Medicare's prospective payment system: A critical appraisal

by Robert F. Coulam and Gary L. Gaumer

Implementation of the Medicare prospective payment system (PPS) for hospital payment has produced major changes in the hospital industry and in the way hospital services are used by physicians and their patients. The substantial published literature that examines these changes is reviewed in this article. This literature suggests that most of the intended effects of PPS on costs and intensity of care have been realized. But the literature fails to answer fundamental questions about the effectiveness and equity of administered pricing as a policy tool for cost containment. The literature offers some hope that the worst fears about the effects of PPS on quality of care and the health of the hospital industry have not materialized. But because of data lags, the studies done to date seem to tell us more about the effects of the early, more generous period of PPS than about the opportunity costs of reducing hospital cost inflation.

Introduction

The implementation of the prospective payment system (PPS) has produced major changes in the hospital industry and in the way hospital services are used by physicians and their patients. Hundreds of researchers and policy analysts have written about the consequences of PPS and commented on the principles of health care policy that PPS embodies. Our purpose here is to review this large body of work as it contributes to our understanding of:

- The effectiveness of programs of administered pricing in controlling spending and maintaining equity across the hospital industry.
- The relative importance of payment stringency, payment incentives, and the regulation of admissions in the pattern of effects seen to date.
- The extent to which payment controls have resulted in improved operational efficiency—or if not, whether hospital finances or patient care have been compromised.

As a policy for hospital cost containment, PPS represents a bundle of ratesetting principles that are fairly well understood but are certainly not universally admired. The components include administered prices rather than market forces, national base rates rather than hospital-specific rates (i.e., a policy of equalizing rates rather than equalizing pressure), and a per case payment unit rather than payment per day, per service, or per procedure.

When PPS was implemented, there were strongly held expectations among promoters and skeptics. Promoters of the policy hoped that payment reductions would be matched by lower levels of spending through reduced lengths of stay (LOS), reduced intensity of care, and more efficient hospital operations. Promoters presumed this could occur without financial collapse or compromises in patient care, as large volumes of "slack" were used up (unproductive resources reallocated, unnecessary ancillaries and days eliminated, and so on). So long as hospitals had been reimbursed their costs, they faced few incentives to provide efficient care. PPS gave hospitals new incentives to operate economically.

But there were also skeptics. If hospitals faced new incentives for efficiency, there were serious questions as to whether they faced just the right incentives. An additional test or day of hospital care became costly under PPS, whether medically justified or not, and the narrow financial incentive was the same in either case to eliminate the added cost. Although hospitals would not necessarily strike the wrong balance between patient well-being and their income statements, there was nothing intrinsic to the PPS structure to guarantee that the right balance would be struck.[1] While PPS assumed that hospitals and physicians practiced inefficiently, it also assumed that hospitals and physicians would successfully mediate between conflicting pressures to enhance patient well-being and to contain costs. However, there necessarily were fears that the changes in practice patterns induced by PPS would be harmful—that changes in practice patterns would harm patients or, to the extent that hospitals resisted purely financial incentives and maintained quality care, that hospitals would suffer financially. Without pre-existing slack, PPS might well force a choice between survival of the institution and quality of patient care. Indeed, this choice is at the core of any system of incentive payment for hospitals: the "carrot" of being able to keep surpluses and the "stick" of failing to survive.

This issue of tradeoffs was of most concern to those worried about the phase-in to national rates. National rates would create a large number of losing hospitals—hospitals with high costs relative to the payment rates. If insufficient slack were available to these hospitals, they might either fail (which could reduce access) or cause quality of care to suffer.

This work was supported by Health Care Financing Administration Contract Number 500-88-0035. The views expressed herein are those of the authors alone.

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[1] This assumes we could know what the right balance was. Among other things, there is a striking absence of information about what medical services produce what outcomes for a surprisingly large array of practices. As others (e.g., Russell, 1989; Lohr, Yordy, and Thier, 1988) have noted, if we do not know the point at which additional expenditures bring no further benefits, then we cannot know when cost controls begins to threaten patient well-being or harm the quality of patient care. It is thus difficult to know precisely what changes in practice patterns should be and, in turn, what structure of incentives a payment system should establish for health care providers.

The literature on PPS is as large and diffuse as we had anticipated in an earlier article (Gaumer, Glazier, and Cowen, 1987). Most of it is descriptive of trends, and most of it utilizes the same common national data sources (e.g., Medicare Cost Reports, American Hospital Association [AHA] annual survey data, Commission on Professional and Hospital Activities [CPHA] discharge abstracts, and Medicare Provider Analysis and Review Files [MEDPAR]). Only small portions of the literature use research approaches other than pre/post designs or test hypotheses about particular population groups or hospital types. For practical reasons, we will limit ourselves in this review to a discussion of the published literature, with occasional reference to unpublished material with which we are familiar.

The literature is more impressive for its size than for its value in understanding how PPS works and the patterns of its effects. There are a number of reasons that must be kept in mind as to why our understanding of PPS and its effectiveness as a cost-containment device is limited. These caveats are common in the literature we review but need to be restated. The most important qualification of the literature stems from the fact that PPS was implemented as a national program rather than as an experiment or a demonstration. Unlike the prior research on prospective payment, which dealt with the impacts of State hospital ratesetting programs, PPS implementation offered analytical leverage only through pre/post-implementation comparisons, and comparisons with four waivered States (Maryland, Massachusetts, New Jersey, and New York). The pre/post comparisons that pervade the literature we review offer substantial threats of temporal confounding to factors that include, among others: the widespread adoption of surgical and other invasive technologies that tend to favor outpatient care; the widespread implementation of managed-care programs in the private sector; and the liberalization of home care, nursing home, and hospice benefits for Medicare in the early 1980s. The number of years available for study has also been limited, largely because of delays in the availability of the most popular forms of administrative records. As we begin the ninth year of PPS, the bulk of the published literature on PPS effects is based on no more than the first 3 or 4 years of PPS experience. This short history limits our ability to observe the consequences of behavioral change among administrators, beneficiaries, and physicians. In particular, we would like to understand how persistent controls on payment affect patterns of spending, clinical practice, and management that we observed in State ratesetting programs (Coelen, Mennemeyer, and Kidder, 1986). But given the short period of time covered by most of the PPS literature, the one-time, initial effects of implementing PPS are more readily observable in this literature than are the consequences of persistent stringency in payment rates.

A final and not insignificant caveat in this literature stems from the levels of the initial payment rates. Widely conceded "overpayment" in the first year of PPS created a situation in which margins were increasing as expenses per case were dropping, due to large reductions in lengths of stay. This not only made the first year a somewhat aberrant intervention, but armed most hospitals with an unanticipated source of disposable funds, and probably altered expectations as well. Consequently, the first-year windfall may itself be an intervention that generated a stream of effects that are confounded with the incentives of PPS. Although the effects of the windfall certainly diminished over time, the years that are studied in most of the research we review are subject to the effects of the windfall and the transitory use of very restrictive updates in the next few years.

To review this research, we have divided our discussion into five substantive areas. We begin with a discussion of the financial effects of PPS on hospitals, focusing primarily on the mechanisms by which changes in expenditures and financial conditions occurred. We then examine the substantial literature on the effects of PPS on practice patterns. The next area discussed covers the financial impacts of PPS on the Medicare program and Medicare beneficiaries, followed by a look at the various potential PPS effects on the health care industry, including effects on other payers, the diffusion of new technologies, and other concerns. Finally, we review the literature on the effects of PPS on the quality of patient care, offer a series of conclusions about the effectiveness of PPS as a hospital cost-containment policy for Medicare, and suggest useful priorities for future research in this area.

Hospital finance

The central objectives of PPS were to reduce rates of increase in Medicare inpatient payments and in overall hospital cost inflation. These aims were expected to be achieved through a combination of three key elements of the PPS program:

- By the marginal incentives of a per case rate-to-rate payment system, which put hospitals at financial risk for inefficiency and unnecessary intensity and allowed hospitals to retain the gains from lower costs and more efficient operations.
- By the financial stringency for higher cost hospitals of a program that controlled rates of increase in payment amounts and that gradually shifted hospitals from their own cost history to national rates.
- By regulatory controls on admission rates by peer review organizations (PROs).

The foundation for this policy package was a decade of incentive ratesetting in the States (Coelen, Mennemeyer, and Kidder, 1986; Schramm et al., 1987). That experience showed that a wide range of approaches to binding revenue control was able to slow inflation rates in hospital expenses by 2-4 percentage points per year; that these effects were the result of persistent controls on inflation rates, not just one-time effects; that the per case unit of payment created strong volume effects, which made the net effects of ratesetting smaller than would have occurred if volumes had been controlled; that excluded payers shared in the financial benefits of administrative ratesetting, but to a lesser degree than the payers for which the rates were binding; that hospital and other administrators were unable (or unwilling) to reduce rates of increase in expenses by as much as rates of increase in revenues (payments) had been reduced, thereby causing reduced margins; and (according to some evidence) that ratesetting may have had small adverse

Table 1

Summary of the effects of the prospective payment system (PPS) on hospital finances

Area of effect	Principal finding	Secondary findings	Important industry differences
PPS margins	Initial windfall increases (PPS 1, 2) followed by reductions through PPS 6, at which point more than one-half of hospitals have negative PPS operating margins; only large urban teaching hospitals are positive as a class.	Volumes, higher case mix, large, urban, teaching, and low base costs are key to high Medicare margins.	Margins not declining for winners. Losers' margins are deteriorating
Total margins	Falling, but flattening after PPS 3, with general rise in margins for all business except Medicare inpatient.	Small hospitals have low non-Medicare margins and cross-subsidize from Medicare.	Margins less likely to fall for less pressured hospitals, who do less to control costs.
Other financial indicators	General decline in industry liquidity and increase in indebtedness.	Increase in assets per bed.	
Closures	Closure rates not influenced by PPS payment rate pressure.	—	Small hospitals most vulnerable. Closure rates comparable in urban and rural areas.
Hospital expenditures	Reductions in the rate of increase are substantial and not restricted to the first year, or simply to the effects of admission declines, or to Medicare alone.	Cost containment was muted by windfall payments (profits) in PPS 1 and 2 and by failing to equalize pressure (national rates).	Cost containment most pronounced for highly pressured hospitals.
Sources of hospital efficiency and productivity	Improved efficiency early due to decreases in intensity and length of stay, along with wage cost increases and higher productivity.	Efficiency reversal after PPS 2 due to increases in intensity and non-labor costs that are larger than gains in labor productivity. Early excess profits may also promote subsequent spending growth.	Improvements greatest in pressured hospitals.

NOTE: PPS followed by a number indicates a particular year under the system; e.g., PPS 1 is the first year of PPS.

SOURCE: Coulam, R.F., and Gaumer, G.L., Abt Associates, Inc., Cambridge, MA.

effects on patient outcomes (Shortell and Hughes, 1988; Gaumer et al., 1989). With several exceptions, this pattern of effects is similar to what we find in the literature on PPS. Indeed, in many ways the PPS literature confirms what was already known about hospital incentive payment as a cost-containment policy. We return to this point later.

For convenience, Table 1 summarizes the basic findings of the literature concerning the effects of PPS on hospital finances. That literature is in general agreement on a few central descriptive results. Specifically, there were:

- Initial windfalls in the first year of PPS (PPS 1) as a result of higher-than-planned PPS payments.
- Modest annual increases in payments after PPS 1, caused by small updates and increases in the case-mix index (CMI).
- Initial large cost reductions in PPS 1 because of reductions in length of stay, followed by a return to nearly double-digit inflation thereafter.
- High initial profits on Medicare cases that declined over time, as Medicare costs grew faster than Medicare payments.
- Steady hospital profits in PPS 4 and after, even as PPS profits have continued to fall.
- Higher rates of closures and mergers in the years following the introduction of PPS.

The most important issues in the literature on hospital finances under PPS concern the causes and implications of this agreed pattern of basic results.

Expenditures in hospitals

Russell (1989) notes that Part A trust fund payments have been growing at a slower rate since the start of PPS, with savings cumulating to around 20 percent by 1990 (or a saving of slightly less than 3 percentage points on the rate of increase).[2] But for PPS to be successful in the longer run, not only must Medicare payments be reduced, but inflation in hospital expenses must be slowed. All but one early study suggest that expenses grew at a slower rate under PPS. (The exception is Sloan, Morrisey, and Valvona [1988b], who find that volume reductions explain all reductions in expenses, with no net efficiency effects.) Studies of expenditures in hospitals during the first year or two of PPS found significant reductions in cost per admission for hospitals that were pressured,[3,4] and for the aggregate of all hospitals under PPS.[5] The measured effects in these studies are quite large, though consistent with the initial large reductions in LOS. Adding to the apparent validity of these large initial effects is the fact that the three Urban Institute/

[2]Evidence from Coelen (1991) described later shows that this revenue effect has largely been exacted from high-cost hospitals.

[3]Robinson and Luft (1988) use percent Medicare payer mix to define a "high-pressure" group that had spending increases 16 percent lower than the "low-pressure" group.

[4]Feder, Hadley, and Zuckerman (1987) and Hadley, Zuckerman, and Feder (1989) show that the hospitals expected to lose the most through the phase-in to national rates have lower rates of increase in expense per case and slower declines in admissions.

[5]Hadley and Swartz (1989) and Feder, Hadley, and Zuckerman (1987) find estimates of expenses 12-13 percent lower as a result of PPS in the first year alone.

Table 2
Rates of increase in hospital expenses

Cost element	Time period					
	TEFRA PPS 1	PPS 1-PPS 2	PPS 2-PPS 3	PPS 3-PPS 4	PPS 4-PPS 5	PPS 5-PPS 6
	Percent					
PPS operating expenses	–4.6	4.2	5.7	7.4	11.8	10.8
PPS operating expenses per discharge	1.9	10.4	9.7	9.0	10.6	9.7
Market basket	4.9	3.4	3.1	3.6	4.8	5.4
FTEs	–2.5	–0.8	1.0	2.7	2.8	3.0
Compensation per FTE	7.2	4.4	3.2	3.7	7.1	6.5
CMI	2.4	3.1	2.0	1.8	6.1	2.7
CMI-adjusted intensity	–2.6	–2.2	2.4	2.5	1.6	0.8

NOTES: TEFRA is Tax Equity and Fiscal Responsibility Act of 1982. PPS is prospective payment system. FTE is full-time equivalent. CMI is case-mix index. The abbreviation PPS followed by a number indicates a particular year under the system, e.g., PPS 1 is the first year of PPS.

SOURCES: (Prospective Payment Assessment Commission, 1990b, 1991b).

Georgetown studies (Feder, Hadley, and Zuckerman, 1987; Hadley, Zuckerman, and Feder, 1989; Hadley and Swartz, 1989) use entirely unique data sets and methods, but still yield consistent findings for the first year of PPS. The large declines in admission volumes appear to have contributed, but in a minor way, to total expenditure reductions, making the expenditure reductions somewhat larger than the efficiency gains alone.[6]

Most of the research on expenditures is consistent as to sources of the effect, but most studies observe only the first year or two of PPS—a period when sharp LOS reductions occurred and little financial pressure was applied. During the first 3 years of PPS, inflation in hospital expenses per adjusted discharge (and Medicare operating expenses per discharge) were reduced about 5-7 percentage points from pre-PPS, double-digit levels (Prospective Payment Assessment Commission, 1991a; Cromwell and Puskin, 1989).[7] Cromwell and Puskin (1989) attribute this decline to:

- A slowdown in the rate of increase in wages per hour (75 percent of the decline).
- A slowdown in intensity growth including LOS (9 percent).
- Improved productivity in producing hospital services (16 percent).

Trend data in Table 2 indicate that rates of increase in staffing and compensation declined early in PPS, then eventually rose. ProPAC (1991a) data show a similar pattern: a substantial slowdown in the rate of increase in salary and in benefit expenses (per full-time equivalent, or FTE). This slowdown began with limits established by the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) and continued through 1987 at modest levels, with the levels rising again thereafter. Sloan, Morrisey, and Valvona (1988b) also find a significant PPS efficiency effect on labor costs per case for the first 2 years of PPS.

A study by Hadley, Zuckerman, and Feder (1989) demonstrates that the expenditure reductions and other outcomes are moderated in the second year. The authors interpret this to mean that incentive effects were one-time only, and pressure was required to achieve continuing savings. The trend data support the view that the magnitude of savings has been dissipating over time, even if effects are somewhat more extended than one-time only. The trends in expenditures (Table 2) suggest that inflation in PPS expense per case has remained at 9-11 percent per year from PPS 1 through PPS 6 (well above the market basket inflation rate); by contrast, over the same period, the initially reduced rate of inflation in overall hospital expenditures has not been sustained.

