Hospital Department Cost and Employment Increases: 1980-92

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Hospital costs have continued to rise at rates well in excess of inflation generally, even after the introduction of Medicare's per case prospective payment system (PPS). This article uses a hospital subscriber microcost reporting system to show trends in costs, wages, labor hours, and outputs for more than 50 individual departments from 1980-92. Descriptive results show dramatic growth in the operating room, catheter lab, and other technologically driven cost centers. Administrative costs also increased rapidly through 1988, but slowed thereafter. The paperwork billing and collection burden of hospitals is estimated to be $6 billion in 1992, or approximately 4 percent of total expenses.

INTRODUCTION

In October 1983, the Federal Government implemented a new method of paying hospitals for inpatient care provided to Medicare beneficiaries. Unlike the previous, cost-based system, which retrospectively paid costs incurred by patients, the new PPS set a fixed price per discharge for more than 468 diagnosis-related groups (DRGs). This put the hospital industry at risk for both longer stays and more intensive care within each DRG. Aggregate statistics show dramatic reductions in lengths of stay (LOSs), shifts to outpatient settings, and diversification of services, all in response to a fixed global payment per discharge. According to American Hospital Association (AHA) (1980-93) figures, the average daily census in community hospitals fell from a high of 763,000 in 1981 to 604,000 in 1992. Average stays were down from 7.6 to 7.1 days, and outpatient visits were up from 203 to 349 million during the same period.

Hospital inpatient cost inflation also abated in response to the new incentives, but more recent information suggests an acceleration in costs once again. In spite of a 21-percent drop in daily census from 1981 to 1992, total expenses in community hospitals still rose 174 percent, from $90.5 to $248 billion (American Hospital Association, 1980-93). A more severe case mix can certainly explain part of the rise in cost per inpatient day and per admission (Ginsburg and Carter, 1986), but potential gains from less inpatient use have been swamped by inflation. Given such dramatic changes in hospital reimbursement during so short a period, better control over costs might have been expected. Clearly, substantial changes have occurred in the way acute-care hospitals are used and patients are treated. It is frustrating, however, that the industry has not been able to align itself better with the overall performance of the economy.

This article addresses the internal cost structure of hospitals in an attempt to better understand how costs were contained in the early years of PPS and what might be the sources of renewed cost increases today (see also Cromwell and Puskin, 1989; Prospective Payment Assessment Commission, 1990). Taking advantage of a unique AHA database called MONITREND, volume, cost, labor intensity, and service intensity trends are reported by more than 50 hospital departments. Such

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organizational detail shows exactly which departments have been growing the fastest and which have contributed the most to growing service intensity, shifts to the outpatient setting, etc.

DATA SOURCES AND METHODS

MONITREND Data

For over 25 years, as a part of its Hospital Administrative Services (HAS) program, AHA has generated a variety of MONITREND reports that enable subscribing hospitals to compare their costs and productivity by department within bed-size group. In the early years, nearly 2,000 hospitals of all bed sizes participated in the program on a monthly basis. Since then, participation has declined as hospitals have purchased their own analytic software. Nevertheless, 530 hospitals of varied bed sizes continued to use the MONITREND service in 1992, and we believe that, with proper weighting by facility size, the figures are still representative of the industry as a whole. Neither AHA nor Medicare Cost Reports provide detailed information to validate the departmental statistics presented later. However, our estimate of total expenses per adjusted discharge using MONITREND produces an estimate of total expenses in community hospitals ($179 billion in 1988) that is only 5.9 percent higher than that reported by AHA (1980-93). The slightly higher cost estimate using MONITREND arises from the way statistics for selected departments were calculated, as discussed in the treatment of excluded bed sizes.

We have used the 6-month summary reports for the period ending June 30 for the years 1980-92 to examine industry trends by department (HAS/MONITREND, 1980-92). These reports do not present individual hospital statistics, but rather medians disaggregated by bed-size group, region, 24 Medicare cost reimbursement categories, and teaching affiliation. Nor are data presented for the United States as a whole, requiring weighting of the cell medians by reporting frequencies.

Paid hours are reported for each of 54 cost centers except utilities. Hospitals are requested to include the hours of contract nurses and similarly paid employees along with regular employee hours. Direct expenses for each functional cost center include salaries, other expenses directly assignable to departments, and any physician remuneration. Salaries include all accrued gross wages paid or imputed to employees (except physicians), including vacation, sick time, holidays, overtime, and on-call time actually worked. Salaries exclude employee benefits, such as employee and employer's Federal Insurance Contributions Act (FICA) withdrawals, health insurance, etc., and resident and student stipends, which are reported in the appropriate cost center (e.g., medical staff education). Other direct expenses include supplies, forms, consultant and management services, and service contracts. Other direct expenses do not include repair and maintenance contracts that are reported in plant operation and maintenance or pharmaceuticals and central supplies billed to the patient that are reported in central supply and pharmacy. Physician remuneration includes all salaries, fees, and contractual amounts paid to physicians, residents, and interns, but excludes salaries for physicians acting in a managerial capacity, which are reported as regular direct salaries of departments, or fees billed private insurers. MONITREND is one of very few sources reporting both salaries and hours worked that can be used to calculate an hourly wage rate by department. Although Medicare

Cost Reports provide data on total salaries versus other costs by department, no information is given on hours worked. Hence, it is not possible to calculate wage rates or productivity per hour worked from Cost Reports.

Hospitals also report actual counts of treatments and procedures for many ancillary services along with paid hours. The number of meals, square footage cleaned, and other statistics are also captured for overhead departments. These data permit the calculation of intermediate labor productivity and patient service intensity. A few departments do not report paid hours (e.g., utilities, other patient expenses). For several other departments, no output measure exists (e.g., social services), leaving us with only hours per discharge. Compared with MONITREND, the only volume measures included in the Medicare Cost Reports are patient days and discharges. Thus, it is not possible to measure either intermediate patient service intensity by department (e.g., computerized axial tomography [CAT] scans per discharge) or labor productivity per intermediate service. Commission on Professional and Hospital Activity data, on the other hand, include detailed diagnostic and therapeutic information on patients, but cannot be linked to either labor inputs or department costs.

Variable Construction

Given this data set, AHA uses subscriber reports to produce a set of analytic variables for each department. These variables were used to construct an additional variable, total direct department costs per hospital (or unit) discharge, adjusted for outpatient activity. The general formula is the following:

$$(C/ADIS)_{db} = (C/SAL)_{db} * (SAL/HR)_{db} * (HR/ADIS)_{db} \quad (1)$$

where:

$(C/ADIS)_{db}$ = Direct expense per adjusted discharge (ADIS) in the $_d$th department in the $_b$th bed size.

$(C/SAL)_{db}$ = Departmental expense-to-salary ratio.

$(SAL/HR)_{db}$ = Departmental hourly wage rate.

$(HR/ADIS)_{db}$ = Paid hours per adjusted discharge by department.

Hours per adjusted discharge can be further decomposed into:

$$(HR/ADIS)_{db} = (HR/PROC)_{db} * (PROC/ADIS)_{db}, \quad (2)$$

or the inverse of intermediate labor productivity, or hours per procedure (HR/PROC) times service intensity, defined as procedures per adjusted discharge (PROC/ADIS). Adjusted discharges are determined by multiplying raw discharges by the ratio of inpatient to total department revenue. No further adjustment is made for case-mix changes over time.

