Procedure codes: Potential modifiers of diagnosis-related groups

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Proposals to make complexity-of-illness adjustments to the diagnosis-related group system have relied on secondary diagnosis codes and additional clinical information obtained from the hospital record. Another potential mechanism for modifying diagnosis-related groups involves the use of non-operating room procedure codes. The use of these codes has the advantage of reliably identifying costly subgroups of patients and thus the potential to provide for fairer compensation to hospitals caring for the sickest patients. There are a number of disadvantages, however, and therefore the criteria with which to evaluate procedures as potential modifiers are suggested.

Introduction

Diagnosis-related groups (DRGs) have been criticized as not adequately accounting for severity of illness (Jencks et al., 1984). Because sicker patients tend to be concentrated in certain hospitals, particularly referral centers and inner city hospitals, and because the Health Care Financing Administration (HCFA) reimburses hospitals based on the average cost of a DRG, it is argued that a maldistribution of payments results. It was in recognition of this fact that Congress provided adjustments for the indirect costs of medical education and, later, for hospitals caring for a disproportionate share of the medically indigent (*Federal Register*, 1986).

The current version of DRGs used for HCFA's prospective payment system (PPS) deals with the severity issue by identifying a long list of complications and comorbidities (CCs) that are thought to be associated with a more complex and costly hospital course and are used to subdivide many of the groups of diagnoses into DRGs. The CC list is quite long (almost 3,000 diagnosis codes) and, with some exceptions, applies throughout the DRG system. Therefore, in the places where it is used, the presence of any one diagnosis from the CC list qualifies a patient for a higher cost DRG.

The CC list has been thought to make inadequate allowance for complexity of illness for a number of reasons:

- The comorbidities and complications are not specific to a DRG, or even to the organ system to which the DRG applies.[1]
- All the diagnoses on the CC list have, in effect, equal weight, despite a wide range in severity of illness.
- The CC list not only contains a number of relatively trivial diagnoses, but also omits some important comorbidities.
- Diagnosis codes often lack sufficient descriptive power to separate out high-cost groups of patients, and therefore the use of secondary diagnoses to make severity adjustments many be severely limited.

These criticisms have naturally led to a number of suggestions as to how best to modify the DRG system. Some have suggested that the DRG system be discarded altogether (Young, 1984), but this seems unlikely to happen in the near future. Others have proposed using clinical data abstracted from the hospital chart—such as blood urea nitrogen (BUN), hematocrit, or number of units of blood transfused, among others—to make severity adjustments to the current DRGs (Horn, 1986; Brewster et al., 1985). Still others have suggested that the DRG system could be modified by making DRG-specific or organ-system-specific CC lists, and by making gradations of severity among the diagnoses on the CC list (SysteMetrics, 1984; Horn, 1986). (For example, a patient with a secondary diagnosis of acute renal failure would be expected to have greater resource use during a hospitalization for pneumonia than would a patient with a secondary diagnosis of chronic renal failure.) Finally, we have reported that for respiratory disease DRGs, procedure codes for temporary tracheostomy, mechanical ventilation, and endotracheal intubation serve as markers of more complicated illness and more costly admissions. These findings, reported elsewhere (Hughes, 1989), prompted the creation of two new high-cost DRGs in the respiratory diseases major diagnostic category (MDC 4), effective October 1987: one for patients with temporary tracheostomy, another for patients with endotracheal intubation or mechanical ventilation (*Federal Register*, 1987).

There are a number of other procedures (called "non-OR" procedures because they are not routinely done in an operating room) that are also associated with higher cost admissions. Could they also be used to improve the DRG system? The purpose of this article is to examine that question by outlining the advantages and disadvantages of the use of non-OR procedures as modifiers of medical DRGs, to develop criteria for when and how they should be used, and to examine several potential procedures that could be developed as DRG modifiers.

[1] Effective October 1, 1987, a number of DRG-specific CC list changes were made, the principal effect of which was to minimize the possibility of financial reward for redundant or obviously inaccurate coding (*Federal Register*, 1987).

