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Journal

JAMA, 276(13)

ISSN

0098-7484

Author

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Publication Date

1996-10-02

Peer reviewed

Decline in Hospital Utilization and Cost Inflation Under Managed Care in California

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Objective.—To measure the impact of health maintenance organizations (HMOs) on hospital capacity, utilization, and expenditures between 1983 and 1993.

Design.—Multivariate regression analysis.

Setting.—Private nonprofit and for-profit hospitals in California with 25 or more beds.

Patients.—Patient discharge abstract data were used to measure growth of HMO penetration of local hospital markets.

Interventions.—None.

Main Outcome Measures.—Hospital closures, changes in bed capacity, changes in acute care admissions and length of stay, psychiatric inpatient days, subacute inpatient days, inpatient and outpatient surgical procedures, ambulatory patient visits, and hospital expenditures.

Results.—Between 1983 and 1993 hospital expenditures grew 44% less rapidly in markets with high HMO penetration than in markets with low HMO penetration. Of this, 28% was due to reductions in the volume and mix of services, 6% was due to reductions in bed capacity, and 10% was due to changes in the intensity of services provided. Health maintenance organizations accelerated the substitution of outpatient for inpatient surgery, the shift from acute to subacute inpatient days, and the reduction of psychiatric hospitalization.

Conclusion.—Managed care is shifting the acute care hospital from the center toward the periphery of the health care system.

JAMA. 1996;276:1060-1064

HEALTH maintenance organizations (HMOs) have targeted hospitals as the principal locus of preventable health care utilization and expenditure. Payment incentives and administrative controls are shifting an ever-increasing proportion of medical and surgical procedures from acute inpatient facilities to outpatient,

subacute, and home health settings. Rates of admission and lengths of stay have plummeted. Hospitals are merging, reducing bed capacity, and, in some instances, closing altogether. These economic dynamics are leading to a fundamental change in the organization of health care. After serving for most of the century as the center of health care coordination in most local communities, the hospital is being displaced by medical groups, health plans, and other non-hospital organizations.

The marketplace pressures from managed care build on the regulatory pres-

ures exerted on hospitals by Medicare's Prospective Payment System (PPS). Under PPS, hospitals face strong financial incentives to shift procedures to the more generously reimbursed ambulatory settings.^{1,2} During the 1980s many hospitals diversified into ambulatory surgery, primary care clinics, outpatient diagnostic services, subacute care, inpatient psychiatric care, and other activities to offset the decline in acute inpatient care.³ These services are often priced by hospitals at levels significantly above those in freestanding facilities not burdened by hospital overhead expenses. Health maintenance organizations are combatting this cost shift by contracting increasingly with nonhospital providers of these nonhospital services. Hence, while Medicare's PPS reduced inpatient acute utilization but kept the hospital organization at the center of the health care delivery system, HMOs are favoring freestanding providers of care and are moving the hospital organization toward the periphery of the system.

Changes in hospital scale and scope are occurring rapidly in California, a state with high HMO enrollment and a large number of medical groups that are independent of hospital control.^{4,5} Medical groups in California have developed strong internal utilization management programs and achieved significant reductions in inpatient utilization.^{6,7} This study analyzes the impact of HMO market penetration on hospital capacity, mix of services, and expenditures in California between 1983 and 1993. Outcome measures include changes in the num-

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ber of hospitals; number of staffed beds; inpatient days for medical, surgical, psychiatric, and subacute care; inpatient and outpatient surgical procedures; outpatient visits; and operating expenditures.

METHODS

Data on Hospital Utilization and Expenditures

Information on hospital characteristics was obtained from 3 comprehensive data systems maintained by the California Office of Statewide Health Planning and Development (OSHPD). The base year for the study is 1983, which coincides with the beginning of Medicare's PPS and with the enactment in California of legislation permitting selective contracting between health plans and individual hospitals.⁸ The final year for the study is 1993, the most recent for which comprehensive data are available. Hospitals were selected for inclusion in the study if they were private (nonprofit or for-profit), provided acute inpatient services, had at least 25 beds, and were not owned by the Kaiser Foundation Health Plan HMO.