Most of these variables are reported on a per adjusted day basis (e.g., salaries per adjusted day, procedures per adjusted day). In taking ratios, adjusted days cancel out, leaving the variable of interest (e.g., salaries per hour). Multiplying any per adjusted day variable by overall LOS allows us to express variables on a per adjusted discharge basis. Not all data are reported on a per day basis, however. Some, like plant operation, are reported on a per occupied bed basis, requiring multiplying by the ratio of occupied beds (or average daily census [ADC]), divided by total discharges (TOTDIS). The last was imputed according to:

$$TOTDIS = ADC * 365/LOS \quad (3)$$

for each bed size.

All but six cost centers use adjusted discharges from the hospital as the ultimate output variable. For medical-surgical, psychiatric, pediatric, subacute, obstetrical, and newborn bed accommodations, discharges from the unit are a more meaningful output measure. Ideally, we would also have similar unit information on the medical-surgical intensive-care unit (ICU), definitive observation, and the neonatal ICU. However, the information reported was detailed enough only to calculate hospital-wide ICU costs and not ICU costs per unit day.

Departmental expenses include salaries paid to employees assigned to a particular cost center plus purchased services plus all other direct expenses that are directly allocated to departments (e.g., supplies, drugs, gloves, bandages). Departmental salaries and hours exclude payments and inputs of physicians, residents, and interns, except when acting in an administrative capacity (e.g., hospital administrator). Purchased services, such as agency nurses, nurse anesthetists, midwives, therapists, etc., are included when MONITREND calculates salaries or paid hours per patient day. Department salaries include payments for vacation and sick time, but all employee FICA, health insurance, pension, and other fringe benefits are included under employee fringes.

Allocation of other direct supplies among the cost centers, central services, and the pharmacy is on a billed versus nonbilled basis. Services and drugs billed directly to patients are allocated to central services and pharmacy whereas those sent to the floors and not billed separately (e.g., bandages, operating room cart supplies) are included in the "other expenses" of the receiving department. Equipment depreciation and lease expenses are excluded from individual departments and are reported as a lump sum in indirect depreciation costs.

Adjustment for Outpatient Activity

One strength of the data base is the adjustment that is made for each ancillary department's contribution to outpatient emergency and clinic patients. For each department providing outpatient services, a ratio of inpatient to total department revenues is calculated. Total inpatient days or discharges are then divided by a department's ratio, which raises final output to reflect some outpatient care activity as well. The effect of this adjustment is to recognize the shifting locus of care and not overstate the intensity of ancillary care per inpatient. All of the variables (except department full time equivalent personnel [FTEs]) are shown on an adjusted discharge basis. As the outpatient share rises, so do adjusted discharges, making temporal comparisons of labor productivity more meaningful.

This adjustment, although common in standardizing for differences in outpatient volume, assumes constant inpatient/outpatient mark-ups over time. Although constant mark-ups are unlikely, we believe the adjustment to be a good first approximation of volume shifts.

While adjustments for outpatient activity are valuable, the resulting trends shown in this article have a very specific interpretation. If laboratory tests per adjusted discharge were declining, for example, patients may still be receiving such tests; only not as many on an inpatient basis. Comparing trends with and without adjusting for outpatient activity bounds the real trend in intensity per patient episode.

Adjustment for Non-Random Sample

Because HAS/MONITREND is a nonrandom sample of all U.S. short-term general hospitals, generalizations to the entire population are subject to reporting bias. To more accurately generalize to the actual

universe of short-term hospitals, we used the AHA bed-size proportions from corresponding issues of AHA *Hospital Statistics* instead of MONITREND hospital frequencies. We then multiplied the AHA bed-size proportions by average discharges per hospital within MONITREND bed-size group. Thus, all statistics presented in this article are shown on a case-weighted basis. Case weights for the 8 MONITREND bed sizes ranged from approximately 4 percent for the under 50 bed hospitals to over 29 percent for over 400 bed hospitals.

Excluded Bed Sizes

Smaller bed sizes either do not offer certain services or report incomparable data on just a few subscribers within a bed-size category. To make the year-to-year comparisons less subject to changes in the mix of reporting hospitals, data for smaller bed sizes were dropped from the calculation of median costs for selected departments (Table 1 shows bed-size exclusions by department). Neonatal department statistics, for example, were based only on the three largest bed sizes over 200 beds. Discharge weights were renormalized by department, depending on the number of included bed sizes.

The advantage to excluding smaller bed sizes is the greater continuity and reliability of data on costs, wages, productivity, and intensity for particular departments. The disadvantage is that per discharge statistics apply only to hospitals above a certain bed size. For instance, neonatal units may employ 40 FTEs in over 200 bed hospitals, but this overstates to some extent the true size of such units across all hospitals. Similarly, neonatal cost per discharge pertains only to the larger bed sizes. This overstates the average neonatal cost per discharge based on MONITREND compared with an estimate based on both small and large hospitals because few discharges from smaller institutions involve neonatal care. Furthermore, because small hospitals are excluded in the calculations for a few departments, average department costliness may overstate the average service cost when spread across hospitals without such services. This produces a small upward bias in total expenses per adjustment discharge.

FINDINGS

Expense Trends by Department

Table 2 reports trends in hospital expenses by department for selected years from 1980-92. Forty-six separate cost centers are reported, plus five indirect cost categories. Except for the six routine bed accommodations, where costs are expressed in terms of discharges from the unit, all department costs are on a hospital-wide, adjusted-discharge basis. Excluded from departmental expenses are depreciation, interest, malpractice premiums, employee benefits, and other teaching and non-operating costs, as described in the previous section. These items are reported separately at the bottom of the table.

In 1980, total expenses per adjusted discharge were $1,532, composed of $1,299 in direct departmental expenses and $233 in indirect expenses. During the next 12 years, total costs per adjusted discharge more than tripled to $4,755 in nominal terms. Hospital cost inflation during the 1980-83 period before PPS was introduced averaged 16 percent annually. Since 1983, the rate has been halved, corresponding to the reduction in inflation economy-wide. Eight percent annual inflation after 1983, however, was still roughly double the overall rate of growth in the Consumer Price Index.

Consider, next, the breakdown of hospital cost inflation by department. In 1980, the average total cost per adjusted dis-

