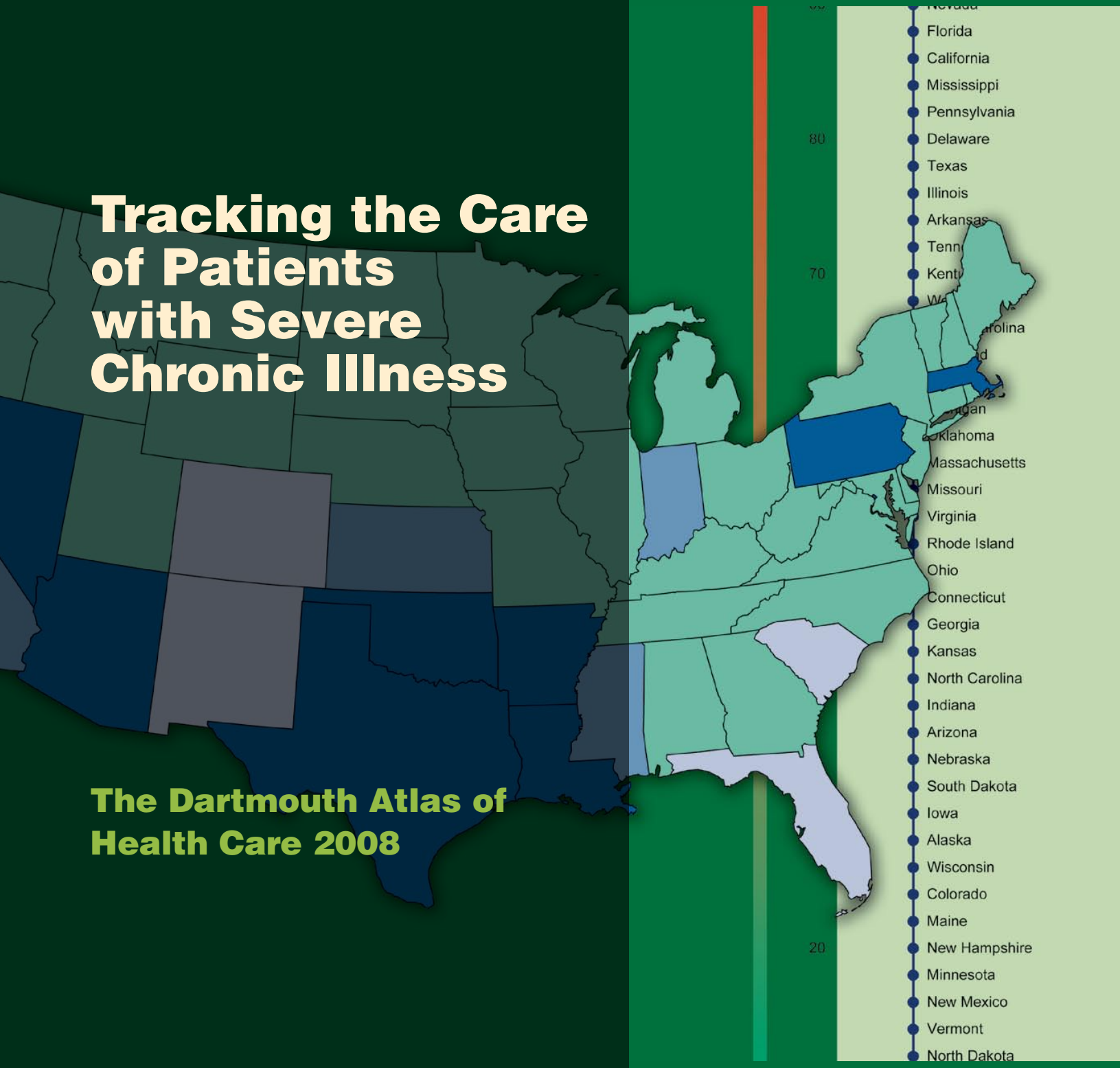
# Tracking the Care of Patients with Severe Chronic Illness




## The Dartmouth Atlas of Health Care 2008

THE DARTMOUTH INSTITUTE
FOR HEALTH POLICY & CLINICAL PRACTICE

*Where Knowledge Informs Change*

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# Tracking the Care of Patients with Severe Chronic Illness: The Dartmouth Atlas of Health Care 2008

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# Introduction

## Health Care Spending, the Care of the Chronically Ill, and the Problem of Supply-Sensitive Care

In 2001 the Institute of Medicine (IOM) issued *Crossing the Quality Chasm*, a report that sent a wake-up call to patients, providers, and policy makers about the poor quality of American health care. The IOM argued that one of the central drivers of poor quality has been the unsystematic and fragmentary nature of our health care delivery system.

Nowhere are the system's failings more apparent than in the care of the chronically ill. More than 90 million Americans live with at least one chronic illness, and seven out of ten Americans die from chronic disease. Among the Medicare population, the toll is even greater: about nine out of ten deaths are associated with just nine chronic illnesses, including congestive heart failure, chronic lung disease, cancer, coronary artery disease, renal failure, peripheral vascular disease, diabetes, chronic liver disease, and dementia.

Treating chronic disease is both enormously costly and not particularly effective. Most patients with chronic disease are treated in episodic fashion by multiple physicians, who rarely coordinate the care they deliver. As chronic disease progresses, the amount of care delivered and the costs associated with this care increase dramatically. Patients with chronic illness in their last two years of life account for about 32% of total Medicare spending, with much of it going toward physician and hospital fees (Medicare Part A and Part B) associated with repeated hospitalizations.

The IOM's report and recent figures on escalating costs due to chronic disease have led to increased attention to the poor quality of health care in America, and a general consensus that improvements are desperately needed. Yet efforts to improve the quality of care and simultaneously bring down costs have been hampered to date by several unfounded assumptions about the structure of the health care industry and how different payment schemes might affect that structure.

This edition of the Dartmouth Atlas will focus on disentangling the phenomenon known as "unwarranted variation," or variation in different regions of the country that is not explained on the basis of illness, patient characteristics or preferences, or the dictates of evidence-based medicine (see box). Like the last edition, it focuses on supply-sensitive care delivered to chronically ill Medicare beneficiaries in the last two years of life. The beneficiaries all died between 2001 and 2005, and they were suffering from one or more of the nine chronic diseases listed above. The extent of variation in Medicare spending and utilization and the evidence that more care does not result in better care or better outcomes indicate that some chronically ill and dying Americans receive too much care: more than they or their families actually benefit from. Unlike the previous Atlas, this version includes Medicare spending not just on inpatient care, but also the amount spent on ambulatory care, skilled nursing care, long-term care, home health care, and hospice care. The final chapter of this Atlas will outline a proposal for reforming the Medicare payment system, a plan that is intended to simultaneously improve the quality of care for the chronically ill and rein in spending.

Dartmouth Atlas research has identified three categories of services that exhibit unwarranted variation.

- **Effective care** consists of evidence-based interventions for which the benefits so far exceed the harms that all patients in need should receive the service. Life-saving drugs following heart attack are examples. Variations in the use of such treatments among eligible patients reflect a failure to deliver needed care, or underuse.

- **Preference-sensitive care** encompasses treatment decisions where different choices carry different benefits and risks, and where patients' attitudes toward these outcomes vary. An example would be the use of bypass surgery for heart disease, where surgery is likely to improve patients' chest pain but carries a small but real risk of causing memory loss. Unwarranted variations in preference-sensitive care reflect both the limitations of current scientific evidence and the failure to ensure informed patient choice.

- **Supply-sensitive care** refers to services where the supply of a specific resource (e.g., the number of specialists per capita) has a major influence on utilization rates. Physician visits, hospitalizations, stays in intensive care units, and imaging services are all examples of care where the local supply influences the frequency of use. Variations in supply-sensitive care are largely due to difference in local capacity, and a payment system that ensures that existing capacity remains fully deployed.