There is some evidence that clinical and general productivity in hospitals improved under PPS and may still be improving. Using AHA survey data, Cromwell and Pope (1989) note that total-factor productivity and labor productivity in hospitals improved in the TEFRA-PPS 2 period. Depending on output measure (days, cases, charges), the improvements after the enactment of TEFRA represent absolute improvements in productivity (if charges are used), or a slowdown in the rate of productivity decline. Using entirely different data and productivity measures based on case-mix-adjusted episode outcomes (from the Professional Activity Study [PAS] of the CPHA), Long et al. (1987) confirm a clinical productivity improvement. For 49 diagnosis-related groups (DRGs), these authors demonstrate a substantial reduction in inputs per unit output in the first year of PPS. (Pharmaceutical usage is the exception.) They also note that the output measure—the episodes of care considered completed—was lower after the introduction of PPS; but the reduction in inputs was even larger, causing an overall improvement in clinical productivity.

ProPAC (1991a) notes that the rate of increase in intermediate productivity (services per FTE) has been rising slowly since PPS 3. This pattern, and the patterns in Table 2, seem to suggest a sharp initial increase in efficiency resulting from a reduction in growth rates of intensity (length of stay) and in salary and benefits, followed by continuing restraints on labor costs and improved labor productivity. The return to higher rates of inflation seems to be a result of higher rates of fringe and salary increases and a sharp increase in the pace of both the CMI and CMI-adjusted intensity after 1985.

[6]Looking at Part A payments, Russell (1989) estimates that one-third (1 percentage point) of the 1984-90 reduction is the result of admissions declines. Hadley and Swartz (1989) estimate that the reduction in inflation rates is 1.5 percentage points larger because of admissions declines.

[7]These sources use different data. The Prospective Payment Assessment Commission (ProPAC) (1991a) uses Medicare Cost Reports, while Cromwell and Puskin (1989) use AHA/HAS (Hospital Administration Studies) Monitrend panel survey data.

Table 3

Margins in chronically high- and low-margin hospitals

Characteristic of hospital	Average PPS margin, by year		
	PPS 3	PPS 4	PPS 5
Urban hospitals		Percent	
Chronically low margin*	–9.4	–15.9	–24.1
Middle margin	8.6	5.2	0.3
Chronically high margin**	22.0	20.9	19.2
Rural hospitals			
Chronically low margin*	–23.4	–28.6	–33.4
Middle margin	0.8	–1.1	–2.6
Chronically high margin**	18.1	17.9	17.6

*Lowest quartile of margins in each PPS 3, 4, and 5.
**Highest quartile of margins in each of PPS 3, 4, and 5.

NOTES: PPS is prospective payment system. The abbreviation PPS followed by a number indicates a particular year under the system, e.g., PPS 1 is the first year of PPS.

SOURCE: (Prospective Payment Asessment Commission, 1991a).

Margins

Profit margins are important measures of hospital financial condition. The combined effects of very modest annual update factors and the complete phase-in to national rates by PPS 5 have led to a situation in which a majority (57 percent) of hospitals earned negative margins on Medicare inpatients by PPS 6. During this period, total hospital margins have fallen and stabilized at levels that are similar to those in 1980, which were higher than margins during the 1970s. (For a discussion of this trend, see Russell, 1989.)

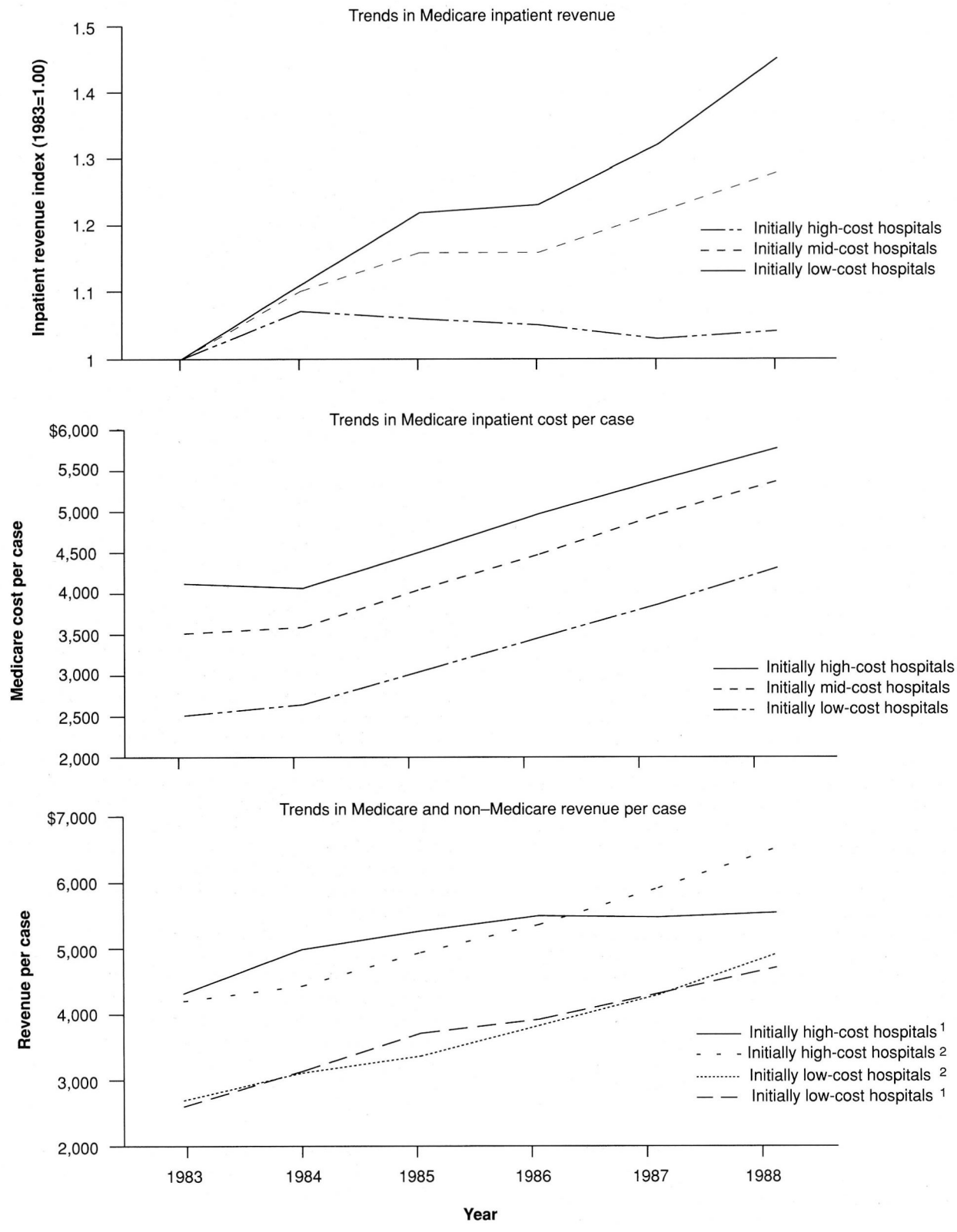
Although many analysts look to variously defined profit trends as "gold standard" evidence of the sufficiency of payment rates, there are many reasons to doubt the importance of such measures. First, research certainly does not directly support a view about levels of margins (PPS or facility) as being too high or too low, because it is not possible to say whether hospitals are operating at maximum efficiency, or if PPS payment levels reflect the "most efficient" level (Russell, 1989). Second, unlike margins in profit-oriented industries, margins for hospitals are largely means, not ends. Their level may not reflect anything about an institution's welfare in a given period, its success in operations, its ability to attract funds from external sources, or the security of top managers in their positions. Finally, the massive reorganizations and product-mix changes occurring in the industry in recent years likely alter the necessary rate of return for these organizations, in comparison to the hospital industry of the 1970s or early 1980s. Among other things, we would expect overall margins to settle at a somewhat higher level in the industry under PPS than under cost reimbursement, because hospitals are assuming more business and financial risk.

There is interesting and important new evidence that the distributions of margins are diverging across the industry, stemming from differential PPS payments and a failure of expenditures to realign across hospitals so that margins are the same. Recent work by both ProPAC (1991a) and Cromwell and Burge (1991) demonstrate a lack of year-to-year profit convergence. Suggestive data are shown in Table 3. Essentially, the winners (hospitals with consistent high margins) did not experience the declines in margins of the typical hospital, and the losers experienced continued declines.

The bifurcation of PPS margins may be a telling fact about the cost-containment success of PPS. As Coelen's (1991) graphic analysis indicates (Figure 1), the hospitals entering PPS with the highest base-year costs per case reduced costs more than the lowest cost hospitals and experienced virtually no increase in PPS revenues per case through the phase-in period. (Coelen uses a threshold of 20 percentage points above the mean to define the high-cost group; the low-cost group has a threshold 20 percentage points below the mean.) The more rigorous econometric work on the early years of PPS by other researchers from the Urban Institute and Georgetown first pointed to the fact that hospitals pressured by payment rates under PPS (i.e., high-cost hospitals) exhibited more aggressive responses to improve financial performance, in terms of cutting LOS, reducing rates of inflation in expenditures, and avoiding larger reductions in admission volumes (Feder, Hadley, and Zuckerman, 1987; Hadley and Swartz, 1989; Hadley, Zuckerman, and Feder, 1989). Examining the first 2 years of PPS, these researchers also found that these differences in response, coupled with the regional rate blend, led to significant differences in margin trends between pressured and not-pressured hospitals. Changes in profit margins were favoring the latter group of facilities, which were taking less aggressive action to improve financial performance. This pattern of evidence suggests that pressure drives discretionary behavior, but profits accrue as windfalls on past cost levels, or to other facility and market characteristics. The pattern has been widely confirmed in every study that has examined differential hospital performance resulting from differential pressure.[8] Across these various pressure

[8]Studies of actual winners and losers have been done (Coelen, 1991; Prospective Payment Assessment Commission, 1991a), as have studies of expected winners and losers (Cromwell and Burge, 1991; Feder, Hadley, and Zuckerman, 1987; Hadley, Zuckerman, and Feder, 1989; Hadley and Swartz, 1989; Zwanziger and Melnick, 1988). Other studies of pressure examine hospitals where Medicare payer shares are greatest or least (Robinson and Luft, 1988).

Figure 1
Trends in Medicare inpatient revenue, cost per case, and revenue per case: 1983–88



[1] Medicare revenue per case.
[2] Non-Medicare revenue per case.
SOURCE: (Coelen, 1991).

indicators and studies using varied data sets,[9] there is a consistent pattern of findings.

These findings and their implications have become something of a literature themselves (see sources cited above, plus Lave, 1990; Oday and Dobson, 1990; Guterman, Altman, and Young, 1990). Can we say that only (or mainly) through pressure—rather than managerial incentives to accrue profit—do administered prices work to reduce hospital cost inflation? The work by Hadley, Zuckerman, and Feder (1989) makes the strongest case for this view. They find large initial effects, followed by diminished effects in the next year and conclude that these early effects are apparently the result of a large (one-time) fall in LOS, creating a large spending effect beyond the effects of TEFRA. (The expenditure effects of TEFRA incentives have been estimated to be about one-half as large as the first-year PPS effects [Hadley and Swartz, 1989].) Hadley, Zuckerman, and Feder also show that hospitals responded to changes in levels of pressure, whether they occurred in the first or second year of PPS, and regardless of the level of prior-year pressure. They conclude that "the initial, rather than the continuing, opportunity for profit has the bigger impact" and that "the slowdown in cost containment—or resurgence in cost increases—after hospitals' initial year on PPS raises questions about the system's long-term effectiveness."

This is strong evidence favoring a general "pressure matters" thesis. However, we cannot conclude that, if pressure had been placed on otherwise unpressured hospitals (i.e., low-cost hospitals), there could have been substantially more savings in hospital spending. It is true that Medicare outlays would certainly have been lower in these hospitals if equal pressure had been applied. But there is no evidence that unpressured, low-cost facilities could (or would) cut the rate of expenditure inflation if pressured. There is also no evidence that such facilities do not have as much inefficiency (slack) as others. If pressure had been equalized, would there have been as much pressure on the high-cost hospitals? If not, this literature certainly suggests that not as much would have been saved from these hospitals. Hence, equalization of pressure through some form of hospital-based rate (rather than a national blend) may allow more cost containment, or it may not.

Can we say why high rates of inflation returned? Hadley and coauthors offer two explanations for the resurgence in spending: first, that maximum efficiency had been attained; and second, that the original profit windfall was being expended in subsequent years. There is some evidence, albeit indirect, to support both explanations. Some research suggests that payment pressure may be able to generate cuts in resource use that are sufficient to reduce patient welfare, possibly buttressing the view that maximum efficiency has been reached. Work by Staiger and Gaumer (1990) and Cutler (1991) suggests that patient mortality outcomes in small hospitals and government facilities may be quite sensitive to variations in payment levels. Other types of facilities do not exhibit such sensitivity. This does not imply that PPS is creating a mortality problem, but that such facilities, for whatever reasons of structure and history, are vulnerable to variations in rates. These results, and the econometric work on margins by Cromwell and Burge (1991), emphasize how strongly total margins seem to be related to size (small facilities, low margins), thereby confirming the special vulnerability of small facilities to fixed payment rates. This vulnerability may result from the volatility of volumes within small pools of patients or from the low occupancy rates or limited revenue recovery alternatives these smaller institutions enjoy. At the same time, however, there is no evidence that other classes of institutions have exhausted slack, nor is there evidence for larger institutions of systematic variations in mortality to suggest exhausted slack.

There is some emerging evidence that excess payments may have fueled some of the early spending increases. This evidence also suggests limits to the marginal incentives to retain profits. But it really does not dismiss the role of marginal incentives in limiting losses. The Urban Institute and Georgetown authors, as well as Cromwell and Burge (1991), estimate models showing that profit levels are related to subsequent spending and margins, lending support to the view that the return of high inflation may have been caused by the national rate phase-in, as excess profits may have caused subsequent spending. That is, with a national rate phase-in, PPS may have had its own built-in self-limiting mechanism. Clearly, much of the windfall early in PPS resulted from overpayment, not rate equalization. Moreover, the initial return of higher rates of spending growth might well have been exacerbated by a pool of windfall profits.[10] The work by Hadley, Zuckerman, and Feder (1989) suggests that 30 cents of every $1 in excess profits will be spent in the subsequent year. This is roughly the order of magnitude of year-to-year profit retention as would be indicated by the Cromwell and Burge (1991) margin model. Unfortunately, there have been no studies of fund balances or investment behavior that would be able to show how retained margins might have been subsequently saved (or spent) apart from operations.

There seems to be little doubt that savings from unpressured (low-cost) hospitals could have been larger had rate pressures been greater. But could this practically be done, without reducing pressure on high-cost hospitals where most PPS savings occurred? Many would argue that rates be set on a hospital-specific base to accomplish this end. What is needed is a way of having payment differences better reflect efficiency differences—otherwise, hospital-based rates propagate inefficiencies (because inefficient hospitals receive relatively higher rates). One way to do this is to inspect and test base costs against reasonableness standards, as is common in some State ratesetting systems. This is likely to be too

[9]The data designs include: AHA annual survey data on individual hospitals (Hadley, Zuckerman, and Feder, 1989; Robinson and Luft, 1988); Standard Metropolitan Statistical Area (SMSA) aggregates of AHA data (Hadley and Swartz, 1989); Special Survey of Hospitals (Feder, Hadley, and Zuckerman, 1987); California financial and discharge data sets (Zwanziger and Melnick, 1988); and Medicare Cost Reports, combined with AHA data at the hospital level (Coelen, 1991; Cromwell and Burge, 1991; Prospective Payment Assessment Commission, 1991a).

[10]Interestingly, there is no apparent difference in the spending rates of investor-owned and non-profit institutions in response to PPS 1 windfall profits (Friedman and Shortell, 1988). We would expect higher retention rates (and lower spending rates) in investor-owned hospitals.

burdensome a process for Medicare, unless formula-generated limits are devised against which to test aggregate or line-item costs. The development of such formulae would be difficult; but if a formula could be written, its parameters could be used to adjust national payment rates directly. Work by Gianfrancesco (1990) suggests the nature of the bias in the current set of PPS adjusters, and extensions of such work using expenditure models could be used to develop a more refined payment rate or to develop limit tests if hospital-specific payment rates are used.

The literature also provides evidence that poses an important issue about any conversion to a system that might equalize rate pressure through hospital-specific rates. The substantial evidence of differential changes in LOS, capacity utilization, and expenditures may be evidence that existing variations in efficiency (slack) are wide. Although hospital-based rates (and equalized pressure) might well have been a preferred cost-containment approach after a decade of cost reimbursement, a transition at this time (in the face of such strong evidence of differential behavior of winners and losers) poses severe equity problems for the transition. Whatever slack differentials have resulted since 1984 would be locked in, as indicated by the evidence developed by those researchers favoring a transition to hospital-specific rates.