Table 1

Included Bed Sizes, by Hospital Department

Hospital Department	Bed Size							
	<-50	50-74	75-100	100-141	150-200	200-300	300-400	400+
Bed Accommodations								
Medical-Surgical Beds	X	X	X	X	X	X	X	X
Neonatal ICU[1]						X	X	X
Subacute Care Beds[1]			X	X	X	X	X	X
Definitive Observation Beds[1]		X	X	X	X	X	X	X
Medical and Surgical ICU	X	X	X	X	X	X	X	X
Psychiatric Beds[1]		X	X	X	X	X	X	X
Obstetrical Beds[1]					X	X	X	X
Pediatric Beds[1]		X	X	X	X	X	X	X
Newborn Beds[1]					X	X	X	X
Ancillary								
Surgical/Anesthesia/Recovery Service[1]	X	X	X	X	X	X	X	
Lab and Blood Bank	X	X	X	X	X	X	X	X
Diagnostic Radiology Department	X	X	X	X	X	X	X	X
Pharmacy	X	X	X	X	X	X	X	X
Respiratory Therapy	X	X	X	X	X	X	X	X
Rehabilitation Services[1]					X	X	X	X
Central Services	X	X	X	X	X	X	X	X
Labor and Delivery Suite	X	X	X	X	X	X	X	X
Physical Therapy	X	X	X	X	X	X	X	X
Hemodialysis Department[1]					X	X	X	X
Catheterization[1]				X	X	X	X	X
Therapeutic Radiology[1]			X	X	X	X	X	X
ECG and EEG	X	X	X	X	X	X	X	X
CAT Scan[1]				X	X	X	X	X
Pulmonary Function[1]					X	X	X	X
Nuclear Medicine	X	X	X	X	X	X	X	X
IV Therapy	X	X	X	X	X	X	X	X
Medical Management								
Medical Records	X	X	X	X	X	X	X	X
Medical Care Evaluation	X	X	X	X	X	X	X	X
Social Services	X	X	X	X	X	X	X	X
Medical Staff Education	X	X	X	X	X	X	X	X
Outpatient Care								
Emergency Care	X	X	X	X	X	X	X	X
OPD Clinic	X	X	X	X	X	X	X	X
General Management								
Dietary Services	X	X	X	X	X	X	X	X
Housekeeping	X	X	X	X	X	X	X	X
Patient Accounts and Admitting	X	X	X	X	X	X	X	X
Administration	X	X	X	X	X	X	X	X
Plant Operation and Maintenance	X	X	X	X	X	X	X	X
Nursing Administration	X	X	X	X	X	X	X	X
Data Processing	X	X	X	X	X	X	X	X
General Accounting	X	X	X	X	X	X	X	X
Security	X	X	X	X	X	X	X	X
Laundry	X	X	X	X	X	X	X	X
Purchasing and Stores	X	X	X	X	X	X	X	X

[1] Not all bed sizes included in authors' calculations.

NOTES: ICU is intensive-care unit. ECG is electrocardiogram. EEG is electroencephalogy. CAT is computerized axial tomography. IV is intravenous. OPD is outpatient department.

SOURCE: (HAS/MONITREND, 1980-92).

Table 2

Decomposition of Hospital Costs Per Adjusted[1] Discharge, by Department: 1980-92

Department	1980	1983	1988	1992	Average Annual Percent Change 1980-83	1983-88	1988-92
Total Expenses	$1,532	$2,365	$3,552	$4,755	16	8	8
Total Direct Expenses	1,299	1,978	2,873	3,883	15	8	8
Routine Beds[2]	311	472	650	867	15	7	7
Medical-Surgical[3]	269	393	514	732	13	6	9
Psychiatric[3]	613	994	1,543	1,730	17	9	3
Subacute[3]	1,049	1,666	2,165	2,128	17	5	-0
Obstetrical[3]	169	251	327	414	14	5	6
Pediatric[3]	200	297	450	626	14	9	9
Newborn[3]	156	236	283	337	15	4	4
Special Care Beds	99	162	275	419	18	11	11
Medical-Surgical ICU	47	79	130	185	19	10	9
Definitive Observation	27	46	85	120	19	13	9
Neonatal ICU	25	37	60	114	14	10	17
Ancillary Services	444	695	1,051	1,559	16	9	10
IV Therapy	18	30	31	[4]	19	1	NA
Surgical Service	78	120	206	392	15	11	17
Pharmacy	64	110	190	297	20	12	12
Lab/Blood Bank	85	128	164	215	15	5	7
Central Services	43	75	102	140	20	6	8
Respiratory Therapy	25	40	60	80	17	8	7
Catheter Lab	19	25	62	69	10	20	3
Radiology, Diagnostic	37	50	57	63	11	3	3
Labor and Delivery	14	23	42	61	18	13	10
Anesthesia	13	17	24	51	9	7	21
Recovery Room	9	15	21	35	19	7	14
Physical Therapy	9	13	19	28	13	8	NA
Other Patient Services[5]	4	7	16	25	21	18	12
Rehabilitation	3	5	10	21	19	15	20
Hemodialysis	3	4	8	21	10	15	27
ECG/EEG	6	10	13	20	19	5	11
CAT Scan	4	9	12	20	31	6	14
Nuclear Medicine	7	9	9	12	9	0	7
Pulmonary Function	2	3	3	6	14	0	19
Radiology, Therapeutic	1	2	2	3	26	0	11
Medical Management	30	46	75	106	15	10	9
Medical Records	18	27	42	55	14	9	7
Medical Care Evaluation	3	5	11	20	19	17	16
Medical Staff Education	5	7	11	17	12	9	11
Social Services	4	7	11	14	21	9	6
Outpatient Care	8	13	23	35	18	12	11
General Management	407	590	799	897	13	6	3
Purchasing/Stores	9	13	18	[6]	13	7	NA
Administration	70	116	205	230	18	12	3
Dietary Services	83	109	123	132	10	2	2
Patient Accounting/Billing	37	54	80	98	13	8	5
Plant Operation	45	66	93	91	14	7	-1
Housekeeping	41	54	65	73	10	4	3
Utilities	37	56	63	68	15	2	2
Nursing Administration	22	32	40	62	13	5	12
Data Processing	19	30	40	59	16	6	10
Laundry	24	31	34	39	9	2	3
General Accounting	13	19	25	29	13	6	4
Security	7	10	13	16	13	5	5

See footnotes at end of table.

Table 2—Continued

Decomposition of Hospital Costs Per Adjusted[1] Discharge, by Department: 1980-92

Department	1980	1983	1988	1992	Average Annual Percent Change 1980-83	1983-88	1988-92
Other Indirect Costs	233	387	679	872	18	12	6
Employee Fringes	105	191	271	365	22	7	8
Depreciation	73	116	233	321	17	15	8
Interest	31	51	98	112	18	14	3
Malpractice Insurance	12	12	42	30	0	28	-8
Miscellaneous[5]	12	17	35	44	12	16	6

[1] Inpatient discharges adjusted upwards for growing outpatient activity using ratio of outpatient to inpatient charges by department.
[2] Average routine bed costs calculated as a weighted sum of specific routine bed costs with the weights based on the likelihood of being admitted to the unit.
[3] Routine bed costs on a unit discharge basis; all other department costs on an adjusted hospital discharge.
[4] Included with Pharmacy since 1988.
[5] Includes sports fitness, industrial medicine, helicopter, ambulance, lithotripsy, family planning, etc.
[6] Included in Administration since 1988.

NOTES: ICU is intensive-care unit. IV is intravenous. NA is not applicable. ECG is electrocardiogram. EEG is electroencephalogy. CAT is computerized axial tomography.

SOURCE: (HAS/MONITREND, 1980-92).

charge was $1,532, made up of $311 in routine bed costs, $99 in special care (ICU) bed costs, $444 in patient ancillary costs, $30 in medical management costs, $8 in emergency outpatient care devoted to patients subsequently admitted, $407 in general overhead costs, and $233 in indirect expenses. Twelve years later, average total costs per adjusted discharge had slightly more than tripled, adding $3,223 to each admission. The sources of this increase were the following: (1) routine beds, up $556 (17 percent of the increase); (2) special care beds, up $320 (10 percent); (3) ancillary services, up $1,115 (35 percent); (4) medical management, up $76 (2 percent); (5) outpatient care to inpatients, up $27 (0.8 percent); (6) general overhead expenses, up $490 (15 percent); and indirect expenses, up $639 (20 percent). Routine bed costs fell from 20 to 18 percent of total costs, while general management's cost share fell even more, from 27 to 19 percent. The share of ancillary services rose nearly 4 percentage points, while the share of other indirect costs increased 3 points.