  The focus of this Atlas is on the use of supply-sensitive care among Medicare patients with severe chronic illness.

## Why do some regions spend more and do more?

The previous version of the Dartmouth Atlas, *The Care of Patients with Severe Chronic Illness*, published in 2006, documented the unwarranted variation in the care of chronically ill Medicare beneficiaries in different regions of the country. That Atlas found extensive unwarranted variation in both the quality of care and the amount of care delivered to Medicare recipients in the last two years of life. For example, Medicare per capita spending on chronically ill beneficiaries varied more than twofold among hospital referral regions.[i] Spending also varied from state to state, and from one hospital to another, even among hospitals within the same region.

Most of this variation was not due to differences in the price of care in different parts of the country, but rather to differences in the volume, or the amount of inpatient care delivered per capita. For example, during the last two years of life, when chronically ill patients are typically very sick and often suffering from multiple chronic diseases, Medicare recipients in one region spent as many as 30.3 days on average in the hospital over the course of their last two years of life, and as few as 11.7

[i] Hospital referral regions (HRRs) represent regional health care markets for tertiary medical care. Each HRR contains at least one hospital that performs major cardiovascular procedures and neurosurgery.

days in another.[ii] The variation in the volume of care became even more striking when we looked at chronically ill patients in the last six months of life, when beneficiaries in one region of the country had, on average, more than 50 visits with a doctor over that six-month period, compared with 15.7 visits in another region.

The most obvious place to look for the source of variation in care is how sick people are in different parts of the country. Indeed, most policy makers, physicians, and patients assume that differences across regions in the prevalence of disease among the chronically ill are the most important factor driving the variation in medical spending. Patients who are sicker naturally need more care, goes the thinking, and consequently Medicare spends more in regions where disease is more common. But while there is some variation in the prevalence of disease in different parts of the country, it turns out that differences in the level of illness account for only a small fraction of the variation in the amount of care delivered.

By far, the most significant factor associated with how much Medicare spends in any given region is the availability of medical resources. Studies from the Dartmouth Atlas Project[1] have shown that the frequency with which physicians admit patients with chronic diseases to the hospital is highly correlated with the number of beds per capita in the region. The frequency of visits to medical specialists is correlated with the number of specialists available. And the frequency with which chronically ill patients undergo many diagnostic tests and procedures also varies. We call such procedures and tests, along with the rates of hospitalization and physician visits, "supply-sensitive" care, or care that varies with the local availability of such medical resources as physicians, hospital beds, intensive care unit (ICU) beds, and diagnostic imaging equipment.

The volume of supply-sensitive care that is delivered to the chronically ill is a powerful force driving Medicare spending. In this Atlas, we will show that the utilization of supply-sensitive services for treating the chronically ill varies dramatically across different regions of the country, and it is responsible for much of Medicare spending. We will review the evidence that local capacity, or the local supply of medical resources per capita, varies widely, and that this local capacity bears directly on how much care is used to treat the chronically ill.

## When is more care worse?

Doing more and spending more might be justified if it resulted in better health outcomes. Indeed, most Americans believe that more care is better: that patients who live in parts of the country like Manhattan, Los Angeles, or Miami, where there are numerous hospitals and abundant medical technology, are the lucky ones. They have access to the best health care money can buy. On the other hand, people who live in areas where there are fewer medical resources—such as Portland, Oregon; Minneapolis; or Salt Lake City—are thought to be at risk for receiving substandard care.

[ii] When we talk about days in the hospital, we are not referring to the average length of stay for each admission. The number of days in the hospital is a function of both the number of admissions and the average time in hospital per admission.

But at the population level, our research and that of others has shown that more resources and more care (and more spending) are not necessarily better. Patient populations with similar chronic illness, followed over time once they become ill, do not enjoy improved survival or better quality of life if they live in regions with more care. In fact, the care they receive appears to be worse. They report being less satisfied with their care than peers in regions that spend less, and having more trouble getting in to see their physicians. The most surprising and significant difference between regions is that mortality is higher in high-spending regions. In other words, your chances of dying increase in regions where the health care system delivers more care.[2]

How can more care result in higher mortality? Patients can be harmed by medical care in many ways. It is becoming increasingly evident that hospitals can be risky. For example, they are good places to acquire antibiotic resistant infections. Patients with chronic illness are particularly vulnerable; if they spend more time in the hospital—as they do if they live in regions that deliver more care—they have greater exposure to hospital-acquired infections, which, according to some accounts, are responsible for about 100,000 deaths annually. Greater use of diagnostic tests could find more abnormalities that would never have caused the patient any problem (a condition referred to as "pseudodisease"). Because most treatments pose some risk, providing those treatments to patients who do not need them could cause harm. And as care becomes more complex and as more physicians get involved in an individual patient's care, it becomes less and less clear who is responsible, and miscommunication—and medical errors—becomes more likely.

What this means is that regions of the country and hospitals with low rates of utilization are not rationing valuable care: quite the opposite. Rather, regions and hospitals with high rates of utilization may in fact be overtreating patients. They are delivering unnecessary care, which is not producing better outcomes.

These findings have several implications for patients with chronic disease, and for the cost of Medicare. First and foremost, overtreatment harms patients, and it contributes to the chaotic quality of American health care. Second, overtreatment wastes taxpayer dollars. Various estimates for the amount we waste on overtreatment in this country range between 20 to 30 cents on every health care dollar spent.[3] And because of the way Medicare is financed, overtreatment also entails a systematic transfer of tax dollars from residents of low-cost regions to high-cost regions, where those dollars fund the useless, and potentially harmful, care that is being delivered. Perhaps most worrisome of all from the standpoint of cost, Medicare spending for supply-sensitive care is going up fastest in regions of the country where spending and utilization are already high.

## Why we are interested in measuring care at the end of life

The emphasis in this edition of the Dartmouth Atlas is on care delivered during the last two years of life. One reason is the growing concern about the way chronic illness is managed in the United States, and about the possibility that some chronically ill and dying Americans might be receiving too much care: more than they and their families actually want or benefit from. Our emphasis on this period of life is also motivated by our interest in developing measures of efficiency and performance

that minimize the chance that variation in the care delivered in different regions and by different hospitals can be explained by differences in the severity of patients' illnesses. By looking at care delivered during fixed intervals of time prior to death, we can say with assurance that the prognosis of all the patients in the cohort is identical—all were dead after the interval of observation. By further adjusting for difference in age, sex, race, and primary chronic illness, we believe that we have developed fair measures of the relative intensity of care provided to equally ill patients—comparisons for which differences among patients are an unlikely explanation.[iii] Moreover, end-of-life care intensity measures identify the position of a given region or provider along a spectrum of care intensity in managing chronic illness throughout its course, not just during the terminal phase. This is evident in the high level of correlation between care intensity during the last six months of life and care intensity during previous periods in the progression of chronic illness toward death (see Chapter Three, Figures 3.4 and 3.5).

It is important for the reader to understand that while end-of-life measures raise the question whether more is better, they do not provide an answer. However, because they are general indicators of care intensity patterns of regions and hospital providers, they can be used to test the hypothesis that cohorts of patients with similar illnesses, followed over time, have better outcomes if they live in regions with greater care intensity. Dartmouth Atlas studies introduced in the previous section and reviewed in Chapter One, illustrate this use of our end-of-life measures.

## The contents of this Atlas

This edition of the Dartmouth Atlas will look in detail at the causes and effects of supply-sensitive care on the treatment of the chronically ill. It will look at variation state by state, region by region, and hospital by hospital among academic medical centers and in the region that includes the city of Los Angeles. It will also update data from the last Atlas that looked at chronic illness, and it will include, for the first time, total Medicare spending. In addition to Part A and Part B spending on inpatient and physician care, this Atlas will document spending in other sectors of the health care industry, including ambulatory care, skilled nursing facilities, long-term care, home health care, and hospice. Many health care policy analysts have argued that increasing the availability of the services provided by these sectors will reduce spending on acute inpatient care, but our data show they have little to no effect on inpatient utilization. The final chapter will outline a proposal to reform the Medicare payment system to increase the efficiency of the inpatient sector and improve the coordination of care within and among sectors.