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Methods

The analyses presented in this article are part of a project by the Yale Health Systems Management Group to revise DRGs to account for differences in complexity of illness (Freeman, 1989). The examples presented here are derived from Maryland hospital discharge data for fiscal year 1984, obtained from the Maryland Health Services Cost Review Commission (HSCRC). Maryland uses a mandatory statewide hospital payment system in which annual budgets are determined in part by the pattern of admissions categorized by DRG and in part on the basis of previous budgets and capital expenditures.

During fiscal year 1984, Maryland was one of three States allowed an exemption from PPS because of an existing "all-payer" system. Although incentives existed to maximize the coding of discharge diagnoses in the Maryland system, they were perhaps not as great as those in other States where hospital reimbursement was directly dependent on DRG assignments.

The Maryland HSCRC data set for fiscal year 1984 contained 514,066 records, of which 182 were eliminated because of invalid charge data, and 11,377 were eliminated because of invalid length-of-stay (LOS) coding. We removed an additional 113,336 records of patients who were under 18 years of age, leaving a total of 389,171 records of adult patients for analysis. The analyses reported in this article were confined to 49,700 records in selected DRGs in MDC 4 (respiratory diseases) and MDC 5 (cardiovascular diseases). (Not all of the DRG analyses are presented.)

In the examples to be presented, we examined the association of various secondary diagnoses and non-OR procedures with LOS and total hospital charges within selected DRGs, after excluding LOS outliers (by Medicare criteria). We used raw total hospital charges for these analyses; earlier analyses had shown correlation coefficients of greater than 0.95 between total and adjusted hospital charges for the Maryland data set (Freeman, 1989). We developed descriptive statistics and performed analysis of variance (ANOVA), using the Statistical Analysis System (Statistical Analysis System Institute, 1985).

Advantages

Utility

The most important advantage of using non-OR procedures to subdivide medical DRGs is that these procedures can often identify distinct groups of high-cost patients. In Table 1, several examples are shown of procedure codes that occur in patient records with principal diagnoses in DRG 89, simple pneumonia and pleurisy; DRG 121, acute myocardial infarction (MI) with complications; or DRG 127, congestive heart failure. In each case, the procedure codes identify groups of patients with substantially higher costs and lengths of stay, because they tend to occur in patients with more complicated illness. The flow-directed pulmonary artery (PA) catheter is used in patients with a combination of acute heart failure and hypotension, frequently after an acute MI; temporary pacemakers are inserted in patients with life-threatening cardiac conduction disturbances (again, usually following an acute MI); endotracheal intubation and mechanical respiratory assistance (combined in this analysis because of their similar clinical implications and financial impact) suggest severe respiratory decompensation requiring ventilatory support.

It is not enough to demonstrate that the non-OR procedure code identifies a high-cost group of patients, however. The procedure codes are most useful in circumstances in which high-cost patients cannot be identified by a secondary diagnosis code or a combination of secondary diagnosis codes. Two procedure codes that appear in DRG 82 (respiratory neoplasms), DRG 89

Table 1

Effect on length of stay and charges of selected non-operating room procedures for patients[1] with pneumonia, acute myocardial infarction, or congestive heart failure

Patient DRG and procedure performed	Number	Length of stay in days		Charges		
		Mean	Standard deviation	Mean	Standard deviation	R^2
DRG 89—Pneumonia						
All patients	5,329	9.27	5.12	$3,723	2,896	—
Intubation or mechanical respiratory assistance	54	9.74	6.43	8,661	6,597	.030
Chest tube insertion	21	14.14	6.06	7,236	4,467	.006
Thoracentesis	169	12.59	5.45	6,364	4,658	.027
DRG 121—Acute myocardial infarction						
All patients	2,814	12.63	5.22	5,847	3,068	—
Intubation or mechanical respiratory assistance	50	14.24	4.95	7,696	3,110	.007
Temporary pacemaker insertion	121	14.24	5.56	7,964	4,185	.021
Pulmonary artery catheter insertion	135	13.94	6.77	9,029	4,237	.054
DRG 127—Congestive heart failure						
All patients	9,978	8.72	4.89	3,320	2,367	—
Intubation or mechanical respiratory assistance	108	9.48	5.65	6,676	4,175	.022
Temporary pacemaker insertion	37	10.16	6.35	7,391	4,268	.011
Pulmonary artery catheter insertion	182	10.62	6.02	8,065	4,408	.075

[1] Length of stay outliers removed.