Routine medical-surgical nursing costs grew only 6 percent annually during the first 5 years following implementation of PPS, then accelerated to 9 percent annually from 1988-92. Cost inflation in all 3 special care units continued to exceed 9 percent annually after 1983. This was true even after 1988, when overall inflation was near 4 percent. The medical-surgical ICU alone added $138 more to hospital discharges 12 years later, in spite of the fact that few patients are ever admitted to the ICU.[1] Neonatal costs per hospital discharge increased 4.5-fold in just 12 years, adding $114, on average, to every discharge.[2]

The surgery department, which in 1980 was already the second largest ancillary cost center after the laboratory, grew 11 percent annually post-PPS, making it the most costly ancillary department by 1988. Since then, the surgery department, along with anesthesia and recovery, saw inflation rates accelerate to 14-21 percent annually. By 1992, the 3 departments together accounted for $478 per adjusted discharge, not counting complementary ancillary and nursing services associated with surgery.

Besides surgery, labor and delivery, pharmacy, rehabilitation, catheter lab, hemodialysis, and other patient services

[1] MONITREND reporting did not enable us to calculate ICU admissions for all years, but 1992 data suggest that roughly one in six discharges spent some time in medical-surgical ICUs.

[2] This finding applies only to hospitals over 200 beds.

(e.g., ambulance, pain management, lithotripsy, family planning) all continued to grow at double-digit rates from 1983-88, and 7 of 20 ancillary services had annual growth rates of 10 percent or more. In spite of even lower economy-wide inflation rates in the early 1990s, 13 of 20 ancillaries still experienced double-digit inflation from 1988-92. Some of the high-growth departments, such as therapeutic radiology and pulmonary function, are quite small, but added costs due to the growth of pharmacies ($107 in the last 4 years) are worthy of note. In 1980, pharmacies added just $64 to the average patient's cost, or only three-quarters the amount due to lab and blood bank. By 1992, pharmacy costs added $297,[3] or 38 percent more than lab and blood bank, even though the latter's cost per case increased 2.5-fold! Over 12 years, pharmacy costs per discharge nearly quintupled!

With the advent of prospective payment on a DRG basis, hospitals have shown a much more active interest in patient medical management. Medical care evaluation was among the 3 fastest growing cost centers out of 46 studied over the 1980-92 period, increasing 6.7-fold; faster even than CAT scanning or surgery (each 5-fold), but slightly slower than rehabilitation and hemodialysis (both 7-fold).

Among general overhead cost centers, administration costs grew faster than any other department from 1980-92, adding $160 per discharge over 12 years and $114 since 1983. From 1983-88, additional costs due to general administration paralleled the increases from surgery, but after 1988, their growth diverged dramatically. While surgery cost inflation accelerated to 17 percent annually, administration cost growth averaged only 3 percent. Nursing administration inflation, on the other hand, accelerated to 12 percent in the post-1988 period, reflecting a renewed emphasis on nursing care. Many other overhead departments experienced very modest growth following PPS implementation—especially those devoted to preparing meals, laundering, housekeeping, security, and utilities. It is interesting to note that during the early 1980s, when hospital administrators were so concerned about rising utility prices, general administrative costs still grew several percentage points faster (18 percent versus 15 percent) than utility costs. After 1983, fuel cost inflation fell to almost zero, whereas administration costs continued to grow rapidly.

Other indirect costs as a whole grew considerably faster than average through 1988, then reversed this trend and grew 2 percentage points a year slower than average from 1988-92. Considerable variation is found, however, among subcategories. Malpractice premiums, which had remained constant through 1983, grew 28 percent annually, on an adjusted-discharge basis, during the next 5 years. Even still, premiums added only 1.2 percent to direct costs in 1988. After 1988, malpractice costs actually fell on an adjusted-discharge basis.

Capital costs, in the form of depreciation and interest, added far more to direct costs than malpractice insurance. In 1980, they amounted to $104, or 6.8 percent of average total expenses. By 1988, they had more than tripled to $331 per adjusted discharge, or 9.3 percent of total average costs. By contrast, employee fringes grew much slower in the early post-PPS period, which is indicative of a substitution of capital for labor in the production of hospital services. Since 1988, the growth in accumulated depreciation has settled back from 15 to 8 percent per year, consistent with overall hospital inflation. Interest charges grew much more slowly in the last four years, indicative of lower interest rates and possibly slower growth in long-term liabilities.

[3] This figure includes an unknown amount of intravenous therapy costs that were reported separately prior to 1990.

In sum, the tripling of hospital costs per adjusted discharge in just 12 years has meant that more than $3,200 was added to the average hospital bill. Of that, $1,129, or about one-third, came as a result of general administrative and other indirect costs. Routine nursing added a modest amount, while another $1,115 was due to ancillary services.

Employment Growth by Department

Table 2 reports department growth on a current dollar basis. Possibly a better measure of real department growth is the number of FTEs. According to figures developed from MONITREND data (Table 3), average hospital FTE employment rose by 47 persons from 1980-83, or 3.5 percent on an annual basis. Average employment then fell during the next 2 years before rising again to 524.7 FTEs in 1988. Net employment growth per hospital was a positive 2.1 percent annually from 1983 to 1988, in spite of the sharp decline immediately after PPS was implemented. Since 1988, total hospital employment grew rapidly at 6 percent annually.

The trend in FTEs on a per adjusted discharge basis gives an estimate of changing labor intensity, or gross productivity, over time without any allowance for case-mix change. From 1980-83, total hospital employment grew 3.3 percent faster than adjusted discharges. From 1983-88, employment rose 1.8 percent faster than adjusted discharges, leaving FTEs per 100 adjusted discharges at 7.0 by 1988. After 1988, employment intensity growth accelerated to 2.1 percent. The net result over the entire PPS period (1983-92) has been a continued growth in labor input per 100 adjusted discharges, reaching an all-time high of 7.6 FTEs by 1992 (see also Cromwell and Pope, 1989). This figure is more than 31 percent higher than in 1980 and 19 percent higher than in 1983.[4]

Table 3 also gives estimates of FTEs by department. Departments are organized into five groups and ranked within group by 1992 employment levels. Figures represent average department employment for reporting hospitals only. Furthermore, because of very low reporting, entire bed sizes have been dropped from the calculation of the department mean (Table 1). Medical-surgical beds is by far the largest employment center in the typical hospital, although the surgical service is beginning to rival it in size. Since 1983, however, there has been a dramatic decline in routine medical-surgical nursing employment. From 1983 to 1988, nearly 20 FTEs were eliminated in routine nursing. Since then, routine medical-surgical employment has risen slowly to approximately 100 FTEs per hospital. No doubt some nurses were reassigned to other bed accommodations, as average total nursing staffs rose 30 percent from 1983-92.

The two bed accommodations experiencing the highest growth following PPS implementation fill two niches between long-term, acute-care, and intensive-care beds. The definitive observation unit, which is a step below the ICU in nursing intensity, tripled in size from 1980-92, and doubled just since 1988. Subacute bed nursing for longer-term psychiatric, hospice, and swing-bed patients expanded even faster. Definitive observation, plus the medical-surgical and neonatal ICUs together, employed 110 nurses and other staff as of 1992, up from 65 employees in 1983. Subacute services have absorbed another 25-30 employees.

Patient ancillary services employed 241.5 workers in 1992 in the average hospital, an increase of 111 over 1980 and 95 over 1983. Surgery has led the way, adding

[4] AHA (1980-93) reports total FTEs per community hospital 30 and 22 percent higher in 1992 versus 1980-83, respectively, on an adjusted-census basis.