**Chapter One** will present the evidence that more than half of the variation in utilization and spending between regions is due to supply-sensitive care. It will document the consequences of this care for chronically ill patients and look at the various reasons physicians and hospitals deliver more care in response to more resources, as well as how different levels of care affect overall quality.

[iii] One may be concerned about the use of end-of-life data for two reasons. First, an individual in one region treated intensively may survive, and thus not end up in the end-of-life sample; in this case there would be an attenuation of expenditures in the high cost regions (and conversely in the low cost regions) which would attenuate the magnitude of regional variations in "true" end-of-life expenditures. Second, as noted by Bach et al. (2004), relates to heterogeneity in how people die; one region may have more diseases with "low cost" deaths. However, adjusting for the type of disease among those in the last six months (or two years) of life does not affect our conclusions.
Bach P, Schrag D, Begg CB. Resurrecting treatment histories of dead patients: A study design that should be laid to rest. *JAMA*. 2004 Dec 8;292(22):2765–70.

**Chapter Two** will provide data on variation in overall Medicare spending across all sectors of care—including inpatient care, outpatient care, skilled nursing facilities, long-term care, home health and hospice care—at the state and regional level. This chapter will show that most of the variation in Medicare spending is due to differences in the volume, or amount of care delivered (i.e., the utilization rate), not in the price of that care in different parts of the country. It will also show that, contrary to widespread assumptions, the availability of services provided by such sectors as hospice, home health care, and skilled nursing facilities does not reduce the utilization of expensive inpatient care, which accounts for the lion's share of Medicare spending on the chronically ill; nor does availability mean coordination of care.

**Chapter Three** will document the wide variations in care delivered by academic medical centers, many of which are among "America's Best Hospitals," according to the annual rankings by *U.S. News & World Report*. As tertiary care centers, academic medical centers care for the sickest of the sick, and many of them fall at the high end of Medicare spending and utilization. These institutions typically argue that they deliver more intense care because their patients are sicker. Yet if they are all caring for the sickest patients, and the amount of care they deliver is driven by how sick their patients are, why is there so much variation among them?

The lack of consistency in care among academic medical centers highlights a central problem for all health care providers: the dearth of scientific evidence to guide them when it comes to caring for the chronically ill. Medical science has paid virtually no attention to determining how much care is needed by patients with chronic illness, and when they need it. Consequently there is little valid evidence, and no clear rules, about when to ask a patient with heart failure, for instance, to return for a follow-up visit, when to hospitalize him, or at what point to admit him to the ICU. Because both doctors and patients tend to believe more care is better, when faced with the uncertainty of medicine, physicians will use available capacity up to its point of exhaustion, no matter how much capacity there is.

This chapter will also introduce the concept of benchmarking as a tool for evaluating the efficiency of hospitals in allocating resources and in the impact they have on the lives of patients. We compare the care that patients receive at high-spending hospitals, which deliver a high volume of procedures, tests, doctor visits, and repeated hospitalizations, to the care delivered to patients with similar levels of illness at low-spending hospitals. In this chapter and the next, we provide dollar figures for potential savings if high-spending hospitals achieved the levels of care delivered by efficient providers. It turns out that the chronically ill are often best-served by low-cost academic medical centers run by organized group practices, such as the Mayo Clinic in Rochester, Minnesota, or by integrated hospital systems such as Intermountain Healthcare, which serves the region around Salt Lake City.

**Chapter Four** will look at the hospitals in the Los Angeles region, which ranks near the top in Medicare spending, resource use, and utilization of care for the chronically ill; yet the care patients receive varies from one hospital to the next. We will show how chronically ill patients loyal to different hospitals in Los Angeles, some within just a few blocks of each other, will experience very different courses of treatment in the two years prior to their deaths, depending upon the resources available and the practice style that has developed at each hospital they might choose.

**Chapter Five** will offer a framework for reforming the Medicare payment system to address several of the perverse incentives that lead to overcapacity, overtreatment, and the fragmented, disorganized care that dominates American medicine. To improve the quality and efficiency of care delivered to Medicare's chronically ill, the nation must find ways to reduce excess capacity and overuse of acute care hospitals: promote organized, coordinated care that makes better use of such services as hospice and home health care; and improve the scientific basis not just for clinical decision making, but also for decisions by hospitals on how to allocate such resources as ICU beds and the physician workforce. The key to achieving these goals is reforming the Medicare payment system beyond the current efforts to pay for performance.

The **Afterword** will illustrate how to use the Dartmouth Atlas web site's tool kit to access reports and provide examples of how selected stakeholders might use them. Information on the database, construction and definition of measures, methods of analysis, and aggregation of populations into regions and hospital-specific cohorts is available in the **Appendix on Methods**.

Endnotes

[1] See Dartmouth Atlas website: www.dartmouthatlas.org

[2] Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 1: The content, quality, and accessibility of care. *Ann Intern Med*. 2003 Feb 18;138(4):273–87.

Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 2: Health outcomes and satisfaction with care. *Ann Intern Med*. 2003 Feb 18;138(4):288–98.

[3] Skinner JS, Fisher ES, Wennberg JE. The Efficiency of Medicare, in D. Wise (ed.) *Analyses in the Economics of Aging*. Chicago: University of Chicago Press and NBER (2005).

Chapter One

# Chronic Illness and the Problem of Supply-Sensitive Care

For patients with chronic illnesses, geography matters. Depending upon where they live, and which hospital or health care organization they are loyal to, patients with chronic illnesses receive very different care. In one region, patients with congestive heart failure will be admitted to the hospital many times in a single year, while patients with heart failure living in another region will be hospitalized far less often. Among the 306 hospital referral regions defined by the Dartmouth Atlas Project, the frequency of primary care visits per enrollee in 2003 varied by a factor of almost three; visits to medical specialists by more than five; and hospitalizations for congestive heart failure and chronic obstructive pulmonary disease by more than four. Later chapters of this Atlas will provide greater detail on the variation among states, regions, academic hospitals, and among the hospitals within a single region.

Why does the care of the chronically ill vary so much? The most obvious explanation might seem to be regional differences in how sick patients are. We would expect to see the chronically ill receiving more care in places where the severity of illness is greater, or where more people are ill. We would also expect to see the hospitals that care for the sickest patients—mostly academic medical centers—delivering the most care.

But the prevalence and severity of illness accounts for remarkably little of the variation in care. The Dartmouth Atlas Project has conducted considerable research that shows only a weak relationship between how sick patients are and the amount and intensity of care they receive. One study, for example, looked at cohorts of patients with three different illnesses: solid tumors, congestive heart failure (CHF), and chronic obstructive pulmonary disease (COPD).[1] The study matched patients within cohorts for age, sex, race, and severity of illness and then compared the care they received at 77 well-respected academic medical centers. Even among matched patients, there was wide variation in the amount of care delivered. At one academic medical center, for example, patients with COPD spent 13.1 days in the intensive care unit during the last six months of life, while, at another, COPD patients spent only 1.8 days in the ICU. Patients with CHF saw a physician 99.3 times in the last six months of life at the highest ranked hospital and 15.2 times at the lowest ranked. Yet all of these hospitals were caring for extremely sick patients.