Our final comment about the cost-containment potential of PPS concerns inpatient volumes. At the time PPS was implemented, volume control was seen by many policy analysts to be the most important problem of cost containment. However, unlike State ratesetting programs (Coelen, Mennemeyer, and Kidder, 1986), PPS effects resulting from incentives and pressure were probably augmented, rather than blunted, by volume changes. The per case incentives worked to reduce hospital use, and the decrease in admissions during the first few years of PPS (possibly because of PRO regulations) helped considerably. Whatever the relative effects of incentives and pressures on efficiency, it seems clear that the volumes policy embedded in the incentives and regulations of PPS did not detract from payment controls on hospital spending. It is also clear that volumes of Medicare admissions have fallen more slowly than non-Medicare admissions, possibly suggesting that the PPS incentive to increase admissions was, indeed, at work. ProPAC (1991a) reports that from 1979 through 1990, per capita admission rates for persons under age 65 decreased rather continuously from 134 per 1,000 to 78 per 1,000, a decline of about 26 percent. During this period, the 65-or-over population had admission rates peak at 431 per 1,000 in 1983, then fall by 16 percent in the next 3 years, stabilizing thereafter at a rate of about 360 per 1,000. This pattern suggests that PRO regulations accompanying PPS may have helped reduce social and other unnecessary admissions at the onset of PPS, but that Medicare admissions are increasing relative to those of other age groups because of the strong PPS payment incentives. Unfortunately, the literature we examine herein is inconclusive on this important point.

Closures

Closure rates represent a blunt, external measure of financial health of hospitals—a measure that is politically provocative as well. Closure rates have certainly been higher since PPS was implemented. As the U.S. General Accounting Office (GAO) (1991b) notes, the number of closures in the 4 years after PPS was double the number in the 4 years prior to PPS. About one-half of all closures in the 1980s were of rural hospitals, and 85 percent of all closures were for hospitals with fewer than 100 beds.

Multivariate models in two recent studies enumerate factors that predict closure. Although the models they use are different in many respects, both GAO (1991b) and Adamache and Hurdle (1991) concur that higher closure rates are associated with:

- Declining volumes (days or occupancy).
- Declining population or high unemployment.
- More competition.
- Small number of beds.
- More debt (Adamache and Hurdle only).
- Less severe case mix.
- Status as an independent proprietary hospital.

Case studies done by both groups also suggest that one part of the rural closure problem concerns physician availability. The loss of a physician creates volume and occupancy problems in small rural hospitals, which in turn reduce profits and raise the threat of closure.

ProPAC (1991a) concurs that competition from urban hospitals and volume and population problems were central to closures in rural places. ProPAC also notes that volumes of births, outpatient activity (surgical and medical), and the availability of high-technology services were lower in sole-county hospitals that closed than in other sole-county hospitals that did not close.

All serious studies conclude that PPS payment levels have not been an important cause for closure. PPS payment levels were higher for closing than non-closing hospitals (Adamache and Hurdle, 1991) and higher for Medicare than for non-Medicare cases in the closing hospitals (U.S. General Accounting Office, 1991b). Additionally, GAO concludes that Medicare-dependent facilities (hospitals at which Medicare days exceed 60 percent of all days) do not have higher closure rates; and Adamache and Hurdle similarly find no relationship between closure and Medicare's share of patient days. Both studies point to declining volumes and low occupancy rates as the cause for closure, relying on non-statistical arguments. Indeed, GAO (1991b) and ProPAC (1991a) both conclude, fairly decisively, that access to inpatient care has unlikely been seriously affected, even if PPS had caused the demise of these hospitals.[11] "It does not appear, therefore, that access to inpatient hospital care has been impeded by rural hospital closures, even in

[11] GAO notes that, in the affected rural areas studied, only about one-third of the Medicare inpatient care base was using the facility to be closed; and only 2 of 29 communities did not have an alternate hospital within 35 miles. ProPAC bases its work on a travel-time analysis. In places where the sole hospital closed, average travel time to the alternate source was 29 minutes. In places not having a hospital, the average was similar: 26 minutes. Moreover, average distance to a hospital with more than 100 beds was not significantly different for the two groups of places.

Table 4

Summary of the effects of the prospective payment system (PPS) on practice patterns

Area of effect	Principal finding	Secondary findings	Important industry differences
Inpatient hospital Admissions	Substantial, unexpected, and still-unexplained decline until 1987, when admissions stabilized or started to increase.	Admissions declines were selective by DRG, patient condition.	Declines started earlier, proceeded at a faster rate, in rural hospitals. Declines less at hospitals under greater fiscal pressure.
Length of stay	Initial, sharp decline in first year or two only.	LOS declines were across the board, not selective.	Declines less at hospitals under greater fiscal pressure.
Intensity of care	Decline or little change (results vary by attribute of care and by study).	Declines in intensity/admission offset (to an indeterminate extent) by increases in outpatient utilization.	—
Case mix/ severity of illness	Substantial increase in nominal case mix was the largest single factor in per case payment increases under PPS.	Case-mix increase due to flaws in original weights, hospital upcoding, and real severity increases. Upcoding errors tend to benefit hospitals.	Case-mix indexes higher for large, urban, and teaching hospitals; indexes increased faster for them.
Outpatient care	Shift in physician services to outpatient setting, drop in inpatient share of surgical services.	Outpatient surgeries and other procedures increased, as did outpatient visits associated with inpatient episodes.	Increases in outpatient visits less at hospitals under greater fiscal pressure.
Post-hospital care	Mixed evidence on whether SNF utilization increased. Clear evidence of increase in home health utilization.	HCFA administrative changes and provisions of the Medicare Catastrophic Coverage Act (since repealed) had large effects. Increase in severity for patients admitted to post-hospital care.	—
Exempt units/ facilities	Increase in admissions, suggesting some shift of admissions to exempt environment.	Many units/facilities benefit from PPS, do not seek exemption. Some surprises: e.g., larger LOS decrease for exempt than non-exempt psychiatric units.	Exempt units (compared with exempt hospitals) had greater percentage increase in number of admissions and facilities.

NOTES: DRG is diagnosis-related group. LOS is length of stay. HCFA is Health Care Financing Administration. SNF is skilled nursing facility.
SOURCE: Coulam, R.F., and Gaumer, G.L., Abt Associates, Inc., Cambridge, MA.

counties where the only hospital closed'' (Prospective Payment Assessment Commission, 1991a).

These studies do not rule out the possibility that PPS did affect closure rates.[12] Rural admission rates have traditionally been quite high; and post-1983 rates were substantially higher among small hospitals and rural populations than urban ones (Gaumer, 1989; Prospective Payment Assessment Commission, 1991a). This set of facts may be less related to the payment effects of PPS and more related to the regulatory aspects (PROs) and the relatively large declines in admissions in rural hospitals. Moreover, small institutions faced greater volatility in patient volumes (Gaumer, 1989), and the financial consequences of this volatility are not as well buffered by PPS as they would be by cost reimbursement. Thus, the incentives and regulatory aspects of PPS may have contributed to elevated closure rates, even if payment levels were not implicated. The literature does not confirm this possibility, but research on the levels of payment rates, updates, and Medicare shares does not rule it out.

Practice patterns

A second perspective for appraising the effects of PPS is to ask how PPS changed the practice patterns of hospitals and other providers of health care to Medicare beneficiaries. Changes in practice patterns were not the only objectives of PPS. But expectations of favorable changes in practice patterns constituted the core justification for the PPS idea: that the incentives of prospective payments would induce hospitals to practice more cost effectively. However, there necessarily were fears that the changes in practice patterns induced by PPS would be harmful: that changes in practice patterns would harm patients or—to the extent that hospitals resisted purely financial incentives and maintained quality care—that hospitals would suffer financially. The controversy surrounding the implementation of PPS fastened attention on these issues. If there was a score to be kept on the effects of PPS, it was in the first instance a score on how the practice patterns of hospitals and other providers changed.

A large literature has developed attempting to identify what the changes in practice patterns have been and what the implications of those changes are. This section focuses on what the changes have been, leaving most of the implications (e.g., for Medicare costs, hospital finances, and quality of patient care) for other sections of this review. The principal findings are summarized in Table 4. Our discussion is organized much as the literature is: in terms of how PPS affected each of the different types of providers in the system. We begin by discussing practice patterns in the hospitals themselves, where the first-order effects of PPS were expected to be felt.

[12] Adamache and Hurdle (1991) do demonstrate a statistically significant trend shift in closure rates starting in 1986, but they do not choose to conclude that PPS was a contributing factor.

Practice patterns in non-exempt hospitals

Studies of PPS' impact on hospital practice patterns have focused on measures of four principal issues: admissions, patient LOS, intensity of care within admissions, and the changing case mix for admitted patients.

Admissions

Because PPS established fixed payment amounts per hospital admission for each DRG, hospitals theoretically could enhance their revenue and margins by increasing the number of admissions for all DRGs for which payment exceeded the marginal costs of care. This tendency was judged to be sufficiently serious as to elicit the single major administrative procedure that accompanied the implementation of PPS: the establishment of PROs, assigned (in the first years of PPS) the task of monitoring hospital utilization, particularly for inappropriate admissions. In any event, some increase in admissions was expected to accompany the new procedure, particularly admissions of less seriously ill patients (Guterman and Dobson, 1986). Any such increases following the implementation of PPS would likely exacerbate the pre-PPS trend of annual admission increases (e.g., DesHarnais et al., 1987; Prospective Payment Assessment Commission, 1990a). Indeed, prior to PPS, Medicare admissions had increased steadily, with the annual increases never falling below 3 percent (Guterman and Dobson, 1986).

We reviewed more than 20 different studies that measured the effect of PPS on hospital admissions. Although the different studies measure admissions or discharges in different ways and are based on different data and methods, all but two of the studies (Sager, Leventhal, and Easterling, 1987; Smith and Pickard, 1986) find PPS associated with a decrease in admissions. (The two exceptional studies are small-area studies of select subpopulations.) For example, DesHarnais, Chesney, and Fleming (1988) find almost a 10-percent reduction in Medicare discharges in the first year of PPS (1984), as against the projected admission level for that year based on pre-PPS (1980-83) experience. Estimates unadjusted for pre-PPS trends typically find lower percentage declines (e.g., Guterman et al. [1988] report 3 straight years of absolute admission declines under PPS (fiscal year 1984-fiscal year 1986), with admission levels declining 3-4 percent per year on average and admission rates per Medicare enrollee declining more than 5 percent per year on average during the same period). Among the few studies with data after 1986, all show admission levels to have stabilized or to have begun to increase slightly by 1987 (Fisher, 1988b; Prospective Payment Assessment Commission, 1990a; Russell, 1989; Schwartz and Mendelson, 1991). As between medical and surgical DRGs, medical discharges began to decrease in 1983 and continued to decrease through 1986; by contrast, surgical discharges actually increased in 1984, but then decreased in 1985 and again to a lesser extent in 1986 (Fisher, 1988b).

Admission declines are estimated to have started earlier—and to have proceeded at a faster rate—for rural, as opposed to urban, hospitals (e.g., Prospective Payment Assessment Commission, 1990a). Admissions declines in rural hospitals thus began before PPS, because of exogenous factors, and PPS appears to have accelerated the trend. Meanwhile, the effects of PPS by region appear to have caused some convergence in admission rates: The rank order among the regions did not change, but there was a slight narrowing of the relative difference between the region with the highest admission rates (the South) and the lowest (the West) from 1983 through 1985 (Latta and Helbing, 1988).

These findings on admissions contradict initial expectations that admissions would increase under PPS. Perhaps the principal finding consistent with original expectations is that admission declines were less in hospitals that faced higher levels of fiscal pressure under PPS—thus suggesting that the incentive to maintain or increase admission levels was felt more strongly by hospitals perceiving a greater need for the added revenue (Hadley, Zuckerman, and Feder 1989). More generally, however, the findings on admissions were a surprise. Nothwithstanding that surprise, the reasons for the decline in admissions are not well understood. The most natural inferences are:

The PROs were effective in preventing or deterring marginal admissions—Although this inference is common (e.g., Eggers, 1987; Russell, 1989; Russell and Manning, 1989), there is in fact little published evidence to support it, and there are at least three reasons to be skeptical. First, PRO reviews cannot have had a direct effect on most Medicare admissions in studies of the first year of PPS. The principal reason for this is that the initial PRO contracts became effective over a 5-month period beginning in July 1984 (Office of the Inspector General, 1988), and PPS was implemented for the initial group of subject hospitals between October 1983 and September 1984. Given this relative timing, the PROs were operating during small parts of the first year of PPS for most hospitals. It is accordingly difficult to attribute admission declines in year one directly to the operations of the PROs. Second, published evidence fails to document large direct effects by the PROs. For example, even when the PROs were operating, the proportion of direct denials of preauthorization apparently was extremely small (less than 1 percent for the Connecticut PRO studied by Imperiale et al., 1988); and the rate of denials was related to declines in admissions only for relatively small hospitals, i.e., for hospitals with 350 beds or fewer (Hadley, Zuckerman, and Feder, 1989). Third, if the direct effects of the PROs seem unlikely to have caused the admission decline, it remains possible that the PROs indirectly reduced admissions through a sentinel effect. But no published study of which we are aware rigorously documents such an effect.

A second possibility: The assumption that hospitals faced an incentive to increase inpatient admissions may itself be wrong—On balance, for particular procedures at least, hospitals may have faced greater incentives to shift admissions to outpatient treatment, rather than to increase inpatient admissions. Changes in technology and medical practice permitted—and the PROs and Health Care Financing Administration (HCFA) regulations may have encouraged—such shifts (e.g., Eggers, 1987; Prospective Payment Assessment Commission, 1990a). The principal

evidence for this hypothesis is the large shift of inpatient procedures to outpatient settings that occurred under PPS. For example, DesHarnais, Chesney, and Fleming (1988) found that a decline in admissions for lens procedures accounted for 54 percent of the total decrease in Medicare admissions under PPS for a cohort of 646 CPHA hospitals. Data reported by Fisher (1988a) show ophthalmology to have contributed more than any other specialty to the shift in surgical procedures to outpatient settings. Guterman et al. (1988) report that inpatient lens extractions decreased by 300,000 from 1983 through 1985 (see also Russell, 1989). Latta and Helbing (1988) report large decreases in Medicare admissions for select DRGs from 1983 through 1985: DRG 39 (lens procedures, admissions down 75 percent), DRG 134 (hypertension, down 59 percent), DRG 183 (esophagitis, gastroenteritis, and miscellaneous digestive disorders, age 18-69, without complications or comorbidity, down 63 percent), and DRG 294 (diabetes, age greater than 35, down 35 percent). Changes in how hospitals coded DRGs after the introduction of PPS make any implications from these latter data tentative, and the controls in these studies for confounding effects are imperfect. These data document, however, that the admission decline under PPS was not uniform across DRGs, but was selective, in ways possibly reflecting incentives to increase outpatient treatment, rather than inpatient admissions.

Published studies do not permit definitive tests of the two hypotheses outlined above. Indeed, the problem is more complex than these hypotheses suggest. As discussed previously in the section "Margins" and in more detail by Russell (1989) and others, the decline in Medicare admission rates in the 1980s was less than the decline in non-Medicare rates. These results raise the possibility that changes in practice patterns that Medicare experienced may be "at least partly the consequence of forces that go well beyond prospective payment and its review mechanisms" (Russell, 1989). To be sure, the few studies that attempt to control for the experience of other payers, as well as for a more general class of health care system variables, still tend to find an independent effect for PPS on admissions (e.g., Hadley and Swartz, 1989, examining the impact of regulatory and other factors on hospital costs). But these studies leave us with little definitive understanding of why PPS had that independent effect. In the end, the biggest surprise of PPS—the admissions decline—is not well explained.

Length of stay

Prior to PPS, the average length of stay for Medicare beneficiaries was declining slowly. The introduction of PPS was expected to accelerate the trend. Indeed, the most conspicuous incentive of the new payment system was its encouragement of hospitals to reduce lengths of stay. Correspondingly, the most conspicuous fear of the new system was that it would induce hospitals to discharge patients too quickly.

The results on LOS are generally consistent with expectations: The introduction of PPS is associated with a brief, but (compared with historical norms) large, reduction in LOS, after which average LOS stabilizes or increases slightly. We reviewed almost 40 studies that, in various ways, estimate the effect of PPS on LOS. Virtually all of the studies—including studies based on small samples—find PPS associated with a decrease in LOS. Only a few studies produce contrary results. For example, two studies based on large national samples of Medicare patients in short-term hospitals (DesHarnais, Chesney, and Fleming, 1988; Morrisey, Sloan, and Valvona, 1988a) find declines in LOS in the first 2 years of PPS; but these declines are statistically insignificant for at least some subgroups of Medicare patients. Two small-sample studies (Mayer-Oakes et al., 1988; Simons and Omundsen, 1988) also find no significant change in Medicare LOS in the first year or two of PPS. But apart from these few exceptions, the finding of a decline in LOS is consistent across this literature. Russell (1989) places the LOS declines in perspective:

> "Historically, length of stay for the elderly had declined steadily, drifting slowly downward from 13.8 days in 1968 to 10.1 days in 1982 [table omitted]. The declines in the two years before prospective payment were unusually steep by historical standards, but the decline between 1983 and 1984, when the average dropped by nearly a day, was unprecedented, ample reason to suspect that prospective payment was the cause."

