Economic Incentives and Organizational Realities: Managing Hospitals under DRGs

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UNTIL RECENTLY THE FEDERAL GOVERNMENT AND most private insurers reimbursed hospitals retrospectively for all reasonable costs incurred in providing services to their beneficiaries. This form of reimbursement, it cannot be denied, had important virtues. Retrospective payment encouraged hospitals to acquire the most advanced technologies. It also assured access to care for most patients. But retrospective reimbursement provided no incentive for the frugal use of hospital resources. Rather, it allowed hospitals to expand services and increase costs without regard to efficiency.

Increasing hospital costs have caused governments and insurers to shift to prospective payment, the use of predetermined prices to pay for hospital services (Enthoven and Noll 1984). Various methods can be used to select the prices. That most commonly chosen in recent years and the one mandated for the federai Medicare program is diagnosis-related groups (DRGs), a system derived from work at Yale University by Robert Fetter and John D. Thompson (Thompson, Averill, and Fetter 1979). Like other methods for predetermining prices, DRGs provide hospitals with an economic incentive to control their costs. But unlike other versions of prospective payment, DRGs

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specify particular changes in the management of hospitals so as to achieve operating efficiency. It is this requirement for management change that we examine.

The prominence that DRGs have gained in current health policy is partially explained by the seductiveness economic incentives hold for policy analysts. Economic logic appeals to common sense and its prescriptions appear to be self-executing: change the financial rewards and behavior changes. Economic theory, however, is neither the only nor perhaps the best guide to understand hospital behavior. An alternative perspective, that of organization theory, describes hospitals as complex, profession-dominated institutions with multiple objectives and wellestablished routines (Perrow 1965). Such an institution can be expected to resist externally imposed pressure to change in directions that threaten preferred values and relationships.

We use New Jersey as our data source to examine the experience of hospitals under DRG incentives, that state being the first to adopt DRG-based reimbursement. Our work involved interviews with hospital and government officials and a review of the statistical results for the period of 1979 to 1984 (see appendix for information on data and methods). The management promise of DRGs, we argue, greatly exceeds its practice in New Jersey and likely everywhere else as well.

DRG Management

Fetter and Thompson conceived the DRG method when they sought to apply the techniques of industrial management, Fetter's disciplinary specialization, to hospitals. Initially, they wished to understand the ways in which hospital inputs—technology, supplies, facilities, and staff—are linked to hospital outputs. This led them to attempt to define the outputs of hospitals through a review of medical records and eventually to the creation of 467 classes of patients or, as they came to be known, diagnosis-related groups (Thompson, Fetter, and Mross 1975). Careful accounting of the minimum resources needed to produce efficacious care for each DRG would, they thought, set the standard for the cost-effective production of hospital outputs. Fetter and Thompson believed that nonprofit organizations, including hospitals, served society best by becoming efficient. When they found little interest among hospitals in utilizing their cost-accounting and F

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management-control system for improving efficiency, the Yale investigators reshaped the DRG concept into a reimbursement system (Fetter, Thompson, and Mills 1976). The expectation was that if hospitals were paid a fixed price for each DRG, they would have to become efficient or be forced into deficit.

Thus, the DRG scheme expanded an internal cost-accounting classification into a full-scale program for evaluating and changing hospital behavior. DRGs were the bench marks, the units of hospital activity to which meaningful production costs could be attached (Fetter and Freeman 1986). The same categories were also to be used by reimbursement agencies to set binding rates for hospital services. Implicit in Fetter and Thompson's view was a restructuring of hospital management that would result in hospital administrators holding sufficient authority to influence more directly the way physicians used resources. The link to reimbursement was crucial for it would give financial stimulus to the restructuring. DRG-based reimbursement, by providing the financial incentives to minimize costs, is the mechanism to force this realignment of internal authority.

DRG proponents believed DRGs offered administrators not only the reason, but also the management tools needed to gain control over resource use within hospitals. Information could be gathered on the use of hospital resources by individual physicians treating like cases. High-cost physicians could be identified and persuaded to avoid wasteful practices (Berki 1985). Similarly, if hospitals were paid the same prices for the same services, it would be possible to compare their efficiency in providing those services. Administrators would learn which services their hospital could produce most efficiently, and therefore should seek to supply, and which would be better supplied by other hospitals or in nonhospital settings. Buttressed by DRGs, hospital administrators could improve the societal return on hospital investments.

The flaw in this approach is the assumption that a change in hospital reimbursement policy will force a change in the distribution of decisionmaking authority within hospitals. DRG proponents believe that hospital administrators will need to expand their control over detailed physician-treatment patterns in order to cope with constrained reimbursements. They looked forward to "a direct linkage between the practices of individual physicians and the financial consequences for the hospital" (Fetter et al. 1980).