There is also little correlation between Medicare spending in the 306 hospital referral regions and prevalence of chronic disease. Among the hospital referral regions, Medicare Part A and Part B spending per enrollee varied 2.5-fold during the two-year period 2000–01, from an annual average low of $4,346 per enrollee living in the Appleton, Wisconsin hospital referral region to $11,544 per enrollee in the Bronx, New York hospital referral region. During the same period, the prevalence of severe chronic illness (measured as the age-, sex-, and race-adjusted percent of Medicare enrollees who were chronically ill and in the last two years of life) also varied more than 2.5-fold, from 5.4% of Medicare Part A and Part B beneficiaries in Honolulu to 13.6% of beneficiaries in the Slidell, Louisiana

hospital referral region. Yet only a small proportion—about 4%—of the variation in Medicare spending was associated with the regional variation in the prevalence of severe chronic illness (Figure 1.1).

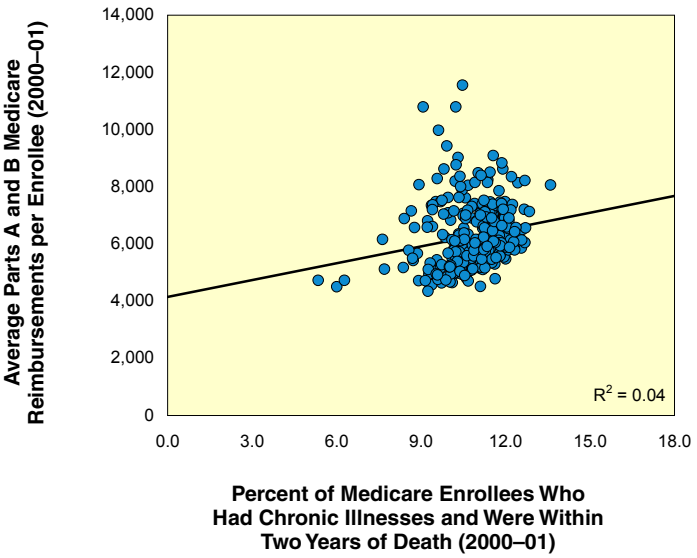



**Figure 1.1. The Relationship Between the Prevalence of Severe Chronic Illness and Medicare Parts A and B Reimbursements per Enrollee Among 306 Hospital Referral Regions (2000–01)**

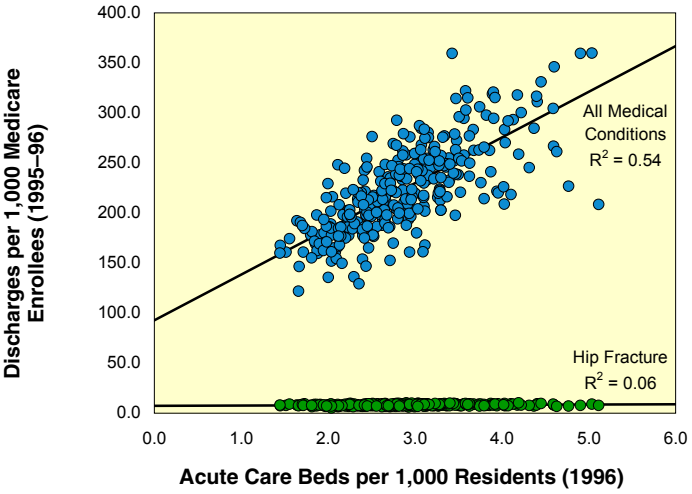



**Figure 1.2. The Association Between Hospital Beds per 1,000 Residents (1996) and Discharges per 1,000 Medicare Enrollees (1995–96)**

If severity of illness does not account for the variation in care at different hospitals or in different regions, what does? The single most powerful explanation for the variation in how patients are treated is the fact that much of the care they receive is "supply-sensitive"; that is, the frequency with which certain kinds of care are delivered depends in large measure on the supply of medical resources available.

The effect of hospital bed supply on hospital use was first observed in the 1960s by health services researcher Milton Roemer, who coined the phrase, "A built hospital bed is a filled hospital bed."[i] Since then, the Dartmouth Atlas Project has consistently confirmed "Roemer's Law" with data showing a positive association between the per capita supply of staffed hospital beds and the hospitalization rate for most medical (non-surgical) conditions (Figure 1.2). Admissions to intensive care units are correlated with the supply of ICU beds. Rates of diagnostic testing and imaging exams are correlated with the supply of the equipment that is needed to produce the tests.

The relationship between the supply of physicians and physician visit rates, particularly in those specialties focused on treating chronic illnesses, is similar to the relationship between bed supply and hospitalization rates. About half of the variation in the number of Medicare visits to cardiologists was associated with the per capita number of cardiologists in the region in 1996 (Figure 1.3). Such a relationship makes arithmetic sense; on average, regions with twice as many cardiologists per capita will have twice as many available visit hours. Since appointments to see physicians are generally fully booked, very few hours in the work week go unfilled. Therefore, available capacity governs the frequency of visits.

Resource capacity has a direct influence on the patient's experience of medical care. The greater the supply of the

[i] Milton I. Roemer first posited Roemer's law around 1960. In 1993, he reiterated this observation in *National Health Systems of the World, Volume Two* (Oxford University Press): "The optimal supply of hospital beds needed by each country, for planning purposes, has been a subject of study and debate everywhere. If there is an assured payment system, it seems that almost any additional hospital beds provided will tend to be used, up to a ceiling not yet determined."

resource, the more of that particular kind of care patients will get. Thus, in regions where there are more intensive care unit beds per Medicare beneficiary, the more often chronically ill Medicare patients will find themselves in the ICU. The more cardiologists per patient, the more often Medicare beneficiaries will see a cardiologist; and the more CT scanners available, the more CT scans they will receive. Conversely, in regions where there are relatively fewer medical resources, patients get less care.

Nationally, supply-sensitive care accounts for well over 50% of Medicare spending, but how much supply-sensitive care an individual patient is likely to receive depends upon where he or she lives and the hospital to which he or she is admitted. During the five-year period 2001–05, on average, patients with chronic illnesses living in the region using the least supply-sensitive care spent about 6.1 days in hospitals during their last six months of life, while those living in the region using the most supply-sensitive services spent an average of 21.9 days as inpatients during the last six months of their lives. How often chronically ill patients saw a physician during their last six months of life also varied substantially. In the region that used the most supply-sensitive care, terminal patients had an average of almost 60 visits during their last six months; in the lowest ranked regions, the average was about 15 visits.

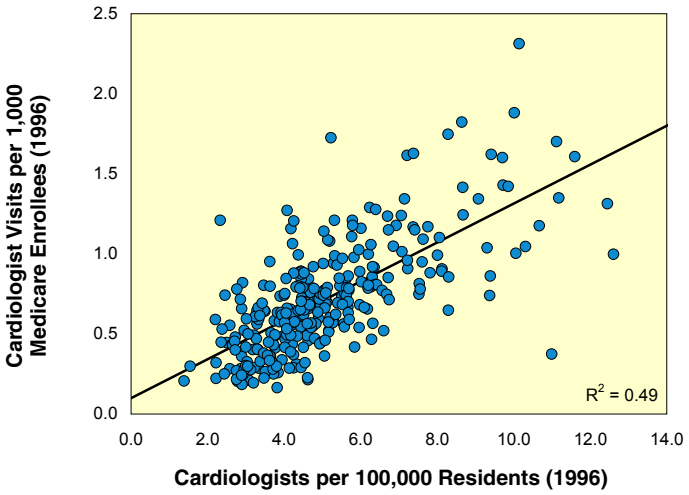



**Figure 1.3. The Association Between the Supply of Cardiologists per 100,000 Residents and Visits to Cardiologists per 1,000 Medicare Enrollees (1996)**

## Is more care better?

Most policy makers, physicians, and patients assume that more care is better care, and that patients living in regions where there are fewer resources available are undoubtedly being denied tests, hospitalizations, and treatments they need. Yet there are several reasons to think this is not the case. First, some of the most highly respected hospitals and health care organizations use relatively few resources and treat their chronically ill Medicare patients less intensely than other providers. For example, at Duke University Hospital, considered one of the best in the country, chronically ill patients dying between 2001 and 2005 spent, on average, only 3.4 days in the ICU in their last six months of life; while at the UCLA Medical Center, also considered one of the nation's best hospitals, chronically ill patients spent, on average, more than 11 days in the ICU during the last six months of life. It is hard to imagine that the patients loyal to Duke were denied admission to the ICU, and there is no evidence to suggest that UCLA patients were sicker.