After an initial, sharp effect, the effects of PPS on LOS appear to moderate: PPS is associated with a decrease in LOS in the first, or first and second, years of implementation only. (One study [Newhouse and Byrne, 1988] finds no effect in the first year, but a slight effect in the second year.) Thereafter, studies that include at least 3 years of PPS data find LOS to have stabilized, with at most slight increases or decreases in the years thereafter (e.g., note the findings of the large-area studies with data for at least 3 years of PPS: Guterman et al., 1988; Helbing and Keene, 1989; Lave, 1990; Menke, 1990; Prospective Payment Assessment Commission, 1990a; Russell, 1989; Schwartz and Mendelson, 1991). The fact that nominal LOS was stable in later PPS years implies that LOS most likely continued to decline for comparable patients, because complexity of the average Medicare case increased over time. However, no published study rigorously documents that LOS continued to decline after 2 years on PPS. In an unpublished study, Gaumer and Fama (1988) find that a small, additional decline in LOS occurred in 1986 (following much larger declines in 1984 and 1985), when the changing DRG mix of cases is taken into account. By contrast, using a similar adjustment for severity, Lave (1990) finds a small increase in LOS in 1986. The reason for the conflicting results is unclear. In any event, severity adjustments in these studies fail to take into account within-DRG changes in severity or to eliminate changes in case mix caused by changes in coding unrelated to actual patient severity. Unfortunately, studies with more sophisticated severity adjustments (e.g., Epstein et al., 1991; Kahn et al., 1990a) have data for only limited periods of PPS. Thus, although some continued decline in LOS may have occurred for comparable patients, that result is not well documented.

The published literature does document other important aspects of the effects of PPS on LOS. It appears that hospitals respond strongly when they shift into the system, but their response is limited in duration, whatever

the year the shift occurs (Hadley, Zuckerman, and Feder, 1989). As with admissions, the relative magnitude of the hospital LOS response appears to be related to the degree of fiscal pressure the hospital faced (Hadley, Zuckerman, and Feder, 1989; Feder, Hadley, and Zuckerman, 1987). In general, hospitals were not selective in their reductions: LOS reductions appear to have been made across the board, rather than selectively—that is, the reductions are not concentrated in specific DRGs or specific age, race, or sex categories (Long, Chesney, and Fleming, 1989; Guterman et al., 1988). However, the decline is not completely indiscriminate. For example, Manton and Liu (1990) evaluate changes in utilization for a particularly vulnerable group of Medicare beneficiaries, the non-institutionalized disabled. The authors find that, even though LOS declined for certain subgroups with more severe disabilities, LOS remained the same for those with medically acute conditions.

The published literature thus suggests that PPS is associated with an initial, substantial effect on LOS, with stabilization thereafter. It is difficult to know whether the recent stabilization in LOS would have characterized a world without PPS, or whether the historical decline in LOS prior to PPS would have continued without PPS, and would, in due course, have caught up to the LOS levels evident in the PPS data. In any event, notwithstanding the strong evidence that PPS had the expected effect on LOS, one important complication should be noted: Virtually all of the studies measure LOS for Medicare admissions to short-stay hospitals only, with no attention to LOS for Medicare hospital admissions to units and hospitals exempt from PPS. Newhouse and Byrne (1988) estimate average LOS for all elderly patients covered by Medicare and find that average LOS for all Medicare patients actually rose slightly in 1984. Only in 1985 does LOS drop below the pre-PPS level. The likely reason that overall LOS increased in 1984 is that the percentage of all elderly patients with extremely long stays increased sufficiently to offset any decreases in LOS for other patients. The authors conclude that, although LOS clearly decreased among patients in non-exempt hospitals, the decline in LOS may have been later and smaller than generally believed. To that extent, the effects of PPS on LOS—looking only at short-stay hospitals—are overstated, particularly insofar as short-stay results are confused with results for all elderly hospitalizations that Medicare covers.

Even with this complication over the timing and extent of the change, there is little dispute that, for short-stay hospitals subject to PPS, LOS declined, then stabilized. Given that result, the question becomes exactly how the cuts in LOS have been made. Unfortunately, it is difficult to establish exactly how episodes of care have changed. We do know that the shorter lengths of stay after PPS do not simply compress the same procedures and treatment within a shorter period and, to that extent, that the LOS data after PPS reflect a different hospital product: a different division of labor among hospitals, outpatient clinics, physician offices, nursing homes, and other providers of care. But data limitations make it difficult to establish precisely how practice patterns have changed since the implementation of PPS.

Intensity of care

With fixed payment for each DRG, hospitals face a clear incentive under PPS to economize on the resources devoted to each admission. Reducing LOS provides one means to economize on those resources. A second way is to change the intensity of care, specifically, to reduce the number of laboratory and other tests, therapeutic procedures, educational sessions, medications, days of intensive care unit (ICU) and coronary care unit (CCU) utilization, and other procedures, or to increase Part B physician resources. Obviously, there are tradeoffs among all these different cost-reducing possibilities. For example, cost-effective reductions in LOS might require more intensive physician attendance, physical therapy, education, and tests to expedite discharge. Thus, we may not expect the intensity of care to decrease for every different procedure or test but the general tendency should be for the intensity of care to decline.

The published literature suggests that the results basically conformed to the expectation. First, notwithstanding that inpatient physician services were paid outside PPS, hospitals do not appear to have economized by devoting more physician resources to patient treatment. There is no consistent pattern of increased visits and consults (DesHarnais et al., 1987; DesHarnais, Chesney, and Fleming, 1988; Menke, 1990; Mitchell, Wedig, and Cromwell, 1989). Second, with respect to laboratory, X-ray, and other tests, most studies find no decrease (Long et al., 1987) or only a slight decrease (Sloan, Morrisey, and Valvona, 1988d) in the average number of laboratory and other tests per patient. To an indeterminate extent, these inpatient reductions are offset by the apparent substitution of outpatient for inpatient testing (Menke, 1990). Third, with respect to ICU and CCU utilization, unadjusted data show days of ICU or CCU care to have increased absolutely and as a percent of total days of care from 1983 through 1986, the third year of PPS (Fisher, 1988b; Sloan, Morrisey, and Valvona, 1988d). However, studies tend to find a slight decrease in the percentage of patients admitted to ICUs and CCUs in the first year of PPS, followed by an increase beyond pre-PPS levels in the second year (DesHarnais, Chesney, and Fleming, 1988; Sloan, Morrisey, and Valvona, 1988d; Russell, 1989). Lengths of stay for patients admitted to ICUs or CCUs appear to have decreased in the first years of PPS, although the decrease appears to be insignificantly different from the pre-PPS trend. Fourth, with respect to physical therapy, most of the evidence points to a decline in utilization. Studies generally find a reduced number of physical therapy sessions per patient (Fitzgerald et al., 1987; Fitzgerald, Moore, and Dittus, 1988; Holt and Winograd, 1990; Palmer et al., 1989), although some studies (e.g., Palmer et al., 1989) find a modest increase in the number of procedures per day. As to the proportion of Medicare patients referred to physical therapy, two small-sample studies suggest an increase (Dore, 1987; Holt and Winograd, 1990), while a large-sample study (Sloan, Morrisey, and Valvona, 1988d) finds a significant decline. Finally, with respect to the number of medications administered, Long et al. (1987) and Long,

Chesney, and Fleming (1989) find no significant change in the number of medications, through the first year of PPS.

Overall, the studies just reviewed generally show PPS to have reduced the intensity of care or to have left the intensity of care unchanged. The results of these studies should be interpreted with caution. Approximately one-half of the studies in this area are of small or select populations, and few of the studies employ multivariate methods to isolate the effects of PPS. In addition, for most dimensions of the intensity of care, the extent to which outpatient procedures have been substituted for inpatient procedures (e.g., for laboratory and other tests) is unknown. Finally, we should not confuse these rough measures of quantity with measures of quality: The best study of the quality of care using explicit and implicit process criteria (including appraisals of the appropriate use of ICUs, therapeutic and diagnostic tests, and other procedures) actually finds an improvement after PPS (Kahn et al., 1990a; Rubenstein et al., 1990). Thus, while patients may receive somewhat fewer tests and procedures since the implementation of PPS, there is little evidence that they receive fewer appropriate tests and procedures.

Case mix, severity of illness

PPS establishes a direct link between hospital payments and the coding of the medical record, thus giving hospitals a new incentive to develop more complete records and coding to maximize payment. The nominal case weight (the volume-weighted average DRG weight) and the CMI (the unweighted average DRG weight across hospitals) were expected to increase as an artifact of PPS incentives. At the same time, real increases were expected as well, resulting from changes in the mix of the severity of patient conditions (given shifts of less complex cases to outpatient settings) and to possible increases in the resource requirements for treating given conditions as practice patterns changed.

All sources agree that the CMI and the average case weight were higher after PPS was implemented than before and that CMI increased more in the first and second years of PPS than in following years (e.g., Prospective Payment Assessment Commission, 1990a, 1990b; Steinwald and Dummit, 1989). Case-mix indexes have generally been higher for large, urban, and teaching hospitals and have increased at a faster rate for them (Ginsburg and Carter, 1986; Prospective Payment Assessment Commission, 1990a; Steinwald and Dummit, 1989). For hospitals in waiver States coming into PPS in 1986 (Massachusetts and New York), the case-mix increases were significantly larger in their first year on PPS than in their last years on the waiver (Steinwald and Dummit, 1989).

Estimates by ProPAC (e.g., 1990b; Altman, 1990) indicate that case-mix changes have generated most of the increases in per case payments under PPS—more than the annual PPS update factors and payment policy changes combined. Given these payment implications, an important policy question arises: How much of the case-mix increase is the result of real increases in the severity of patient illnesses (and associated real resource requirements), and how much is the result of hospital upcoding and other artifacts of PPS incentives? The literature on case mix and severity of illness documents, first, that there was a one-time case-mix increase due to data flaws in the calculation of the original DRG weights (Ginsburg and Carter, 1986). Second, the literature documents that PPS has had the expected effect of encouraging upcoding and DRG creep by hospitals (e.g., Ginsburg and Carter, 1986; DesHarnais, et al., 1987; Steinwald and Dummit, 1989). The literature also documents a relatively high frequency of coding errors, a substantial proportion of which benefit hospitals economically (Hsia, 1990; Hsia et al., 1988). Finally, the literature shows that PPS was accompanied by the expected real case-mix increases, resulting from outpatient substitution and other changes in medical practice (e.g., Ginsburg and Carter, 1986; Keeler et al., 1990a; Sloan, Morrisey, and Valvona, 1988a, 1988b). However, some studies find no evidence of a severity increase (e.g., DesHarnais et al., 1987). There is evidence that most of the case-mix increase for later years has a large real component (Carter, Newhouse, and Relles, 1990, evaluating the case-mix increase for 1986-87), but the uncertainty of such estimates remains large, so that the appropriate payment implications are difficult to establish with any precision (Altman, 1990).

The case-mix/severity issue is critical to PPS, given its substantial implications for payment. It remains technically difficult to sort out the different factors at work, and the limitations of available data for making such estimates are significant. ProPAC (1991a) expected CMI change to diminish sooner than it has. Research in this area will remain important, so long as payment is so directly tied to medical records and the ways they are coded.

Inpatient hospital practice patterns: Summary

The findings reviewed to this point suggest that PPS has had a significant effect on admissions, lengths of stay, intensities of care during stays, and the real and nominal case mix of admitted patients. All but the admissions effects were in the expected directions, and the unexpected reduction in admissions meant that a potential negative effect of PPS had been avoided, for reasons that still are not well documented. Case-mix changes have been more persistent than expected—and very costly—but appeared by the end of the 1980s to have stabilized. As the 1990s began, PPS appeared to have achieved the key changes in hospital practice patterns that had been hoped for and to have avoided the worst fears that accompanied implementation.

Effects on outpatient services

Expectations that PPS would change hospital practice patterns were accompanied by expectations of how outpatient services would be affected. The natural prediction was straightforward. It was expected that PPS (in conjunction with the utilization review of the PROs) would shift many tests and other preparations for surgery or medical treatment to hospital outpatient clinics and would shift many surgical and other admissions to outpatient clinics, freestanding ambulatory surgical centers, and other outpatient settings.

Virtually all studies show a sharp shift in physician services away from the inpatient setting to the outpatient setting, according to a variety of different measures. For example, from 1983 through 1986, the place of service for physicians' charges changed dramatically: In 1983, approximately 61 percent of Medicare physician dollars were for services delivered in the hospital; by 1986, the percentage had dropped to 47 percent (Fisher, 1987, 1988b). Physician services in offices and particularly in outpatient clinics made up the difference. Hadley, Zuckerman, and Feder (1989) find that PPS has an independent effect of increasing outpatient visits more than 10 percent, while reducing inpatient discharges 8-9 percent. Increases in outpatient visits and reductions in admissions are less for hospitals under greater fiscal pressure. Menke (1990) uses linked Part A and B data for 1983-86 for four States to show large increases in outpatient expenditures associated with a hospital admission. Outpatient expenditures per admission rose at least 50 percent for two-thirds of the DRGs studied and rose more rapidly than inpatient expenditures for all of the DRGs. Mitchell, Wedig, and Cromwell (1989) use the same data base to show that the number of physician visits per beneficiary changed hardly at all 1983-86; however, office visits per beneficiary increased 21 percent, while hospital visits decreased by the same proportion.

Allowed charges for physicians and suppliers for inpatient surgical services totaled almost $4.6 billion by 1986, but showed only a trivial change from 1983 through 1986 (Fisher, 1988b). Over the same period, surgical services performed in outpatient clinics increased more than 500 percent (to almost $2.1 billion in 1986) and in physician offices nearly 70 percent (to $1.2 billion). From 1983 through 1986, the inpatient share of all surgical charges dropped from 80 to 57 percent. This growth in allowed charges reflects more than a shift in the number of procedures. It reflects as well changes in the complexity of procedures and general increases in prices. It is not possible to sort out all of these changes, but even in relatively conservative terms, e.g., the number of physician and surgeon bills per 1,000 enrollees, the growth has been explosive: more than 100 percent for hospital outpatient departments, almost 35 percent for physician offices, and nearly 800 percent for ambulatory surgery centers, with the growth over all outpatient sites being 55 percent (Leader and Moon, 1989). Hadley and Swartz (1989) find that, controlling for a large array of Medicare, other-payer, cost, and other variables, PPS had the effect of increasing outpatient surgery visits by one-third. As noted earlier, the large growth in outpatient surgeries is driven by the large shift in lens procedures (DesHarnais, Chesney, and Fleming, 1988; Latta and Helbing, 1988; Fisher, 1988a, 1988b), which alone account for perhaps one-half of the total shift. Acting through the PROs, HCFA specifically sought this shift; and outpatient reimbursement may have been more generous than inpatient payment, according to unpublished studies cited by Russell (1989).

The evidence outlined herein suggests that PPS clearly coincided with a substantial shift in practice patterns to outpatient settings, much as originally expected. This shift helps to explain why hospital admissions have declined. It may also help to explain why the intensity of care within hospital stays has declined, although the data in virtually all studies do not permit construction of patient-level episodes to definitively answer the question.

Effects on post-hospital care

PPS was expected not only to increase outpatient care but also to increase utilization of post-hospital care provided by nursing homes and home health agencies. The key questions have been, first, whether hospital discharges to nursing homes and home health care have increased under PPS; and second, whether the discharged patients have been sicker on average, given the decline in hospital lengths of stay. The questions are difficult to answer, given the multiplicity of payers for post-hospital, particularly nursing home, care that the elderly receive. With greater fragmentation among payers and changes in coverage and payment policies over time, the possibility of developing relatively complete utilization profiles and of isolating the effects of Medicare PPS diminishes. As a result, the conclusions of different studies frequently conflict, and the role of PPS in the picture that emerges is frequently qualified.

Nursing homes

Simple, unadjusted statistics for the early years of PPS show an increase in discharges to Medicare skilled nursing facility (SNF) care and in other measures of utilization (e.g., Gornick and Hall, 1988; Guterman et al., 1988; Latta and Keene, 1989; Morrisey, Sloan, and Valvona, 1988b; Silverman, 1991). Some more complex analyses, controlling in various ways for such factors as severity of illness, agree with the simple statistics: They find PPS had a statistically significant effect on discharges to Medicare SNFs or to nursing homes generally (Fitzgerald et al., 1987; Fitzgerald, Moore, and Dittus, 1988; Gerety, Soderholm-Difatte, and Winograd, 1989; Mayer-Oakes et al., 1988; Morrisey, Sloan, and Valvona, 1988a). The RAND study of quality agrees, finding a significant increase (from 23 to 27 percent) in the proportion of patients admitted from home who are not discharged to home (Kahn et al., 1990a). However, other studies reach a different conclusion: They find that there in fact was little, if any, increase in discharges to Medicare SNFs or to nursing homes generally (DesHarnais, Chesney, and Fleming, 1988, as adjusted by Russell, 1989; Liebson et al., 1990; Long et al., 1987; Manton and Liu, 1990; Palmer et al., 1989; Rich and Freedland, 1988). At most, these studies found very small increases.