The 3 hospital facility data sources were merged and then linked to the OSHPD Individual Hospital Discharge Data system, which contains computerized discharge abstracts from every hospital patient in California, including information on type of payer (Medicare, Medicaid, HMO, non-HMO insurer, and uninsured). These records were used to derive the percentage of annual discharges in each hospital in each year that were covered by each of the 5 payer types. The patient discharge data also were used to calculate the penetration by HMOs of the local market for each hospital. Market penetration was measured in terms of the percentage of admissions to all competing hospitals that are from HMO enrollees. The method for computing market boundaries and HMO penetration has been described elsewhere.⁹ To adjust for uneven rates of population growth and hence change in epidemiologic demand for health care services among local California areas, data on population at the county level were obtained from US Census sources.

Statistical Analysis

California hospitals were classified into 5 groups: (1) hospitals open and fitting the study criteria in both 1983 and 1993, (2) hospitals open in 1983 that closed prior to 1993, (3) hospitals open in 1983 that changed status prior to 1993 and no longer fit the study criteria (eg, shifted to exclusively subacute care), (4) hospitals that opened after 1983, and (5) hospitals that did not meet study

criteria in 1983 but changed status and met study criteria in 1993. Descriptive statistics for 1983 and 1993 were calculated using the full populations of hospitals open and meeting study criteria in each of those years, for nonprofit and for-profit hospitals separately, and for hospitals in markets with very high HMO penetration and very low HMO penetration separately.

Least squares regression techniques were used to obtain a multivariate measure of the impact of HMO market penetration on hospital cost inflation, after controlling for changes in mix of services. The dependent variable in this analysis was the change between 1983 and 1993 in the logarithm of annual operating costs for each hospital. The logarithmic change is interpretable as the percentage rate of growth over the 10-year period. This analysis was necessarily limited to hospitals open and meeting study criteria in both years. The principal independent variables in the multivariate analysis were HMO market penetration, the payer mix of each hospital's patients (Medicare, Medicaid, HMO, and uninsured, with non-HMO privately insured as the comparison category), and ownership status (nonprofit vs for-profit). Additional independent variables included the change between 1983 and 1993 in number of medical and surgical inpatient days, change in psychiatric days, change in subacute days, change in outpatient visits, change in hourly nursing wages, and change in county population.

The descriptive and multivariate analyses shed light on distinct aspects of the HMOs' impact on hospital performance. The descriptive analyses focus on the association between HMOs and each of the various measures of hospital capacity and utilization separately, and highlight the changes in number of hospitals, staffed beds, inpatient days, outpatient visits, and expenditures in each type of market. They measure the association between HMO market penetration and total hospital expenditures, but cannot distinguish how much of that association is due to changes in the volume and mix of hospital services, on the one hand, and the intensity of services, on the other. The multivariate analysis quantifies the impact of HMO market penetration on cost inflation after adjusting for volume and mix of services, and hence highlights HMO impact on intensity of hospital services.

RESULTS

Table 1 quantifies the decline of inpatient acute care and rise of outpatient and subacute care in California hospitals between 1983 and 1993. During that

Table 1.—Utilization and Expenditures for Inpatient and Outpatient Services in California Hospitals, 1983-1993*

	1983	1993
Hospital capacity		
Facilities	414	335
Staffed beds	69 467	62 027
Inpatient days		
Medical/surgical	16 235 623	11 332 033
Psychiatric	732 996	717 422
Subacute	550 654	1 708 343
Inpatient acute care		
Discharges	2 675 999	2 395 046
Length of stay, d	6.0	5.0
Surgical procedures	1 198 653	781 764
Outpatient acute care		
Patient visits	17 552 198	29 603 612
Surgical procedures	316 481	733 848
Expenditures, in \$ thousands	11 932 885	23 747 189
HMO penetration, %	7.8	22.7

*HMO indicates health maintenance organization.

period, the number of hospitals declined by 19%, while the number of staffed beds declined by 11%, reflecting the disproportionate tendency of small facilities to cease operations. Acute care discharges declined by 11%, average length of stay by 17%, inpatient days by 30%, and inpatient surgical procedures by 35%. Patient visits to hospital-based ambulatory care facilities increased by 69% and outpatient surgical procedures performed in hospital facilities increased by 132%. Subacute patient days in hospital-based units increased by 210%. Total hospital expenditures, including inpatient, outpatient, and subacute care, doubled over the course of the decade.

Table 2 presents analogous data for nonprofit and for-profit hospitals separately. The for-profit sector shrank at a faster rate than the nonprofit sector, with a loss of 28% of facilities and 27% of beds, compared with a 15% decrease in nonprofit facilities and a 6% decrease in nonprofit beds.