More to the point, do patients who receive more supply-sensitive care have better outcomes? Do they live longer? Do they have better quality of life? Such questions have received virtually no attention from academic medicine or from federal agencies, such as the National Institutes of Health, that are responsible for the scientific basis of medicine. With the exception of a few studies of chronic disease management, clinical research that might shed light on the question simply has not been done.

In the absence of detailed, patient-level data, comparing outcomes among populations living in the 306 hospital referral regions in the United States and relating those outcomes to available resources has been the focus of Dartmouth researchers. Our studies consistently show that more resources and greater utilization of medical care do not result in better outcomes (Table 1.1).

**Table 1.1. Dartmouth Studies Comparing Regional Differences in Spending and the Content, Quality, and Outcomes of Care**

| | ***Higher spending regions compared to lower spending**** |
|---|---|
| Health care resources [2] | • Per capita supply of hospital beds 32% higher.<br>• Per capita supply of physicians 31% higher overall: 65% more medical specialists, 75% more general internists, 29% more surgeons, and 26% fewer family practitioners. |
| Content and quality of care [2, 3, 4] | • Adherence to process-based measures of quality lower (quality worse).<br>• Little difference in rates of major elective surgery.<br>• More hospital stays, physician visits, specialist referrals, imaging, and minor tests and procedures. |
| Health outcomes [5, 6] | • Mortality over a period of up to five years slightly higher following acute myocardial infarction, hip fracture, and colorectal cancer diagnosis.<br>• No difference in functional status. |
| Physician perceptions of quality [7] | • More likely to report poor communication among physicians.<br>• More likely to report inadequate continuity of patient care.<br>• Greater difficulty obtaining inpatient admissions or high quality specialist referrals. |
| Patient-reported quality of care [5] | • Worse access to care and greater waiting times.<br>• No difference in patient-reported satisfaction with care. |
| Trends over time [6] | • Although all U.S. regions experienced improvements in acute myocardial infarction survival between 1986 and 2002, regions with greater growth in spending had smaller gains in survival than those with lower growth in spending. |

** High and low spending regions were defined as the U.S. hospital referral regions in the highest and lowest quintiles of per capita Medicare spending as in Fisher, 2003.[2]*

Whether from the patient's perspective (satisfaction, technical quality, health outcomes) or from physicians' perspective (quality of communication among physicians, continuity of care), higher spending and greater use of supply-sensitive care is not associated with better care. The same findings hold true whether one looks at all Medicare beneficiaries and the comparisons are made across regions of differing spending levels (Table 1.1), or whether one looks only at patients with serious illnesses cared for at the major academic medical centers within the United States.[8]

## How can more care be worse?

The best explanation for the surprising finding that more care is associated with higher mortality is that all medical care poses some risk, and the more care a patient receives, and the more often he or she is hospitalized, the greater the risks. Where more resources are available, patients receive more care, and receiving more care increases the chances of errors being committed, and of patients being faced with complications. As care becomes more complex and more physicians become involved, it also becomes less clear who is responsible for each aspect of a patient's care, making miscommunication and errors more likely. Our research also suggests that the technical quality of care, such as whether patients receive appropriate initial treatment for their heart attacks or timely preventive services, is somewhat worse in higher spending regions and hospitals where there are more medical resources available.[2]

Equally surprising is the finding that more care does not provide patients with greater satisfaction or improved functional status. To address questions about functional status (which is associated with quality of life) and patient satisfaction, we used the ongoing Medicare Current Beneficiary Survey. The results indicated no difference between regions in functional status or satisfaction. Oddly enough, patients living in the highest utilization regions—where there were more medical resources available—reported that they felt they had less access to care.

Studies comparing physicians' perceptions of their ability to provide high quality care presented a similar picture. Physicians in higher spending regions were more likely to report that the continuity of their relationships with patients and their communication with other physicians was inadequate to support high quality care. On average, physicians in higher spending regions were more likely to report difficulty providing high quality care.[7]

This study on regional outcomes was repeated, restricting the analysis to patients who received their initial care at academic medical centers. The results were similar: academic medical centers in high spending, resource-rich regions provided more supply-sensitive services than those in low spending, comparatively resource-poor regions. For example, during the first six months following hip fracture, patients using academic medical centers in high spending areas had 82% more physician visits, 26% more imaging exams, 90% more diagnostic tests, and 46% more minor surgery than those in the lowest spending regions. Nevertheless, patients in high intensity academic medical centers had slightly higher mortality rates and worse quality scores.[8]

These findings all point to a troubling paradox: within the context of the U.S. health care delivery system, higher spending is associated with lower quality of care and, on average, slightly worse outcomes.

## Understanding supply-sensitive care

If more care leads to lower satisfaction, lower quality scores and higher morbidity, why are physicians and hospitals delivering so much of it? Why do patients consume so much of it? And why do policy makers support a care system so prone to overuse? In attempting to answer these questions, it is important to distinguish between what we know, based on completed research, and our theory of what explains the facts.

## The evidence:

Research extending over more than three decades establishes the following:

- Hospitalizations for most medical (non-surgical) causes of admission, stays in intensive care units, visits to physicians, referrals to specialists, diagnostic tests, and use of home health agencies and long-term care facilities belong to the "supply-sensitive" category of care.

- The utilization of supply-sensitive services varies remarkably on a per capita basis among communities, largely independent of patient characteristics and illness; the variation has not been explained by variation in patient preferences for aggressive care, or by differences in malpractice environments.

- The associations between supply of resources and utilization are strong; for hospitalization and physician services, half or more of the variation in utilization is explained by supply.

- Supply-sensitive care accounts for well over half of Medicare spending, most going to patients with severe chronic illness; variation in spending for supply-sensitive care is the principle determinant of variation in per capita Medicare spending among states and regions.

- Greater per capita use of supply-sensitive care and more spending do not result in lower mortality or improved quality of life; nor do they lead to improvement in the quality of care as measured by standard technical process measures.

## The theory:

The research findings suggest a likely explanation for the dramatic differences in spending across regions and the correlations with the supply of resources. Large-scale weaknesses in clinical science create a permissive clinical environment in which utilization is not constrained by evidence-based medicine. As an example, the 2003 edition of the *British Medical Journal's Clinical Evidence Concise*—which describes itself as "the international source of the best available medical evidence for effective health care"—contains not a single reference as to when to hospitalize patients with cancer, chronic lung disease, or heart failure, or when to schedule them for physician visits and revisits, all of which are examples of supply-sensitive care. Similarly, many so-called "minor" procedures that are performed with greater frequency on patients in high spending regions have little evidence to back them up. The use of vena cava filters to prevent pulmonary embolism, for example, is almost entirely at the physician's discretion. Compared to patients in low spending regions, patients in high spending regions where there are more specialists employing vena cava filters are more likely to have one inserted during a hospital stay.

On the other hand, where clinical evidence is strong, the diagnosis is certain, and when doctors agree on the course of treatment, there is remarkably little variation from region to region. Hospitalization for hip fracture is one of the few clinical events determined by the incidence of illness, rather than the supply of resources. The explanation is straightforward; hip fracture is a serious, life-threatening condition. It is easily diagnosed, and everyone—physicians, patients, families, and insurance companies—agrees on the need for hospitalization. The incidence of hip fracture, not the

per capita supply of beds, drives the demand for hospitalization (Figure 1.2). Unfortunately, very few conditions correspond to the model where demand is dictated by the incidence of disease rather than the supply of resources.

