Papers

Use of hospitals, physician visits, and hospice care during last six months of life among cohorts loyal to highly respected hospitals in the United States

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Abstract

Objective To evaluate the use of healthcare resources during the last six months of life among patients of US hospitals with strong reputations for high quality care in managing chronic illness.

Design Retrospective cohort study based on claims data from the US Medicare programme.

Participants Cohorts receiving most of their hospital care from 77 hospitals that appeared on the 2001 *US News and World Report* "best hospitals" list for heart and pulmonary disease, cancer, and geriatric services.

Main outcome measures Use of healthcare resources in the last six months of life: number of days spent in hospital and in intensive care units; number of physician visits; percentage of patients seeing 10 or more physicians; percentage enrolled in hospice. Terminal care: percentage of deaths occurring in hospital; percentage of deaths occurring in association with a stay in an intensive care unit.

Results Extensive variation in each measure existed among the 77 hospital cohorts. Days in hospital per decedent ranged from 9.4 to 27.1 (interquartile range 11.6-16.1); days in intensive care units ranged from 1.6 to 9.5 (2.6-4.5); number of physician visits ranged from 17.6 to 76.2 (25.5-39.5); percentage of patients seeing 10 or more physicians ranged from 16.9% to 58.5% (29.4-43.4%); and hospice enrolment ranged from 10.8% to 43.8% (22.0-32.0%). The percentage of deaths occurring in hospital ranged from 15.9% to 55.6% (35.4-43.1%), and the percentage of deaths associated with a stay in intensive care ranged from 8.4% to 36.8% (20.2-27.1%).

Conclusion Striking variation exists in the utilisation of end of life care among US medical centres with strong national reputations for clinical care.

Introduction

The frequency of use of hospitals, intensive care units, and physician visits among patients with chronic illness varies extensively across hospital regions in the United States. The variations are unrelated to population based measures of need but are closely associated with the per capita supply of hospital beds and physicians.[1–4] The variations in frequency of use of these "supply sensitive" services are particularly striking during the last six months of life.[1] These variations are of concern because they do not seem to reflect patients' preferences or rates of illness. Moreover, patients with chronic illnesses who live in regions with high rates of use do not seem to have better health outcomes.[5–7] We have argued the need for academic medical centres to answer questions about how many hospital beds and physicians are needed to provide optimal care.[5 8] An important first step is to obtain population based performance measures specific to academic medical centres. In this paper, we document end of life care among cohorts of patients enrolled in Medicare who receive most of their inpatient care at well known academic medical centres in the United States.

Methods

Selection of cohorts

Hospital specific utilisation measures are feasible because patients, particularly those with chronic illness, tend to receive most of their inpatient care from a given hospital.[4] We identified patients who received most of their inpatient care during the last two years of their lives from a hospital that appeared on the 2001 list of "America's best hospitals" for geriatric care and for the treatment of three common chronic illnesses: heart disease, cancer, and pulmonary disease.[9] By using Medicare's hospital admission files for patients who died in 1999-2000, we assigned decedents to the hospital used most often during the last two years of life. We generated utilisation measures for the cohorts assigned to the selected hospitals.

Outcome measures

The measures of utilisation during the last six months of life included the number of days spent in hospital ("hospital days"), the number of days spent in intensive care units ("ICU days"), the number of physician visits, the percentage of patients seeing 10 or more physicians, and the percentage of patients enrolled in a hospice. Measures of intensity of terminal care

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included the percentage of deaths occurring in hospital and the percentage of deaths involving a stay in an intensive care unit.

Statistical analysis

On the basis of the diagnoses that appeared on the record of the last hospital admission, we determined the presence of up to 11 chronic conditions and used these to adjust for differences among cohorts in underlying rates of disease. We calculated utilisation rates in the last six months of life and crude hospital specific rates. We adjusted the hospital and visit rates directly for age, sex, race, and illness by using regression models.[10] The dependent variable was the total event count per decedent, and the independent variables were indicator variables for the study hospitals and for age, sex, race, and chronic condition.