Table 3

Annual Full Time Equivalent Personnel (FTEs), by Department: 1980-92

Department	FTEs per Hospital				Annual Percent Change		
	1980	1983	1988	1992	1980-83	1983-88	1988-92
Total Hospital FTEs	425.6	472.7	524.7	663.2	3.5	2.1	6.0
FTEs per 100 Adjusted Discharges	5.8	6.4	7.0	7.6	3.3	1.8	2.1
Bed Accommodations	210.5	234.6	235.2	306.3	3.6	0.1	6.8
Medical-Surgical Beds	105.0	113.9	95.2	98.5	2.7	-3.5	0.9
Neonatal ICU	25.0	27.6	32.6	45.4	3.3	3.4	8.6
Subacute Care Beds	12.5	14.0	19.4	41.7	3.8	6.7	21.1
Definitive Observation Beds	11.2	14.4	17.9	34.3	8.6	4.4	17.7
Medical and Surgical ICU	18.6	22.9	26.1	30.6	7.1	2.7	4.1
Psychiatric Beds	12.4	14.4	17.2	26.4	5.1	3.6	11.3
Obstetrical Beds	9.5	10.2	10.7	11.4	2.4	1.0	1.6
Pediatric Beds	9.6	9.8	9.2	10.5	0.7	-1.3	3.4
Newborn Beds	6.7	7.4	6.9	7.5	3.3	-1.4	2.1
Ancillary	130.2	146.4	177.4	241.5	3.9	3.9	8.0
Surgical/Anesthesia/Recovery Service	32.3	35.7	49.1	79.8	3.4	6.6	12.9
Lab and Blood Bank	23.6	27.3	29.5	36.8	4.9	1.6	5.7
Radiology, Diagnostic	15.4	17.0	19.6	20.9	3.3	2.9	1.6
Pharmacy	7.4	9.6	11.5	15.0	9.0	3.7	6.9
Respiratory Therapy	8.7	10.4	11.5	14.5	6.1	2.0	6.0
Rehabilitation Services	3.5	4.4	7.3	11.3	7.8	10.7	11.5
Central Services	7.4	8.1	8.7	9.8	3.0	1.4	3.0
Labor and Delivery Suite	5.0	5.9	7.4	9.5	5.6	4.6	6.4
Physical Therapy	5.0	6.0	7.1	9.0	6.2	3.4	6.1
Hemodialysis Department	6.9	4.1	4.2	7.7	-15.8	0.5	16.4
Catheterization	4.0	5.0	5.8	6.8	7.6	3.0	4.1
Radiology, Therapeutic	2.8	3.5	4.4	6.2	7.6	4.7	9.0
ECG and EEG	3.2	3.7	4.2	5.4	4.9	2.6	6.5
CAT Scan	1.8	2.4	3.4	4.1	10.0	7.2	4.8
Pulmonary Function	1.6	1.6	1.8	2.6	0.0	2.4	9.6
Nuclear Medicine	1.6	1.7	1.9	2.1	2.0	2.2	2.5
IV Therapy	2.6	3.6	3.6	NA	11.3	0.0	NA
Medical Management	15.3	17.2	22.8	30.7	3.9	5.8	7.7
Medical Records	10.3	11.6	14.9	19.0	4.0	5.1	6.3
Medical Care Evaluation	1.5	1.7	2.9	5.0	4.2	11.3	14.6
Social Services	2.0	2.3	3.1	3.9	4.7	6.2	5.9
Medical Staff Education	1.5	1.6	1.9	2.8	2.2	3.5	10.2
Outpatient Care	15.3	17.9	21.6	29.8	5.3	3.8	8.4
Emergency Care	11.6	13.3	16.4	21.6	4.6	4.3	7.1
OPD Clinic	3.7	4.6	5.2	8.2	7.4	2.5	12.1
General Management	130.1	141.2	150.5	179.8	2.7	1.3	4.5
Dietary Services	31.2	32.9	31.7	35.6	1.8	-0.7	2.9
Housekeeping	26.5	27.9	28.2	33.2	1.7	0.2	4.2
Patient Accounts and Admitting	20.9	22.8	26.8	31.9	2.9	3.3	4.5
Administration	15.5	17.9	21.1	27.1	4.9	3.3	6.5
Plant Operation and Maintenance	12.9	14.4	15.5	17.3	3.7	1.5	2.8
Nursing Administration	8.2	8.9	9.0	12.6	2.7	0.2	8.8
Data Processing	4.3	4.8	5.7	7.5	3.7	3.5	7.1
General Accounting	5.1	5.6	6.1	7.3	3.1	1.7	4.6
Security	4.2	4.9	5.3	6.2	5.2	1.6	4.1
Laundry	1.3	1.1	1.1	1.1	-5.4	0.0	0.0
Purchasing and Stores	4.5	5.2	5.8	NA	4.9	2.2	NA

NOTES: ICU is intensive-care unit. ECG is electrocardiogram. EEG is electroencephalogy. CAT is computerized axial tomography. IV is intravenous. NA is not applicable. OPD is outpatient department.

SOURCE: (HAS/MONITREND, 1980-92).

13.4 new workers to the payroll from 1983 to 1988 and another 30 in the next 4 years. Indeed, it is one of many departments whose employment growth accelerated after 1983. Note also the high employment growth in rehabilitation services, CAT scan, therapeutic radiology, pulmonary function, labor and delivery, and the pharmacy. After a major hiring slowdown in the early PPS years, overall ancillary employment has definitely accelerated since 1988, averaging 8.0 percent annually. This rate is nearly double what the industry experienced from 1980-83. Such growth in the face of a 20-percent decline in inpatient days since 1983 is all the more remarkable.

Employment in the 5 medical management departments has risen nearly 14 FTEs since 1983, a 78-percent increase in 9 years. Much of the absolute gain has come in medical records, but hospitals also have added more than 3 new persons to medical care evaluation to conduct quality assurance, utilization review, and DRG classification. Outpatient care and medical management are nearly equivalent in labor requirements and have experienced similar growth since 1983.

General overhead departments together employed essentially the same number of workers as the 17 listed ancillary departments in 1980, but their post-PPS growth has only been about one-third as great. Moreover, even though the overhead employment growth rate more than tripled after 1988, the 4.5-percent figure was only about one-half the rate experienced in ancillary services. Relatively low overall management growth, however, masks some rather high growth rates among individual cost centers, particularly since 1988, including nurse and general administration and data processing. Overhead support employment, such as dietary, housekeeping, and laundry, was essentially flat during the first 5 years after PPS implementation.

Cost Inflation by Department

Table 4 gives a decomposition of cost inflation for the nine routine and special-care bed accommodations. All figures represent percentage changes for selected periods. Column (1) gives annual percentage changes in expenses per unit discharge from the accommodation unit (e.g., pediatrics), except for the last three ICUs, which are reported on a total discharge basis. No outpatient volume adjustment is required for the nine inpatient-bed-only accommodations. Percentage changes in salaries per hour and hours per discharge in columns (2) and (3) add (approximately) to column (1), except for additional growth in other direct expenses besides labor. Columns (4)-(6) break down annual growth rates in hours per unit discharge (3) into the sum of (a) hours per unit day, and either (b) days per hospital discharge (in the case of ICUs) or (c) average unit LOS (for the first six routine bed accommodations). Unit days per hospital discharge in column (6) can be thought of as the product of two ratios: unit LOS, which is available for the first six accommodations; and the unit admissions rate. Thus, where average unit LOSs are falling slower than unit days per hospital-wide discharge, unit admission rates must also be falling. (Complete data on each department by year are available upon request from the authors.)