The impact of HMO market penetration on the volume and mix of hospital services is highlighted in Table 3, which presents the 1983-1993 changes for hospitals in markets with the lowest HMO penetration (bottom quartile) and the highest HMO penetration (top quartile), respectively. While the decline in the number of hospitals was similar in both types of markets, the decline in inpatient utilization was much more significant in areas with a high HMO presence. While acute care discharges, length of stay, and inpatient days declined by 15%, 19%, and 29%, respectively, in markets with low HMO penetration, they declined by 23%, 20%, and 44%, respectively, in markets with high HMO penetration. The volume of inpatient surgical procedures declined more rapidly and volume of outpatient procedures increased more slowly in markets with high HMO penetration (46% and 100%)

Table 2.—Changes in Utilization and Expenditures in Nonprofit and For-Profit Hospitals, 1983-1993*

	Nonprofit Hospitals		For-profit Hospitals	
	1983	1993	1983	1993
Hospital capacity				
Facilities	282	240	132	95
Staffed beds	54 255	50 863	15 212	11 164
Inpatient days				
Medical/surgical	13 230 707	9 660 432	3 004 916	1 671 601
Psychiatric	695 029	629 928	37 967	87 494
Subacute	474 309	1 576 354	76 345	131 989
Inpatient acute care				
Discharges	2 152 285	2 030 080	523 714	364 966
Length of stay, d	5.9	4.5	6.1	6.3
Surgical procedures	951 133	663 343	247 520	118 421
Outpatient acute care				
Patient visits	15 490 704	26 930 708	2 061 494	2 672 904
Surgical procedures	242 533	580 440	73 948	153 408
Expenditures, in \$ thousands	9 892 200	20 504 806	2 040 685	3 242 382
HMO penetration, %	7.4	22.2	8.7	23.7

*HMO indicates health maintenance organization.

Table 3.—Changes in Hospital Utilization and Expenditures in Local California Markets, According to the Level of HMO Penetration*

	Hospitals in Markets With Lowest HMO Penetration		Hospitals in Markets With Highest HMO Penetration	
	1983	1993	1983	1993
Hospital capacity				
Facilities	103	83	104	84
Staffed beds	10 398	9 164	20 554	15 644
Inpatient days				
Medical/surgical	2 442 497	1 732 376	4 920 168	2 777 181
Psychiatric	55 816	63 159	310 102	160 804
Subacute	170 045	299 567	104 244	329 476
Inpatient acute care				
Discharges	458 974	391 539	795 750	612 308
Length of stay, d	5.2	4.2	6.1	4.9
Surgical procedures	202 711	131 046	354 708	190 272
Outpatient acute care				
Patient visits	3 291 694	5 607 863	5 634 715	7 871 258
Surgical procedure	48 777	140 310	97 458	195 041
Expenditures, in \$ thousands	1 595 311	3 340 221	3 748 641	6 029 751
HMO penetration, %	0.6	10.7	15.2	31.4

*HMO indicates health maintenance organization.

than in markets with low HMO penetration (35% and 187%). The total volume of surgical procedures performed in hospitals declined by 15% in heavily penetrated markets, while increasing 8% in markets with low HMO penetration. Inpatient days for psychiatric care declined by 48% in the presence of high HMO market share, while increasing 13% in markets with low HMO market share. Subacute care days increased faster in markets with high HMO shares (216%) than in markets with low HMO shares (76%). Total hospital expenditures, covering both inpatient and outpatient services, increased by 109% in markets with low HMO penetration, but by only 61% in markets with high HMO penetration.

Table 4 presents regression coefficients from the multivariate analysis of

hospital cost growth using the 318 hospitals that were open for the entire 1983-1993 period. Hospitals in markets with a high level of HMO penetration in 1983 and hospitals in areas with high HMO growth exhibit lower rates of cost inflation than hospitals in areas with weaker HMO presence. Hospitals with a disproportionate growth in Medicaid patients exhibited slower rates of expenditure growth than hospitals with higher proportions of non-HMO, privately insured patients (the comparison category). The proportion of a hospital's own patient discharges that come from HMO enrollees, as distinct from the proportion of HMO enrollees in the local hospital market, did not influence the rate of cost inflation.