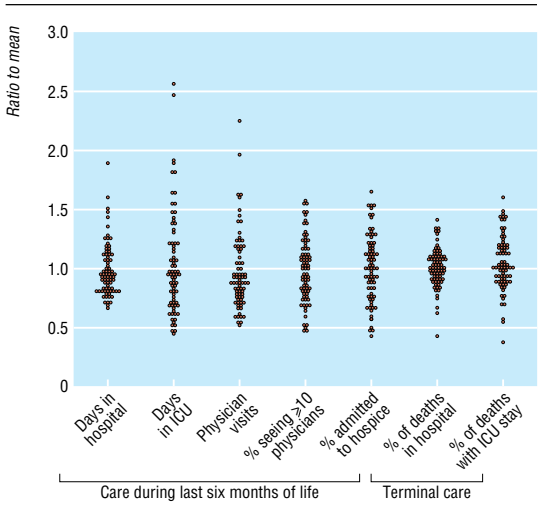
We evaluated relations between hospital specific rates by using product-moment correlation. We used the coefficient of variation and interquartile and extremal range ratios to compare the degree of variation among utilisation measures. We also compared variation graphically by displaying the directly standardised rate for each hospital, expressed as a ratio to the mean rate among the 77 hospital cohorts. See bmj.com for details.

Final sample of hospital specific cohorts

Ninety two acute general hospitals appeared one or more times on the list of best hospitals for 2001. We excluded hospitals with fewer than 100 decedents with data for physician claims, leaving 77 hospital cohorts. Patient loyalty (defined as percentage of all days in hospital that occurred in the assigned hospital) tended to be strong. Among the 77 hospital specific cohorts, patient loyalty, measured over the two years before death, ranged from 64.6% to 91.9%, with a median of 82.5% and a mean of 81.4%.

Illness and demographic characteristics among patients assigned to 77 hospital cohorts. Values are numbers (percentages)

Characteristic	Patients (n=115 089)
Chronic conditions:	
Cancer: solid tumours	31 764 (27.6)
Lymphomas and leukaemias	6 279 (5.5)
AIDS	103 (0.1)
Chronic pulmonary disease	25 864 (22.5)
Coronary artery disease	9 931 (8.6)
Congestive heart failure	37 584 (32.7)
Peripheral vascular disease	5 958 (5.2)
Severe chronic liver disease	2 317 (2.0)
Diabetes with end organ damage	2 902 (2.5)
Chronic renal failure	6 809 (5.9)
Nutritional deficiencies	12 068 (10.5)
Dementia	17 062 (14.8)
Functional impairment	3 040 (2.6)
No of chronic conditions:	
None	17 674 (15.4)
1 only	49 568 (43.1)
2 only	33 914 (29.5)
3 only	11 656 (10.1)
≥4	2 277 (2.0)
Demographic characteristics:	
Age 65-69	12 912 (11.2)
Age 70-74	19 811 (17.2)
Age 75-79	23 545 (20.5)
Age 80-84	22 995 (20.0)
Age ≥85	35 826 (31.1)
Male	52 313 (45.5)
Female	62 776 (54.5)
Non-black	97 740 (84.9)
Black	17 349 (15.1)



	Days in hospital	Days in ICU	Physician visits	% seeing ≥10 physicians	% admitted to hospice	% of deaths in hospital	% of deaths with ICU stay
Mean	14.5	3.72	34.1	37.3	26.9	39.6	23.1
Interquartile ratio	1.38	1.72	1.55	1.47	1.46	1.22	1.34
Extremal ratio	2.89	5.85	4.33	3.46	4.05	3.50	4.38
Coefficient of variation	0.23	0.42	0.34	0.28	0.28	0.17	0.23

Distribution of rates and statistical measures of variation for end of life care among 77 cohorts assigned to hospitals with national reputations for high quality. ICU=intensive care unit