From 1980-83, nursing costs rose more than 13 percent annually in the dominant medical-surgical routine bed area and more than 19 percent in the medical-surgical ICU and in definitive observation. During the next 9 years, cost inflation fell dramatically in all departments except the neonatal ICU.

Lower expense growth, beginning in 1983, was due in large part to lower wage inflation in all accommodations. For example, nursing wage growth was roughly halved in medical-surgical beds after 1983.

Table 4

Annual Percent Change in Hospital Expenses, Wages, Productivity, and Intensity in 9 Bed Accommodations: 1980-92

Bed Accommodation	Expense per Unit Discharge (1)	=	Salary per Hour (2)	x	Hours per Unit Discharge (3)	=	Hours per Unit Day (4)	x	Average Unit Length of Stay (5)	Unit Days per Hospital Discharge (6)
Medical-Surgical Beds							Percent Change			
1980-83	13.4		11.5		1.8		3.4		-1.6	-0.8
1983-85	1.8		6.6		-4.8		2.4		-7.1	-7.9
1985-88	8.1		5.0		2.5		3.0		-0.5	-1.8
1988-92	9.2		5.5		3.8		3.3		0.6	-4.0
Pediatric Beds										
1980-83	14.3		12.2		1.9		3.6		-1.8	-2.7
1983-85	7.0		14.0		-4.5		-6.2		-3.9	-6.5
1985-88	8.6		0.9		6.5		10.2		-0.1	-1.4
1988-92	8.6		7.0		1.7		3.2		-1.0	-6.2
Psychiatric Beds										
1980-83	17.5		11.2		4.8		2.1		2.5	2.2
1983-85	6.2		6.8		-2.0		1.8		-3.6	1.0
1985-88	11.3		3.8		4.2		2.2		1.3	4.6
1988-92	2.9		6.1		-1.6		3.3		-4.5	0.5
Subacute Care Beds										
1980-83	16.7		13.0		5.4		6.0		-0.7	-1.0
1983-85	6.8		0.7		-0.0		2.6		-0.8	-3.9
1985-88	4.4		4.3		2.4		2.4		-0.1	11.7
1988-92	-0.4		4.3		-3.1		2.1		-7.7	13.8
Obstetrical Beds										
1980-83	14.0		11.7		2.2		3.3		-1.4	-0.3
1983-85	2.7		6.2		-2.6		-0.4		-3.6	1.6
1985-88	7.4		5.2		1.0		4.8		-3.6	-2.3
1988-92	6.0		7.6		-0.8		1.4		-3.1	-4.3
Newborn Nursery Beds										
1980-83	14.8		13.3		1.7		4.1		-2.3	-1.2
1983-85	2.6		5.8		-2.1		1.6		-3.6	3.2
1985-88	4.4		6.3		-1.7		2.5		-4.1	-3.9
1988-92	4.5		6.7		-1.7		2.5		-4.1	-2.3
Medical and Surgical ICU										
1980-83	19.2		13.0		6.3		3.3		NA	3.0
1983-85	7.9		4.7		3.5		1.1		NA	2.5
1985-88	12.2		5.6		5.8		0.6		NA	5.1
1988-92	9.2		7.2		2.3		2.0		NA	0.3
Definitive Observation Beds										
1980-83	19.3		10.1		8.9		3.0		NA	5.7
1983-85	8.8		5.6		2.9		-0.8		NA	3.8
1985-88	15.9		5.5		9.0		1.5		NA	7.3
1988-92	9.1		3.8		6.6		1.6		NA	5.0
Neonatal ICU										
1980-83	13.1		9.5		4.0		3.8		NA	0.5
1983-85	15.6		7.4		9.5		-0.4		NA	9.2
1985-88	8.8		7.4		0.9		1.2		NA	-0.3
1988-92	13.0		5.4		6.7		-1.6		NA	8.5

NOTES: Figures are per hospital discharge for the medical-surgical ICU, definitive observation, and neonatal ICU; otherwise, discharges are for the designated unit. Expenses include other direct costs besides salaries. Therefore, growth figures in column (1) do not equal the sum of rates in columns (2) and (3) because of growth in other direct costs. ICU is intensive-care unit. NA is not applicable.

SOURCE: (HAS/MONITREND, 1980-92).

Much lower wage growth was true even for the intensive care areas where the scarcity of nurses was thought to be most severe. Furthermore, no consistent evidence is found for accelerated (or decelerated) wage inflation after 1988.

What made the initial PPS period (1983-85) so unique was the simultaneous reduction in nursing hours per discharge among the six basic routine accommodations. Not only was wage inflation dramatically slowed, but labor hours per unit discharge also turned negative in several departments. For example, from 1983 to 1985, nursing hours per discharge from the medical-surgical routine unit fell 4.8 percent each year. Yet, by 1988, medical-surgical nursing intensity was rising again by nearly 4 percent, a rate twice the 1980-83 rate.

Absolute reductions in labor intensity per discharge were the product of even more substantial declines in medical-surgical LOS. Although nursing hours per patient day (i.e., the reciprocal of intermediate productivity) continued to rise at near-historical rates of 2-3 percent annually from 1983-85 (column 4), LOS fell 7.1 percent per year. By 1985, LOS in medical-surgical units had nearly stabilized and has actually been rising slowly since 1988. The other five routine accommodations show a different pattern in the sense that declines in LOS continued through 1991. Obstetrics and newborn are notable exceptions in that LOS has declined continuously through 1992 and now averages only 2.5 days. This has occurred at a time when the cesarean section rate was rising rapidly, which should have extended stays.

How much of what is observed in Table 4 can be attributed to the introduction of PPS? Slower wage inflation conforms with lower overall price inflation in the economy that had little to do with PPS. Drastic declines in hospital labor demand that accompanied PPS, however, certainly put downward pressure on wages as well. Declining nursing hours per discharge because of shorter stays have a closer link to PPS incentives to discharge more quickly and to diagnose and treat on an outpatient basis than do wage changes. Less clear are the observed declines in LOS in pediatrics, obstetrics, and the newborn nursery, departments with few Medicare patients.

The ICU experience differed in that while routine nursing intensity fell from 1983-85, ICU intensity showed continued strong growth. The obvious explanation is the invigoration of preadmission review that had more of an effect on routine than ICU utilization. As a result, from 1983-92, medical-surgical ICU days per hospital discharge increased from 0.361 to 0.446, an increase of 24 percent. An even greater jump in intensity (64 percent) occurred in the neonatal ICU. Mitigating this growth in ICU usage was the slower rate of productivity decline. Prior to 1984, ICU nursing hours per ICU day were rising 3.3 percent annually. This rate of productivity decline averaged only 1.1 percent from 1983-85, followed by an even lower 0.6 percent from 1985-88, although the annual decline jumped to nearly 2 percent during the next 4 years. Among neonatal units, by contrast, productivity gains on a per day basis have been realized since 1988, although they have been swamped by greater utilization.

