Chapter 3

DRG Payment and the Use of Medical Technology

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INTRODUCTION

The use of Diagnosis Related Groups (DRGs) in hospital payment has grown from an experiment in a handful of hospitals to national Medicare policy in just 3 years. At the time of passage of the 1983 Social Security Amendments (Public Law 98-21), which established a national Medicare prospective payment system using DRGs, the Medicare program was planning to use DRGs to implement the hospital expenditure control provisions of the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA). Before that, DRG payment had been used for only 2 years in 26 hospitals in New Jersey and even fewer in Maryland. *

*See app. C for detailed descriptions of selected DRG payment systems.

The rapid acceptance of DRG payment in the absence of much experience argues for a careful look at its implications, both good and bad, for medical technology. DRG payment methods establish incentives for the use of medical technologies both within and outside of hospitals that differ markedly from those of retrospective cost-based reimbursement and other kinds of prospective payment. These new incentives have implications for the efficiency and quality of care delivered to Medicare beneficiaries. This chapter will examine the implications of DRG payment for the amount, characteristics, prices, and settings of medical technology use.

DRG PAYMENT: AN OVERVIEW

Theoretically, DRGs could be used in any hospital payment method, including retrospective cost-based reimbursement, but their importance in payment comes from their use as part of prospective per-case payment systems. ***Per-case payment*** refers to any prospective hospital payment system with fixed rates of payment based on the hospital admission, not on the number and types of services or number of days of care provided. Per-case payment is a radical departure from traditional cost-based reimbursement and even from other kinds of prospective payment. One of the unique features of a per-case payment system is that it cannot survive for long without a way to adjust payment for differences in case mix; otherwise serious inequities among hospitals would be likely to develop, and selective admitting strategies would be encouraged.

DRGs represent only one possible approach to characterizing hospital case mix; but as the previous chapters demonstrate, the DRG system is the only explicit case-mix measurement approach that is now ready for use in a payment system. It is not surprising, then, that the search for a case-mix adjuster has led to DRGs. ***DRG payment*** is defined here as any per-case hospital payment method in which differences in case mix are taken into account using DRGs to classify case types. Appendix C provides examples of various types of per-case payment methods that have been applied or suggested for ***use*** by third-party payers.

Per-case payment is possible without the use of DRGs, but any such method must somehow adjust for case mix, if only implicitly. One frequently used approach to per-case payment that does not use DRGs or any other explicit case-mix measure is to tie each hospital's future rate per case to its own costs per case in a fixed base year (2). The base year cost is presumably a reflection

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of the mix of cases treated by the hospital in that year. So long as it can be assumed that the hospital's case mix is stable and not subject to manipulation, this is a reasonable, though imprecise, implicit case-mix adjustment method. As time passes, however, the assumptions of stability and nonmanipulation of case mix become more and more tenuous, requiring ever more cumbersome appeals processes or revisions than in a system with explicit case-mix adjustment. *

There are two general approaches to the use of DRGs in per-case payment: 1) DRG-specific prices per case; and 2) a single rate per case that reflects the hospital's case mix determined by a DRG-based case-mix category. The first approach, DRG-specific prices per case, requires the payer to issue a separate rate for each DRG. The payer may pay a unique rate for each DRG in each hospital, the same amount for each DRG regardless of the hospital in which care is rendered, or different amounts for any given DRG depending on the location or particular characteristics of the hospital.

The case-mix category approach requires that hospitals be classified into a number of groups based on similarities in their case mixes. All hospitals in a group would be paid a uniform rate per case. A DRG case-mix index is a categorization method in which each hospital is assigned a unique index value reflecting the relative resource requirements of its particular patients. The index value is determined by a formula using DRGs.

The two approaches to DRG payment–DRG-specific prices and DRG-based case-mix adjusters—do not differ much from one another. The principal difference is in the time period on which case-mix measurement is based. A DRG index must be constructed on the basis of case mix in some prior time period, perhaps the most recently completed fiscal year. A DRG-specific pricing system adjusts for changes in case mix as they occur. Thus, any fluctuations in case mix that occur either by chance or by a hospital's actions, such as the introduction of a new service, would be reflected immediately in a DRG-specific pricing system but would enter a DRG case-mix adjustment system only as time passes.

Both kinds of DRG payment—DRG prices and DRG case-mix indexes—have two essential components: the average level of payment per case; and the relative weights applied to each DRG. The average payment level determines how stringent or generous the payment system is as a whole, while the relative DRG weights or prices determine the profitability of one DRG relative to another. The financial incentives of a DRG payment system depend on both the average level and the relative weights.