The regression coefficients can be used to estimate the impact of HMO market

penetration on the intensity of services provided in California hospitals after adjusting for changes in the volume and mix of services. The mean percentage of HMO discharges in markets with high HMO penetration (top quartile) was 15.2% in 1983 and grew by 16.2 percentage points between 1983 and 1993. The mean percentage of HMO discharges in markets with low HMO penetration (bottom quartile) was 0.6% in 1983 and grew by 10.1 percentage points between 1983 and 1993. The difference between the means in the highly penetrated and weakly penetrated markets, when multiplied by the regression parameters on 1983 HMO market penetration (−0.0046) and 1983-1993 change in market penetration (−0.0057), yield an estimate of 10.2% as the reduction in hospital expenditures due to HMO market penetration. This is interpretable as the HMO impact on the intensity and complexity of hospital services, since the regression analyses already accounted for changes in the volume and mix of services.

COMMENT

Between 1983 and 1993 the number of community hospitals in the United States declined by 9%, staffed beds declined by 10%, inpatient days declined by 21%, and inpatient surgical procedures declined by 33%. These decreases in inpatient utilization were offset in part by a 75% increase in outpatient visits and a 168% increase in outpatient surgical procedures.³ The American hospital now must be conceptualized as a diversified health care organization rather than primarily a facility for acute inpatient care.¹⁰

The shift in hospital utilization patterns was due in part to Medicare's PPS, which placed strong limits on reimbursement for services provided during an acute inpatient stay while continuing to reimburse on a fee-for-service basis those services provided in outpatient, subacute, and home health settings. The growth of managed care, which has occurred at different rates in different regions, accelerated this trend. Health maintenance organizations have traditionally reduced rates of hospital utilization by 40%, compared with unmanaged fee-for-service insurers.¹¹⁻¹⁴ In California, medical groups paid on a capitation basis are continuing to push down on hospital utilization, both through fewer admissions and shorter lengths of stay, thereby achieving the lowest rates of hospital use in the nation.⁷

The decline in hospital cost inflation reported in this study reflects both a reduction in the intensity of services provided in hospitals and a shift of some

services from hospitals to physician offices and other freestanding facilities. The combined magnitude of these intensity and service mix effects can be measured by comparing the total rate of cost inflation in markets with high HMO penetration relative to markets with low penetration (Table 3). Health maintenance organizations have reduced the 10-year rate of hospital expenditure growth by 44% ($100 \times [1 - 61/109]$). When the analysis is limited to the 318 hospitals that were continuously open between 1983 and 1993, expenditure growth averaged 130% in markets with low HMO penetration and 81% in markets with high penetration, a reduction of 38%. This is smaller than the full 44% reduction since it excludes the impact of HMOs on hospital bed capacity. The multivariate analysis of the 318 hospitals that remained open (Table 4) indicates a 10% reduction in cost growth, which is interpretable as a change in intensity of services after having adjusted for changes in volume and mix of services. The total 44% HMO-induced reduction in cost growth thus can be disaggregated into a 6% reduction due to declines in bed capacity (44%–38%), a 10% reduction due to changes in the intensity of hospital services, and a 28% reduction due to changes in the mix of services (38%–10%).

During this period the number of staffed beds declined much more slowly than did the number of inpatient days, leading to a significant decline in capacity utilization. This unwillingness to contract capacity at the same rate as utilization poses a major threat to the financial viability of the system, given the salience of fixed costs in total hospital expenditures. In this context, the more rapid decline in the number of facilities and beds within the for-profit sector is an indicator of organizational strength rather than weakness, compared with the nonprofit sector. The for-profit systems have evinced a greater ability to close marginal facilities rather than allow them to continue draining the financial strength of the organization as a whole. The inability to reduce excess capacity has led to the financial weakening of the major nonprofit systems in the state. In 1995, the largest nonprofit system in San Jose (Good Samaritan) sold itself to a for-profit system (Columbia/HCA) and the largest nonprofit system in San Diego (Sharp HealthCare) turned over control of its hospitals to a joint venture with the same for-profit system. Both nonprofit systems had experienced unsustainable financial losses from the maintenance of excess capacity.