Table 5 presents similar productivity and intensity figures for 11 ancillary departments that reported intermediate services for at least part of the 12 years. Discharges have been adjusted for outpatient activity so that expenses and hours are on an "inpatient" basis. Distinct growth periods are less obvious than among the nursing cost centers, although surgery and a few others show a high-low-high pattern. The surgical service saw its inflation rate more than halved in 1984-85 before rebounding to 1980-83 rates. For surgery, as elsewhere, the pri-

Table 5

Annual Percent Change in Hospital Expenses, Wages, Productivity, and Intensity for Selected Ancillary Departments: 1980-92

Ancillary Department	Inpatient Expense per Hospital Discharge (1)	=	Salary per Hour (2)	x	Inpatient Hours per Hospital Discharge (3)	=	Hours per Unit Day (4)	x	Inpatient Procedures per Hospital Discharge (5)
Surgical Service					Percent Change				
1980-83	15.4		11.2		1.9		3.0		-1.1
1983-85	7.7		4.7		-0.2		-0.2		-0.0
1985-88	14.0		5.2		6.5		3.4		2.8
1988-92	17.5		6.0		8.5		4.2		3.4
Labor and Delivery Suite									
1980-83	16.9		12.4		4.8		4.3		0.5
1983-85	11.9		5.2		7.0		0.3		6.6
1985-88	13.5		6.0		6.8		4.4		2.1
1988-92	10.0		6.6		4.6		3.2		2.1
Diagnostic Radiology									
1980-83	10.7		10.2		2.8		2.8		0.1
1983-85	0.2		5.9		-2.9		0.3		-3.1
1985-88	4.6		3.7		0.7		-1.0		1.7
1988-92	2.4		5.6		-1.0		1.4		-1.9
Therapeutic Radiology									
1980-83	15.2		9.6		4.0		5.3		-1.0
1983-85	-1.8		6.3		-8.9		-3.4		-6.3
1985-88	4.5		3.4		1.5		2.5		-0.5
1988-92	11.0		7.4		0.6		0.8		-0.2
CAT Scan									
1980-83	29.2		7.9		14.2		0.1		14.6
1983-85	12.4		3.3		6.7		-3.6		9.9
1985-88	2.0		3.8		3.0		-4.1		7.1
1988-92	13.6		6.3		0.2		-2.4		2.8
Catheterization Laboratory									
1980-83	13.1		11.8		3.4		-0.5		1.0
1983-85	3.7		9.4		-2.8		-3.6		0.4
1985-88	28.7		3.1		13.5		6.0		8.2
1988-92	3.0		4.4		-1.5		1.8		-1.7
Lab and Blood Bank									
1980-83	14.7		10.0		4.5		3.7		0.7
1983-85	4.5		5.7		-0.3		3.2		-3.2
1985-88	5.5		3.5		1.6		-1.1		2.8
1988-92	7.1		4.8		1.4		0.7		0.7
ECG and EEG									
1980-83	16.4		10.7		4.2		-3.2		7.5
1983-85	2.7		3.2		-0.1		3.2		-3.3
1985-88	7.8		5.7		1.6		-3.4		5.0
1988-92	10.6		5.6		2.5		NA		NA
Respiratory Therapy									
1980-83	16.6		10.8		5.8		-4.4		10.7
1983-85	6.8		5.7		3.8		-0.8		4.9
1985-88	9.8		5.0		3.5		-4.7		8.8
1988-92	7.6		5.7		3.5		NA		NA
Physical Therapy									
1980-83	16.0		9.8		5.7		1.5		4.1
1983-85	1.8		6.3		-3.8		-0.0		-4.3
1985-88	10.8		5.4		3.2		-1.5		4.6
1988-92	10.3		NA		3.4		NA		NA
Hemodialysis									
1980-83	11.2		9.3		1.4		-1.9		2.6
1983-85	-7.5		7.8		-13.2		-6.2		-5.6
1985-88	28.2		3.5		26.1		-1.7		26.6
1988-92	29.2		6.5		23.4		-3.7		29.1

NOTES: Inpatient expenses, hours, and procedures are derived by multiplying total department expenses, hours, and procedures by the department's ratio of inpatient to total revenues. CAT is computerized axial tomography. ECG is electrocardiogram. EEG is electroencephalogy. NA is not available.

SOURCE: (HAS/MONITREND, 1980-92).

mary cause of the reduction in 1984-85 was lower wage inflation, although negative labor intensity trends (column 3) also played a part (as they did in diagnostic and therapeutic radiology, catheter and pathology labs, physical therapy, and hemodialysis).

After 1985, higher cost inflation rates returned, although usually not at pre-PPS levels. (Surgery and the catheter lab are notable exceptions.) Patient care intensity, shown in column 5 of Table 5, was responsible for much of the acceleration in costs.

Drastic swings in pure labor productivity per intermediate service also played a role in the return to high cost inflation among the ancillary departments. Prior to 1984, most cost centers exhibited pure productivity declines (column 4) of 1.5-4.8 percent annually in hours per procedure (electrocardiogram/electroencephalogy and respiratory therapy being exceptions). After experiencing productivity gains in the next 2 years, many ancillary departments returned to historical (i.e., negative) rates.

It is difficult to ascribe recent productivity declines to a more severe case mix, as the procedures within most of these departments are either reasonably homogeneous (e.g., deliveries) or not subject to large year-to-year variations in case mix (e.g., surgery or the catheter lab). Most of the post-PPS case-mix effect derives from denied admissions of less ill patients, which should be reflected in higher patient care intensity rather than hours per procedure. Labor intensity trends (column 3), of course, do reflect the net effects of case mix via productivity and intensity. Unlike wages, overall inpatient labor intensity accelerated after 1985, often due to a combination of declining productivity and rising intensity. Case mix may explain part, but certainly not all, of this growth.

One often-mentioned source of continued hospital cost inflation is technology. Compared with cost inflation in routine and general overhead departments, the rates shown in Table 5 are high, which suggests an underlying technological imperative is at work. Probably the most obvious, and the most expensive, of these new technologies involves open heart surgery—particularly with complementary catheterization. But new technologies come in waves, as exemplified by CAT scanning and catheterization. Each had nearly identical growth in inpatient hours per discharge during the 1980-92 era, but their rates differed greatly within the 12-year period. The net result is high cost inflation across ancillary departments as a whole over a prolonged period.

Outpatient Trends

It should also be kept in mind that trends in inpatient care intensity, if anything, understate the total intensity effect because of the dramatic shift to outpatient sites of care. (FTE figures in Table 3, on the other hand, do reflect total department growth.) Table 6 shows the growth in outpatient shares for 16 selected ancillary departments along with the (discharge-weighted) average for the hospital industry as a whole. From 1980-83, the share of outpatient in total revenues increased by less than 1 percentage point. Beginning in 1984, the outpatient share started to rise sharply, exceeding 20 percent by 1988, a 70 percent growth in the share. During the next 4 years, the overall outpatient share approached 28 percent.