Results

The table shows the characteristics of the study population. The intensity of care during the last six months of life and at the time of death varied substantially (fig). The average number of days spent in hospital during the last six months of life was more than 27 days in the highest ranked cohort and fewer than 10 days in the lowest ranked cohort. Average ICU days varied by a factor of six, from 1.6 to 9.5 days per person; physician visits varied by a factor of four, from less than 18 to more than 76 visits per decedent. The propensity to use multiple physicians varied from less than 17% of patients seeing 10 or more physicians in the last six months of life to more than 58% of patients. Deaths occurring in hospital ranged from less than 16% to more than 55%; deaths associated with a stay in an intensive care unit varied from less than 9% to more than 36%. Enrolment in a hospice varied among the cohorts from less than 11% of decedents to more than 43%.

We examined the intensity of care during the last six months for cohorts loyal to major teaching hospitals located in metropolitan regions with two or more major teaching hospitals. We ranked them according to the (unweighted) average number of patient days per decedent. By this measure, the hospitals located in Manhattan provided the most care. Other regions with high hospital day rates included Los Angeles, Philadelphia, and Washington DC. Patient cohorts loyal to the teaching hospitals in these regions also tended to have a higher frequency of physician visits, and a higher proportion saw 10 or more physicians. However, use of intensive care units varied.

Hospitals in Minneapolis and San Francisco had low rates on all four measures of intensity of care in the last six months of life (see bmj.com).

The observed variation could have been generated by substitution between hospital use, physician visits, and hospice care. Enrolment in a hospice was inversely correlated with hospital days in the last six months of life ($r = -0.41$; $P < 0.0002$), the chance of dying in a hospital ($r = -0.51$; $P < 0.0001$), and the percentage of deaths occurring in association with a stay in the intensive care unit ($r = -0.28$; $P = 0.012$). However, the percentage enrolled in a hospice was not correlated significantly ($P > 0.05$) with fewer physician visits, seeing 10 or more physicians, or ICU days in the last six months of life. We found a strong positive correlation between the number of days spent in hospital and the number of physician visits within the last six months of life ($r = 0.77$; $P < 0.0001$).

Discussion

Academic medical centres in the United States with reputations for excellence differed dramatically in the care they provided to patients during the last six months of life.

What explains such variation?

Among regions, a direct relation exists between supply and utilisation of services. The frequency of use of physician services is strongly associated with the local workforce supply,[1 11 12] and bed supply "explains" more than half of the variation in hospital admission rates for medical conditions.[1]

The key question is whether greater frequency of physician visits and hospital care for chronically ill patients results in better health outcomes. Two randomised trials of elderly patients found that more frequent office visits and more intensive primary care were associated with increased use of the hospital, no improvement in health or function, and a non-significant increase in mortality.[13 14] We compared practice patterns and health outcomes across regions of the United States that were similar in baseline health status but that differed by 60% in overall utilisation of services.[6] Greater frequency of use was associated with worse outcomes, suggesting that overuse of supply sensitive services was leading to harm, possibly because greater use of hospital and specialist care exposes populations to greater risks of medical errors.[7]

Limitations of the study

With the exception of hospice care, we were unable to evaluate the contribution of community care services. Interestingly, whereas hospice enrolment varied substantially among the 77 cohorts, we did not find that increased use of hospices led to less use of intensive care units or physician visits during the last six months of life. It was, however, associated with fewer deaths in hospital and, to a lesser degree, with a decrease in the chance that death was associated with a stay in an intensive care unit.

We had no information on preferences for end of life care or on satisfaction with the services provided, the effectiveness of pain control, or the degree of emotional or physical support provided by each healthcare system. The SUPPORT study documented deficiencies in these aspects of care and showed that the differences in hospital care were due neither to case mix nor to patients' preferences.[15]

We excluded patients who did not experience at least one hospital admission during their last two years of life. Adjusting our variables for the percentage of deaths without any hospital admission within two years of death had little impact on our results, and if anything tended to increase dispersion across hospitals. We also underestimated loyalty for medical centres that use affiliated hospitals, as this information was not available.

