactly based on the information provided by a responsible physician, a hospital coder may try to 'challenge code' by exploring the discharge summary to come up with the best possible codes. This can also be assisted by computer software [16]. Whether or not this is upcoding depends on the quality of discharge summary. Code challenging can be done by switching between the primary and secondary diagnosis [50, 55]. Hospitals may claim that re-sequencing is essential to overcome under-reimbursement from physician mis-specification of the narrative diagnosis [56]. This type of coding manipulation can happen only if the coding process starts after patient discharge in the American and Australian DRG systems, for example, as compared with the Dutch case-mix system, in which the code can be modified during the care process [50]. Second, a hospital coder may go beyond the discharge summary and look for reimbursable conditions in the medical records. This is called DRG bracket creep, which is considered as a 'benign' form of upcoding [14]. The most extreme coding manipulation is exaggeration of codes by hospital coders without supportive evidence in the medical record. The patient condition can look more complicated simply by adding more secondary diagnosis [50, 55]. Serden demonstrated that hospitals with a DRG-based prospective payment system had been coding more secondary diagnoses than hospitals without a prospective payment system [55]. In cardiovascular patients, for example, adding heart failure as a complication to common conditions such as AMI, pneumonia, or GI hemorrhage increased the reimbursement to hospital by \$3,096.39 on average [13].

Interestingly, some studies found that downcoding is as likely as upcoding [56]. Hospital providers may downcode to reduce potential inquiries [57]. Another reason to downcode can be seen in a number of specialties. For example, some pediatric surgeons elected to stop billing for non-operative care, believing that it was not worth their effort [20].

Discussion

There has not been much literature that explicitly discusses how hospitals can manipulate the DRG system. Based on our conceptual model and the findings from this systematic review, we propose that DRG creep can be practiced by hospitals in three different approaches as presented above. While the literature usually focuses on upcoding, it is just one part of DRG creep as defined by Simborg [12].

Although our review can identify all possible ways that a hospital can manipulate the DRG system, the finding is inadequate to explain ‘why’ they would want to do so. Our attempt to explore this issue was done using a qualitative case study [15]. We found that the coding practice can be affected by some factors beyond a hospital’s control. For example, the internal dynamics among the three main factors from different disciplines with different interests in an organization is not easily predicted.

The DRG system also has its check-and-balance mechanism (**Figure 2**). The audit mechanism has been in place to monitor the accuracy of the submitted codes, which can lead to a drop in improper payments for certain types of patients and hospitals [58]. Auditors can be unreliable and make even more mistakes than the hospital [51, 59], but this problem is counter-balanced by an appeal mechanism. With the existence of various forms of incentives, hospital management does still not have full control over clinicians or coders because they also have to adhere to their professional

standard. Boadway et al. suggested that the incentive to provide more intensive treatments is driven by a doctor’s desire to increase the patient’s benefit irrespective of cost consideration [60]. The balance of power between the administrative and clinical staff also exists as discussed by Silverman and Skinner, “For upcoding to occur, administrators must be willing to engage in ex ante risky but potentially profitable behavior, and physicians must acquiesce by approving (and until 1995, signing) the DRG claims submitted by the hospital to Medicare” [14].

Each of the methods of manipulation presented in **Figure 1** can differ by not only a hospital’s capacity [15], but also a hospital’s intention. The DRG literature usually considers a hospital as a unit of analysis and attempts to use various indirect economic or outcome measures to make inference about hospital’s intention. Economic analysis usually assumes that the management take full responsibility of the hospital so the hospital’s intention can be assessed from the management team. Those who limit the scope of DRG creep to only upcoding usually suggest that the hospital coder should be accountable for the coding errors found during any audit, whereas clinicians usually express negative concern about the DRG system or argue that their clinical practice should not be financially influenced. More direct measures for coding practice that can reflect hospital intention is essential and warrants further research.

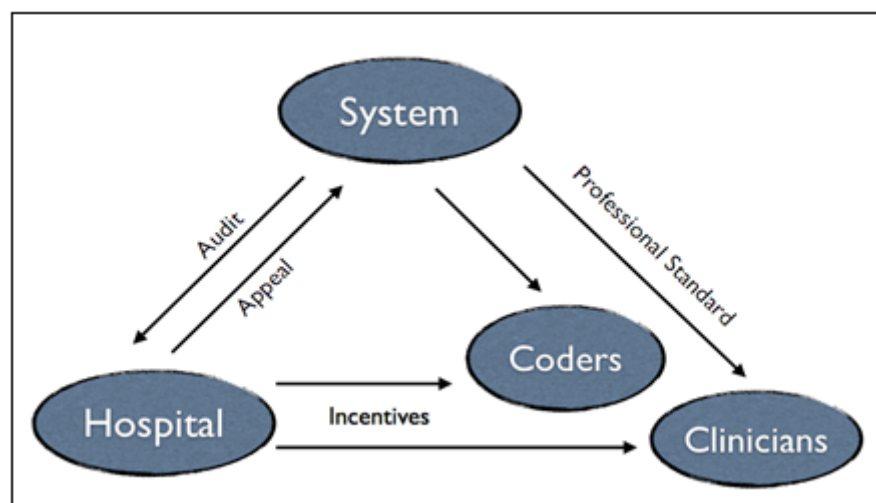


Figure 2. Check and balance across three levels

Despite a robust systematic scoping review methodology that aimed to include all relevant literature, it is still not possible to identify all hospital manipulations. The literature databases included in this study may not cover other business or technological oriented strategies that hospital may be able to apply. Language for publication is another important limitation as seen from the larger number of articles included in EMBASE, which contains more non-English language articles, as compared with Medline.

Conclusions

Hospital manipulations of the DRG system can be categorized into three groups: corporate, clinical, and coding practices. Corporate includes all activities not directly related to patient care; possible manipulations are focused on hospital management, administration, or finance and therefore are the responsibility of the executive board or hospital director. Clinical manipulation deals with activities in the care process and are the responsibility of health care professionals. The last group covers the conventional definition of DRG creep that focuses on documentation and coding.

Hospital managers who deal with the DRG payment system should be aware that DRG creep is not merely about upcoding. The DRG system can be manipulated by hospitals in three different approaches, the so-called "3C": corporate, clinical, and coding practices.

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