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Evolution of DRGs and Clinical Information Systems

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In 1983, Medicare (the public insurance system for the elderly) in the US began paying for hospital care for its beneficiaries based on prospective payment amounts for each DRG. As the DRGs became widely used numerous suggestions for improvements in the DRG definitions were proposed by the hospital industry. In response to the concerns of the hospital industry, the Healthcare Financing Administration (HCFA) in 1985 began to provide annual updates to the DRG definitions. Version 2.0 of the DRGs was used in 1983 and Version 6.0 of the DRGs was effective in October of 1988. Some of the changes to the DRG definitions included the elimination of the use of age 70, the modification of the complication and comorbidity list to be specific to the patient's principal diagnosis, and the creation of seven new DRGs. In 1986, HCFA also began to modify the International Classification of Diseases (ICD-9-CM) disease and procedure coding system. For example, new disease codes for Acquired Immune Syndrome were added in 1987. The annual DRG update process also includes the addition of the ICD-9-CM modifications to the DRG definitions.

All changes to the DRG definitions by HCFA have focused exclusively on the elderly population. Thus, any limitations of the DRGs for a non Medicare population have not been addressed. In order to address the limitations of the HCFA DRGs, several alternative definitions to the HCFA DRGs have been developed.

The state of New York has developed a modification of DRG definitions to address problems with non Medicare patients. The New York DRGs created a new Major Diagnostic Category (MDC) for HIV infection patients, a new MDC for multiple trauma patients, restructured the newborn MDC based on birth weight, restructured the drug and alcohol abuse MDC, modified the DRGs for cystic fibrosis patients and created numerous new DRGs for liver transplants and bone-marrow transplants. The New York DRGs are used in the prospective payment systems in the states of New York and New Jersey.

The National Association of Childrens Hospitals and Related Institutions (NACHRI) has created a modification of the HCFA DRGs designed for hospitals treating large numbers of pediatric patients. The NACHRI modifications added approximately 100 additional DRGs to the HCFA DRGs.

Both the New York and NACHRI DRG definitions are updated annually and include all the HCFA DRG modifications. HSI has developed and distributes all versions of the HCFA, New York and NACHRI DRG software.

Severity Adjusted DRGs

None of the current DRG definitions explicitly account for a patient's severity of illness. The concept of severity of illness refers to the extensiveness and interaction among a patient's diseases. For example, a pneumonia patient with a WBC of 12/cu mm, a fever of 101 °F, dyspnea on exertion and minimal infiltrate or consolidation on the chest x-ray, is not as severely ill as a pneumonia patient with a WBC of 30/cu mm, a fever of 104 °F, dyspnea at rest and infiltrate and consolidation in three lobes.

HSI is currently evaluating two alternative methods of incorporating a measure of patient severity into the DRGs. Yale University has recently completed a project to refine the complication and comorbidity list. The complication and comorbidity list is divided into three subgroups for medical patients (catastrophic, moderate and minor) and four subgroups for surgical patients (catastrophic, major, moderate and minor). The subgroups within the complication and comorbidity list are specific to each DRG. Overall, a patient is assigned to the subgroup associated with the most severe secondary diagnosis. In general, the use of hospital resources will increase for patients assigned to a higher severity complication and comorbidity subgroup.

The second method of incorporating severity into the DRG being evaluated by HSI involves the Computerized Severity Index (CSI) developed by Dr. Susan Horn of Johns Hopkins University. CSI uses a patient's physiological characteristics such as laboratory test results (eg WBC, blood gasses, etc), vital signs (eg temperature, fever, etc), and history and physical (eg presence of dyspnea at rest, etc), to compute a patient's severity level. The severity of a patient is measured on a 1–4 scale (mild, moderate, severe, life threatening).

In addition to the patients physiological characteristics, the presence of significant related complications or comorbidities would also increase a patient's severity level. Thus, a pneumonia patient with a secondary diagnosis of a broken finger is not as severe overall as a pneumonia patient with a secondary diagnosis of congestive heart failure. The patient's severity can be

computed at several times during a patient's stay. The most times at which severity is collected are at admission and discharge, along with the maximum severity achieved during the stay.
Severity scores are not a replacement for DRGs but can be used in the DRG definitions to improve the accuracy of the DRGs. The most direct method of integrating severity into the DRGs would be to count a secondary diagnosis as a complication or comorbidity only if it had a high severity. This would require the severity system to assign a severity score for each diagnosis. Thus, a severity system such as CSI, which assigns a severity level to each diagnosis can be directly integrated into the DRGs. An alternative method of integrating severity into DRGs would be to replace the existing complications and comorbidity splits in the DRGs with splits based on the patient overall severity score. In order for this approach to be feasible, the computation of the overall severity must explicitly take into account the effect of a patient's complications and comorbidities. Both of the above approaches would create a system of severity adjusted DRG with only a modest increase in the number of DRGs.
The Yale complication and comorbidity refinements and CSI are both available from HSI. Preliminary evaluation of both CSI and the refined complication and comorbidity subgroups have shown that a significant improvement in the ability of DRGs to predict hospital costs can be achieved.