NOTES: DRG is diagnosis-related group. R^2 value is generated by partition of DRG into groups with and without procedure.

SOURCE: Health Systems Management Group: Yale University School of Organization and Management, New Haven, Connecticut, 1989.

Table 2

A comparison of the effect on length of stay and charges of procedure codes for thoracentesis or chest tube insertion with a secondary diagnosis of pleural effusion[1]

Patient DRG and procedure performed	Number	Length of stay in days		Charges		
		Mean	Standard deviation	Mean	Standard deviation	R^2
DRG 82—Neoplasm						
All patients	3,336	8.27	5.67	$3,279	2,519	—
Pleural effusion diagnosis	127	9.42	5.03	3,667	2,350	.0009
Thoracentesis	334	9.84	5.72	3,935	2,669	.008
Chest tube insertion	134	11.60	5.60	4,559	2,751	.011
DRG 89—Pneumonia						
All patients	5,329	9.27	5.12	3,723	2,896	—
Pleural effusion diagnosis	266	11.04	5.58	4,693	3,076	.006
Thoracentesis	169	12.59	5.45	6,364	4,658	.027
Chest tube insertion	21	14.14	6.06	7,236	4,468	.006
DRG 127—Congestive heart failure						
All patients	9,978	8.72	4.89	3,320	2,367	—
Pleural effusion diagnosis	698	10.51	5.05	3,798	2,564	.003
Thoracentesis	280	12.09	5.71	5,132	3,408	.017
Chest tube insertion	15	13.87	5.74	11,821	5,756	.019

[1]Length of stay outliers removed.

NOTES: DRG is diagnosis-related group. R^2 value is generated by partition of DRG into groups with and without procedure or diagnosis.

SOURCE: Health Systems Management Group: Yale University School of Organization and Management, New Haven, Connecticut, 1989.

(simple pneumonia and pleurisy), and DRG 127 (congestive heart failure) illustrate this point (Table 2). In these DRGs, patients with a secondary diagnosis of pleural effusion (a collection of fluid in the chest cavity resulting from infection, malignancy, or heart failure) have higher costs than the average patient in the DRG. However, the group of patients who had a thoracentesis (in which a catheter is inserted into the chest cavity to remove some of the fluid) had dramatically higher mean charges than did the group with a secondary diagnosis of pleural effusion only. A smaller group of patients in whom chest tube insertion was performed had even higher costs. (Patients with either of these procedures may not have also carried a secondary diagnosis of pleural effusion because of incomplete coding.)

These differences most likely result from the fact that a diagnosis of pleural effusion can represent a wide range of clinical entities, from a relatively small pleural effusion that resolves promptly, to a much larger effusion that takes much longer to clear. Thoracentesis was performed in the sickest patients with the largest effusions, greatest diagnostic uncertainty, and most complicated hospital courses. A chest tube would have been inserted only in even more extreme situations, for example, when a patient had a collapsed lung, or a collection of pus (empyema) adjacent to the lung and requiring drainage. In these situations, the procedures have identified groups of high-cost patients who could not be identified with a secondary diagnosis code alone. As we point out, such identification is necessary, but not at all sufficient, for accepting a procedure code as a DRG modifier.

Reliability, reproducibility, and precision

The translation of an individual patient's episode of illness into a listing of primary and secondary diagnosis codes for the purposes of categorization into a DRG involves several steps, each of which provides an opportunity for error or variability. It is therefore possible for patients whose episodes of illness are exactly the same to be classified differently because of this inherent variability.

The first step, assigning labels (diagnoses) to the episode, can be inconsistent for several reasons. First, many diagnosis codes in the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) system (Public Health Service and Health Care Financing Administration, 1980) are imprecise because there are no clearly stated or uniformly accepted criteria. Second, even if there are clearly outlined and generally accepted criteria, physicians can vary widely in their interpretation of the criteria (or may reject the criteria out of hand based on their own training, habit, and/or experience). Third, even when physicians agree on criteria and their interpretation, reproducibility can be affected by intra- and inter-observer variability.