The proponents, however, ignore the organizational realities. Power

within organizations is assumed by those who cope with the most serious uncertainties (Thompson 1967). In hospitals the most serious uncertainties are those of medical and surgical interventions, the domain of physicians (Young and Saltman 1985). The more medical expertise required, the more physicians reserve the decisions for themselves. Thus, for example, decisions about surgery are perceived as closer to the core of medical practice than judgments about average lengths of stay. When decisions become more predictable, administrators come to the fore.

The basic structure of hospitals separates financial management from clinical activities and gives priority to the latter (Harris 1977). Traditionally, hospital administrators have seen themselves as facilitators, not managers in the corporate sense. The task of administrators is to maintain a stable, financially viable work place for physicians. An ability to temper external threats, and especially external financial threats, to this work environment is the expertise administrators claim.

Until reimbursement uncertainties exceed those of clinical practice, the power balance within hospitals will not shift. Hospital income is unlikely to be so constrained by reimbursement policies, DRG-based or otherwise. While concerns for cost control are widespread, there is no support for threatening the financial viability of hospitals. Society's desire to control hospital costs is counterbalanced by its desire to improve the access to and the quality of hospital care.

In practice, administrators have a wide range of actions available to them to cope with rate pressures before they have to confront the sensitive relationship with physicians (Cook et al. 1983). These include (1) the mobilization of political support to temper stringent regulation, (2) the development of new strategies to enhance revenues, and (3) the reduction of expenditures for support services. Only the prospect of persistent deficits will compel administrators to challenge the clinical authority of physicians. DRG incentives in themselves do not force either the achievement of operational efficiency or a realignment of authority within hospitals.

Regulatory Relief through the Political System

A common response of hospital administrators to rate setting is to seek regulatory relief through the political system. Stringent rate 1

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setting, if maintained, would threaten the functioning of hospitals and, thus, political influence will be mobilized to make rate setting less constraining. The New Jersey DRG system itself is the result of attempts by hospitals to escape from the Standard Hospital Accounting and Rate Evaluation System (SHARE), the prospective per diem reimbursement system that was in effect across the state from 1976 to 1979 (Worthington, Cromwell, and Kamens 1979). Under the SHARE system, which applied only to Blue Cross and Medicaid patients, New Jersey's inner-city hospitals began accumulating significant deficits because they lacked sufficient numbers of commercially insured patients to absorb losses sustained in providing care within the regulated rates (Rosko and Broyles 1984). They responded by forming a coalition with aggrieved insurers that helped change the law (Morone and Dunham 1985; Hsiao et al. 1986). Although heralded for creating DRG reimbursement, the 1978 reform served, in effect, as a fiscal relief measure for the hospitals in the state that cared for the poor. It required what SHARE did not-that the costs for caring for the uninsured poor be shared among all the payers of hospital services. This change in the treatment of hospital bad debt and charity care was a major way inner-city hospitals achieved financial health (Vladeck 1986). With the implementation of DRGs in 1980, the average innercity hospital received an infusion of more than three million dollars per year to pay for uncompensated care (New Jersey State Department of Health 1980-1982). By the third year of the new system, innercity hospitals were generating larger financial surpluses than their suburban counterparts (figure 1).

Except for those anticipating a windfall, New Jersey hospitals were initially reluctant to move to DRG reimbursement. They feared the changes in the routines for managing hospital resources that DRG advocates sought. Before they would cooperate with the state in the implementation of the DRG system, the hospitals lobbied for concessions (Morone and Dunham 1985). These included changes in the methodology for calculating the DRG rates, in the percentages of the rates to be based on individual hospital experience, in the definition of hospital groupings, and in the extent to which there would be exemptions for costly cases (Sapolsky, Greene, and Weiner 1986). The state agreed to the concessions, even though they greatly reduced the potential cost-control effects of DRGs, because it needed hospital cooperation to begin the use of DRGs and because it expected to retrieve most



FIG. 1. Comparison of percentage surplus of gross revenue in inner-city versus suburban hospitals,* 1974-1984.

* Hospitals grouped by service or catchment area as defined by the New Jersey State Department of Health. The sample is comprised of 20 inner-city and 34 suburban hospitals.

Source: American Hospital Association 1972-1985a.

of the concessions in later negotiations (Sapolsky, Aisenberg, and Morone 1987).

In addition, the hospitals had the protection of an appeals mechanism within the reconciliation process. Reimbursements are not final until hospitals exhaust appeals to the state rate-setting commission and complete an annual reconciliation with the state on the specifics of reimbursement. This process delays the determination of final operating results for upward of two years. Most hospitals, thanks to good legal and accounting advice, manage to gain significant additional payments and avoid deficits when they receive their final reimbursement totals.