There is clearly some conflict over the early effects of PPS on SNF and nursing home utilization by Medicare beneficiaries. After 1985, however, any effects of PPS on SNF utilization were increasingly overwhelmed by HCFA administrative changes and changes in Medicare coverage. Specifically, HCFA responded to the nominal increases in utilization in 1984-85 by instituting a series of administrative changes and intermediary reviews (Silverman, 1991). By 1987, discharge rates and covered days of care per 1,000 enrollees were near or below historical lows. Lawsuits and political complaints about the equity and consistency of these changes resulted in a liberalization of HCFA policy. Dramatic increases in

utilization followed in 1988, back to the much higher discharge rates of the mid-1970s. Utilization then increased at truly unprecedented rates in 1989, under the expanded coverage provisions of the Medicare Catastrophic Coverage Act (Prospective Payment Assessment Commission, 1990a).

Given this mix of studies and events, the effects of PPS on nursing home utilization are ambiguous. In the early years, there may have been a statistically significant increase in utilization, although the evidence is mixed. It is at least fair to say that the initial effects of PPS on nursing home utilization were not so large and consistent as to register on all of the most reliable studies, given different data sources in the studies and different methods the studies use to control for such key factors as the PPS effect on admissions (e.g., compare Kahn et al., 1990a; DesHarnais, Chesney, and Fleming, 1988, as adjusted by Russell, 1989). But notwithstanding this conflict over the early effects of PPS, it appears that administrative changes and coverage changes subsequently confounded any continuing effects PPS might have had.

Home health agencies

If the data on discharges to nursing homes is conflicting, the data on discharges to home health agencies is relatively clear cut: When PPS was introduced, there were substantial increases in the proportion of discharges to home health. The principal difficulty with this relatively consistent finding is that it is particularly difficult to ascribe this increase to PPS itself, as Medicare policies for the coverage of home health were substantially changed in the years immediately preceding, and immediately following, PPS. In terms of simple statistics, home health care utilization grew dramatically in the 3 years preceding PPS, under the influence of the reforms of the Omnibus Budget Reconciliation Act of 1980 (OBRA); utilization then slowed in growth, particularly after 1984 (when growth rates were negative), under the influence of HCFA administrative changes (Prospective Payment Assessment Commission, 1989). Lawsuits overturned the instructions of the U.S. Department of Health and Human Services (DHHS) in 1987, auguring a future of increased growth (note the summary statistics in [Prospective Payment Assessment Commission, 1990a]).

This general description suggests that overall utilization of home health care in the 1980s was more affected by coverage and policy decisions than by PPS. However, careful studies suggest that PPS had a statistically significant independent effect on the proportion of discharges to home health agencies in the early years of PPS (e.g., DesHarnais, Chesney, and Fleming, 1988; Long et al., 1987; Russell, 1989). Only one large-sample study concludes that discharges to home health were only modestly affected by PPS: Morrisey, Sloan, and Valvona (1988a), a study that focused on a small set of DRGs notably likely to result in transfer to post-hospital care. All of the other studies reviewed found that the proportion of discharges to home health agencies had increased in the early years of PPS.

To our knowledge, no large-area, large-sample study in the published literature examines the later years of PPS (e.g., after 1985), when DHHS payment instructions apparently had a substantial effect on utilization of Medicare-covered home health services. Thus, for later years of PPS, we have only simple statistics on aggregate utilization, reported by ProPAC and others, rather than careful multivariate studies to help sort out the various influences.

Severity of illness

A second question to ask about post-hospital care turns the issue around: Rather than asking about the proportion of hospital discharges to different post-hospital locations, this question asks about changes in the composition of Medicare patients admitted to subacute care after PPS. The logic here is intuitive. Whether or not hospital discharges to subacute care are more frequent, if the patients discharged are sicker, there will be some confirmation that PPS has changed the division of labor within the health care system, with post-hospital care picking up some of the recuperation time and rehabilitation functions that were performed more completely in hospitals before PPS.

Studies of the severity of illness of patients in post-hospital care vary in methodological rigor. Moreover, virtually all of them are based on local samples for a small set of post-hospital providers (usually nursing homes). Not surprisingly, the findings from the studies are not uniform. One study is based on a national sample of Medicare patients in all 50 States for all the years from 1981 through 1985 (Sager et al., 1989). Sager and his colleagues find that PPS was coincident with a statistically significant shift in the location of death, from hospitals to nursing homes. This shift could be plausibly ascribed to PPS, because (1) the pre-PPS trend in the proportion of deaths in nursing homes was stable; (2) the shift did not occur in waiver States in 1984-85; and (3) the shift was greatest in States with the largest reduction in lengths of stay from 1983 through 1984. As Russell (1989) notes, "This finding [by Sager et al.] stands out as one of the clearest signs that prospective payment has changed the kinds of patients being received by nursing homes, even as it has not had much effect on their numbers." The findings of an earlier analysis by Sager, Leventhal, and Easterling (1987), as well as Carroll and Erwin (1990), Goldbert and Estes (1990), and Lyles (1986), are basically consistent with Sager's 1989 study. So, too, are impressionistic appraisals from surveys of provider staff. Although these surveys usually lack pre-PPS baselines, they find consistent beliefs among provider staff that the severity of patient conditions or the complexity of patient service needs increased after the implementation of PPS (e.g., Binney, Estes, and Ingman, 1990; Lyles, 1986; Swan, Torre, and Steinhart, 1990; Wood and Estes, 1990). By contrast, some studies of facility records find little change after PPS went into effect (e.g., Carroll and Erwin, 1987; Lewis et al., 1987; Rogers, 1989; Sandall and Massey, 1989), and RAND's major study of patients' medical records found no significant increase in the instability of patients at hospital discharge for the cohort of patients discharged to institutions (Kosecoff et al., 1990).

Overall, this literature provides conflicting findings using data that typically are limited in time, even as most

of the studies are limited to local areas and small samples. The most tenable conclusion from this research is that there does appear to have been some change in post-hospital admission patterns, but the change is not so large or consistent as to emerge from all samples or through all measures of severity.

Post-hospital care: Conclusion

The somewhat muddled picture just described suggests that some pre-PPS functions of the hospital may indeed have been moved to post-hospital care, but not with the strength or consistency we have seen in reviewing other PPS effects (e.g., on issues such as LOS). This qualified set of results is perhaps inevitable, given the peculiar data difficulties that analyses of post-hospital practice patterns present. But it is also inevitable given surrounding changes in Medicare policy that confound easy causal attribution, even when effects coincident with PPS are found.

Exempt hospitals and distinct-part units

Our review of the effects of PPS on practice patterns concludes with a review of one last set of institutions: exempt hospitals and units. PPS does not cover all types of hospitals; psychiatric, rehabilitation, children's, and long-term care hospitals are exempt. Nor does PPS cover all Medicare discharges from hospitals that are covered by PPS. Qualifying psychiatric and rehabilitation units in acute care hospitals are exempt. Alcohol and drug abuse hospitals and units were also exempt when PPS was first introduced, but they were brought under PPS in fiscal year 1988. Exempt hospitals and units are paid under TEFRA methodologies, which reimburse for reasonable charges, subject to limits on the rate of increase each year.

The presence of hospitals and units exempt from PPS creates potential opportunities for diversion or transfer of patients to the exempt, charge-based environment—the expectation being that PPS would increase admissions to exempt facilities, particularly admissions of notably costly (e.g., potentially long-stay) patients. Given the possible value of the exemption, there is an expectation as well that qualifying units, especially those likely to suffer financially under PPS, will seek exempt status.[13]

Against these expectations, the published literature presents a mixed picture. There was indeed an increase in the number of exempt hospitals and units after the implementation of PPS and an increase as well in admissions (e.g., DesHarnais, Wroblewski, and Schumacher, 1990; Heinemann, Billeter, and Betts, 1988; Prospective Payment Assessment Commission, 1990a; Hatten and Gibson, 1987). The percentage increases in facilities and admissions are much larger for exempt units than for exempt hospitals. The literature on exempt facilities does reveal some surprises, however. In particular, there was an unexpected decline in lengths of stay in exempt psychiatric units—indeed, the decline in LOS was larger in exempt than in non-exempt units, although declines were largest in scatter beds (DesHarnais, Wroblewski, and Schumacher, 1990; Jencks, Horgan, and Taube, 1987; Lave et al., 1988b). At the same time, the general decline in LOS for Medicare psychiatric patients may have helped change practice patterns for Blue Cross and other private payers (DesHarnais, Wroblewski, and Schumacher, 1990). Unfortunately, few rigorous studies have been published to examine the effects of PPS on exempt hospitals and units, other than psychiatric units, and there is some question about what happened to lengths of stay for Medicare patients across all different types of exempt facilities after PPS was implemented (Newhouse and Byrne, 1988). As a result, the literature is not so comprehensive as to permit strong conclusions concerning exempt facilities generally.

But even this limited literature raises an important caution that bears on all studies of PPS practice patterns. Specifically, this literature suggests that PPS incentives are not as simple as imagined in many of the original, straightforward predictions. For example, psychiatric units did not move in lockstep to exempt status when PPS was implemented. Some units were winners, not losers, under PPS, and appear in fact to have had little incentive to avoid the new system or to change their behavior under it (Frank et al., 1987; and Lave et al., 1988b). Meanwhile, at least some exempt facilities changed their practice patterns along lines of their non-exempt counterparts, and some recent evidence (e.g., Prospective Payment Assessment Commission, 1991a) suggests that the profitability of exempt status for hospitals and distinct-part units has declined over time. Accordingly, although the availability of exemptions may have had a marginal effect on where certain patients were admitted, there is little in the limited published literature to suggest that the exemptions wrought a fundamental change in the division of labor between short-term acute hospitals and specialty facilities.

Practice patterns: Conclusions

It is useful at this point to bring into focus the revised contours of health care practice following PPS. As expected, PPS appears to have been associated with a substantial, albeit one-time, reduction in LOS across the board, for hospitals, diagnoses, and age groups of all kinds, and even for admissions to the subset of exempt facilities documented in the literature. As expected, this reduction in length of stay was accompanied by somewhat less intense care within the shortened hospital stay. Contrary to expectations, hospitals did not compensate for payment limitations by increasing the rates of inpatient admissions: Admission rates in the early years of PPS appear to have declined, for reasons that are not well documented. For those patients continuing to be admitted, case-mix indexes increased substantially, with major payment implications; these patients were probably more severely ill on average, although the evidence on this point is limited and somewhat conflicting.

[13] In principle, exempt status was not a matter of choice: Exemption was to be granted to all units that met HCFA's qualifying conditions. But the actual exemption process was quite complicated. In some cases, it was initiated by the hospital; in other cases, Medicare intermediaries identified the units to which an exemption should be granted (Lave et al., 1988a). In any event, "Since providers could control whether a number of the qualifying conditions were in place, it is likely that they had some choice about their exemption status" (Lave et al., 1988a).

These large changes raise questions about what happened to the patients who were treated in the hospital prior to PPS, but who now are not admitted or, if they are admitted, are treated less intensely on average, for a shorter period. As there are no comprehensive studies of episodes of care before and after the implementation of PPS, we can only infer what has happened from studies of more aggregated trends. Apparently, some of these patients formerly admitted to hospitals were simply shifted to outpatient surgery and treatment, another of the large and expected shifts from PPS. To a lesser degree, some of these patients were shifted to exempt facilities. Some of the patients continuing to be admitted to inpatient settings had some of their care shifted to outpatient settings prior to admission (although the evidence here is not very precise), and some of their care was shifted to specialized post-hospital providers. But the expected shift to post-hospital care was not large and systematic; SNFs and home health care may be receiving sicker patients and performing some of the role formerly performed by hospitals, but the rates of discharge to SNFs in particular have not increased dramatically and consistently as a result of PPS.

Given this set of conclusions about the effects of PPS on practice patterns, what are the implications? Did Medicare save money? Has the health care industry suffered, in terms of declining progress or shifts of Medicare costs to other payers? Most important, was the quality of care received by beneficiaries reduced? In the sections that follow, we turn to questions about these implications of prospective payment.

Health care costs

In financial terms, the main purpose of PPS was to control the growth of inpatient benefit costs without increasing costs to beneficiaries. PPS appears to have accomplished that purpose, as suggested by the summary of findings in Table 5. There are four principal reasons for this conclusion. First, since PPS began, there has been a clear reduction in historic rates of growth in total Medicare spending. If adjustments are made for inflation, enrollment, and changes in enrollee mix, total Medicare spending (including supplementary medical insurance [SMI] premiums) grew 6.9 percent annually from 1980 through 1984, but only 4.0 percent annually from 1984 through 1987 (Long and Welch, 1988; Guterman et al., 1988). Second, the reduced growth rate for total Medicare spending has been largely the result of historically low growth rates in spending for inpatient hospital benefits. For example, the 4.6 percent inflation-adjusted increase in inpatient hospital benefit payments in fiscal year 1986 was the smallest increase in the history of the Medicare program (Guterman et al., 1988). The reduced growth in inpatient hospital payments was only partially offset by increases in outpatient hospital, skilled nursing, home health, and physician payment increases. Third, these changes in growth rates can be shown to have reduced projected Medicare spending levels. Russell and Manning (1989) find that PPS reduced hospital insurance (HI) expenditures by approximately 20 percent in 1990. Approximately one-third of this reduction was attributable to declines in admissions rather than to the prospective rates themselves. Meanwhile, the authors find only a slight offsetting increase in SMI expenditures

Table 5

Summary of the effects of the prospective payment system (PPS) on the health care industry, Medicare expenditures, and Medicare beneficiaries

Area of effect	Principal finding	Secondary findings	Important industry differences
Health care industry			
Cost shifting	Only minor evidence of cost shifting.	"Spillover" utilization reductions from PPS a potential offset to price increases from any cost shifting.	—
Technology diffusion	No large or systematic reduction in technology diffusion.	Evidence of negative effects in a few cases (e.g., cochlear implants).	—
Hospital specialization	Greater diversity in some terms (*number of hospitals offering* particular services), but slightly greater specialization in other terms (relative volumes of services).	Specialization increases associated with lower hospital costs. Specialization encouraged by PPS incentives.	—
Hospital management	Organization culture more businesslike, management techniques more sophisticated.	Tangible consequences of management changes unclear.	—
Clinical research	No systematic study—only anecdotal information.	—	—
Uncompensated care	Evidence that PPS increased uncompensated care.	—	PPS rates generous to hospitals with large uncompensated care load (e.g., teaching hospitals).
Medicare expenditures, beneficiary liabilities			
Benefit costs/beneficiary liabilities	Substantial hospital insurance trust fund savings, only slightly offset by increase in supplemental medical insurance costs.	Average beneficiary liability increased slightly; beneficiary share of costs unchanged.	—

SOURCE: Coulam, R.F., and Gaumer, G.L., Abt Associates, Inc., Cambridge, MA.

versus projections (the SMI increase is equivalent to only 1 percentage point of the 20-percent HI savings). The authors thus conclude that savings in hospital benefit costs were not simply shifted to other parts of the Medicare program, as the net savings remain substantial. Finally, these substantial savings for the Medicare program do not appear to have come at the direct expense of Medicare beneficiaries. Beneficiaries now pay more for their care, but the average increase under PPS has been small in real terms, with a much smaller annual growth rate than before PPS, and beneficiary liabilities now constitute roughly the same share of total spending as they did before PPS (Prospective Payment Assessment Commission, 1988, 1990a, 1991a; Russell, 1989). Although out-of-pocket liabilities are a problem for many beneficiaries, PPS does not appear to have made the problem worse (Russell, 1989).

Medicare thus appears to have been successful in controlling its own benefit costs, without shifting the burden to beneficiaries. These results raise a question as to whether Medicare's success in reducing cost growth has had an effect on the overall growth of U.S. health care expenditures. Anderson and Erikson (1987), Levit and Freeland (1988), ProPAC (1991a), and others reach similar conclusions based on similar analyses: They find reductions in the growth of Medicare inpatient hospital spending, but little ultimate success in controlling the overall growth in U.S. health care expenditures. There is little evidence that PPS has increased overall U.S. health care expenditures; if anything, PPS has dampened overall spending growth, but the growth remains substantial.

Because there has been little containment of the overall growth in U.S. health care expenditures, it is useful to ask whether the strategy that PPS embodies is a sound general strategy for all payers, not just Medicare, to employ. On this score, the results to date suggest the limits of PPS. Insofar as PPS and PROs are consistent with the fragmented, payer-by-payer micromanagement of health care costs characteristic of current public and private initiatives, the continued growth of U.S. health care expenditures at least supports a speculation that more fundamental reform is needed, even if, standing alone, the direct and measurable effects of PPS point generally to the success of the PPS effort for the Medicare program.