In the absence of theories and evidence about what constitutes best practice, other factors drive clinical decisions. Foremost among them is the generally held assumption, common to both doctors and patients, that more frequent intervention constitutes better care: that whatever resources are available should be fully utilized in managing difficult illnesses. When providers and patients are working under this assumption, clinical decisions are inevitably influenced, sometimes unconsciously, by the available supply of resources.

There is good evidence that this is what is going on in health care markets. In the 1980s and 1990s, Dartmouth researchers conducted a series of interviews with physicians working in hospitals within the Harvard academic medical system in Boston and at the Yale Medical Center in New Haven, Connecticut.[9] Boston had many more beds per capita than did New Haven. Yet when Yale physicians were asked if they felt they had to ration hospitalizations or ICU admissions, they reported there was no shortage of available beds. When physicians who had transferred from Boston to New Haven, and vice versa, were interviewed, they reported that there was no difference between the two institutions in terms of the availability of beds and their ability to admit patients.

What this suggests is that physicians adapt their practice styles to the resources available, but they do so subliminally, in ways that even they are unaware of. But the resource availability in a community is largely determined by other factors: by decisions made by the hospital or hospitals where physicians admit patients. For their part, hospitals face financial incentives that generally reward expansion in high-margin services, such as interventional cardiology and intensive care, and the recruitment of additional procedure-oriented specialists. When there are more physicians relative to the size of the population served, physicians will see patients more frequently. When there are more specialists or hospital beds available, primary care physicians and other practitioners will learn to rely upon those specialists and use those beds. (It is more efficient from the primary care physician's perspective to refer difficult cases to specialists or admit patients to the hospital than to try to manage them themselves in the context of office visits, for which payments have become relatively constrained.)

The consequence is that what may appear on the surface to be reasonable individual clinical decisions on the part of doctors, and investment decisions on the part of hospitals, lead in aggregate to higher utilization rates, greater costs and, inadvertently, worse quality and worse outcomes. The key element of this theory is that because so many clinical decisions are in the "gray areas" of medicine, where evidence is lacking (how often to see a patient, when to refer to a specialist, when to admit to the hospital, when an imaging test is necessary), any expansion of capacity will result in a subtle shift in clinical judgment toward greater intensity.

## Implications for patient preferences

What do patients want at the end of life? Do they want their physicians to do everything possible to extend life? Do they want more care? More invasive care? Research suggests that the care they get is not the care they want. The evidence comes from a large-scale intervention study funded by the Robert Wood Johnson Foundation.[10] Patients, it turned out, generally preferred care that was less intense than what they received, even after extensive efforts were made by families, caregivers, and hospitals to establish what individual patients with high probability of dying actually preferred.

In a second phase of the study, researchers looked at interventions designed to reduce the mismatch between what patients said they wanted in advance directives, and what they actually received in terms of care.[ii] The researchers assumed that information about patient prognosis and improved communication among patients, physicians, nurses, and family members would lead to end-of-life decisions that promoted patient preferences and autonomy.

The study results were deeply disappointing. The conclusion, published in 1995, came as a shock to many advocates for reform of end-of-life care:

> *" The . . . intervention failed to improve care or patient outcomes. Enhancing opportunities for more physician-patient communication, although advocated as the major method for improving patient outcomes, may be inadequate to change established practices. To improve the experience of the seriously ill and dying patients, greater individual and societal commitment and more proactive and forceful measures may be needed."*

One mark of failure was the study's lack of impact in improving compliance with the patient's preference to die at home. Among the patients who indicated that they preferred to die at home, the majority—55%—actually died in the hospital. At the same time, those who wanted to die in the hospital often did not; less than half (46%) of those who preferred to die in the hospital actually did.[iii] But the chances of dying in the hospital varied strikingly among the five teaching hospitals, ranging from 26% to 66% of deaths.

A subsequent analysis provided an explanation for the variation. It showed that the supply of hospital beds was highly correlated with the chance of dying in the hospital, even after elaborate steps had been taken to ensure that patient preferences were respected.[iv]

It is of course quite possible that patient preferences as stated at one point in time in the course of a serious illness might change; once death is near, a patient might become a strong advocate for the

[ii] Physicians in the intervention group received estimates of their patients' likelihood of surviving for six months, as well as periodic reports on functional disability. The point was to make physicians aware of their patients' poor prognosis and the need for advance planning. Specially trained nurses were part of the intervention. Their job was to make "multiple contacts with the patient, family, physician, and hospital staff to elicit preference, improve understanding of the outcomes, encourage pain control, and facilitate advance care planning and patient-physician communication."

[iii] The sample included 479 SUPPORT patients. 56% died in the hospital, 25% at home, 9% in a nursing home, 9% in a hospice, and 1% on the way to the hospital.

[iv] Here we are using patient days of care as proxy for bed supply, assuming that beds are fully occupied.

more-is-better assumption. At the minimum, however, we learned from the intervention study that patient preferences for place of death, stated at one point in time when they were already seriously ill from a condition that soon proved fatal, did not predict actual place of death. The available evidence thus suggests that patients may prefer a more conservative pattern of end-of-life care than they actually receive. The capacity of the local health care system often trumps patient preference.

## Implications for evaluating efficiency in managing chronic illness

The overuse of acute care hospital[v] services is an important problem that demands public policy attention. Most of Medicare's spending for the chronically ill pays for care delivered in acute care hospitals. Massive federal subsidies to promote the expansion of hospitals through the Hill-Burton program, easy financing of expansion projects through tax-free bonds and the stock market, strong philanthropic support, and generous reimbursements from public and private sector insurers have led to overcapacity in many regions of the country.

The clinical justification for this emphasis on "rescue" medicine in the acute care hospital rests on the assumption that more intensive management of patients with chronic illness results in better health outcomes. Yet as we have shown in this chapter, people with severe chronic illness who live in communities with more medical resources, and who consequently receive more intensive inpatient care, do not enjoy improved survival, better quality of life, or better access to care. They do, however, face a greater chance of dying in an intensive care unit rather than in hospice or at home, as most Americans say they would wish. It is also clear that, over the course of their lives, the care of people with severe chronic illnesses living in high resource, high utilization areas costs a lot more than the care that is provided to equally sick people who live in areas where resources such as hospital beds and medical specialists are more scarce, and where care is much less aggressive and intense.

The evidence that the outcomes and quality of care tend to be better in regions with low resource availability and low care intensity has important policy implications for health care reform. Hospitals and physicians serving low spending regions are not rationing care; rather, they are relatively more efficient, achieving equal and possibly better outcomes using fewer resources and spending fewer Medicare dollars. This concept of relative efficiency can be useful in evaluating the performance of both physicians and hospitals. By using the per capita spending of relatively efficient hospitals and regions as benchmarks, and their mix of resources as models for inefficient providers, it may be possible to create a new Medicare reimbursement system that would simultaneously bring down costs and improve the quality of care.

For example, the Dartmouth Atlas Project recently compared the performance of hospital referral regions in California in managing chronic illness over the last two years of life.[11] On an illness-, age-, sex-, and race-adjusted basis, providers in the Sacramento region were relatively more efficient than those in the Los Angeles region. Medicare spending was 69% higher in Los Angeles than in Sacramento per beneficiary for patients with similar illnesses and levels of severity. Providers in Los Angeles used 61% more hospital beds, 128% more intensive care beds, and 89% more physician

[v] When we use the term "acute care hospital," we are referring to general hospitals that provide a range of acute care services.

labor in the management of chronically ill patients during the last two years of life. On average, the quality of care given to heart attack, congestive heart failure, and pneumonia patients was worse in Los Angeles than in Sacramento. The quality of terminal care was also quite different; 33% of Medicare deaths in Los Angeles involved an admission to intensive care, compared to 19% in Sacramento. Moreover, 57% of Los Angeles hospitals were rated below average by patients who had used them, while only 13% of Sacramento hospitals were rated below average by patients who had been admitted to those hospitals.