Strategies for Expanding Revenues

As productive as political strategies proved to be for protecting hospitals from the rigors of regulation, New Jersey administrators still worried đ

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about the potential effects of DRGs when the system was being put in place. Quite understandably, many hospitals sought to increase revenues by expanding the volume of admissions. By bringing in more patients, it would not be necessary to make painful choices about reductions in hospital capacity. Past research suggested that the uncertainties of medical judgment provided management with sufficient opportunities to influence admissions policies (Wennberg and Gittlesohn 1982). In the period from 1979 to 1984, New Jersey hospitals increased admissions per capita by more than 6 percent while admissions were declining 5 percent nationally (American Hospital Association 1972– 1985a).

Most hospitals turned to traditional ways to expand admissions. A prime technique was by recruiting more physicians. St. Michael's in Newark, for example, urged its graduating residents to join the attending staff (Pena, Jamison, and Rosen 1986). Others, such as St. Joseph's in Paterson, started new programs in open-heart surgery or oncology, and brought in out-of-state specialists to staff them. Hospitals also expanded high-visibility technology such as computerized tomography (CT) and magnetic resonance imaging (MRI) scanners, adding greatly to their capital investment in the years since DRGs were introduced. In addition, hospitals experimented with programs in industrial medicine, satellite facilities, and preferred provider arrangements, all with the goal of increasing the patient base available to hospitals. There were even direct-marketing efforts including television and newspaper advertising and the distribution of hospital magazines and newsletters. A particular target was the use of Philadelphia and New York City hospitals by New Jersey residents (Courtney 1986).

Yet another strategy hospitals rely on to expand revenues is to assure that the highest applicable diagnosis is reported. In its most flagrant form, known as "DRG creep," a hospital attempts to shift systematically its reported case mix in order to improve reimbursement (Simbourg 1981). In interviews with hospital administrators, we discovered that the deliberate reordering of diagnoses into the most profitable categories was not generally needed. Hospitals enhanced their revenues simply by documenting complications and, in cases with imprecise diagnostic boundaries, by labeling the diagnosis with the highest level of payment as the principal diagnosis. The revenue gains from more careful record keeping were sufficient that physicians

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did not have to become very knowledgeable about choosing diagnoses in order to increase hospital payments.

We examined hospital attempts to manage diagnostic information through an analysis of changes in hospital case mix reported during the period of 1981 to 1984. A comparison of 12 pairs of high-volume DRGs (table 1)-the simple diagnosis and the same diagnosis with complications-provides evidence of how hospitals gain revenue through complete documentation. For each pair, there was a dramatic shift in the volume of cases from the simple diagnosis to the higher-priced classification, which adjusts for complications, comorbidities, and an age factor. We also relied on a weighted average index of hospital discharges, with each discharge weighted by its DRG price to measure case-mix intensity (New Jersey State Department of Health 1981-1984). The aggregate case-mix index expanded by 3.7 percent from 1981 to 1983. In this period, the estimated revenue gain due to reported changes in case mix was \$38.7 million, or roughly \$380,000 per hospital. Although some of the reported increase in the severity of case mix may result from an aging population and the substitution of outpatient for inpatient services, it can be presumed that a large portion is due to more sophisticated coding practices. The greater emphasis on record keeping is reflected in a more than 20 percent increase in total man hours for that purpose reported by New Jersey hospitals between 1979 and 1983 (New Jersey State Department of Health 1979, 1983).

Cost Control within the Hospital

We believe hospital administrators prefer management strategies that are designed to enhance revenues over cost-control measures that may be resisted by members of their staff. They institute cost-saving procedures only when they have exhausted other possibilities for revenue growth. Some New Jersey hospitals were successful enough in expanding their revenue base that they avoided difficult cost-cutting decisions altogether. Others had to become sophisticated in cutting back on operating costs in order to stay within the financial limits imposed by DRGs. Clinical services—although not immune to scrutiny—were usually accorded the highest priority and, therefore, were the last to be pared.

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Case Volume for Pairs of DRGs Separated by the Identification of Complications and/or Comorbidities, 1981 and 1984 (upper DRG is higher priced, w/complication)

Primary diagnosis or principal procedure	DRG	1981 volume	Percentage change between 1981 and 1984
Adult simple pneumonias	89*	8,426	36.4%
	90	3,284	0.9
Adult bronchitis and	96*	5,760	46.5
asthma	97	5,584	15.4
Acute myocardial infarction,	121	4,235	45.1
discharged alive	122	10,557	- 7.2
Cardiac arrhythmias	138*	6,897	36.1
-	139	3,550	- 6.9
Major small and large	148*	5,309	18.1
bowel surgery	149	2,039	- 38.8
Inguinal and femoral	161*	3,674	20.4
hernia repair	162	9,591	1.7
Adult gastroenteritis	182*	14,362	19.3
	183	15,888	- 12.6
Total cholecystectomy w/o	197*	4,292	34.2
bile duct exploration	198	6,371	-24.2
Transurethral operations	336*	5,266	27.9
	337	2,287	- 10.1
Other hysterectomy**	354*	2,419	47.1
	355	9,782	- 15.0
Caesarean section	370	2,028	69.7
	371	15,418	26.2
Vaginal delivery	372	3,329	47.8
	373	61,021	4.6
Total upper DRG		65,997	29.3
Total lower DRG		145,342	0.6