● **Other criticisms can be lodged against this implicit case-mix adjustment method. The most important is that it rewards past inefficiency. Hospitals which have been relatively efficient in treating patients will have a lower cost base than those which have been less so prior to initiation of the per-case system. This criticism can also be made of some DRG payment systems, particularly those in which rate per DRG is based totally or partially on the hospital's own cost per DRG.**

DRG PAYMENT AND THE USE OF MEDICAL TECHNOLOGY

Appendix C describes eight per-case payment systems, five of which use DRGs. Three DRG payment systems have already been implemented, and one was recently enacted for the Medicare program. This section presents an analysis of the expected effects of per-case payment, and specifically DRG payment, on access to and use of medical technologies. For the purposes of this technical memorandum, medical technology is defined as the drugs, devices, and medical and surgical procedures used in medical care and the organizational and supportive systems within which such care is provided. In this technical memorandum, the focus is on drugs, devices, and procedures, but many of the points apply to the system technologies.

DRG payment establishes a new set of financial incentives for hospital behavior that differs from those found under both cost-based reimbursement and other kinds of prospective hospital payment. These incentives are rooted in per-case

payment itself, but their effects differ with the particular case-mix measure adopted. For example, while financial incentives facing hospitals are generally the same under the old 383 DRGs and the new 467 DRGs, their strength and the ability of hospitals to respond to them may differ. This discussion concentrates on the new DRGs on the assumption that they are more refined than the old DRGs and, at present, are more practical than any alternative case-mix measurement approach (see ch. 2). It should be understood that the basic incentives are the result of paying by the case and will remain to some extent regardless of the case-mix measurement approach taken.

Despite the fact that DRG payment has been embraced by Congress and the administration in the past 9 months, there is no empirical evidence available on its effect on access to or use of medical technologies. Evaluations of New Jersey's and Maryland's DRG systems on the use of services within or outside of hospitals are not yet available. These programs are themselves so new or of such limited scope that they cannot offer empirical evidence on which to draw conclusions.

Evidence does exist on the effect of other types of prospective hospital payment on the use of medical technologies. As part of a comprehensive study of nine State-legislated hospital ratesetting systems, Worthington and Piro (102) found that programs that pay hospitals on the basis of a per-diem rate all produced an increase in hospitals' average lengths of stay (LOS) and occupancy rates. This result would be expected from a per-diem ratesetting system in which the longer patients stay, the more revenue the hospital receives. However, a per-diem ratesetting program should also encourage increases in rates of inpatient admission, but no such admission effects were found. These findings suggest that manipulating admission rates may be more difficult than increasing the length of hospital stay for those already admitted. Taken as a whole, however, the results do suggest that decisionmakers in hospitals respond in predictable ways to financial incentives for the use of hospital services. Consequently, in the absence of empirical evidence on the effects of DRG payment on medical technology use, an assessment of the direction and strength of its financial incentives is reasonable.

General Incentives of DRG Payment

To understand how DRG payment affects incentives to ***use*** particular medical technologies, it is helpful first to examine incentives affecting the use of hospital and other health services in general. These general incentives ultimately translate into specific demands for medical technologies.

DRG payment creates two fundamental incentives: to reduce the cost to the hospital of each inpatient hospital stay; and to increase the number of inpatient admissions.

Incentives To Reduce Cost Per Case

The incentive to reduce cost per case is the motivation for per-case payment in the first place. Per-case payment is predicated on the belief that hospitals have many opportunities to save money by operating more efficiently and offering a more cost-effective mix of services, Per-case payment rewards hospitals that take advantage of these opportunities.

Reductions in cost per admission can be achieved by reducing LOS, the number or mix of services provided during the stay, or the prices paid for inputs into the production of hospital services. Reductions in LOS are likely to have the greatest immediate effects on per-case costs, although such savings would be lower for hospitals already operating at low occupancy rates. A reduction in occupancy rate does not result in a proportional reduction in operating costs, because many of these (e.g., utilities, housekeeping, administration) may be largely fixed. Thus, in hospitals with low occupancy, the incentive to reduce LOS, though present, will be less than in hospitals with a high daily census and a backlog of potential admissions. Recent studies have demonstrated that the well-known regional differences in average LOS in the United States persist even when diagnosis and severity of illness are taken into account (37,89). Thus, there may be substantial room for reduction of LOS in some areas of the country.

Shorter LOS could have positive or negative effects on patients' health. * On the one hand, hospitalization itself carries the risk of iatrogenic illness; shorter lengths of stay reduce this risk. Psychological factors associated with hospitalization may also be important in adversely affecting outcomes. On the other hand, too early discharge could place patients at risk of inadequate care and threaten recovery. For example, patients with serious infections have often remained hospitalized simply to receive long-term intravenous antibiotic therapy. There is suggestive evidence that hospital-sponsored home antibiotic therapy programs can save total hospital costs and be safe if accompanied by adequate patient training and monitoring (43,82). However, the potential for inadequate education and followup by hospital personnel exists. While financial incentives under DRG payment would encourage home intravenous antibiotic therapy, they would also discourage the expenditure of resources to educate and monitor patients adequately.