Health care industry

PPS was expected to have an array of direct and indirect effects on the health care industry, beyond the effects on practice patterns and hospital finances already discussed. Some of these effects might be beneficial to Medicare and to the industry, e.g., an improvement in the sophistication of hospital management. But it was also possible for PPS to benefit Medicare even as it harmed other parts of the health care system, such as by shifting costs from Medicare to other payers. Most of these industry effects were intrinsically difficult to predict and to analyze. In this section, we review six different areas of possible industry effects. Our findings in each area are summarized in Table 5.

Cost shifting[14]

Commercial insurers often pay higher prices for hospital care than those paid by Medicare or Medicaid. According to the limited amount of data available, these price differentials cannot be justified on the basis of costs (e.g., Hadley and Swartz [1989] find the marginal cost of Medicare and Medicaid admissions is actually greater than that for other payers). As a consequence, hospitals appear to be shifting costs, i.e., raising prices to some third-party payers to cover shortfalls from others. The Health Insurance Association of America (1982) has referred to this cost shifting as a "hidden tax" on privately insured individuals. Some authors have made striking claims; for example, Coddington, Keen, and Moore (1991) assert that cost shifting accounts for one-third of the premium increases for health plans in 1988.

This attitude, so pervasive in the trade press, is in stark contrast to the tone and results of most of the rigorous economic and empirical literature. The latter works emphasize that price differences by payer are not, ipso facto, evidence of cost shifting. Indeed, these price differences are equally consistent with profit-maximizing price discrimination by hospitals that have some degree of monopoly power (Hay, 1983; Foster, 1985; Dranove, 1988). Moreover, profit-maximizing hospitals will not cost shift when a payer with monopsony power demands lower prices, because prices to other payers will already have been set at their profit-maximizing level. However, hospitals might not maximize profits; in that event, cost shifting can occur. But for there to be cost shifting, there must be a systematic relationship between the stated cause and effect, e.g., between decreases in Medicare payment and increases in prices paid by third parties.

In fact, published empirical studies of cost shifting after the implementation of PPS fail to find evidence of cost shifting (Hadley and Zuckerman, 1990; Morrisey, Sloan, and Valvona, 1988b; Zuckerman and Holahan, 1988) or find evidence that cost shifting exists but does not apply to all hospitals. (Note Morrisey and Sloan [1989] who find evidence of cost shifting for urban hospitals but find that rural hospitals actually lowered their prices to other payers following PPS.) Moreover, even if PPS was associated with cost shifting (i.e., higher prices for other payers for at least some types of hospitals), there is also evidence outside the cost-shifting literature that PPS helped to reduce utilization for other payers, thereby tending to offset the effects of any higher prices (e.g., DesHarnais, Wroblewski, and Schumacher, 1990; Scheffler, Gibbs, and Gurnick, 1988, a widely cited but unpublished study of the effects of PPS on Blue Cross).

The studies published to date do not definitively dispose of the cost-shifting issue because among other reasons, the available data for empirical research (almost all of it from AHA surveys) are at times a crude match to the theoretical constructs one would most like to measure. Meanwhile, the concerns of the insurance industry and others make the cost-shifting issue one that needs continuing investigation, if only to ensure that the results

[14]This discussion of cost shifting is drawn from Schmitz and Olinger (1991).

observed to date have not changed as hospital margins have declined. But based on the research to date, industry anxieties about cost shifting appear excessive.

New technologies

PPS assumes hospitals will strike a benign balance between revenue and the costs of treatment. Even when DRG payments create a marginal disincentive for particular technologies, hospitals are expected to take losses on particular cases because:

- Not all new technologies are likely to be adversely affected (e.g., cost-neutral or cost-decreasing technologies should be adequately compensated).
- Payments will be adequate, on average, with unfavorable cost variance for particular cases made up by favorable results for other cases.
- New technologies do little to reduce the overall profitability of hospitals, because the added costs of adopting new technologies add little to total inpatient costs (e.g., Prospective Payment Assessment Commission, 1990a, 1991a).
- New technologies leverage other financial and professional considerations, such as market share, the quality of care, malpractice, and other hospital concerns, that may offset marginal payment losses.
- Full funding of new technologies through a diffusion period (e.g., at cost) would create little incentive for manufacturers and hospitals to economize.

Thus, as implemented, PPS assumes new technology to be one of many sources of case-by-case cost variation within a system of average cost payment. Marginal disincentives for particular technologies are not significant overall, they are compensated by other factors, and they are a necessary part of a new regime that introduces considerations of cost into treatment decisions.

Published research suggests that the diffusion rates for many new technologies have been adequate, measured against such standards as pre-PPS rates of diffusion (e.g., Prospective Payment Assessment Commission, 1988, 1990a; although note Sloan, Morrisey, and Valvona, 1988d); international rates of availability (Jönsson, 1989; Rublee, 1989); and the justifications hospitals offer for decisions on whether to adopt new technologies (Steinberg et al., 1988). For example, ProPAC implies that continued positive growth rates after the implementation of PPS for a number of technologies provide at least first-order reassurance that the effects of PPS on technology diffusion are not harmful. The implication is not frivolous. If the rates after implementation showed sharp, negative shifts, most observers would view those shifts as a cause for concern. The positive results reported by ProPAC are at least a reassurance that the most negative results did not occur. Other studies show, however, that PPS may have had notably negative effects in particular cases, such as cochlear implants (Kane and Manoukian, 1989).

Thus, the research to date demonstrates that PPS has not caused a large and systematic reduction in the rates of adoption of new technology. The research also raises a caution, however, that some technologies may have been discouraged. The principal problem with these results is that no authoritative judgment exists as to the optimal or appropriate rate of diffusion for any of the technologies involved (note Jacobson and Rosenquist, 1988). In the absence of such judgments, the norms used to appraise technology diffusion, before or under PPS, are necessarily arguable. Positive diffusion rates may be too fast or too slow. A technology that fails to find widespread use may deserve its fate or it may not. Perhaps the most that can be said at this point is that PPS has not visibly discouraged the diffusion of all technologies; however, in the long-term—as yet unstudied—the discouraging effects may become more important, as the effects of declining hospital margins are felt.

Hospital specialization

PPS was expected to encourage hospitals to specialize in the services they could offer more efficiently (e.g., Stern and Epstein, 1985). The logic behind this expectation was straightforward. Under PPS, each hospital would face incentives to expand profitable services and to curtail unprofitable services. Of course, hospitals had to take into account factors beyond the simple difference between payments and costs; concerns such as market position and quality of care were expected to influence the exact portfolio of service offerings. But PPS was expected to encourage specialization, so that particular services would increasingly be provided by more efficient hospitals.

Studies of the specialization of hospitals since PPS began present a mixed picture. Hospitals diversified, rather than specialized, after PPS began, in the sense that the number of hospitals that performed particular procedures for Medicare patients increased (Prospective Payment Assessment Commission, 1988, 1989, 1990a). Apparently, competitive considerations, notably fears about losing market share, have been at work to sustain this trend. Meanwhile, for select procedures studied by ProPAC, the volume at the average hospital performing the procedures increased. But this increase was largely the result of an overall increase in procedure volume, rather than a consolidation of where the procedures were performed.

However, measures of specialization that track changes in case mix across a full spectrum of hospital services and patients show a tendency toward specialization after the implementation of PPS (Farley and Hogan, 1990). There is also evidence to suggest that specialization in this sense was promoted by financial incentives of PPS and contributed to lower average hospital costs.

These results suggest that hospitals are not dropping some procedures entirely to focus on others, but that the relative volume of different procedures within hospitals is shifting somewhat, and with favorable cost results. It is not clear that these trends will continue: The most profitable gains from case-mix specialization may already have been explored (Farley and Hogan, 1990). But these results do provide modest corroboration of some of the optimistic expectations for PPS.

Hospital management

Given all of the different effects of PPS detailed in this literature review, it would be a great surprise if PPS did not cause substantial changes in hospital management. PPS was designed to create incentives for the balancing of costs and benefits in treating patients. In the economic model of the hospital as thus construed, the hospital is a black box, calculating and adjusting bloodlessly to the new regime. In actual hospitals, each of the incentives and adjustments required people within the hospital to think differently, to attend to different information, to accept different roles, and to make different decisions. New institutional capabilities (e.g., information systems) were necessary for hospitals to respond to the changes called for under PPS. Hospital management changed in important ways as a result.

The most important changes include those in the organizational culture of hospitals, toward more businesslike institutions (Alper, 1984; Berki, 1985; Burda, 1988; Campbell and Kane, 1990; Grassi, 1989); changes in the sophistication of hospital management and information systems, including systems for accounting, billing, coding, evaluating, and reporting (e.g., McNeil, 1985; Prospective Payment Assessment Commission, 1989); and changes in the relationships between physicians and hospitals (e.g., Campbell and Kane, 1990; Glandon and Morrisey, 1986).

In part because of the impressionistic character of most of the studies of changes in hospital management, it is difficult to establish the ultimate significance of most of the changes these studies describe (the principal exception being the effects of more refined coding practices by hospitals, which have been carefully measured [Ginsburg and Carter, 1986; DesHarnais et al., 1987]). The summary impression one gets from these various observations is that PPS (along with other public and private health care initiatives of the 1980s) has moved hospitals in a more cost-conscious, more businesslike direction, much as was intended. The movement is not complete: Physicians are not suddenly cost-conscious, compared with their pre-PPS counterparts (e.g., Thomas and Davis, 1987); and careful hospitals do not now attempt crudely to control physicians in a "businesslike" way (e.g., Campbell and Kane, 1990). But hospitals and physicians clearly feel that they are in a very different business, and doing that business differently than they were a decade ago. Published studies give voice to those general feelings, although the tangible consequences of the changes involved are diffuse and not well understood.

The literature on hospital management is thus consistent with the effects of PPS described in other sections; the management literature suggests new attitudes and capabilities that could support the other effects we have observed. However, the management literature and the effects literature are not joined. In the end, we lack a systematic, concrete picture of how the significant changes in operations under PPS were actually administered. A more detailed appraisal of the connection between hospital operations and PPS effects would give us a better understanding of how hospitals generate and control costs and would give us a more reliable foundation for making policies to shape the hospital environment.

Clinical research

The effects of PPS on clinical research are like many other PPS effects. At the payment margin, there is a likely disincentive, but there is an array of other influences present that might offset that disincentive. Medicare does not cover the costs of experimental treatments, but (notably in clinical trials) it does cover the costs of usual patient care associated with such treatments. The basic problem under PPS is that Medicare no longer pays for each allowable day, test, and other cost of treatment; the payment is fixed for the appropriate DRG. The fear has been that payment would be allocated away from hospitals doing a disproportionate share of research. Some fears were also expressed (e.g., Steinwald, 1986) that average payments might become inadequate under PPS, that is, that PPS might in due course be used to contain hospital costs so significantly that hospital discretion to invest in research activities would be eroded.

Even if the net effects of PPS on clinical research were somewhat negative, that result would not by itself be proof of harm. Indeed, it might suggest a better balance of costs and benefits. As HCFA's Davis (1985) notes: "Under prospective payment, hospitals will likely trim away only those programs that they cannot manage efficiently or in which they have no overriding interest." Worried clinicians would likely find that summary appraisal too complacent and, in any event, are uncomfortable with the idea of cost disincentives under an average-price regime (e.g., Yarbro and Mortenson, 1985, who argue for a special research DRG for National Institutes of Health [NIH]-approved clinical trials, to be paid on a cost basis).

Some of this dispute is simply a reflection of a more general disagreement on the role of incentives in health care. But some of the dispute could be informed by careful estimates of the net effects on clinical research that PPS has actually had. Unfortunately, although there is some anecdotal information in the published record (e.g., Yarbro and Mortenson, 1985), we are aware of no systematic empirical study in the published literature that would permit careful estimates of net PPS effects. In the absence of such estimates, it is fair to say that potential harms have not been documented. However, we also have no way to confirm HCFA's prediction that the only casualties would be research of marginal interest or research that could not be efficiently managed.

Uncompensated care

Medicare payment and uncompensated care are not directly linked, because Medicare assumes no formal obligation to cover the costs of uncompensated care. However, a potential indirect linkage has long existed, through the medium of the hospital balance sheet. Uncompensated care (a combination of free care and bad debt) could be provided by cross-subsidization from paying patients and from other revenue sources (e.g., non-patient care revenue, State and local appropriations, and charitable contributions). By reducing hospital margins, PPS could reduce the funds available to hospitals for this, as for other, purposes, thereby reducing

the willingess of hospitals to treat patients who are unlikely to be able to pay for their own care. Because the number of uninsured increased substantially in the 1980s as PPS was being implemented, concerns about the possible effects of PPS on uncompensated care became more serious.

However, studies by Sheingold and Buchberger (1986) and Sloan, Morrisey, and Valvona (1988a, 1988c) suggest that worries about the effects of PPS on uncompensated care may have been misplaced, at least for the early years of PPS. This is so largely because PPS was relatively generous to hospitals, such as teaching hospitals, that carried disproportionate shares of the uncompensated care burden. The principal question then becomes whether this favorable experience at the outset of PPS was sustained in later years, when PPS rates became less generous. Although hospitals' PPS margins generally declined in the later years of PPS, it is possible that hospitals with large uncompensated care burdens fared better than the average. This could be for fortuitous reasons or because of deliberate policy actions (notably, the establishment of a special disproportionate-share [DSH] adjustment, which provided an increase in the PPS rates for hospitals with large indigent care loads, beginning in fiscal year 1986). Studies by ProPAC (1991b) suggest that the DSH adjustment is not efficiently targeted to all hospitals with large uncompensated care burdens. But no published study we have seen provides a rigorous answer to the more general question of whether or not, on balance, PPS rates discouraged the provision of uncompensated care in the late 1980s, after apparently encouraging it in the first years of PPS.

Quality of care

An unspoken assumption under the cost-reimbursement systems of the past was that more care is better care. PPS reflected a skepticism about this premise. Indeed, PPS was based on the belief that some of the care being provided was unnecessary in the sense that the benefits to patients were small at best, even though the costs of the care were substantial and providers had little incentive to concern themselves with costs. But the incentives of PPS were open to a range of outcomes, some of which could be beneficial and some of which could be decidedly detrimental to patients. PPS in effect viewed hospitals, physicians, and others as buffers between the purely financial incentives of PPS and the patient needs for quality care. There was some uncertainty about the ultimate balance that would in fact result.

The effects of PPS reviewed to this point do not resolve those uncertainties. Indeed, standing alone, virtually all of the changes we have observed could be associated with harm to Medicare beneficiaries. To take a conspicuous example, large reductions in admissions and LOS under PPS could reflect more cost-effective medical practice, or they could reflect insufficient access and insufficient treatment for those who get into the hospital. The literature on the quality of care under PPS provides an essential normative check on PPS effects such as these—effects that, standing alone, repeatedly raise the specter of possible harm to beneficiaries.

At the outset, it is important to emphasize that any conclusions we have about PPS and quality of care are based on the experience of the initial years of PPS. More recent experience is unknown, because published studies are based on data that rarely extend beyond 1986 or 1987. Hospitals have faced tightening financial circumstances in more recent years, and those changed financial circumstances could induce new adaptations by hospitals that more seriously compromise patient care. This threat suggests the need for continued monitoring of the effects of PPS on quality, quite apart from the other reasons for further research we discuss in this section. Our basic findings from the literature on PPS and quality, shown in Table 6, should be read with that caveat in

Table 6

Summary of the effects of the prospective payment system (PPS) on quality of care

Area of effect	Principal finding	Secondary findings	Important industry differences
Access	Little evidence of hospitalization being indiscriminately denied.	Greater admissions declines where PPS rates more generous. Possible PRO effects undocumented.	—
Mortality	No documented rise in mortality rates after PPS, whether measured in hospital or up to 1 year later.	Some evidence that deaths formerly occurring in hospital now occur elsewhere.	Rates for small and government-owned hospitals slightly sensitive to generosity of rates.
Readmissions	No significant change.	Possible decline in readmission rates in later PPS years.	Rates for rural and small urban hospitals declined by 1988. Rates for large urban hospitals increased slightly by 1988.
Transfers	Little change.	Possible increase in transfer rate in later years of PPS.	Some evidence that elderly veterans diverted to VA hospitals.
Emergency room admissions	Evidence inconclusive—possible increase, but likely not due to poor care.	—	—
Processes of care	Improvement in explicit and implicit measures of process quality, due to continuing pre-PPS trend (i.e., PPS did not cause, but did not prevent, the improvement). Decrease in stability of patients at discharge.	Indications that discharge planning and management of post-hospital care uneven. Improvements in process and decrease in discharge stability do not vary by patient type (e.g., age, sex, race).	Process improvements greatest for rural, non-teaching hospitals, least for urban, teaching hospitals. Decrease in stability at discharge consistent across hospital types.

NOTES: PRO is peer review organization. VA is Department of Veterans Affairs.