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> * Indicates the split between the pairs of DRGs; also involves an age variable (70 years of age and greater in upper DRG).

** Excludes pelvic evisceration, radical hysterectomy, and vulvectomy.

Source: New Jersey State Department of Health 1981-1984. Data include all cases for New Jersey hospitals under DRG payment.

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Time period		Annual percentage change in costs						
	per capita	per capita (1969 dollars)*	per case**	per case (1969 dollars)				
NEW JERSEY								
1971-1975	16.12%	8.20%	11.25%	3.66%				
1976–1979	11.86	2.66	10.94	1.81				
1980–1984	11.51	1.88	9.93	0.44				
NORTHEAST**	*							
1971–1975	13.55	5.81	12.39	4.73				
1976–1979	10.95	1.82	10.03	0.97				
1980–1984	12.02	2.39	11.56	2.03				
UNITED STATE	ES			-				
1971–1975	13.61	5.84	11.31	3.71				
1976-1979	12.89	3.59	12.34	3.09				
1980–1984	12.19	2.50	12.81	3.08				

		ТA	BLE	2				
A Comparison of Hospital C	Costs	in	New	Jersey,	the	Northeast	Region,	and
	the	U	nited	States				

* Costs are deflated using the American Hospital Association Hospital Input Price Index, 1971-1984.

** Cases are measured by adjusted admissions.

*** Northeast region includes New England and Middle Atlantic states, excluding New Jersey.

Source: New Jersey: edited data from American Hospital Association 1972–1985a. Northeast and United States: American Hospital Association 1972–1985b. Population estimates from the U.S. Bureau of the Census, 1972–1985.

An evaluation of the first five years' experience showed that the New Jersey DRG system was about as effective in controlling overall hospital inflation as was the previous SHARE regulation (table 2). Although there was no significant decrease in the growth of hospital expense per capita after 1980 when the DRG system replaced SHARE, the New Jersey rate did remain slightly below national and regional levels (Hsiao and Dunn 1987). New Jersey hospitals did slow the growth in the costs per admission. When adjusted for inflation, expenses per admission were maintained at relatively constant levels during the period of 1980 to 1984. New Jersey hospitals constrained per case expenses more effectively than their counterparts in either the Northeast region or the United States as a whole.

To identify the kinds of changes instituted by hospitals, we examined

Cost	Mean 1981	Mean 1984	Percentage change*
center	cost per case	cost per case	Mean 1981–1984
Routine care	\$782.26	\$752.15	- 3.8%**
Total ancillary	736.20	756.26	+ 2.7
Intensive care	128.20	142.55	+11.1***

TABLE 3Cost-center Costs in 87 of 97 New Jersey DRG Hospitals, 1981–1984(in 1980 dollars)

* Statistical test used is difference between two means of a matched sample.

** Statistically significant (p < .10). *** Statistically significant (p < .05).

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Source: New Jersey State Department of Health 1981–1984. Cost-center-specific price deflators calculated from New Jersey State Department of Health economic factors, 1981 and 1984.

expenses by different cost centers between 1981 and 1984 (table 3). The most significant change that occurred was about a 4 percent decrease in routine-care costs when adjusted for inflation. Routine care, accounting for more than half of total expenses per case, includes nursing, dietary, laundry, and other operating costs. Given that some of these costs are fixed, the decrease in routine-care expenditures was not only due to hospital efficiencies, but also to increased admissions that spread the costs over more cases.

Some analysts predicted that DRGs would force hospitals to cut back on nursing staff, one of the largest components of routine-care costs (Lohr et al. 1985). But New Jersey hospitals did not reduce nursing staff or shift to less expensive nurses. Nursing hours per patient day in New Jersey increased by 15 percent over the period of 1979 to 1984, which was roughly comparable to regional and national trends (New Jersey State Department of Health 1979, 1984). In addition, registered nurses, who earn considerably higher salaries than licensed practical nurses, now comprise a larger share of nursing staff than in 1979, also reflecting national trends. Because the New Jersey payment system was not very constraining, most hospitals did not confront difficult decisions about reducing their staff.