The data reported in this study high-

Table 4.—Impact of HMO Market Penetration on the Rate of Hospital Expenditure Growth, 1983-1993*

	Coefficient	SE	P
HMO market penetration, %			
1983 level	–0.0046	0.0026	.08
1983-1993 change	–0.0057	0.0027	.03
For-profit hospital	–0.0485	0.0347	.16
1983 hospital payer mix, %			
HMO	0.0025	0.0028	.37
Medicare	–0.0032	0.0016	.047
Medicaid	–0.0035	0.0017	.49
Uninsured	–0.0022	0.0043	.61
1983-1993 payer mix change, %			
HMO	0.0002	0.0014	.88
Medicare	–0.0016	0.0017	.37
Medicaid	–0.0046	0.0016	.003
Uninsured	–0.0038	0.0037	.31
Change in logarithm of			
Medical/surgical days	0.4499	0.0421	.001
Psychiatric days	–0.0020	0.0044	.65
Subacute days	0.0044	0.0035	.21
Outpatient visits	0.1092	0.0137	.001
Registered nurse wage	0.2550	0.0806	.002
County population	0.1615	0.1417	.26
Intercept	0.9619	0.1254	.001

*HMO indicates health maintenance organization. Adjusted $R^2=0.57$.

light the evolving nature of competition among hospitals. Prior to Medicare's PPS and the growth of managed care, hospitals competed by adding new capacity and new clinical technologies that were valued by physicians and patients. Price was not an important consideration.¹⁵⁻¹⁷ This "medical arms race" produced excess capacity, duplication of services, and exceptionally high costs in the most competitive local markets.¹⁸ The pattern changed with the introduction of prospective payment and price competition. Studies using data from the 1980s report lower rates of cost growth in competitive than in concentrated hospital markets.^{19,20} Between 1982 and 1988 hospitals in areas with high HMO penetration experienced rates of growth in cost per admission 9% lower than hospitals in markets with low HMO penetration,⁹ due in part to shorter lengths of stay.¹⁵

The results reported here indicate that during the 1990s HMOs have reduced cost inflation primarily by reducing admissions and length of stay (28% of the total 44% reduction), and secondarily by reducing the intensity of services provided per patient day (10% of the total 44%). Reductions in hospital bed capacity played only a tertiary role (6% of the total 44%). In the coming decade it is likely that this pattern of relative effects will be reversed. Rates of inpatient days cannot continue to decline indefinitely, especially in states like California where utilization has already been reduced considerably. The biggest impact will come through consolidations of hospitals and hospital systems that reduce excess ca-

capacity. The longer-term impact of managed care on hospital costs will depend on whether market forces can continue to limit growth in the intensity of services provided per patient day.²¹

We are witnessing a historic transformation in the role of the hospital within the American health care delivery system. At the dawn of the 20th century, the hospital played only a peripheral role as a provider of last resort while most medical services were delivered in the physician's office or the patient's home.^{22,23} However, developments in diagnostic and therapeutic technologies vastly increased the possibilities for medical interventions that were performed in inpatient settings, thereby moving the acute care hospital to the center of the delivery system.²⁴ Over time, an ever greater proportion of health care utilization and expenditures was attributable to hospital services and even outpatient services were provided increasingly in settings owned by hospital organizations. Now, 100 years later, the pendulum is swinging back the other way. Technological advances permit numerous medical and surgical procedures that had required inpatient facilities to be performed in an ambulatory surgery center, a physician's office, a freestanding diagnostic center, a skilled nursing facility, or a patient's home.

Care must be taken to distinguish conceptually between the role of the hospital as a facility for inpatient services and the role of the hospital as a social and economic institution. The former role is declining in an accelerating and probably irreversible fashion. As social and

economic institutions, however, hospitals are not passively fading from the health care scene. On the contrary, hospitals are aggressively expanding into outpatient, subacute, and home health services. Many are now pursuing a strategy of "vertical integration," seeking to combine and control the full continuum of care in their communities. During the 1980s the strategy of vertical integration focused on the acquisition of new facilities and departments such as outpatient surgery suites, nursing home

units, and home health agencies.²⁵ In the 1990s this strategy extends further to incorporate physicians and medical groups as components of the hospital-centered system. The most active hospitals are purchasing or developing strategic alliances with physician practices and medical groups to become "physician-hospital organizations" and "integrated delivery systems."²⁶ This trend toward vertically integrated systems is not uncontested, however. Some major medical groups have chosen to affiliate

with nonhospital physician practice management companies that provide capital and business expertise for a share in practice revenues without exerting pressure to fill hospital beds or perform ambulatory procedures in hospital facilities. The outcome of this competitive process will determine the position of the hospital in the health care delivery system for the century to come.

This study was supported by a grant from the Milbank Memorial Fund.

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