SOURCE: Coulam, R.F., and Gaumer, G.L., Abt Associates, Inc., Cambridge, MA.

mind. These findings can conveniently be discussed in terms of three substantive conclusions:

- In studies published to date, the negative effects of PPS on quality are not so large and consistent as to register on commonly accepted measures of major patient outcomes.
- But there are some reports of negative quality effects, particularly concerning how care is managed at and after hospital discharge.
- The most compelling issues raised by this research certainly implicate PPS, but go well beyond it to question the quality of care before, as well as after, the implementation of PPS. In this context, PPS is a marginal factor, exacerbating certain weaknesses already present in the system of hospital and post-hospital care.

Effects on quality-related outcome measures

Perhaps the most important finding of the literature published to date is simply that commonly accepted forms of scorekeeping fail to record negative changes following the introduction of PPS:

Access

Published measures of access are generally reassuring, with little indication that hospitalization is being indiscriminately denied. For example, reductions in admissions appear to have been selective across DRGs and to have been moderated for the most frail patients (Russell, 1989). Moreover, admission reductions were inversely correlated to the financial pressures of prospective rates, thus making it difficult to attribute the reduction in admissions—or any systematic access problems—to those rates (Hadley, Zuckerman, and Feder, 1989). The PRO reviews that were instituted with PPS could create access difficulties. Published evidence suggests that the problems are minor (e.g., Imperiale et al., 1988), although in truth little is known about the effects of the PROs.

Mortality

Following the introduction of PPS, mortality measures have shown no change or a decline for:

- In-hospital rates (e.g., DesHarnais et al., 1987; DesHarnais, Chesney, and Fleming, 1988; Kahn et al., 1990a; Long et al., 1987; Long, Chesney, and Fleming, 1989; Manton, Vertrees, and Wrigley, 1990; Sager et al., 1989).
- Long term mortality rates, ranging from 30 days (e.g., Kahn et al., 1990a), to 36 days (Eggers, 1987), to 180 days (Kahn et al., 1990a), to 12 months (Ray, Griffin, and Baugh, 1990).
- Population mortality rates (Eggers, 1987; Manton, Vertrees, and Wrigley, 1990; Russell, 1989).

Even small-area studies tend to agree with the results of these national and State studies (e.g., Fitzgerald, Moore, and Dittus, 1988; Mayer-Oakes et al., 1988; Simons and Omundsen, 1988; but compare Lindberg et al., 1989). There is evidence to suggest that some of the deaths that formerly occurred in the hospital now occur elsewhere—notably, in nursing homes (Lyles, 1986; Sager, Leventhal, and Easterling, 1987; Sager et al., 1989; but compare Carroll and Erwin, 1987, 1990; Lewis et al., 1987) or in the community (Manton, Vertrees, and Wrigley, 1990).

A slightly different issue is raised if, instead of looking at comparisons of mortality rates before and after the implementation of PPS, we compare variations in mortality rates with variations in the level of generosity of PPS payment. One unpublished study (Cutler, 1991) finds a small but significant average price effect on hospital mortality. However, all of the change is in the timing of early deaths, not in the long-run mortality hazard. That is, in diagnoses with price reductions, some deaths that used to occur in the first 6 months after hospitalization now occur in the hospital; but given survival to 6 months, there is virtually no increased probability of death following changes in average prices. A second unpublished study (Staiger and Gaumer, 1990) examines the relationship between a hospital's financial condition in the previous year and 45-day mortality rates for urgent care conditions judged to be sensitive to pressures to contain costs. No relationship exists for the majority of urgent care admissions (i.e., urgent care admissions to large hospitals); however, a small but significant and robust relationship was found for small hospitals (with fewer than 150 beds) and government-owned hospitals. These studies suggest that it is not only the structure, but also the generosity, of PPS rates that contributes to their ultimate impact on the quality of care. The Cutler study suggests as well that this effect influences the timing, but not the longer run rate, of mortality. (The data for the Staiger and Gaumer study did not permit the authors to test this proposition.)

Mortality measures are a crude device for detecting quality declines. But virtually without exception, published studies using that measure in various forms fail to find significant increases following the implementation of PPS. However, most of this work has been devoted to comparisons of mortality rates before and after the introduction of PPS. Recent unpublished work suggests the possibility of small, subtle relationships within the framework of PPS payments, particularly concerning changes in the generosity of PPS rates. In an era of declining hospital margins, further exploration of such effects gains in importance, as against the pre/post comparisons that have dominated the first wave of PPS research.

Readmissions

Readmission statistics do not necessarily show changes in the quality of care. But a large increase in readmission percentages would make possible the inference that initial hospital stays were deficient in some way, such as providing incomplete or inappropriate treatment.

In general, readmission statistics have not increased under PPS. Studies based on national samples of various Medicare patient groups typically find no significant change in readmission rates (Desharnais et al., 1987; DesHarnais, Chesney, and Fleming, 1988; Guterman et al., 1988; Kahn et al., 1990a; Lave et al., 1988b). Reports that include later data (e.g., Prospective Payment Assessment Commission, 1990a, which has data through

1988) suggest an actual decline in readmission rates in the later years of PPS. Across hospital types, rural and small urban hospitals had lower readmission rates in 1988 than in 1984; but large urban hospitals had slightly higher rates in 1988. Across age groups, only beneficiaries 90 years of age or over had higher readmission rates in 1988 than in 1984 (Prospective Payment Assessment Commission, 1990a). Most State and local samples agree with the national statistics and fail to find a significant increase in readmission rates (Carroll and Erwin, 1987; Gerety, Soderholm-Difatte, and Winograd, 1989; Lewis et al., 1987; Rich and Freedland, 1988; but see Carroll and Erwin, 1990; Gay et al., 1989; Gay and Kronenfeld, 1990). Meanwhile, certain single-hospital studies (Flynn et al., 1990; Weinberger, Ault, and Vinicor, 1988) revealed increases in readmission rates, but the increases were not significant, at least in part because the samples of patients were so small.

Thus, while some studies reach contrary results, the exceptions are narrow, especially in view of the probability that, other things being equal, readmission rates would have increased after PPS because of the decline in admissions and the increase in the severity of illness of the inpatient population. The relative consistency of research results on readmissions argues against any inference that hospitals systematically changed their patterns of care in ways that increased readmissions.

Transfers

In principle, hospitals could use transfers to improve quality, by transferring a patient to a better equipped or otherwise more appropriate setting. However, hospitals also could use transfers for financial advantage, even if they were against the best interests of the patient, simply to avoid costly patients, and/or to shift the patients into a setting exempt from PPS. Indeed, fears that costly patients would be "dumped" by hospitals were a major concern when PPS was instituted. Although there are no data to discriminate between appropriate transfers and transfers motivated by financial advantage alone, any major increase in transfers after PPS would raise at least the suspicion of financial motivation and of possible quality consequences.

Three sets of studies based on national samples of CPHA hospitals find little or no significant change in the rate of transfers to other short-term hospitals or to exempt hospitals or units (DesHarnais et al., 1987; DesHarnais, Chesney, and Fleming, 1988; Long et al., 1987; Long, Chesney, and Fleming, 1989; Sloan, Morrisey, and Valvona, 1988a). A study of Medicare patients in South Carolina reaches a similar result (Gay et al., 1989; Gay and Kronenfeld, 1990). A study of transfers of elderly veterans from hospitals outside the Department of Veterans Affairs (VA) to three VA hospitals suggests an increase in such transfers from 1982 through 1984 (Hurley, Linz, and Swint, 1990); however, the distribution of such transfers across "problem" (unprofitable) and other DRGs fails to reveal evidence of financial motivation.[15]

These studies generally imply that rates of transfer did not substantially change after the introduction of PPS, although the VA data suggest a need for some caution. Moreover, these studies are all based on data no later than 1985. There is some evidence to indicate that rates of transfer increased thereafter: ProPAC (1990a) shows that transfer rates increased only 2.6 percent annually 1984-86 but then increased by 9 percent annually 1986-88, for reasons that could not be explained. Coincidentally, this latter period was a time when hospital margins began to be squeezed, after the more generous early years of PPS. It therefore appears that no final judgment on the issue of transfer rates is possible, pending careful analysis of more recent trends. Standing alone, the simple fact of accelerating transfer rates raises the possibility of the kind of financial opportunism that was feared under PPS.

Emergency room admissions

The final quality-related outcome measure to be considered is emergency room (ER) admissions. An increase in ER admissions could occur for many different reasons, but some of the possibilities have troubling implications for the quality of care; e.g., stricter criteria for admission under PPS could mean more delays in admission until emergency conditions arise. Unfortunately, there is little available evidence on this issue. Data for 1980-85 from a sample of CPHA hospitals show an increase in the proportion of ER admissions for Medicare patients in 1984 and particularly 1985; however, attributes of the ER patients (e.g., the relatively low resource intensity of their care and the relatively low percentage of readmissions among them) argue against any simple inference about the quality of their care (Sloan, Morrisey, and Valvona, 1988a). Studies by Gay et al. (1989) and Gay and Kronenfeld (1990), for South Carolina hospital admissions reach a contrary result: For 1984 (versus 1981), ER admissions declined by more than one-third (from 34 to 22 percent) for short-term acute care hospitals in the State.

Whatever the reasons for the difference, it is clear that the published data conflict and that too little is known about the trend of ER admissions under PPS to offer any strong conclusions. The work of Sloan and colleagues on a national sample suggests that there has been some increase, while the work of Gay and colleagues implies the contrary result for one State. In any event, because these studies cover only 1 or 2 years of PPS, we could say little about the lasting effect of PPS, even if we were more certain about the initial impacts.

[15] Other data from the three VA hospitals revealed a more troubling pattern, however. It appeared that non-VA hospitals were not admitting certain elderly veteran patients in problem DRGs and were instead diverting these patients to VA hospitals before a non-VA admission. As a result, these patients did not show up as transfer patients, although in substance they likely were.

Quality-related outcome measures: Conclusion

The purpose of research on quality-related outcome measures is to search for indications that the quality of care has deteriorated under PPS, to an extent sufficient to register on certain relatively coarse variables. In general, studies in this area fail to document any significant deterioration. Mortality statistics and readmission rates do not appear to have changed substantially. Transfer rates changed little in the early years of PPS, although there may have been a more substantial change in later years. The few studies of ER admissions are inconclusive. The net implication, therefore, is that it is still possible to make the statement that (in terms of these outcome measures) there has been no documented deterioration in the quality of care under PPS. However, it is important to add to that blanket statement that certain studies and data raise important cautionary notes, and little has been carefully documented for the past 4 or 5 years of PPS. In other words, the general level of comfort this literature provides is based on (at most) one-half of the time hospitals have spent under PPS—and it is the first and more profitable half at that. We know little about the behavior of hospitals under more stringent PPS payment levels. Given these limitations in the research, there is no reason to assume that the questions addressed by this literature have been definitively settled. However, the published studies provide at least a first-order reassurance that the worst case has been avoided: Any negative effects of PPS on quality are not so large and consistent as to register on these measures.

Management of patients at discharge

If the results on major patient outcomes are generally reassuring, other results raise occasional cautions and point to serious questions about patient care. Most important, the major RAND study of the quality of care under PPS shows a systematic improvement in explicit and implicit measures of the processes of care for five major disease conditions (Kahn et al., 1990b; Rubenstein et al., 1990). Rural non-teaching hospitals showed the greatest process improvements, while urban teaching hospitals showed the smallest gains (Rogers et al., 1990). There were no consistent differences in process improvement by patient type (e.g., age, gender, or race). Although PPS did not appear specifically to have encouraged this improvement in process quality, it could at least be said that PPS did not prevent it.

However, if the RAND study finds a general improvement in the process of care, it also reveals one important problem: an increase in the instability of patients at discharge after PPS was introduced (Kosecoff et al., 1990). This increase in instability was consistent across all hospital and patient types (Rogers et al., 1990). A number of small-sample studies show similar declines in the conditions of patients at discharge and thereafter, following the implementation of PPS, e.g., the hip fracture studies of Fitzgerald et al. (1987), Fitzgerald, Moore, and Dittus (1988), Gerety, Soderholm-Difatte, and Winograd (1989) (but compare the hip fracture results of Palmer et al., 1989; Ray, Griffin, and Baugh, 1990; as well as the results for diabetes patients in Weinberger, Ault, and Vinicor, 1988).

Some of these results may be read as a standard caution that some areas (or some hospitals, or some patients) inevitably differ in important ways from the reassuring norm, and we should attempt to discern whether there are any systematic factors coinciding to cause the deviant cases. But the more pointed message of these studies is a message about the relationship of hospital care to complete episodes of patient illness (note the comments of Russell, 1989). The RAND results urge careful research on discharge protocols and the management of discharged patients. The results of Fitzgerald et al. (1987), Fitzgerald, Moore, and Dittus (1988), and Gerety, Soderholm-Difatte, and Winograd (1989) urge greater attention to how and where patients are rehabilitated from hip fracture surgery after their hospital stay. The results of Weinberger, Ault, and Vinicor (1988) urge a multifaceted effort to improve post-hospital, outpatient care for diabetes patients, given the reduced role that hospital care plays.

The impression one gets from this research is that, by reducing the hospital role in patient episodes, PPS has placed a premium on what happens after the hospital stay. Yet these post-hospital caregivers, ranging from relatives at home to professional staff in skilled nursing facilities, have not been systematically drafted into a new regime—not by PPS, nor (it would appear) by hospitals. What adjustments have occurred have been local and ad hoc. Perhaps a more explicit effort is required, especially in view of the next conclusion, which suggests the need for a larger context for understanding the quality problems this literature reveals.

The long-standing quality problem

Although PPS appears strongly implicated in certain negative results this literature reveals, it is useful to shift the focus to a different question, concerning the level of quality independent of or before PPS. It is useful to recall that:

- The RAND study (Kosecoff et al., 1990) found an increase in patient instability at discharge after PPS, from 15 to 18 percent of all discharges. However, the study also found that the relationship between instability at discharge and mortality was significant for pre-PPS cohorts as well as those after PPS was introduced. Discharge planning and the management of post-hospital care appear to have been a weak link in patient care before as well as after the implementation of PPS.
- Within the PPS cohort of the Fitzgerald, Moore, and Dittus (1988) study, there was evidence that the rehabilitation of health maintenance organization (HMO) patients was substantially faster and more complete (greater probability of returning home) than for non-HMO patients, notwithstanding that HMO patients left the hospital sooner, with less ambulatory capacity. (Note that there were no pre-PPS HMO patients in the Fitzgerald sample, so no pre-PPS comparison of HMO patients to others is possible.) Although comparisons between HMO and other patients are notably risky, the superior results for the HMO patients are possibly the result of superior post-hospital case management (Russell, 1989). This possibility suggests that certain opportunities for

improving patient outcomes at discharge have not been systematically documented and explored, before or under PPS.

- In the Gerety, Soderholm-Difatte, and Winograd (1989) study, one nursing home that specialized in geriatric rehabilitation was able to rehabilitate patients much sooner than other facilities, before and after the implementation of PPS. The superiority of this one facility did not appear to have been appreciated by the hospital nor to have shaped how the hospital discharged patients during the period covered by the study.

These data are only suggestive, but they sketch the outlines of a fundamental point. The different components of a complete episode of care should support and complement each other in order for the patient to receive effective care for an illness. But the appropriate division of labor between hospital and post-hospital care and the appropriate management of their linkage are difficult to specify from the available literature. These difficulties serve to emphasize important gaps in our understanding of what constitutes quality patient care. PPS has likely raised the stakes on this score—it is now more important to understand how best to mesh hospital and post-hospital care. But the stakes were substantial in any event. By making these issues more central to the politics of Medicare payment and by eliciting research on potential problems feared from the new payment methodology, PPS has served to focus attention on opportunities for improvement in quality that may have existed all along.

Conclusion

The 1980s saw an energetic array of public and private initiatives to control health care costs, particularly the costs of hospitalization. The most significant single initiative was PPS. Like the State ratesetting programs it followed, PPS embodies a philosophy of incentive payment. Program savings were expected to result from providing opportunities for institutions to earn surpluses by competing successfully with, and providing services more economically than, other hospitals—or to suffer losses when they failed. These carrots and sticks were new, because as long as hospitals were reimbursed their costs, they faced few incentives to provide efficient care. Under cost reimbursement, there were no obvious reasons why all that could be done for patients would not be done. Under PPS, on the other hand, skeptics were concerned that the motive for surplus would lead hospitals to do less for patients than what needed to be done. There was no way to know with certainty if hospitals and physicians would establish precisely the right balance between financial and clinical concerns. PPS, as supplemented by the reviews of the PROs, was open to many different possible results. Some of these possibilities rightly caused concern in the health care community. There were legitimate fears that patient care would be shortchanged in a regime where withholding tests and procedures would save the hospital money; that patients would be discharged too quickly, with unresolved problems left to fragmented post-hospital environments that (to the degree they were covered by Medicare) enjoyed greater payment flexibility; and that hospitals would dump patients that might require unusually costly care, even as marginally necessary admissions were encouraged. While some States and private payers had implemented prospective payment well before Medicare joined the experiment, there were enough residual uncertainties in the State results and enough distinctive characteristics in Medicare to leave the outcomes of PPS in doubt. It appeared that many of the most important issues that PPS raised could only be answered with Medicare experience.