Hospitals sought other, more administratively feasible, procedures for lowering routine-care costs that would not undermine staff morale. Perhaps the single most important method was to decrease the average length of stay. It dropped by more than 10 percent from 1981 to

TABLE 4
Mean Length of Stay in New Jersey Hospitals under DRG Reimbursement,
by Hospital Financial Groups

Category	N	1979 length of stay	1984 length of stay*	Percentage change, 1979–1984
All hospitals	90	8.66	7.77	- 10.3%
Financial groups**				
Profit	36	8.18	7.65	- 7.6
Break-even	37	8.90	7.84	- 11.9
Deficit	17	9.10	7.84	- 13.8
$F-value^{***} = 2.95$				

* Mean length of stay for 1984 is significantly different from the mean for 1979 for all categories (p < 0.05). Statistical test for difference of means of a matched sample was used.

** Hospital financial groups are measured by a hospital's average operating surplus three years prior to DRG payment. The ranges of average surplus are: profit hospitals, +1.5 percent and above; break-even, -1.0 to +1.5 percent; and deficit, less than -1.0 percent.

*** F-statistic for testing the hypothesis that group mean length of stay changes, 1979 to 1984, for different financial groups are equal. F-value is significant at the 0.10 level.

Source: American Hospital Association 1972-1985a.

1984, which translated into lower costs per case for routine services. (Hospitals could obtain considerable savings by shortening hospital stays, even though the marginal cost per day does tend to decline over the course of a hospitalization.) Our data suggest that hospital administrators responded more to the overall financial pressure of prospective payment by reducing the length of stay generally than to the incentives linked to specific DRGs. Hospitals earning a comfortable financial surplus decreased their length of stay by 8 percent from 1979 to 1984, compared to nearly 12 percent for break-even hospitals and 14 percent for deficit hospitals (table 4). In contrast, we found little evidence that administrators systematically targeted their length of stay efforts to money-losing DRGs. Nor did they single out either surgical or medical DRGs in their efforts to control hospital days; length of stay declined in both categories (New Jersey State Department of Health 1981-1984). Interestingly, the length of stay was even reduced among outlier cases when it was contrary to the financial interests of the hospital, evidence again of systemic rather than focused control efforts.

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DRG reformers believed that hospital administrators would not only decrease the routine costs of operating a hospital, but that they would also try to eliminate costly medical practices that were of marginal value (Broyles and Rosko 1986). Ancillary services were seen as a potential target for cost containment, as some observers noted that a substantial portion of their utilization was of little therapeutic benefit (Hubbell et al. 1985; Stoughton 1982). Hospitals, it was predicted, would begin monitoring individual physicians' use of X rays, laboratory tests, and other services. If a physician's resource use were to exceed the norm, without adequate medical justification, he would be encouraged to cut back his orders for ancillary services.

Nevertheless, in our data we found few examples of hospitals that attempted to monitor ancillary use as a means of controlling costs. In fact, the total constant dollar costs per case of ancillary services among New Jersey's hospitals increased by about 3 percent from 1981 to 1984. Expenditures for drugs expanded by about 6 percent over this period. (The trend in ancillary costs per case in the period of 1981 to 1984 did drop slightly from the two preceding years. The increase in costs for services outside the hospital and the drop in length of stay may account for part of this. The data show that cost pressures, though, were clearly most focused on routine care.) The growth in ancillary costs further demonstrates the reluctance of most hospital administrators to attempt to modify clinical as opposed to routine services. Financial constraints on ancillary services are not imposed because they directly threaten the physician's role as the manager of care provided to the individual patient.

To examine whether hospitals would diminish their reliance on costly high technology, we analyzed changes in the costs of care provided in the intensive-care unit (coronary care units were included in this category). Intensive-care units are considered by many to be the "hallmark" of the modern hospital, combining sophisticated monitoring and state-of-the-art therapies (Knaus and Thibault 1982). Research suggests that certain patients incur high costs in the intensivecare unit, but derive no measurable benefit from the services provided (Cullen et al. 1976). Some commentators believe that DRGs provide hospitals with a dictate that they must evaluate the cost effectiveness of intensive care and eliminate any unnecessary utilization (Coulton et al. 1985; Butler, Bone, and Field 1985; Lohr et al. 1985). When this cost center was scrutinized, however, we detected no specific DRG effects. After accounting for inflation, the intensive-care costs per case rose over 11 percent from 1981 to 1984 (New Jersey State Department of Health 1981, 1984). Nor did the number of intensive-care unit days per case decrease (.46 days per case in 1981 compared with .49 days in 1984). These data are consistent with the notion that hospitals will attempt to protect their technical core from the effects of rate regulation (Cook et al. 1983).