The incentives inherent in DRG payment regarding the use of particular ancillary services are complex. The cost of ancillary services whose use would, on the average, shorten hospital LOS, would be weighed against the savings from reductions in LOS. The effect on any particular ancillary service would depend on the nature of these cost tradeoffs. For example, hospitals might provide more high-cost antibiotics prophylactically if these were shown to substantially reduce the average LOS through reductions in hospital-acquired infection rates. Or, as another example, liaison psychiatric services, which appear to shorten LOS of postoperative elderly patients (47), might be provided more frequently under DRG payment than under cost-based reimbursement. A probable byproduct of DRG payment will be an increase in the demand for and supply of information on such cost tradeoffs. Nevertheless, if the consensus is correct that ancillary services, particularly diagnostic tests, have been provided in the past without adequate consideration for their impact on total hospital costs (1,26,52,56) then the net effect of per-case payment would be to reduce the intensity or amount of these services per stay.

The incentive to reduce the price of technologies such as drugs and medical supplies is obvious. In the past 10 years, hospitals have increasingly embraced membership in group purchasing plans and generic substitution programs. For example, hospital membership in pharmacy purchasing groups grew from 40 to 88 percent between 1975 and 1981 (16,83). Generic substitution–the automatic substitution of a less costly but chemically equivalent generic drug for a prescribed brand-name drug—has become commonplace in U.S. hospitals: 96 percent of hospitals responding to a national survey in 1981 reported having such programs (16). The pressure to find new ways to save on the purchase of drugs and supplies should continue. A logical outcome of this trend is a decline in product variation as hospitals and their purchasing groups seek further price reductions and strengthen the competitive position of products with high sales volumes.

Incentives **To Increase Admissions**

DRG payment encourages hospitals to increase admissions selectively. Whereas cost- and charge-based reimbursement gave the hospital an incentive to keep occupancy rates high by increasing either admissions or LOS, only admissions produce or increase revenue under DRG payment. Every new admission generates new revenue (in the amount of the DRG price) and new costs. Serving patients in some DRGs will be more profitable than in others, because those DRGs will have higher ratios of price to cost. The hospital would naturally want to encourage the more profitable admissions. If the average level of payment is high enough that all DRGs are profitable, then the hospital has an incentive to increase admissions in general, but the most profitable admissions should still be sought more vigorously.

A variety of mechanisms is available to increase admissions selectively, including recruitment of physicians in key specialties, adoption of services useful in certain DRGs, and marketing campaigns targeted to preferred patients or their physicians. These strategies may be called "competitive" in that they are designed to draw patients from other hospitals.

***This topic is the subject of OTA's Health Technology Case Study #24, "Variations in Hospital Length of Stay: Their Relationship to Health Outcomes. "**

As competition for admissions increases under per-case payment, some specialization in service delivery can be expected (5). Since the per-unit costs of major services often decline as service volumes increase, hospitals with high service volumes in specific DRGs will find them more profitable, and those with low volumes less. When a hospital finds that a service is unprofitable and when the prospects for more efficient operation or increases in volume are dim, it may abandon the service. For example, a hospital in New Jersey recently closed its hyperbaric chamber because it was found to be unprofitable under DRG payment. Those in need of hyperbaric services (primarily divers) will be referred to a hospital in New York City **(64).** However, competition for admissions can also drive hospitals to maintain unprofitable services if their existence is important to the maintenance of the hospital's position with physicians or patients.

Specialization in service delivery may have desirable effects on quality as well as cost, since for many services there is a positive relationship between quality and volume (5). However, these gains in quality and cost could be partially or totally offset by reductions in patient access to services. Since it is difficult to predict the kinds of services that will be subject to specialization under DRG payment, the desirability of future patterns of service availability is unknown. As DRG payment is implemented nationwide, patterns of service specialization among hospitals should be carefully monitored.

Hospitals may turn to noncompetitive strategies to increase admissions and lower per-case costs. For example, physicians or staff might be encouraged directly or indirectly to hospitalize marginally ill patients and to discharge and readmit patients at a later date for deferrable procedures that might otherwise be performed as part of a single stay. This "revolving door" incentive is a new phenomenon, unique to per-case payment. For example, a patient under treatment for pneumonia might be found during the course of the hospital stay to have a urological condition requiring a deferrable therapeutic procedure. Rather than initiate therapy during the first stay, the physician might discharge the patient for readmission at a later date. This strategy is both easy for physicians to implement and difficult for third-party payers to control.

The incentive to increase admissions selectively has its counterpart in an incentive to avoid admitting unprofitable patients. Patient selection strategies could conceivably be used to exclude patients in unprofitable DRGs or unprofitable patients within a DRG. But there are important restrictions on the potential for direct manipulation of case loads. Although hospitals may be able to avoid admissions in some unprofitable DRGs by not offering the necessary facilities or services, for many patients the DRG is unknown at the time of admission. Moreover, to discriminate against the less profitable (i.e., more costly) patients within a specific DRG, two conditions would have to hold. First, the physician would have to be able to predict with reasonable accuracy the relative costliness of different patients within the same DRG at the time of admission; and second, the physician would have to be induced not to admit his or her more costly (and presumably sicker) patients. These conditions are simply unlikely to be met frequently.