Generalisability

End of life measures provide a good indicator of how hospitals are treating all patients with chronic illness, not just those near death.[6] Typically, hospital level comparisons are confounded by differences in case mix across communities. However, all patients in the last six months of life are similar with regard to one critical case mix adjuster—they are all dead within six months. Although we have found that regions allocating the least resources to patients at the end of life tend to have lower mortality and do better on other measures of quality for all of their patients,[7] this association needs to be tested in countries where the frequency of acute hospital care and physician visits is less than in the United States.

What is already known on this topic

Population based rates of use of hospitals, intensive care units, and physician visits vary extensively across US regions, particularly during the last six months of life

Population based rates are uncorrelated with illness and patients' preferences but are closely associated with the supply of hospital beds and physicians

The outcomes of care are no better among the cohorts of patients with chronic illness who receive care in regions with higher rates of use of services

What this study adds

Population based rates of use of hospitals and physician services can be measured among populations loyal to specific hospitals

End of life care varies extensively among patient cohorts who receive most of their care from well known academic medical centres, even among those located in the same region

Hospital specific information opens the opportunity for academic medical centres to participate in studies to improve the quality and efficiency of care

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Commentary: Getting a grip on clinical variations in hospital services

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The findings reported by Wennberg and colleagues should come as no surprise to observers of the NHS and other healthcare systems.[1] They are neither unique nor confined to the United States. It is an iron law of health policy that supply determines utilisation and demand. Elasticity of demand dictates that if beds are available then patients will be found to fill them, regardless of the appropriateness of such care.

Wennberg and colleagues show starkly how, despite the assault on clinical practice by managers and politicians as they strive to control costs, improve quality, and tackle unexplained variations in clinical practice and outcomes, the power to determine what happens within health services resides firmly with clinicians based in acute hospitals.[1] Were the study to be repeated in the United Kingdom and elsewhere, as it should be, the results would be unlikely to differ substantially.

The findings should make policy makers wary of unleashing further, often ill considered, reforms on health systems. Successive reorganisations of the British NHS, for example, seem to have resulted in a situation best described as "dynamics without change."[2] The structures and organisations may come and go at bewildering speed, but life on the front line among clinicians proceeds with minimal disturbance.

Particularly striking is that the hospitals featured in the study are those with strong reputations for high quality care in managing chronic illness. High performing organisations may facilitate the development of particular cultural traits among staff, but in this instance such organisations seem to have been largely confined to acute care settings lacking a patient centred ethos. The effective management of chronic illness needs joined-up working across the entire spectrum of care, of which acute care is but one component and perhaps not the most critical.

The findings also prompt concerns about whether the English *NHS Plan* and its commitment to providing 9500 more doctors (7500 consultants and 2000 general practitioners) and increasing bed capacity by 7000 beds is entirely wise or appropriate if having more of them doing much the same sort of work in the same way is no guarantee of better health.[3 4] Do we really know the optimal number of staff and beds needed?[5]

In any event, with the focus of the government's reforms on the acute sector, on foundation hospitals, and on patient choice, Wennberg and colleagues' conclusion that the improved management of chronic illness and end of life care are priorities and should be determined by patients' needs "and not the capacity of the acute care system" is especially apposite. If the commissioning role of primary care was strengthened then the appropriate role of acute hospital care might be more effectively determined.[6]

Perhaps the most important lesson arising from the study is that if real change in the way health systems function is to occur then far greater attention must be given to the way clinicians operate and manage resources throughout the care pathway.[7] Improving the micromanagement of chronic illness through integrated care pathways and "whole systems" thinking demands that health and social care services work together with and in the interests of patients. We have struggled with these issues for decades with limited effect. In contrast to some other European countries, Britain is still some way from reaching the promised land of integrated care. Wennberg and colleagues provide some critical insights into why.

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