On the basis of its lower spending, lower resource inputs, lower utilization rates, and its relatively satisfactory quality measures, the Sacramento region's performance provides a benchmark of relative efficiency for evaluating Los Angeles providers. While there was more than a twofold variation among hospitals within the Los Angeles region, *none was lower in per person spending, level of resources, or utilization than the average among hospitals in the Sacramento region*. If providers serving the Los Angeles region adopted Sacramento practices, the savings would be substantial. For example, had Los Angeles hospitals provided care at the rate of the Sacramento benchmark over the five years of our study (1999–2003), savings from care during the last two years of life for Medicare patients with chronic illnesses would have been approximately $1.7 billion.

The legitimacy of the Sacramento benchmark depends on the evidence that, at the population level, more intensive use of supply-sensitive care—more frequent physician visits, hospitalizations, and stays in intensive care among the chronically ill—does not result in better health outcomes. Many physicians and policy makers will argue that what is needed are evidence-based clinical guidelines for the care of the chronically ill, and that private and public payers should pay for performance, or reward providers on the basis of how well they adhere to these guidelines, as well as on the outcomes of their patients. We agree that this should be the ultimate goal. But scientifically validated, detailed evidence defining efficient clinical pathways—for example, whom to hospitalize, when to schedule a revisit, or when to refer to a medical specialist, home health agency, or hospice—does not exist. It will take a long time and a major reorientation of the academic research agenda to provide such clinical evidence. In the meantime, we must rely on the results of natural experiments: population-based studies comparing overall quality and outcomes for similarly ill patients exposed to different levels of care intensity. So far, these studies indicate no marginal gain from greater resource use across the range of practice in the United States. Given the critical need to address practice variations, the use of high quality/low resource regions and hospitals as benchmarks for evaluating efficiency seems a fair and prudent policy.

## Endnotes

[1] Wennberg JE, Fisher ES, Stukel TA, Sharp SM. Use of Medicare claims data to monitor provider-specific performance among patients with severe chronic illness. *Health Affairs* web exclusive, 7 Oct 2004.

[2] Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 1: The content, quality, and accessibility of care. *Ann Intern Med*. 2003 Feb 18;138(4):273–87.

[3] Wennberg JE, Fisher ES, Skinner JS. Geography and the debate over Medicare reform. *Health Affairs* web exclusive, 13 Feb 2002.

[4] Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Affairs* web exclusive, 7 Apr 2004.

[5] Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 2: Health outcomes and satisfaction with care. *Ann Intern Med*. 2003 Feb 18;138(4):288–98.

[6] Skinner JS, Staiger DO, Fisher ES. Is technological change in medicine always worth it? The case of acute myocardial infarction. *Health Affairs* web exclusive, 7 Feb 2006.

[7] Sirovich BE, Gottlieb DJ, Welch HG, Fisher ES. Regional variations in health care intensity and physician perceptions of quality of care. *Ann Intern Med*. 2006;144:641–49.

[8] Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ. Variations in the longitudinal efficiency of academic medical centers. *Health Affairs* web exclusive, 7 Oct 2004.

[9] Wennberg JE. Dealing with medical practice variations: A proposal for action. *Health Affairs* 1984;3(2):6–32.

[10] The SUPPORT Principal Investigators. A controlled trial to improve care for seriously ill hospitalized patients: The study to understand prognoses and preferences for outcomes and risks of treatments (SUPPORT). *JAMA* 1995;274(20):1591–98.

[11] Wennberg JE, Fisher ES, Baker L, Sharp SM, Bronner KK. Evaluating the efficiency of California providers in caring for patients with chronic illness. *Health Affairs* web exclusive, 16 Nov 2005.

Chapter Two

# Variation Among States and Regions in Medicare Spending for Severe Chronic Illness

The Dartmouth Atlas has traditionally presented its geographic performance measures by local and regional health care markets. While local and regional patterns of practice are correlated with variations in resources (e.g., hospital beds and physicians), the amount of care and the kinds of care used are also influenced by factors associated with state-level policies, particularly in the financing and regulation of care. Each state has flexibility in designing and managing its Medicaid program, which, because of its role in financing much of long-term care, has a direct impact on the costs and quality of the care delivered to the chronically ill.

States are also increasingly concerned about rising health care costs because of their responsibilities as payers for their own government employees and retirees. States routinely regulate and, through such regulation, influence the practice of medicine. In some states, government involvement includes determining the distribution of resources through certificate of need programs. This is a potentially important regulatory role because, as the Atlas project has demonstrated, clinical decisions governing the frequency of use of such supply-sensitive care as physician visits, referrals to specialists, hospital care, and diagnostic testing are strongly affected by local capacity, which strongly influences both the quantity and per capita cost of care provided to patients with chronic illnesses.

This chapter focuses on differences among the states and hospital referral regions (HRRs) in how much they spent on Medicare enrollees with severe chronic illnesses, the population that accounts for the lion's share of Medicare spending. During the five-year period 2001–05, nearly a third of total Medicare spending—31.7%—went toward the care of patients with severe chronic illness during their last two years of life. The population we studied for this chapter comprised a 20% sample of individuals enrolled in traditional Medicare who died over the five-year period 2001–05, and were diagnosed with at least one of nine chronic illnesses. The results are adjusted for differences in age, sex, race, and primary chronic diagnosis. Because we are comparing large populations with identical outcomes—all were dead at the end of the two-year period for which their utilization was measured—we believe it is extremely unlikely that differences in illness explain the variation we observed among states and regions. A more detailed discussion of the end-of-life metric can be found in the Appendix on Methods.

In addition to spending associated with hospitalization and physician utilization, the Dartmouth Atlas Project is now able to provide comprehensive state- and HRR-level estimates of the *total* amount Medicare spends on providing care to chronically ill Medicare patients who are in their last two years of life. For the first time, this Atlas provides information on spending in all the sectors of care, or places where care is provided, including acute care hospitals; doctors' offices and outpatient clinics; skilled nursing facilities (SNF); long-term care hospitals and rehabilitation facilities; hospices; and care delivered at patients' homes by home health agencies.

The new data presented in this chapter have important implications for how we think about controlling Medicare spending. It is widely assumed that the variations in per capita spending we see among states, regions, and sectors of care can be largely attributed to differences in the price paid for each unit of care. But this chapter shows that most of the variation is due not to price, but to variation in the volume or intensity of care delivered. If costs are to be controlled, the clear and consistent message of the Dartmouth Atlas is *pay attention to volume*.

This chapter also contradicts another widely-held assumption: that simply making less expensive care available outside the hospital setting—in hospice or skilled nursing facilities, for instance—will reduce hospital utilization. As this chapter shows, there is little evidence for such trade-offs between sectors. Indeed, we see that regions and states with more care delivered outside the hospital are usually the same places with more care delivered inside the hospital. Reducing inpatient utilization will require more than simply controlling prices and making alternative sites of care available. As we discuss at greater length in Chapter Five, coordination of care will be necessary if we wish to control Medicare costs.