Of course, a hospital could simply choose not to participate in the DRG payment system by refusing all such patients. While this response is infeasible in an all-payer system, it might be attractive to some hospitals in a Medicare-only system. Total nonparticipation would be financially attractive to a hospital if the average DRG payment level were to lie below the additional (marginal) costs of serving patients in any DRG, but it is unlikely in the foreseeable future that the payment level, which is calculated on the basis of fully allocated average operating ***costs,*** will be less than marginal costs for all DRGs in most hospitals. A hospital could decide that the losses in some DRGs outweigh the surplus available in others, but with Medicare accounting for about 30 percent of hospitals' revenues, this situation would also be rare. Thus, the probability that many hospitals will refuse to serve any DRG patients at all is low.

Constraints on Financial Incentives

Whether the financial incentives to reduce LOS and the cost per case and to increase admissions will lead hospitals to overadmit patients and

underprovide services is an empirical question. The potential is real, but the possibility of adverse effects on access and quality of care under DRG payment is moderated by several built-in constraints whose strength is unknown at present.

First, the physician, not the hospital administrator, makes the decision to admit and discharge patients and order procedures. The physician's income often is dependent on hospitalization, as in the case of surgical admissions. Physician visits to hospitalized patients may be more lucrative relative to their time requirements than are office visits (28). Perhaps most important, the physician's professional and ethical standards protect the patient from the withholding of needed care. And, in a DRG payment system not covering all payers, the physician would still be likely to engage in a uniform style of practice for all patients.

It is often asserted that defensive medicine—practices that are employed directly in response to fears of malpractice lawsuits—would limit the willingness of physicians and hospitals to engage in practices that threaten the outcome of care (91). The strength of the influence of malpractice on physician behavior is arguable. There are no direct objective data on how much defensive medicine is practiced today or how much it costs. Physicians have claimed in some surveys that they perform more tests than they otherwise would **(67, 85);** in other surveys that they perform fewer tests (29) due to malpractice lawsuits.

Hospitals themselves are subject to malpractice suits, which have risen dramatically since the first lawsuit was decided against a hospital in **1961 (60,66).** Approximately **75** to **80** percent of all malpractice claims arise from medical care provided in hospitals **(60).** An Institute of Medicine (IOM) study found in 1978 that a relatively small number of institutions had formal programs for managing such risks (60), but their frequency and importance is growing (71). Even if objective estimates were available on the extent of defensive medicine and risk management under present conditions, it would be dangerous to generalize these results to a DRG payment system, where the financial incentives conflict with the incentives to practice defensive medicine. Thus, at this time, one can only conjecture about the potential strength of defensive medicine.

To the extent that it does function as a deterrent to the underprovision of services, defensive medicine may be less effective in protecting the elderly or disabled. There is a general consensus among experts that these patients are less "litigious," in that they are less likely to sue physicians if they are harmed. A commonly cited reason for this is the fact that malpractice lawyers work on a contingency basis and rarely accept cases in which the claimant would not receive a large compensation award. Most elderly and disabled persons would be awarded less money than younger patients, because part of the compensation award is based on lost wages (60), and the elderly and disabled generally have lower income potential. Table 1 shows that the elderly received less money in closed malpractice cases in 1978 regardless of the severity of the injury suffered (61).

Table 1.—Malpractice Claims Paid, 1978

		Age of injured person						
Severity of injury		Under 18	18-24	25-34	35-44	45-54	55-54	65 and over
Emotional only	Avg. indem.	2,473	8,298	7,105	7,052	4,749	969	6,401
Temporary: insignificant	Avg. indem.	3,274	3,080	3,029	3,332	3,027	2,354	1,123
Temporary: minor	Avg. indem.	7,233	7,330	10,106	7,552	11,071	7,444	6,753
Temporary: major	Avg. indem.	14,039	13,020	21,771	22,437	19,582	19,169	15,333
Permanent: minor	Avg. indem.	43,260	31,639	33,513	37,247	34,400	32,205	18,233
Permanent: significant	Avg. indem.	151,908	90,539	93,221	87,979	89,435	66,038	43,176
Permanent: major	Avg. indem.	244,156	151,519	173,063	238,696	197,461	93,361	33,292
Permanent: grave	Avg. indem.	415,982	347,417	388,474	361,507	258,034	182,325	56,620
Death	Avg. indem.	31,419	53,134	114,844	138,495	75,231	53,402	29,234
All other	Avg. indem.	6,333	6,491	6,913	10,129	8,522	6,875	2,000
Total	Avg. indem.	87,127	32,761	41,607	54,857	46,312	32,605	15,768

SOURCE: National Association of Insurance Commissioners, *Malpractice Claims Final Compilation* (Medical Malpractice Closed Claims 1975-1978), vol. 2, No. 2, September 1980, table 2.8, p. 59.