Clearly the driving force behind these changes has been outpatient surgery. The share of outpatient in total surgical revenues grew 178 percent from 1983-88 and another 16.4 percent through 1992. By 1992, almost 37 percent of hospital-based surgery revenue was being generated from outpatients. The shift in pharmacy, central services, lab, and numerous other services followed pari passu the growth in

Table 6

Selected Ancillary Departments, Ranked by 1992 Outpatient Revenue Share: 1980-92

Department	Outpatient Revenue Share				Total Percent Change		
	1980	1983	1988	1992	1980-83	1983-88	1988-92
Total Hospital[1]	11.21	11.84	20.11	27.88	5.6	69.8	38.6
Therapeutic Radiology	77.7	82.7	89.2	91.4	6.4	7.9	2.5
Nuclear Medicine	26.4	31.0	54.9	62.5	17.4	77.1	13.8
Diagnostic Radiology	39.6	40.2	54.6	58.4	1.5	35.8	7.0
CAT Scan	39.2	40.3	53.2	58.2	2.8	32.0	9.4
Physical Therapy	29.8	30.6	45.9	47.0	2.7	50.0	2.4
Rehabilitation	36.5	40.1	51.7	43.5	9.9	28.9	-15.9
Pulmonary Function	18.4	20.5	38.2	42.4	11.4	86.3	11.0
Hemodialysis	84.7	75.1	64.8	41.4	-11.3	-13.7	-36.1
ECG and EEG	18.7	21.2	34.6	39.9	13.4	63.2	15.3
Surgical Service	6.5	11.4	31.7	36.9	75.4	178.1	16.4
Lab and Blood Bank	15.7	16.5	26.9	33.4	5.1	63.0	24.2
Catheter Lab	5.6	8.8	9.9	27.3	57.1	12.5	175.8
Central Services	6.1	6.6	12.3	15.2	8.2	86.4	23.6
Pharmacy	4.4	4.4	9.4	14.1	0.0	113.6	50.0
Respiratory Therapy	2.0	2.2	4.2	6.2	10.0	90.9	47.6

[1] Includes departments other than those listed.

NOTES: CAT is computerized axial tomography. ECG is electrocardiogram. EEG is electroencephalogy.

SOURCE: (HAS/MONITREND, 1980-92).

surgery. Pharmacy, for example, showed no outpatient trend before the surgical shift. After 1983, its outpatient share more than tripled to 14.1 percent in just 9 years. Several other ancillary services that showed little inclination to move to an outpatient setting made dramatic changes after 1983, including diagnostic radiology, CAT scans, and physical therapy.

Of the 16 services, only 3 showed no outpatient acceleration in the post-1983 period. Therapeutic radiology (e.g., cancer radiation) was already being delivered primarily on an outpatient basis with little opportunity for continued growth. The catheter lab showed relatively slow outpatient growth before 1988, but its locus of care shifted dramatically since 1988. In 1992, more than one out of every four dollars in lab revenues came from outpatients. This is partially attributable to preadmission angiograms for burgeoning open heart surgery, but more to the development of other vascular techniques that can be done on an ambulatory basis for some patients. Only hemodialysis shows a negative outpatient trend from 1980-92. This is likely due to the growth in freestanding dialysis centers that have taken away business from hospitals. Those receiving dialysis from institutions are therefore more likely to have been admitted for renal complications or another illness. Rehabilitation's outpatient share fell after 1988, possibly due to similar case-mix shifts.

The effects of these large outpatient shifts on observed trends in patient care intensity depend on whether they are the result of avoided admissions or simply the changing locus of diagnosis and treatment for admitted patients. Assuming the growth in outpatient surgery avoided an admission altogether, the 2.8-percent growth in inpatient procedures per discharge in Table 5 is a true intensity rate for the 1985-88 period. It also follows that the 14-17 percent annual growth in inpatient costs per discharge beginning in 1985 is an accurate measure of overall inflation in surgical costs (ignoring other complementary costs, such as catheterization).

For other ancillaries, the impact of the changing locus of care on patient intensity is more complicated. For example, if one assumes that the shift in pathology lab

services following PPS implementation did not reduce the likelihood of patients receiving tests, then the true growth in lab intensity per patient (versus adjusted discharge) was not 2.9 percent annually from 1985-88, but rather 5.5 percent once the annual decline in the inpatient lab share is factored in. Although certainly some growth in lab services are associated with avoided admissions, the true growth in patient intensity and cost per patient (as distinct from cost per discharge) is several points higher than shown in Table 5.

DISCUSSION

Since 1983, hospital cost inflation has clearly slowed, but much of the decline can be attributed to slower wage inflation, generally, in the economy and not to the Medicare PPS in particular, although it likely had a further dampening effect on wage increases. Whatever effects prospective payment may have had on costs were concentrated in the first 2 years, 1984 and 1985. Since 1985, labor intensity growth has resumed historical rates, whereas wage inflation has remained modestly above wage inflation nationwide.

In the first 2 tumultuous years of PPS, the hospital industry made drastic changes in LOS that resulted in substantial savings in routine nursing costs. These savings, however, were quickly reinvested by the industry in more intensive care and diversification into psychiatric and subacute bed care as well as in ancillary services. One might have expected continued, and possibly even accelerated, growth in ICU costs and labor intensity per discharge through avoided non-critical admissions, but the absolute growth in ICU employment is difficult to explain by stricter admissions policies alone. Diversification into new services and treatment modalities seems a natural reaction to strong financial incentives to either cut staff or to redeploy them to other revenue-producing activities, which is preferred by employees, administrators, and hospital boards alike. Whether diversification has enhanced total consumer welfare is a difficult question to answer and beyond the scope of this descriptive article.

Without question, certain ancillary departments, along with the ICU, have been responsible for much of the renewed inflation in recent years. Surgery, catheter lab, rehabilitation, and the pharmacy have been strong growth centers. Each has added to inflation primarily through growing service intensity, but only after a notable slowdown in 1984-85. These trends remain even after adjusting for an unparalleled shift to the outpatient setting.

Expectations ran high in the early years of prospective payment that the large observed outpatient shifts would bring material savings in hospital costs and third party outlays, in total if not per admission. Such has not been the case. Savings from greater outpatient activity have been offset by renewed growth in inpatient costs per hospital discharge after 1985. Much of the observed decline in per case costs, while important, was ephemeral. Inflation in inpatient costs continued to rise at double the CPI.

From 1988 to 1992, another $1,203 was added to inpatient costs per discharge, raising costs by one-third. Ancillary expenses accounted for more than 40 percent of the growth, while general plus medical overhead management together added only 10 percent. The contribution of routine beds to cost inflation was suprisingly high, particularly given declining stays, accounting for 18 percent of the growth. Diversification of nursing services into new product lines has enabled hospitals to maintain and expand their revenue base.

Lest the reader is left with the technological imperative as the sole explanation for the return to high inflation rates, con-

sider the near doubling in general administration costs per adjusted discharge from 1983 to 1988. When other overhead departments are included as well, more than $200 was added to average costs per adjusted discharge in the 5 years after PPS was introduced. This is nearly double the contribution made by ICU cost centers together. Nor can such administrative growth be attributed to more costly medical management, which is reported separately. After 1988, however, the growth in general overhead management no longer contributed to excess hospital cost growth. (The one exception is the acceleration in data processing costs.)

Regarding the debate over the high paperwork costs of health care, it is interesting to compare, for example, the costs associated with patient billing, general accounting, and data processing with medical care management expenses. As of 1992, the average hospital discharge included $186 in paperwork billing and accounting costs compared with $106 for medical management. While certainly not trivial, these billing/accounting costs have been growing relatively slowly since 1988 compared with direct patient care services. When $186 is spread across the 31 million admissions to community hospitals in 1992, the bill comes to $5.8 billion. Reducing these costs by even 10 percent could save $580 million a year.

Without question, every hospital is more difficult to manage today than even 10 years ago. Patients are sicker, technologies are more complex, and contracting arrangements are more variable. All of this is occurring at a time when care is being rapidly shifted to ambulatory settings. Clearly, how the industry will respond to a more competitive reimbursement environment is hard to predict, but given past behavior, hospitals exhibit a strong tendency to diversify and expand services, aided by innovative technologies.

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