As we write, it is now 8 years since Medicare's test began. Most of the initial questions have at least tentative answers, although the agenda of continuing issues remains imposing. Having surveyed the published literature on the effects of PPS, we are now in a position to summarize the judgment that that literature collectively provides. There are six principal implications to be drawn, discussed in the following sections.

Administered prices can control spending

We do know that administered prices can control hospital spending by providing payment incentives to control efficiency and intensity of services. Of course, the PPS literature was not the first to point this out (Coelen, Mennemeyer, and Kidder, 1986; Schramm, 1987). Like State ratesetting, PPS reduced expenses in hospitals by constraining payments, and, on average, the control of expenses did not fully match the constrained payment stream, resulting in reduced profits across the industry. And like State ratesetting, there were early administrative errors in setting rates. (See early histories of New Jersey's DRG system and of the program in western Pennsylvania in Coelen et al., 1986.)

Unlike the literature on State ratesetting, the literature on PPS fails to generate any reliable estimates of the expenditure (or payment) reductions that resulted, although several studies offer approximations ranging from 13-16 percent of inflation rates (Feder, Hadley, and Zuckerman, 1987; Robinson and Luft, 1988) to $10-$18 billion by PPS 5 (Coelen, 1991; Russell and Manning, 1989). These estimates are based on a number of different data sets. Though each provides a dubious point estimate of program effects, their general consistency provides some security beyond their specific methods.

There is still much disagreement about the underlying pattern of the effects. Some contend that the savings stem largely from a one-time savings in response to the shock of new or anticipated incentives (e.g., Hadley, Zuckerman, and Feder, 1989), while most others see a reduction in inflation rates. There is also disagreement about the extent to which the effects are driven mainly by admission reductions (see Sloan, Morrisey, and Valvona, 1988b), or only partially so (in the range of 15-30 percent of the total savings [Russell, 1989; Hadley, Zuckerman, and Feder, 1989]). In the case of State ratesetting, volume changes reduced the efficiency effects of cost-containment payment incentives (Coelen, Mennemeyer, and Kidder, 1986). In the case of PPS, there is agreement that the volume incentives of a per case payment unit have not hampered savings to the Medicare program and may have extended the savings beyond those attributed to efficiency alone. Several authors argue that the economies of PPS have helped payers other than Medicare via spillovers (e.g., Coelen, 1991).

Worst fears not realized

The literature on PPS contains a variety of qualifications and warnings. However, in terms of the overall effects of PPS, it is fair to say that none of the worst fears raised at the outset have been borne out by experience—at least, in the experience that has been studied to date. Admissions went down, not up, and the decline was selective and concentrated in procedures (e.g., cataract surgery) widely considered appropriate for diversion from the inpatient setting. There is little evidence that hospitals have dumped patients and evidence of only marginal shifts in admissions to exempt settings. Moderations of increases in intensity of care have occurred but appear to be selective, not relentless, and in any event appear not to have impeded long-term trends of improvement in the processes of care. Mortality rates and other indirect measures of the quality of care have not deteriorated. Worries that PPS would result in widespread cost shifting, retard the diffusion of new technology, or reduce uncompensated care appear to have been misplaced. In the bargain, Medicare appears to have saved a considerable amount of money, even as other public and private payers may have enjoyed substantial spillover benefits in the control of utilization, and the financial burden on Medicare beneficiaries has not been materially changed.

To be sure, there are some troubling signs in this research:

- PPS has not been financially neutral to the industry. Although it is impossible to say if the general financial health of the industry is better or worse now than it was at the outset of PPS, it is obvious that, on average, hospitals have been unable to match constrained Medicare payment growth with corresponding reductions in expenditures. Some segments of the industry have done quite well under PPS, while others have been unable to remain viable. The lack of convergence in the profits of such groups appears to be the result of structural market factors and provisions of PPS granting special treatment to certain groups of hospitals (e.g., teaching hospitals).
- There are signs of greater instability in patients at discharge and—an unfortunate complement—signs of poor discharge planning and management of post-hospital care. Notably, these are problems that predate PPS, but PPS seems to have exacerbated them.

At the same time, given difficulties of data and analysis or the absence of research, substantial open issues remain in certain areas. For example, few results are available for the later years of PPS; no comprehensive evaluation has been done on the effects of the PROs; we have only conjectures to explain the major surprise of PPS (the decline in Medicare admissions in the first few years of PPS); little is known about the effects of PPS on certain exempt institutions and on clinical research; substantial uncertainties remain concerning such questions as the components of the case-mix increase and the effects of PPS on nursing home utilization; and it is not certain that the pace of closures of small hospitals has not been caused in part by the interaction of PROs, volume instability, and prospective per case rates.

Thus, the record of PPS is not without gaps or important cautions. But it is a set of results that would generally have been welcomed by PPS proponents at the outset. It is surprising that so fundamental a change has failed to yield more fundamental conflicts in results.

Equalizing pressure or payment rates?

There is a growing body of evidence that cost-containment results could be stronger by moving ratesetting policy toward equalizing pressure on hospitals and away from equalizing payment rates. Early work by researchers at the Urban Institute and Georgetown University (Feder, Hadley, and Zuckerman, 1987) first noted that pressured facilities (potential losers under PPS rates) were more responsive to the PPS incentives; that the most favorable margins still accrued to the institutions that did the least to follow indicated marginal signals; and that more vigorous pressure on the institutions having low base-year costs (the least pressured) might increase the savings and be more fair. Subsequent work by the same authors (Hadley, Zuckerman, and Feder, 1989) confirms these points. Others confirm the pressure thesis (Robinson and Luft, 1988; Lave, 1990; Zwanziger and Melnick, 1988). Recent work helps to confirm that convergence to adjusted national average spending and payment levels is a very sticky process, with winners retaining high margins and losers tending to lose even more over time (Cromwell and Burge, 1991; Coelen, 1991). Local market factors appear to cause some institutions to persist in spending more (or less) against a fixed payment rate. This evidence, coupled with direct studies of the effectiveness of PPS payment adjusters (Gianfrancesco, 1990; Sheingold, 1986), indicates that payment pressure is not equalized across hospitals.

An obvious caution to the equal-pressure thesis concerns the rates (and pressure) on high-cost institutions. If pressure is reduced, research clearly shows that less will be saved in these institutions, where the gains of PPS have accrued to date. It is not possible to say if the effects from PPS would have been more or less pronounced if pressure had been equalized through hospital-based rates, rather than through national or blended rates. There is little question that the pattern of effects and the equities relating to margins would be different, possibly obviating the kinds of PPS policy changes (regarding rural hospitals, for example) that have absorbed so much time of policymakers in recent years.

Improving and extending adjustments—or rebasing on a hospital-specific basis—would begin to equalize pressure and to create a fresh avenue to recover potential slack from institutions that otherwise are unpressured winners. Indeed, the generation of excess PPS profits may have partially contributed to the renewed rise in hospital spending in the wake of the precipitous LOS drop. This latter point has not been studied, although Hadley, Zuckerman, and Feder (1989) and Cromwell and Burge (1991) do demonstrate that an industry of non-profit firms will tend to spend some portion of excess profits by elevating expenditures in subsequent years.

Viewed in terms of this literature, the return of double-digit hospital cost inflation in later PPS years may suggest self-limiting aspects of prospective payment

programs as cost-containment devices. If profit accrues under a rate-to-rate system like PPS, then the propensity to consume those funds in future years should depend on expectations about future paths of revenues and expenses and the ownership status of the hospital. Non-profit hospitals that are "stable winners"—i.e., that are facing stable positive margins and little prospect of rebasing[16]—would be expected to consume prior savings at a higher rate than other hospitals. Similarly, proprietary institutions that are stable winners under PPS would be expected to consume prior savings or to distribute them to stockholders.

Thus, for both proprietary and non-profit hospitals, stable conditions with positive margins might result in a high marginal propensity to spend savings. In turn, that propensity could render the cost-containment effects of prospective payment self-limiting. To reduce the marginal propensity of these hospitals to consume prior-period profits, we would likely have to change the hospitals' expectations, in particular, to increase the hospitals' expectations of financial pressure or "rainy days" in the future. Threatened or periodic rebasing, as is almost universal in State payment systems, would achieve this end.

Did payment levels mitigate incentives?

Published research on the effects of PPS focuses on years when PPS was generally profitable to hospitals. This focus in time raises a fundamental question: To what extent did the generosity of PPS rates moderate reactions to the incentives of PPS rates? Most published studies of the effects of PPS are based on data that run to the third or fourth year of PPS at the latest—roughly one-half of the total PPS experience to date, and the more profitable half by all accounts. The introduction of PPS provided a financial windfall to hospitals, in comparison to the TEFRA rates it replaced. The resulting surplus buffered the typical hospital from the costs of continuing activities that were unprofitable at the margin. In effect, the PPS intervention was an increase in, as well as a restructuring of, payments for the average hospital case. However, the debate on PPS focused on the marginal incentives PPS presented, and the literature appears to have followed that emphasis. Indeed, any reading of the PPS literature leaves one with the impression that only the marginal incentives changed; apart from the literature on hospital finances, most studies do not even bother to measure changes in average payment.

We thus have a published literature on the profitable years of PPS that addresses questions of incentives but generally ignores the role that rate generosity may have played in the results we observe. If the relative generosity of rates remained constant over time, the failing would not be serious. But given the increasing stringency of PPS rates, we must necessarily be concerned as to whether the generally benign story to date will be revised in important ways when studies using later data are published. Indeed, the measures of margins, volumes, productivity, and other indicators are quite active in the first 5 years of PPS, no doubt reflecting behavior that anticipated and reacted to substantial changes in payments and practice patterns. At the outset of our review, we briefly summarized findings from studies of State prospective payment programs. These State programs differ in important ways from Medicare PPS, but they provide a clue about the later years of PPS, in that these programs (e.g., in New York, Rhode Island, Maryland) were not notably generous—and the results were far more mixed than we have observed for PPS. For example, we found in State ratesetting programs that reductions in expenditure growth of 2-4 percentage points per year could be sustained over more than a decade, with large cumulative effects on budgets; that large wage, FTE, and investment growth paths were substantially altered; and that important quality measures (urgent care mortality) might be adversely affected (Coelen, Mennemeyer, and Kidder, 1986; and Gaumer et al., 1989).

At the same time, certain findings in the PPS literature itself suggest the effects of relative stringency. Expenditure reductions were more pronounced, admissions declines were smaller, and LOS reductions greater in hospitals facing greater fiscal pressure under PPS (Feder, Hadley, and Zuckerman, 1987). Moreover, generous Medicare payment rates at the outset led to more liberal spending by hospitals in subsequent periods (Hadley, Zuckerman, and Feder, 1989). Temporal variations in the generosity of PPS rates show a small but significant relationship to short-term mortality rates (Cutler, 1991; Staiger and Gaumer, 1990). More generally, we have to anticipate that hospitals under greater financial pressure will become far more sensitive to activities unprofitable at the margin—to the point of restricting activities that were commonly maintained in the early years of PPS. Hospitals under financial pressure will almost certainly be less willing to care for high-risk patients, to underwrite additional tests when necessity is arguable, to acquire costly new technologies, or otherwise to act as a benign buffer between the signals PPS sends and the increasingly negative messages from their financial reports. All of these negative results were at least possible when PPS was originally implemented and are simply more likely now. The first wave of PPS softened the effects of prospective rates with generous payment levels, and the published literature on PPS is focused on those early years. The later years should show the effects of more ubiquitous financial pressure: The apparent effects of the incentives will be much stronger. Studies using data from the late 1980s should be closely followed to ascertain how much the declining generosity of PPS rates has mattered.

Data limitations

Data fragmentation and other data limitations have set important limits on what we can know about the effects of PPS—particularly concerning the effects across the boundaries between hospitals and other forms of care, and between Medicare and other payers. Research on health issues is pervasively affected by the limitations of available data bases. For studies of PPS, the limitations are serious, given that the ultimate reach of PPS effects cuts across so many different payers and provider types.

[16]Rebasing could alter established patterns of winners and losers. Hence, the potential for rebasing could change hospitals' expectations.

It is a straightforward matter to study particular issues in the small, e.g., before-and-after changes in admissions or LOS at non-exempt short-stay hospitals. However, for these particular issues, it is difficult to be certain about how much care is leaking across institutional boundaries in ways that cannot be traced through existing data bases, e.g., between non-exempt and exempt facilities (note Newhouse and Byrne, 1988, and the difficulty of identifying exempt facilities in pre-PPS data), and Medicare and other payers (note Hurley, Linz, and Swint, 1990, and the possible deflection of elderly veterans in unprofitable DRGs to VA hospitals). To the extent that particular statistics are affected by shifts of care to other settings, before-and-after comparisons are biased in ways that are invisible to the analyses. Statistical controls, e.g., for patient mix, certainly mitigate the problem, but are necessarily coarse in virtually all studies.

Meanwhile, a comprehensive estimation of the effects of PPS involves more than a list of changes in particular outcome statistics for inpatient care. Ideally, we would like to compare complete episodes of patient care before and after the implementation of PPS to track how the composition of episodes of care has changed for different kinds of patients (note Russell, 1989). But the construction of patient-level episodes is extremely difficult, in part because of the technical complexity and expense (e.g., in linking Part A and Part B claims data), and in part because Medicare is a relatively minor payer for key components of care that PPS has made more important (notably, extended nursing home care). Some data sources are more comprehensive than others for particular purposes (e.g., some data sources include discharge destination or clinical history, while others do not); and some studies have made substantial progress filling the gaps present in readily available sources (e.g., the combination of large-scale medical record abstraction and post-discharge data collection by the RAND quality of care study [Draper et al., 1990] and the linkage of Part A and B data bases by Mitchell and her colleagues [Menke, 1990; Mitchell, Wedig, and Cromwell, 1989]). But no published study has constructed complete before-and-after episodes of patient care, and, to that extent, there are significant limits to our understanding of changes in the different components of care and in how they fit together after PPS.

Ratesetting and hospital behavior

The results of PPS tend to exonerate the basic premises on which PPS was based. However, the results also suggest that we still do not fully understand the preferences and behavior of hospitals. For example, based on the literature to date, PPS appears to have saved Medicare money without causing systematic, documented harm to patients or the health care industry. These results tend to confirm the basic premise of the venture: that there was slack in the provision of inpatient hospital services, and that creating incentives for cost containment would squeeze some of the slack out of the system. Moreover, many of the ways that hospitals economized fit expectations for how they would behave, e.g., by reducing LOS and shifting care to outpatient settings.

Having recognized these consistencies with original expectations, we should also recognize the limitations in our understandings of how the hospitals would react. First, the admissions decline was a surprise. The stylized facts used to explain it tend to be simplistic, and no one has rigorously documented why it occurred. Was it due entirely to PRO regulation (and associated sentinel effects)? To physician preferences to avoid the hassles of admission and continued-stay review? To better payment rates in the outpatient setting? To pure hospital preferences to substitute? We do not have the studies available to discriminate among the possibilities. Second, we do not know whether narrow payment incentives of PPS (e.g., to cut back on tests or to forego purchases of new technology) were buffered by generous rate levels, hospital and physician commitments to quality care, preferences for institutional stability, the deterrent effects of reviews by the PROs, compelling marketing considerations, the need to retain physicians, or other concerns. Indeed, given how little is known about how the PROs affected all these elements, we do not know whether financial carrots or regulatory sticks were the most important factors influencing key dimensions of hospital behavior. Third, we do not know how risk preferences vary among hospitals or how those preferences affected hospital adaptations to PPS. For example, PPS made hospitals liable for the full costs of care; while a large hospital could essentially self-insure for variations in patient needs and patient volumes, small hospitals may not have been able to do so. How much of what we see was driven by preferences for risk? Fourth, we do not have a good map of how hospitals actually administered all of the different changes that the PPS literature describes. A more detailed appraisal of the connection between hospital operations and PPS effects would give us a better understanding of how hospitals generate and control costs. Finally, we do not know how profit and expectations of future profit influence spending, and the effect of ownership and other control measures on this relationship. This issue may be fundamental to understanding the cost-containment limits of incentive payment systems such as PPS.

In general, a review of the PPS literature serves to reassure us on most of the original concerns that accompanied implementation of the program. But reflection on this literature also points to a series of problems that were not central questions at the outset. For some of these latter problems—notably, the possible effects of the declining generosity of PPS rates—the passage of time should reveal whether or not the worry is misplaced, as studies using later data appear. Other problems will not so naturally be explored and will require instead a reconception of what the central questions should be for understanding the behavior of hospitals and other providers, for creating equitable adjustments to behavior across the program's providers, for pursuing improvements in the quality of care, and others.

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