The incentive to increase admissions could conceivably be limited by the reluctance of patients to be hospitalized for marginal indications or be subjected to the "revolving door." The Medicare beneficiary is currently responsible for a deductible of **$304** upon hospitalization (18). It might be argued that this financial disincentive to hospitalization would moderate the incentive to admit Medicare patients. Yet the deductible is not likely to act as an effective deterrent to hospital admission. First, approximately **65** percent of Medicare beneficiaries have private supplementary insurance ("Medigap" coverage) which often pays for part or all of the deductible. Second, the elderly patient is unlikely to question "doctor's orders" in a decision involving hospitalization. Third, the deductible will not adequately discourage readmission because the beneficiary is liable for the deductible upon a readmission only if it occurs more than 60 days later than the previous episode of hospitalization.1

In summary, natural limits do exist on the inclination or ability of hospitals to overadmit, discharge too rapidly, and underprovide services. Yet, the magnitude of these constraints is unknown, and the protection of the elderly in particular may be relatively weak. Programs to monitor hospital performance may be necessary to identify behavior that is ultimately costly or harmful resulting from the economic incentives inherent in DRG payment.

Key Features of DRG Payment Systems That Affect Hospital Incentives

The effects of any DRG payment system on decisions in hospitals and, hence, on medical technology use are influenced by five critical elements of program design:

1. the proportion of the hospital's case load covered by DRG payment,
2. the treatment of costs as pass-throughs,
3. the methods of DRG rate construction,
4. the methods of updating DRG rates, and
5. the level of risk and reward built into the payment system.

'Social Security Act, sees, 1861(a) and 1813(a).

The Proportion of the Hospital's Case Load Covered by DRG Payment

Every case excluded or exempted from the DRG payment system will weaken its incentives. Exclusion of major payer categories from the system, for example, will limit its leverage on hospitals. *

Under the new Medicare law, about 32 percent of the revenues of non-Federal short-term hospitals will be subject to DRG payment (27), except in the few States with DRG payment systems covering other payers as well. DRG payment could become even less important if States develop alternative prospective payment systems, as the law allows them to do. Yet, a payment system with control over about one-third of hospitals' revenues is not inconsequential. To the extent that it does force changes in hospitals' behavior and does not merely shift costs to other payers, Medicare's DRG payment system will influence the use of medical technologies by all kinds of patients. Many changes in physicians' practice patterns or hospitals' purchasing decisions will probably be applied broadly across all patients. And, if a hospital decides to eliminate a service to discourage unprofitable DRGs, the service would be unavailable to all patients.

The leverage of a DRG payment system can be reduced by exclusions built into the system itself. For example, recognition of "outliers," cases with unusually high or low resource use, may reduce the strength of DRG incentives. Approximately **20** percent of all cases in New Jersey's all-payer system, comprising 35 percent of hospitals' costs, fall into the system's outlier category (15). And the State's criteria for declaring a case an outlier have become more generous over time (97).

The treatment of outliers complicates hospitals' incentives. Exclusion of low-cost cases from DRG payment is an important strategy for discouraging potentially unnecessary hospitalizations, particularly for surgery that could be performed on an outpatient basis. Otherwise, in DRGs containing both simple and complicated procedures, the hospital will have an incentive to admit the simple surgeries as inpatients. At the high end of the

***Failure to cover all payers has important implications for equity among payers, but that topic is beyond the scope of this memorandum.**

cost distribution, there may be incentives to increase LOS in order to qualify a patient as an outlier. The strength of these incentives depends on the location of the cutoff points-whether they involve only a few or many patients—and the payment method for outliers. New Jersey's DRG system, which pays both high and low outliers on the basis of controlled charges, provides an incentive to manipulate LOS in high-cost patients. The Medicare system, which as currently legislated has no low-cost outliers, may encourage potentially unnecessary admissions.

DRG payment systems could conceivably exclude certain types of cases or DRG categories on the rationale that these categories or services need to be treated in a special way. Patients treated in burn care centers or psychiatric services, for example, could be excluded from DRG payment on the grounds that these patients present unique medical and social problems. However justified such exclusions are, they would nevertheless weaken the impact of DRG payment and, depending on how they are paid, could encourage admissions in these categories.

Treatment of Costs as Pass-Throughs

"Pass-throughs" are elements of hospital cost that are not controlled by the per-case payment system. Cost-based reimbursement, as a whole, can be interpreted as a payment method in which all cost categories are passed through. Per-case payment systems that directly link a hospital's per-case rates in a given year to its own previous year's costs are only minor departures from pass-through payment. Effective removal of pass-throughs requires a break in the link between the hospital's own current costs and its future rate of payment.