Mechanisms for Reducing Length of Stay

Our data show that by far the most widespread change in New Jersey hospitals was a reduction in the length of stay. Because the state's per diem rate-setting system that was in effect between 1975 and 1979 had encouraged longer stays, hospitals only began to decrease length of stay in 1980 when the DRG reforms were adopted. Hospitals elsewhere started to decrease length of stay at an earlier period (American Hospital Association 1972–1985b). By 1980 the technical conditions thus existed for New Jersey to reduce substantially hospital stays.

Hospital administrators have long used patient days as a measure for the consumption of nonclinical or hotel-type resources. In contrast, physicians consider the marginal hospital day to be without much clinical relevance. Because of these differing perspectives, physicians have been willing to allow administrators influence over length of stay in ways that would not be acceptable in other areas of their responsibility. Directives from administrators about the core of clinical practice—the detailed treatment regimens for patients—would not be accepted by physicians. Exhortations for physicians to help fill or vacate hospital beds, however, are viewed as legitimate.

In our interviews, we discovered that hospitals used many different methods to foster shorter stays. Patients often remain in hospitals because they have no place to go. Under a per diem system a hospital has a financial impetus to hold onto its patients in order to gain larger reimbursements. Under a per case system, administrators have a clear financial incentive to transfer patients out of the hospital as quickly as possible. New Jersey hospitals, therefore, expanded their discharge planning efforts. More social workers now evaluate elderly or sicker patients at an earlier stage, so that an appropriate nursing-home placement can be found. Links of all kinds to nursing homes have been strengthened; some hospitals have even purchased nursing homes. Similar ties to home care agencies have been formed, and hospitalmanaged home care is growing. The potential effects of discharge planning are limited, however, by the relatively small percentage of patients who are institutionalized or receive home care following hospitalization (Meiners and Coffey 1985). In order to cut the average length of stay by a significant amount, hospitals must frequently turn to strategies that affect larger numbers of patients.

At the same time that the reimbursement system in New Jersey was being established, the state's professional review organizations (PROs) were strengthened and reorganized. (This took place three years before changes in the national system.) They scrutinized most admissions against specific length-of-stay norms. Nurse evaluators, backed by physician advisory committees, made frequent phone calls to high utilizers, asking for justification of patient stays. Although their ultimate sanction—to deny payment for added days—was rarely used, they caused considerable physician consciousness on this issue.

PROs achieved this result in New Jersey because they were usually structured as county-wide agencies, no longer under direct hospital control. In some hospitals the PRO norms were notably inconsistent with the average length of stay for particular DRGs, and physicians complained about the conflicting standards. Some administrators found the situation convenient, as it allowed them to blame the federal government for the pressures on hospital use.

Reductions in length of stay were also the result of national changes in medical practice that affected specific DRGs (Sloan and Valvona 1986). Like health facilities in the nation as a whole, New Jersey hospitals encouraged more preadmission testing prior to hospitalization, which in turn stimulated the growth of outpatient diagnostic services. Other diagnostic tests are being clustered on the first or second hospital day, instead of sequentially. Administrators have also expanded sameday surgery facilities. Between 1981 and 1983, the volume of sameday surgery grew by 70 percent among the largest 30 DRGs where there is a same-day surgery option (New Jersey State Department of Health 1981–1984).

Although our interviews and our data base show little sustained administrator pressure on the details of medical treatment, we found that length of stay is subject to administrative influences. Many hospitals found that the length of stay for high-volume DRGs (e.g., uncomplicated delivery, uncomplicated myocardial infarction) was the most reliable and understandable number in DRG profiles. By monitoring these DRG profiles, hospital administrators could suggest length-of-stay norms and encourage physicians to comply with them. But small length-of-stay reductions do not seriously threaten professional prerogatives, and hospital sensitivity to length of stay affects social workers and lab schedules more than physicians. Discharging the patient a day or two earlier is consistent with a long-standing national trend, and far different from altering the physicians' detailed treatment patterns.

New Jersey hospitals increasingly found that it was useful to create or expand the position of chief of the medical staff to interpret their concerns about length of stay to attending physicians in a legitimate professional manner. The newly appointed chiefs were often local practitioners, in semiretirement from clinical practice. They would usually be given the task of reviewing the length-of-stay profiles with some of the high utilizers, but follow-up was erratic. The inherent need of hospitals to cultivate affiliated physicians limited the degree of administrative pressure that they were willing to exert.

DRGs as Management-control Systems

Advocates of DRGs believed that even if hospitals did not adopt casemix accounting and control systems on their own, the DRG reimbursement would finally provide the necessary economic stimulus. Administrators would be forced to examine utilization of services within their hospitals and to implement management-control systems similar to those employed by manufacturing firms. We found, however, that DRGs were not utilized in the average hospital as an integral part of its management-control system. It seems that there are far easier ways to save money. Indeed, the more financial pressure a hospital felt, the more likely it was to turn to traditional revenueenhancing and budget-cutting methods.