In the second step, the diagnoses must be recorded on the discharge abstract. Having decided to assign a particular diagnostic label as a secondary diagnosis, the physician must then remember to record it on the list of discharge diagnoses. If the physician does not record it, a medical records abstractor may or may not then determine that the diagnostic label applies after examining the chart. Recording the secondary diagnosis is therefore dependent either on the diligence of the physician or the skill and diligence of the medical records abstractor.

In the final step, after the diagnosis is identified and abstracted, it must be assigned an ICD-9-CM code. This step is subject to simple human error and variation in coding practice but contributes much less to overall variation than do the first two.

The identification of a procedure, on the other hand, is much less subject to these vagaries of interpretation and recording. Although physicians may disagree on when a

procedure should be done, or whether it should be done at all, there can be no disagreement on whether the procedure was actually done or not. All that is necessary is that the procedure be identified (which is easier to do than reviewing pages and pages of the medical record to find evidence of a CC secondary diagnosis).

Fair compensation

The use of a non-OR procedure may be the only way to identify a group of patients for whom a hospital should receive extra compensation because of their extraordinary cost of care. Steinberg and Anderson (1987) provide an example with patients who require total parenteral nutrition (TPN). These authors point out that, unless hospitals can expect a reasonable compensation for the extra cost of a TPN service, they will be reluctant to add these types of services. The care needs of a small but severely ill group of patients would therefore be inadequately met because few hospitals could afford the financial loss.

Unbundling

Under a case-based hospital payment system, there are incentives to minimize the number of diagnostic and therapeutic procedures done in the hospital. There are no concomitant incentives to minimize procedures in the outpatient setting, because reimbursement is based on a fee-for-service model (except for prepaid group plans such as health maintenance organizations). Similarly, although PPS encourages lower costs per hospital admission, it does very little to encourage a reduction in the total number of admissions. This means that, although some procedures not considered to be absolutely necessary during the hospitalization might eventually be avoided altogether, more often the procedures will be postponed to a separate elective admission or shifted to an ambulatory surgery center. This shifting is known as "unbundling." Although reducing inpatient procedures and therefore hospital costs is a desired effect of the DRG system, the net effect of unbundling may be to actually increase total health care costs, even if hospital costs per admission are reduced.

Cystoscopy, which is performed widely among hospitalized elderly in medical DRGs, provides a useful example of unbundling. The procedure has a consistent and substantial association with additional hospital costs and LOS, as shown in Table 3. For none of the cases shown did the cystoscopy have a clear relation to the principal diagnosis for the hospitalization. Many of the patients with cystoscopies in the current data set no doubt required cystoscopy urgently during the hospitalization; it is also likely that a substantial proportion could have been candidates for an outpatient procedure after discharge. (It is also possible that some of the patients who had cystoscopy did not need a procedure at all, but this would have to be dealt with by a utilization review mechanism.)

If all the patients who were candidates for outpatient cystoscopy had avoided the inpatient procedure, then total hospital resource use and costs would have been lower. But then Medicare would have had to pay the fees for outpatient cystoscopy (or for a hospital readmission for the elective procedure), which may or may not be less than the hospital's marginal cost of doing the cystoscopy during the admission. It is therefore theoretically possible

Table 3

Effect of cystoscopy on length of stay and charges in selected diagnosis-related groups (DRGs) in major diagnostic category 4[1]

Patient DRG and procedure performed	Number	Length of stay in days		Charges	
		Mean	Standard deviation	Mean	Standard deviation
DRG 79—Respiratory infections					
All patients	1,223	11.17	6.18	$4,909	3,625
Cystoscopy	6	13.00	4.15	6,053	2,339
DRG 82—Neoplasm					
All patients	3,336	8.27	5.67	3,279	2,519
Cystoscopy	11	15.81	5.96	5,889	2,611
DRG 87—Respiratory failure					
All patients	1,600	8.68	5.29	4,411	3,449
Cystoscopy	7	12.57	6.00	6,580	5,116
DRG 88—Chronic obstructive pulmonary disease					
All patients	4,927	8.15	4.67	3,178	2,624
Cystoscopy	43	9.56	4.38	3,542	1,890
DRG 89—Pneumonia					
All patients	7,026	8.46	4.97	3,358	2,736
Cystoscopy	47	11.49	4.83	4,503	2,692
DRG 96—Asthma					
All patients	6,915	6.13	3.58	2,339	1,725
Cystoscopy	33	11.06	4.23	3,781	1,619

[1] Length of stay outliers removed.