Individual cost categories are treated as pass-throughs to varying degrees under different DRG payment systems. During its first 3 years of operation, Medicare will treat capital costs (depreciation and interest payments) as complete pass-throughs: the hospital will be reimbursed for whatever capital costs are incurred. New Jersey has established a capital facilities allowance for buildings and fixed plant and equipment that is designed to meet the hospital's need for cash to pay off existing debt and to fund the downpayment for replacement or additions approved by the health planning agency. For major movable equipment, such as beds and laboratory instruments, the State allows a depreciation rate that is adjusted for inflation in replacement costs. Thus, except to the extent that the State's health planning agency limits bed expansion or the acquisition of equipment, the New Jersey system passes through capital costs.

Like New Jersey, Maryland has specific capital allowances, but in the case of major movable equipment, the hospital's asset value is calculated in a base year and adjusted in subsequent years with inflation factors. The allowance for movable equipment is unaffected by the hospital's subsequent capital expenditure decisions except for special cases in which the ratesetting commission may make exceptions **(42).**

Other common pass-through categories under per-case payment are the costs of medical education (i.e., stipends of interns and residents, and teaching faculty costs), malpractice premiums, and utility expenses. Treatment of one or more categories of cost as pass-throughs under DRG payment renders these inputs to patient care free to the hospital at the same time that the effective price of all other inputs has been increased because of their inclusion in a per-case prospective system (46). In the absence of other effective controls, this change in the relative price of inputs gives hospitals an incentive to expand pass-through inputs.

The Medicare law also excludes from per-case payment an important product of hospitals: outpatient services. These services will continue to be reimbursed on a retrospective cost basis (and the patient is responsible for **20** percent coinsurance). Consequently, hospitals have a strong incentive to increase outpatient service volumes as a way of shifting fixed and overhead costs from inpatient to outpatient categories. Ancillary departments, such as radiology, clinical laboratory, physical therapy, and occupational therapy, will be encouraged to compete for business with independent providers of these services. New hospital-based home health services, which also escape the DRG system for now, are strongly en-

couraged both for their contribution to profitability and their prospects for reducing inpatient LOS (7,39,51,54).

Methods of DRG Rate Construction

The methods used to construct the relative weights or prices of each DRG can affect hospitals' incentives. The important issue is how the ratio of cost to price varies among the patients served by the hospital. This ratio of cost to price should be constant across all patients; if not, incentives will exist to manipulate case load (i.e., to encourage low-cost or discourage high-cost admissions). Though it is virtually infeasible to devise a per-case payment system that does not have some variation in the ratio of cost to price, the method of rate construction determines how great the variation is and which patients are paid according to relatively high and low rates.

There are two sources of variation across patients in the ratio of cost to price: within-DRG variation and across-DRG variation. Within-DRG variation stems from the inherent heterogeneity of patients' resource needs in a particular DRG. Any per-case payment method that establishes a single price (or weight) for all patients in a case-mix category will result in some within-group differences in the ratio of cost to price. This cannot be avoided, but the extent of the problem may depend on the case-mix classification system. The relative performance of DRGs and other case-mix classification systems with respect to within-group variation has been discussed in chapter 2. The method of DRG price or weight construction does not alter this kind of variation. Policies regarding the handling of "outlier" cases, discussed earlier, are more germane to this issue.

Conversely, across-DRG variation is determined largely by the method of construction of relative DRG prices or weights. In theory, relative DRG prices should reflect the relative costs of efficient and clinically optimal patient care across DRGs **(5,69).** This would encourage hospitals to specialize in those services that they can provide efficiently and to search for ways to further reduce costs. In practice: however, efficient care is difficult to identify and even harder to measure, and at present, all DRG rates are constructed from empirical estimates of DRG costs. The DRG case-mix index under TEFRA and the DRG prices of the new Medicare system are estimated from the average operating costs in a national sample of Medicare hospital claims. Maryland uses the hospital's own average revenue per case in a fixed base year to develop relative DRG weights specific to the hospital. New Jersey combines average statewide costs with the hospital's own average cost of treating each DRG to arrive at a hospital-specific price. *

None of these methods assures that the relative weights reflect efficient relative costs. Suppose that patients in one DRG are treated relatively efficiently and uniformly throughout all hospitals while those in another are subject to a great deal of inefficient care. By Medicare's average cost calculation, the inefficient DRG would be assigned a higher rate than it should be relative to the efficiently produced DRG. It is important to recognize both the reality of this problem and the opportunity for mitigating it over time. As hospitals respond to the incentives of DRG payment, increases in their efficiency can be expected. Over time, as DRG relative prices are recalibrated using hospitals' updated cost data, the disparities in cost-to-price ratios should diminish. Without recalibration, whatever disparities in cost-to-price ratios existed at the beginning will remain.