Data Quality

DRG assignment is based on the coding of information contained in the medical record. Inaccurate coding or missing information or incorrect information in the medical record can lead to the wrong DRG being assigned. Any country using the DRGs as a basis of budgeting, payment, management or quality assessment must insure that the data used is accurate. HSI has developed a comprehensive set of clinical edits called the Clinical Data Editor (CDE). The CDE will detect inconsistencies in patient abstract data such as age/sex and diagnosis conflicts as well as very subtle clinical inconsistencies such as conflicts between procedures and diagnoses or conflicts between principal and secondary diagnoses. Typically between 15 and 20% of abstracted medical records data contains significant clinical inconsistencies. A limited version of the CDE is used by HCFA prior to accepting hospital claims and the full CDE is used by more than 2000 hospitals in the US.

Utilization Review and Quality Assurance

The incentives inherent in any DRG based budgeting or payment system will reward hospitals for becoming more efficient and effective. A comprehensive utilization review and quality assurance program is essential for a hospital to be able to improve efficiency and effectiveness of care.
One approach to the evaluation of hospital quality is through the development of clinical indicators. Clinical indicators are not direct measures of hospital quality, but are flags that identify events that have a significant probability of being associated with an adverse patient outcome. Thus, when a clinical indicator occurs, additional review of the case by the hospital's quality assurance department is necessary. Clinical indicators can be generic or specific to individual departments or specialties. Some examples of clinical indicators are:
- Complications resulting from medication errors
- Discrepancies between pre-op diagnosis and pathology report
- Drug interactions
- Hyaline membrane disease after elective C-section

Hospitals need to establish a systematic program for identifying and evaluating the occurrence of clinical indicators. In order for a hospital to have an effective quality assurance program, the evaluation or reason for the occurrence of a clinical indicator is an essential part of the process. For example, when a clinical indicator is identified, the hospital should record the following information:
- Identification of the clinical indicator
- The date the clinical indicator occurred
- Where the clinical indicator occurred (ie location)
- Who was responsible for assessing whether the clinical indicator was the result of poor quality
- A yes/no judgment of whether the clinical indicator was the result of poor quality

If the occurrence of the clinical indicator was the result of poor quality, then the following additional information should be recorded:
- The actual impact of the patient (eg major permanent adverse effect, death, etc)
- The potential impact on the patient
- The cause of the quality problem (eg performance, delay, physical plant, etc)
- The party responsible for the quality problem
- The action taken to correct the quality problem (eg education, supervision, change policy, etc)
- Indication of whether follow-up was performed

As an example, consider an elderly male patient admitted for a cholecystectomy who, post-op, goes into urinary retention due to benign prostatic hypertrophy and requires a transurethral resection of the prostate. The patient would have the clinical indicator for an unplanned return to surgery within the same admission. The quality assessment would conclude that the return to surgery was unavoidable and the care met accepted standards. On the other hand, if the wrong dosage of heparin was administered by a nurse to a phlebitis patient, then the quality assessment would be that there was a quality problem which potentially could have had a major permanent adverse effect on the patient. The actual impact would be recorded with an indication that the cause of the problem was performance by the nurse and that the action

taken was, for example, education. By recording the above information, a systematic quality assessment process for the hospital is established.

The availability of a severity measure can also improve the quality assurance process. The value of a severity adjustment is that patients in the same severity level for similar diagnoses should be expected to achieve similar outcomes. Thus, using severity adjusted data from a group of hospitals, the expected rate of certain outcomes such as death, readmissions, complications and infections can be computed. For an individual hospital, the expected levels based on national data can be compared to the actual outcome levels achieved by that hospital. Thus, a profile of many quality indicators for each hospital can be computed. The more quality indicators collected, the more confident one can be of the judgment of the relative level of quality of a hospital. Quality of care can also be monitored from a study of changes in severity levels during the hospitalization. Comparison of the admission severity level to the maximum severity level can provide an indicator of the unexpected events. HSI provides a completely integrated utilization review and quality assurance system. This system is also fully integrated with HSIs DRG, Severity and CDE software.

Summary

DRG definitions have evolved during the past decade and will continue to evolve as methods for evaluating severity data become available. The use of DRGs for hospital budgeting, payment and evaluation as well as the support of hospital utilization review and quality assurance activities requires that systems be available to insure data quality. A comprehensive and flexible clinical information system will be required by hospitals in order to manage under a DRG system.

Résumé

Evolution des DRG et systèmes d'information clinique

Les DRG évoluent constamment depuis une décennie pour améliorer leur performance descriptive, en particulier la prise en compte de la complexité et de la sévérité du cas. Les DRG constituent un système d'information clinique à la fois exhaustif et flexible, permettant de budgéter, financer et évaluer l'activité hospitalière. Ces objectifs nécessitent aussi une amélioration de la qualité des données.

Zusammenfassung

Die Entwicklung der DRGs und klinischer Informationssysteme

DRG-Definitionen haben sich im letzten Jahrzehnt entwickelt und werden weiteren Aufschwung erleben, wenn Daten zur Beurteilung der Schwere der Fälle zur Verfügung stehen. Der Gebrauch von DRGs für Spitalbudgetierung, Rechnung und Evaluation erfordert, dass Systeme zur Verfügung stehen, welche Datenqualität sicherstellen und Spitalbelegungsstatistiken und Qualitätskontrolle unterstützen. Ein umfassendes und flexibles klinisches Informationssystem ist aber Voraussetzung, um Spitäler mit Hilfe des DRG-Systems zu führen.

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