SOURCE: Health Systems Management Group: Yale University School of Organization and Management, New Haven, Connecticut.

that an incremental Medicare payment to the hospital for inpatient cystoscopy (which would encourage the hospital to keep the patient in the hospital for cystoscopy) would have ultimately cost Medicare less than the cost of performing cystoscopy in a 1-day surgery center or the urologist's office or during a readmission to the hospital. Ideally, HCFA would want to find a level of payment that would be sufficient to not discourage inpatient cystoscopy and that would be less than the Medicare payment for outpatient cystoscopy. Whether such fine tuning is practicable remains to be seen and is yet another topic in the long list for further research. It is clear, however, that if we continue to combine a case-based hospital payment system with a fee-for-service outpatient payment system, then the effects of unbundling could be substantial. The marginal cost of an additional payment for a non-OR procedure done in the hospital could be less than that for the procedure shifted to the outpatient side.

Disadvantages

Although non-OR procedures can reliably identify homogeneous groups of patients within DRGs, the use of these codes has a number of potential disadvantages that render many, and perhaps most of them, unsuitable for a reimbursement system.

Variation

The use of secondary diagnoses for complexity-of-illness adjustments is subject to variability in interpretation and identification. Similarly, the use of non-OR procedures to make complexity adjustments is subject to variation in usage. Wennberg and others have pointed out that physicians can differ enormously in their use of procedures (Wennberg and Gittelsohn, 1982; McPherson et al., 1982). The regional variations that these authors have identified may be the result of differences in the availability of technology, the number of specialists available, and in local patterns of practice. It is difficult to identify with any certainty what the "correct" number of procedures should be, for a number of reasons. First, a lack of clinical data frequently leads to a lack of consensus about the indications for a given procedure. Second, even if the data exist, practice patterns change slowly in response to new information, either because practicing physicians are unaware of it, or because they are skeptical that the new data actually apply to the patients they are treating. Third, the interpretation of existing literature, as well as the interpretation of agreed-upon indications, can vary as widely as do the interpretations of diagnostic criteria.

In addition to a lack of agreement about whether a procedure should be performed in a given situation is the question of timing: Should the procedure be done during the hospitalization, or should it be postponed, perhaps to the outpatient setting?

Perverse economic incentives

If a hospital's payment is higher when a procedure is performed, and the additional payment exceeds the hospital's marginal cost of doing the procedure, then the laws of economics and human nature dictate that the procedure may be done more often. This is particularly true if the costs of doing the procedure include only a minimal risk of harm to the patient.

It is not surprising that the presence of a non-OR procedure is frequently associated with a higher cost hospital admission. This association can occur for any of several reasons:

- The procedure itself is expensive, because it requires considerable labor, equipment, or both.
- The procedure initiates a process of care that requires more staff time and/or equipment and is therefore more costly.
- The procedure is only performed in tertiary care hospitals, which have the highest costs to begin with (which could mean that the procedure serves as a marker of a high-cost hospital, rather than of a complicated illness).
- The procedure is only performed on those patients who are the most severely ill and therefore serves as a marker or identifier for patients who require the most complicated care.

The last case, in which the procedure is uniformly associated with a certain level of complexity of care, is the crucial determinant of whether the procedure should be a DRG modifier. If a procedure only generates costs directly or reflects that the patient is being cared for in an expensive setting, and the procedure is not consistently associated with complicated illness, then it provides perverse economic incentives and would be susceptible to manipulation.

If the procedure is susceptible to manipulation but is nevertheless adopted as an adjustment factor for DRGs, it may subsequently be performed more frequently and in less severely ill patients—a form of "procedure creep" analogous to "DRG creep" (Simborg, 1981). Procedure creep will ultimately dilute the correlation of the procedure with severity of illness and complexity of care. This would be a particular problem when a consensus regarding the application of a non-OR procedure does not exist or when it has a substantial elective component.