DRG proponents have argued, though, that the experience of the typical New Jersey hospital is not a fair test, as the financial constraints were not really onerous, and the DRG incentives were greatly watered down. Detailed interview information from specific New Jersey hospitals addresses the question of running a DRG-style internal-management system. Several of the suburban hospitals with reputations for aggressive

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management experimented with DRG data systems. The data gleaned from DRG accounting were discovered to be imprecise and often irrelevant to allocation decisions.

The administrators of these hospitals found the cost data attributed to each DRG to be particularly wanting. The DRG system, by linking costs to specific outputs, demands financial data far more precise than was ever collected before. But calculating the cost of every major activity in a hospital requires the use of accounting consultants and is very expensive. Most hospitals have been forced to rely on their existing charge schedules, developed for reimbursement rather than analysis purposes, as proxies for actual costs. When these schedules are examined closely, they invariably prove to be inaccurate.

The failure to take account of patient severity adequately within the DRG groups also limits their usefulness for management information (Horn and Sharkey 1983; Young and Saltman 1982). DRG advocates have argued that severity should average out and not affect total reimbursement. But it does not average out within the hospital when individual physician profiles are created. Even if an entire year's data are accumulated, a few atypical cases can skew a physician's average. When these individual cases are eventually reviewed, the physician can contend that this information is not useful. At one suburban hospital, the senior, most respected surgeons appeared on the list of highest resource utilizers (i.e., greatest "money losers"). It turned out that there is an internal referral process, so that they receive the toughest, most costly cases.

Just which physician should be held responsible for costly cases remains unsettled within the system. The computer usually assigns patient costs to the admitting physician. But internists protest that when a patient is eventually transferred to surgery, the charges should also be transferred. The surgeons note that these same patients have longer lengths of stay because of the time before they reached surgery. Similar problems appear when tests or drugs were ordered by residents, rather than the admitting doctor. DRGs have trouble sorting out the shared-treatment responsibilities that are so common in hospitals.

Some administrators still compile and circulate DRG profiles to affiliated physicians. The language of business has been absorbed into the hospital culture, producing frequent reference to terms like strategic planning and cost control. But potential opposition from members of the medical staff leaves administrators unwilling to insist on the changes that the profiles or the terms might suggest (Young and Saltman 1982). Even if DRG data were to improve significantly, it is highly unlikely that power relationships within hospitals would be altered. All organizations dependent on a single profession for the control of crucial uncertainties tread lightly on the authority of that profession (Sapolsky 1967; Rose 1972).

Conclusions

The use of DRG-based prospective reimbursement did not alter the management objectives and structure of New Jersey hospitals. Affiliated physicians were not required to change the core of their practice patterns significantly. Rather than challenging the prerogatives of physicians, New Jersey hospital administrators sought to preserve them. Administrators found that standard measures such as legislative lobbying, bargaining with regulators, better record keeping, and the development of new revenue sources were generally sufficient to protect the financial balances of their hospitals. Their strongest intervention was simply to reinforce a national trend toward lower lengths of stay and this was done without confronting physicians over detailed treatment regimens.

We believe that Medicare's DRG-reimbursement system will produce no different management effects even though the system varies considerably in detail from that applied in New Jersey (Vladeck 1984). The theory underlying DRG-induced efficiency assumes a greater restraint on hospital revenues than rate setting is likely to achieve. The contradictory nature of health-system goals prevents the imposition of revenue levels that would force a realignment in hospital management. Although rate regulators may wish to encourage hospitals to become more cost conscious, they are fearful of adversely affecting access to care and the quality of medical treatment and, thus, are not willing to test the limits of their rate-setting powers.

Without the prospect of persistent deficits, hospitals lack the motivation to shift decision-making authority from physicians to administrators. Hospital administrators themselves accept the current division of authority between financial and clinical affairs, considering it functional to patient-care objectives. Because hospitals are not profit maximizers, the opportunities to accumulate surpluses that DRG rates may offer are not sufficient to induce a search for clinical savings. Only the threat of financial failure can precipitate action and, even then, administrators are likely to explore fully routine methods for regaining solvency before considering clinical changes.

The reluctance to intervene in detailed treatment decisions is understandable. The care of individual patients is the domain of physicians who hold both legal and organizational responsibility for coping with the substantial uncertainties involved. In many instances, physicians are in disagreement about the value of particular therapies. When the path to efficacious care is unclear, so too is the path to efficient care.

DRG system designers saw a manufacturing analogy in hospitals where there is none. In only the limited statistical sense of their diagnosis categories do hospitals produce standardized products. The permutations of services available to hospital patients are large, with the selection of particular combinations left to the judgment of individual physicians. DRG reporting systems can detect differences in physicians' selection patterns, but offer only criteria for determining what is the average, not what is the best or most efficient pattern.