The method used to allocate hospitals' costs to particular DRGs presents a more enduring problem for relative prices. The Medicare method relies on hospitals' charges to reflect average costs, where the DRG weight construction method is based on the hospitals' charges for services. These charges are deflated by hospital-and-department-specific cost-to-charge ratios calculated from the Medicare cost reports. While this deflator reduces some of the distortions created by interdepartmental subsidies, there remains a residual cross-subsidy of procedures and cases within departments. Cohen has claimed that this method compresses the relative weight scale by underestimating the true cost of complex cases and overestimating the true cost of simple cases **(9).** Routine care is charged at a flat rate per day, regardless of case

*See app. C for details.

severity, and some ancillary services, such as the use of operating rooms, are billed on the basis of time, not on the basis of resources needed to conduct more complex procedures. Though the extent of the bias is unknown, it implies that the charge-based cost weights are likely to penalize the more complex DRGs.

New Jersey intends to improve on this method by directly observing the use of nursing time by patients in various DRGs in selected hospitals (22). Direct observation of resource use is costly and has some methodological problems (94), but the results of these studies should provide valuable information on the magnitude of this problem.

Methods of Updating Relative DRG Prices

As the cost of efficient care in each DRG changes over time, so, too, should the relative DRG price. If it were reasonable to expect that costs would increase or decrease uniformly across all DRGs, then the only issue would be whether the average payment level is sufficiently high to cover the costs of efficient operation. But, uniform cost increases are highly unlikely: From year to year, some DRGs will experience cost-saving technological innovations; others will experience cost-raising ones. The relative prices of inputs (personnel, supplies, energy, etc.) also change, with consequences for relative DRG costs. In the absence of any changes in DRG prices, the ratio of DRG price to efficient cost would show increasing divergence across DRG categories. As these ratios diverge, certain DRGs will become more profitable, others less so, and hospitals will have greater incentives to engage in patient selection strategies. Therefore, the mechanisms employed to update, or recalibrate, relative DRG prices influence the Iongrun incentives of the system. Recalibration must depend on information if it is to avoid being completely arbitrary; thus, these updating mechanisms must include specification of the data and information systems available to support them.

There are three basic approaches to recalibrating relative DRG payment rates: empirical cost estimation techniques, central policy decision adjustments, and provider appeals.

All DRG pricing systems have originally been established with empirical estimates of the relative cost of various DRGs. Periodic reestimation of relative costs based on updated data merely repeats the process at reasonable intervals. New Jersey employs a ratesetting method that, at least in theory, annually reestimates relative DRG costs. The Medicare law calls for changes in DRG relative rates at least every 4 years, but the methods to be used to recalibrate DRGs are unspecified. The law establishes an independent panel of experts—the Prospective Payment Assessment Commission—to recommend changes in relative prices to the Secretary of the Department of Health and Human Services (DHHS) who will authorize the changes. Presumably, the methods used by the Commission will include reestimation of DRG costs.

Central policy adjustments in DRG rates occur when those in charge of ratesetting determine that certain changes in relative prices are justified to take account of new technology or changes in clinical practice. The Prospective Payment Assessment Commission is specifically charged with making recommendations about such adjustments. The Commission, and DHHS, will therefore require an information base that exceeds that needed for empirical cost estimation. Data on the cost and clinical effectiveness of new technology will also have to be collected and synthesized.

Provider-initiated appeals or petitions for changes in relative rates represent the third avenue for relative DRG rate adjustments. Like policy adjustments, provider appeals can be used to adjust rates for changing technology, but this approach allows more flexibility in responding to the needs of particular hospitals. The burden of producing data to justify changes in DRG prices rests to a greater degree on the appealing institution. New Jersey has instituted a DRG appeals mechanism to specifically account for changing technology. The new Medicare system prohibits appeals of rates per se, but it does permit hospitals to appeal for additional payments for “outlier” cases whose estimated per-case costs are extraordinarily high. The effective price of DRGs containing new technologies (e.g., organ transplants), may be altered through this process.

Risk and Reward

The degree to which the hospital is able to generate surplus revenues and appropriate them to its own use will influence the strength of incentives to provide technologies more efficiently and can also affect the hospital's access to sources of capital. The ability to generate surplus depends on both the average level of payment and the rules governing hospitals' ability to keep surplus and liability for deficits. One program may emphasize the risk side, putting hospitals entirely at risk for losses without allowing them to keep surplus, while another may offer both substantial risks and rewards.

Traditional cost-based reimbursement is essentially a "no risk/no reward" system. DRG payment systems vary widely in this regard. Hospitals in New Jersey and Maryland can keep any surpluses attained from cutting costs per case and must bear the full burden of cost increases. However, both systems limit the revenue gains or losses attributable to changes in admissions to their estimated marginal costs or savings. In New Jersey, the potential for continued surplus-building in subsequent years is reduced somewhat by periodic recalibration of DRG prices reflecting changes in costs. In Maryland, however, the benefits of cost reductions (and the penalties for cost increases) are maintained in subsequent years, because DRG weights are not updated. Under the temporary provisions of TEFRA, the hospital reaps little reward for keeping its per-case costs low (a maximum of 5 percent of its per-case rate) but bears the full penalty of exceeding the per-case limit. Under the new Medicare law, the hospital bears the full burden of a loss and reaps the full rewards of a surplus, regardless of their source. The hospital keeps the full portion of any surplus due to increases in admissions. Thus, under the Medicare law, hospitals will have strong incentives both to reduce costs and increase profitable admissions.