Two of the non-OR procedures shown in Table 1, mechanical respiratory assistance and PA catheterization, illustrate this point. A PA catheter is (usually) placed only in the sickest patients with MI and/or congestive heart failure. Although the procedure itself is not particularly expensive, subsequent monitoring requires an expensive coronary care unit bed. Similarly, putting a patient on a mechanical ventilator by means of endotracheal intubation is not expensive, but the patient's subsequent care requires an intensive care unit bed and intensive monitoring. The usefulness of these two procedures for payment purposes is dependent on the uniformity of the association with complexity of illness. Although there are generally agreed-upon indications for the use of a PA catheter, in practice, its use in patients with MI and congestive heart failure varies quite widely (Gore, 1987). An additional payment for PA catheter placement could encourage additional use, which would render it inappropriate as a DRG modifier. Mechanical respiratory assistance, on the other hand, has more clearly identified and uniformly applied criteria for use and

should only minimally distort economic incentives when used to modify DRGs (Hughes, 1989).

It may be argued that physicians, who are generally still paid on a fee-for-service basis for procedures, already have a maximum incentive to perform them. Therefore, an additional incentive to the hospital should make little difference. Nonetheless, a physician's decision to do or not do a procedure is influenced by a number of factors controlled by the hospital, including the availability of equipment, procedure rooms, and technical and nursing help. Furthermore, hospitals are increasingly involved in the recruitment and employment of physicians, which could have subtle, but ultimately profound, effects on physician behavior.

If the hospital makes a technology more readily available, it will tend to be used more often (the "technological imperative"). This will be especially true if the technology provides no great risk of harm to the patient and no great risk of a malpractice claim against the doctor or hospital. (If neither the hospital nor the physician has an incentive to discourage procedures, then the number of procedures performed will likely increase.)

Discouraging innovation

In a similar fashion, a procedure-modified DRG could discourage innovation. For example, in Table 4, it can be seen that patients admitted with a diagnosis of pulmonary embolism or deep vein thrombophlebitis have somewhat higher total charges if they undergo venography (an injection of radiographic contrast material into the veins). If these patients are included in a higher paying category if they have venography, then it will be in the hospital's economic interest to maximize the number of venograms done. It would not be in the hospital's interest to establish or expand the availability of impedance plethysmography or doppler ultrasonography—both of which are lower cost, non-invasive, and potentially highly accurate tests for deep vein thrombosis. By not making either of these procedures available, or limiting their availability, the hospital selects in favor of venography.

Criteria for procedure selection

This review suggests a number of criteria that should be met before selecting a non-OR procedure for modifying medical DRGs.

- The procedure should identify a group of high-cost patients who are severely ill. This high-cost group should be one that is not easily identified by specific secondary diagnosis codes.
- The procedure should serve as a marker for severity of illness and complexity of care and should not be used only because it is expensive to perform.
- There should be consensus regarding the application and the indications for the procedure.
- There should also be consensus on the timing of the procedure, so that it cannot be bundled or unbundled in response to economic incentives.
- Finally, there should be a minimum of perverse economic incentives that would result from having an increased payment associated with the procedure. This is especially important for procedures that have minimal inconvenience, discomfort, or risk for the patient.

In Table 5, these criteria are applied to a number of non-OR procedures that we have found to be associated with substantially higher total charges within the MDCs noted. Tracheostomy, mechanical respiratory assistance, and endotracheal intubation (the latter two are combined in the second column) meet most of the criteria and have already been accepted as modifiers to MDC 4 by HCFA (*Federal Register*, 1987). These procedures also appear to be useful in a number of cardiovascular DRGs (MDC 5) and may prove useful in other MDCs as well.

Another procedure, chest tube insertion, appears to meet all the criteria when used in MDC 4 (respiratory diseases). This procedure performs particularly well in DRGs for pneumonia and pulmonary malignancies. The procedure serves as a marker for a significant pneumothorax (collapsed lung), hemothorax (blood in the chest cavity), or empyema, and therefore as a marker for severity and complexity of care. It is particularly useful in identifying patients with the most significant degree of

Table 4

Effect of venogram on length of stay and charges for patients with pulmonary embolism and deep vein thrombophlebitis[1]

Patient DRG and procedure performed	Number	Length of stay in days		Charges		
		Mean	Standard deviation	Mean	Standard deviation	R^2
DRG 78—Pulmonary embolism						
All patients	792	11.15	5.02	$4,473	2,817	—
Venogram	73	13.00	4.79	5,495	3,197	.013
DRG 128—Deep vein thrombophlebitis						
All patients	1,375	9.27	4.19	2,656	1,451	—
Venogram	377	9.75	4.60	2,937	1,748	.014

[1]Length of stay outliers removed.