Prospective reimbursement arrangements are useful in highlighting a growing concern about the costs of hospital care and, if sufficiently stringent, may even constrain expenditures. Under both prospective systems—SHARE and DRGs—New Jersey's cost increases were somewhat below national averages. But in each system it was the overall budget cap of prospective rate setting that was the serious motivator for administrators. The expenditures constrained under a cap are more likely to be the ones traditionally controlled by administrators, not those controlled by physicians. The organizational structure carefully separates financial and clinical responsibilities in order to provide a stable, administratively protected environment for the uncertain practice of medicine. Until either the state of medical knowledge becomes much more certain than it is or the financing of hospital care much less certain than can be expected, this division of labor is likely to persist, DRG incentives notwithstanding.

Appendix: Data and Methods

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The data for this study were gathered through two methods: statistical analysis and interviews. We conducted semistructured interviews with

doctors, nurses, DRG coordinators, finance officers, and administrators at 16 New Jersey hospitals, distributed by size, geographic location, patient mix, ownership, and management reputation. We also interviewed state and federal officials, insurers, local employers, and hospital and physician groups.

The statistical data were derived from the American Hospital Association surveys from 1972 to 1985 and the New Jersey State Department of Health SHARE cost and utilization reports from 1979 to 1984. In addition, we performed analyses on a data file maintained by the New Jersey State Department of Health and formally known as the uniform bill-patient summary (UBPS). The annual reports collected by the American Hospital Association include information on hospital facilities, utilization, finances, and personnel. The New Jersey State Department of Health's SHARE reports are standardized accounts of financial performance and patient-volume data collected on an annual basis. The American Hospital Association and SHARE reports contain data for 93 of New Jersey's 97 acute-care hospitals and were audited in order to correct for reporting errors.

The UBPS data contain both clinical and billing information for each discharge and are used in New Jersey to assign patients to DRG payment categories. All UBPS records were included in the analysis with the exception of patients who left against medical advice and those who were transferred to other facilities. Data for 87 of the 93 New Jersey acute-care hospitals paid under DRGs were included in the UBPS sample and the hospitals selected had complete data for the study period.

Each UBPS patient record includes an account of hospital utilization by clinical service. Utilization is measured by charges, and services are grouped into clusters called cost centers. Hospital charges were transformed to costs using hospital- and cost-center-specific cost-tocharge ratios. In addition, all financial data were deflated to 1980 dollars using cost-center price indices from the New Jersey Department of Health.

Our analysis provides a detailed summary of costs and utilization under New Jersey's DRG-based payment system. Among the measures examined were percentage surplus of gross revenue, case volume for specific DRGs, an aggregate case-mix index, costs per capita, costs per case, nursing hours per day, and average length of stay. Data were also presented on changes in routine care, intensive care, and ancillary costs. In most of the analyses, we compared measures in the pre-DRG period with the same measures in the post-DRG period. When a pre-DRG measure was not available, we examined trends between 1981—one of the first years of DRG implementation—and 1984, the last year for which data were obtainable. In addition to making pre- and post-DRG comparisons, we contrasted data from New Jersey with regional and national trends.

There are several methodological limitations in evaluating the effects of DRGs on hospital costs and revenues in New Jersey. First, it is difficult to have valid pre- and post-DRG measures because the DRG system was implemented over a three-year period. Hospitals were not only entering the system at different times, but they also varied in the degree to which they anticipated and planned for the reimbursement changes. Thus, it is hard to separate completely the effects of the previous per diem regulation (SHARE) from DRGs. We primarily analyze, however, the multiyear impact from all SHARE to all DRG for financial shifts rather than year-by-year transitions. In another article we use statistical techniques that account precisely for when each hospital entered the system, and it does not produce significantly different conclusions (Hsiao and Dunn 1987).

Second, by employing univariate statistical techniques, we were unable to control fully for all of the supply and demand factors that might confound our results. We tried, however, to be sensitive to the effects of changes in case mix, population, prices, case volume, and technology on our analyses. We also used our interview data as a check against our statistical findings. Moreover, our conclusion that rate setting has had only modest effects on hospital costs is consistent with past research (Eby and Cohodes 1985).

A third limitation of the analysis is the use of costs or charges as a measure of service utilization. Costs-per-case trends can reflect both a change in the quantity of a clinical service provided per admission and a change in the service production function. Routine and intensive care unit days per case were presented in the results, but comparable measures of ancillary utilization were not available. Despite their imperfections, hospital charges or costs can serve as weights for the units of lab tests, radiological procedures, etc., and are the best proxy measure for ancillary resource use available for this study.

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