Technology-Specific Effects of DRG Payment

How do the general incentives of DRG payment translate into specific effects on the use of medical technologies? The previous sections demonstrate both the complexity of the underlying incentives and the impact of program design on their direction and strength. DRG payment will not have a uniform effect on medical technologies and in some instances technologies will be subject to conflicting incentives. From the discussions above it can b; concluded that:

- Overall, the number and intensity of ancillary procedures provided to inpatients can be expected to decrease, but the use of procedures that can be shown to lower the cost per case will increase.
- The settings of technology use are likely to be influenced by DRG payment, but the incentives work in conflicting directions and are sensitive to the key features of program design. In the absence of an outlier policy for low-cost patients, DRG payment encourages inpatient admissions for simple procedures. On the other hand, the exclusion of outpatient costs gives hospitals an incentive to offer outpatient procedures. It remains to be seen which incentive will dominate for which procedures. DRG payment will encourage the movement of technologies, particularly those for posthospital care, into the home and other nonhospital sites of care.
- DRG payment is likely to influence the specialization of services, but the magnitude and direction of these effects is unknown. The incentives to reduce costs encourage concentration of capital-intensive technologies in fewer institutions. Conversely, the increasing competition among hospitals for physicians and patients will create incentives for the widespread acquisition of some technologies.
- A change in technology product mix is likely to result from downward pressure on the price and quantity of supplies and, if capital is included in the DRG rate, capital equipment. Greater product standardization can be expected as more expensive models and procedures are eased out of the market through competition.

Implications for Utilization Review and Quality Assurance

Per-case payment introduces much needed incentives for cost control in hospitals, but it also

has potential negative implications for quality of care, access to care, and systemwide costs. The incentives in DRG payment for hospitals to potentially manipulate case load, overadmit patients, discharge patients too early, and underprovide ancillary technologies argue for safeguards in the form of quality and utilization review.

Review functions under Medicare have always had two partially conflicting objectives: quality assurance and cost containment. Under DRG payment, these dual objectives remain. Utilization review will be necessary both to avoid costly increases in admissions and readmissions, and quality audits will be necessary to protect inpatients from the underprovision of technologies and from too early discharge.

Both types of review overlap because of the tradeoff between quality and cost that becomes more explicit with per-case payment. For example, physicians may become more selective in their ordering of diagnostic tests. Some tests may add to the cost per case but give better patient outcomes. Other tests can be avoided with little consequence for outcomes. Review processes that recognize the balance between cost and quality become critical under DRG payment.

Historically, the responsibility for quality assurance and utilization review has been shared by hospitals, intermediaries, and Professional Standards Review Organizations (PSROs). Hospitals have been required to have programs of quality assurance and utilization review as conditions of participation in the Medicare program[2] as well as for accreditation by the Joint Commission on Accreditation of Hospitals. Before the PSRO law was implemented, Medicare fiscal intermediaries were required to perform independent utilization reviews and thereafter remained the reviewers of last resort in areas without active PSROs (68). Congress instituted the PSRO program in the 1972 Social Security Act amendments (Public Law 92-603), establishing independent physician review organizations with the dual objectives of quality assurance and cost containment.

In 1982, Congress replaced the PSRO program with utilization and quality control peer review organizations (PROS) (Public Law 97-248). PROS will be physician organizations whose performance will be evaluated by the degree to which they meet objectives for quality assurance and cost containment specified in 2-year contracts with DHHS. Under the new Medicare DRG payment system, hospitals must enter into agreements with PROS for review of the quality of care and the appropriateness of admissions and readmissions.

The integration of cost-containment and quality-assurance objectives in a single physician-run independent review organization such as a PRO is both necessary and troublesome. Because the inherent tradeoff between cost and quality is bound up in every review decision, it would be impossible to separate the two. Yet, it is difficult for those responsible for conducting review and for those funding such efforts to maintain a balance between the two objectives. The history of PSROs is instructive. Although the original intent of Congress was that PSROs were to both contain costs and assure quality, Federal evaluations of the program focused largely on the cost-containment objectives (86,87,88,91). The difficulty of specifying and measuring criteria for quality of care added to the relative obscurity of this objective. The critical question to Federal policymakers was whether PSROs were cost saving to the Medicare program—i. e., did they reduce inpatient hospital utilization sufficiently to cover the program costs? On the other hand, at the local level, PSROs emphasized quality assurance (25, 59).

Whether PROS can strike an appropriate balance between the cost containment and quality assurance objectives remains to be seen. It is important that at the Federal level the real need for quality assurance presented by DRG payment be recognized.

[2] 42 CFR 405J.