NOTES: DRG is diagnosis-related group. R^2 value is generated by partition of the DRG into groups with and without venogram.

SOURCE: Health Systems Management Group: Yale University School of Organization and Management, New Haven, Connecticut, 1989.

Table 5

Selection criteria applied to several procedures' potential to modify diagnosis-related group payments in selected major diagnostic categories

Selection criteria	Tracheostomy	Intubation ventilation	Chest tube	Thoracentesis		Pulmonary artery catheter	Temporary cardiac pacemaker	Red cell transfusion	Cysto-scopy
Procedure identifies severely ill and high-cost patients	+	+	+	+	+	+	+	+	+
Consensus exists on procedure application and indications	+	+	+	+	0	±	±	±	0
Scheduling of procedure is rarely elective	+	+	+	±	±	0	±	?	0
Procedure's effect on costs not likely to be identified by diagnosis codes	+	+	+	+	±	±	?	+	+
Procedure performance has no perverse economic incentives	+	+	+	+	0	±	±	+	0
Category number of affected MDC[1]	4	4,5	4	4	5	5	5	1,4,5,6	1,4,5,6

[1]1—neurological diseases, 4—respiratory diseases, 5—cardiac diseases, 6—gastrointestinal diseases.

NOTES: + indicates criteria met. 0 indicates criteria not met. ± indicates criteria partially met. ? indicates theoretically possible, needs further evaluation.

SOURCE: Health Systems Management Group: Yale University School of Organization and Management, New Haven, Connecticut.

pneumothorax, because there is a great range in severity with this diagnosis. The indications for chest tube insertion are clear and fairly uniform, there is no great debate about its timing, it identifies a group not likely to be selected by ICD-9-CM diagnosis codes, and therefore it should not distort economic incentives.

Thoracentesis, on the other hand, may be acceptable in some DRGs, but not in others. In the DRG for congestive heart failure, for example, the association with severity and the indications for the procedure are not uniform or universally accepted. A patient with congestive heart failure and a pleural effusion could be handled legitimately in either of at least two ways: The physician could assume that the effusion was secondary to congestive heart failure, and therefore likely to resolve after treatment. Other physicians would prefer to do thoracentesis, a relatively benign procedure, early on to be sure that nothing was being missed. It would be unwise to attach an additional reward for a procedure when there are such variations in physician practice, even though it may, on the average, identify a high-cost group. In the respiratory diseases MDC, on the other hand, indications for thoracentesis tend to be more uniform. Patients who have principal diagnoses of pulmonary neoplasm, pulmonary embolism, or pneumonia, who have an associated pleural effusion, all clearly deserve a diagnostic (or perhaps therapeutic) thoracentesis.

Cystoscopy, as noted earlier in this article, can have a considerable elective component, lacks a clear consensus on indications, can be easily unbundled, and could be manipulated easily. It should not be used as a DRG modifier unless there is strong evidence that an incremental payment would actually minimize costs overall by discouraging unbundling.

Temporary pacemaker insertion has shortcomings similar to PA catheter placement: lack of consensus on indications and timing, wide variation in physician practice, and a susceptibility to manipulation. Red blood cell transfusion, on the other hand, meets most of the criteria and could prove useful as a modifier of certain DRGs. Increasing concern in recent years over the risk of transfusion reactions and the spread of infection by blood products would help discourage the excessive use of red blood cell transfusion and would therefore reduce the possibility of perverse economic incentives. Further analysis is needed to examine whether transfusion of multiple units provides better distinction between high- and low-cost patients than the presence of any transfusion at all.

Conclusion

A major criticism of PPS is that it fails to compensate tertiary care centers adequately for the intensive services they are required to give. Any modification of PPS that helps to identify small groups of very costly patients should help with an appropriate redistribution of payments. Procedures that are not usually performed in an operating room but are usually coded on the hospital discharge abstract can often help identify groups of more severely ill, and therefore more costly, patients. When these non-OR procedures have clear indications for use and little variation among physicians in their application, they can be used to improve the accuracy and fairness of the DRG system.

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