## Variation in Medicare spending among states and regions

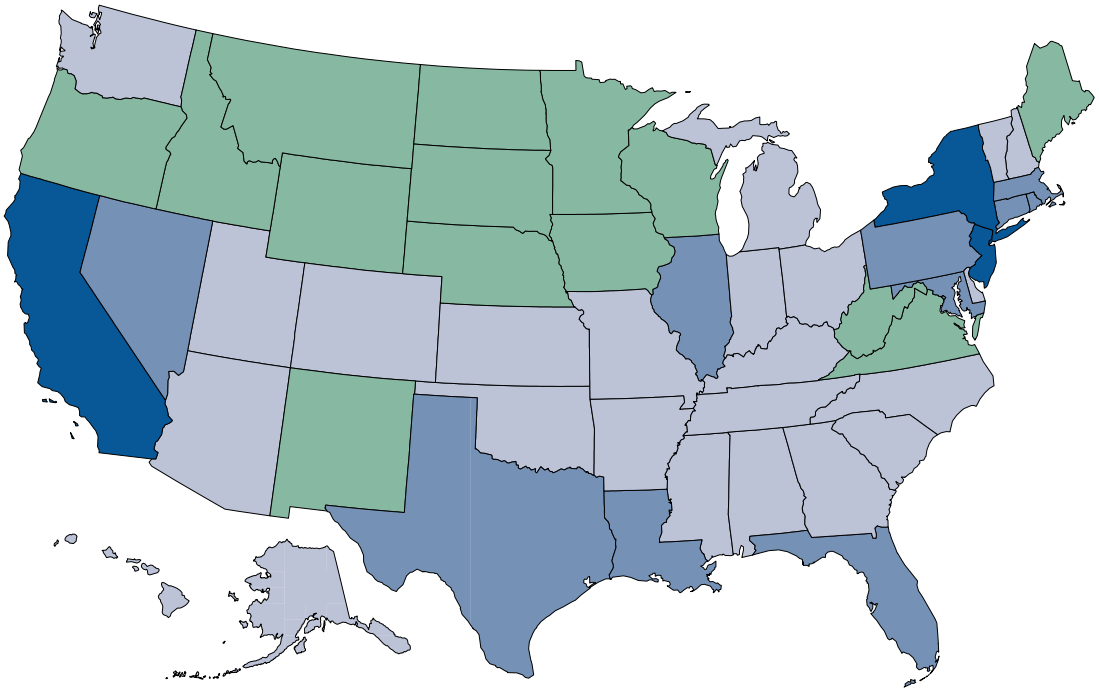
### Medicare spending by state

As in previous Atlases, the amount of money the Medicare program spent per patient with severe chronic illness in the last two years of life in 2001–05 varied substantially among states.[i] Thirteen states had spending levels above the national average; 37 states had spending levels below the nation average, and in 14 of these, spending was less than 85% of the national average. The highest spending states consumed more than one and a half times the Medicare dollars spent by the lowest spending states. Three states—New Jersey ($59,379), California ($57,914), and New York ($55,718)—spent at a level that was more than 20% above the national average of $46,412. At the opposite end of the spectrum, three states—North Dakota, Iowa, and South Dakota—spent less than $35,000 per person, more than 25% below the national average (Map 2.1).

[i] This amount represents the spending per decedent in the study, Medicare beneficiaries with severe chronic illness who were in their last two years of life. While the study period covered deaths occurring 2001–05, the amounts reported here represent per patient spending over two years—each patient's last two years of life—not the five years of the study.

**Map 2.1. Total Medicare Spending During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions, by State (Deaths Occurring 2001–05)**

| 1.20 to 1.28 | | | 1.00 to < 1.20 | | | 0.85 to < 1.00 | | | | | | 0.70 to < 0.85 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NJ | $59,379 | (1.28) | MA | $55,348 | (1.19) | MI | $45,995 | (0.99) | KY | $41,314 | (0.89) | ME | $38,846 | (0.84) |
| CA | $57,914 | (1.25) | DC | $54,725 | (1.18) | DE | $45,661 | (0.98) | GA | $40,862 | (0.88) | WV | $38,793 | (0.84) |
| NY | $55,718 | (1.20) | MD | $54,304 | (1.17) | OK | $44,608 | (0.96) | AL | $40,811 | (0.88) | VA | $38,735 | (0.83) |
| | | | LA | $52,827 | (1.14) | AK | $44,164 | (0.95) | MO | $40,793 | (0.88) | NE | $38,459 | (0.83) |
| | | | CT | $52,760 | (1.14) | AZ | $43,851 | (0.94) | SC | $40,726 | (0.88) | MN | $38,186 | (0.82) |
| | | | NV | $51,571 | (1.11) | HI | $43,682 | (0.94) | WA | $40,649 | (0.88) | NM | $37,632 | (0.81) |
| | | | TX | $50,905 | (1.10) | MS | $43,082 | (0.93) | IN | $40,583 | (0.87) | WI | $37,218 | (0.80) |
| | | | FL | $50,810 | (1.09) | OH | $42,926 | (0.92) | UT | $40,310 | (0.87) | OR | $35,679 | (0.77) |
| | | | IL | $47,857 | (1.03) | CO | $42,595 | (0.92) | AR | $40,193 | (0.87) | ID | $35,518 | (0.77) |
| | | | RI | $47,790 | (1.03) | TN | $42,478 | (0.92) | KS | $39,873 | (0.86) | WY | $35,249 | (0.76) |
| | | | PA | $46,624 | (1.00) | NH | $42,003 | (0.90) | NC | $39,818 | (0.86) | MT | $35,114 | (0.76) |
| | | | | | | VT | $41,514 | (0.89) | | | | SD | $34,296 | (0.74) |
| | | | | | | | | | | | | IA | $33,864 | (0.73) |
| | | | | | | | | | | | | ND | $32,523 | (0.70) |



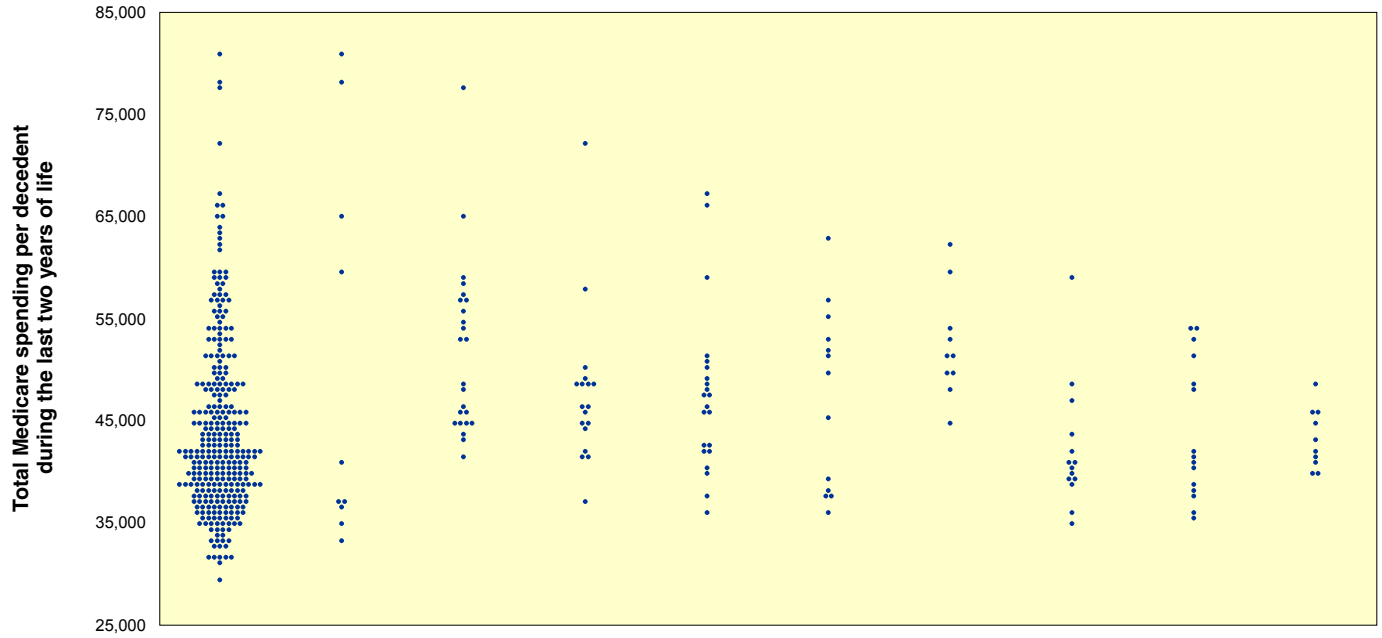
**Ratio of state to the U.S. average of total Medicare spending per chronically ill decedent during the last two years of life**

by State (deaths occurring 2001-05)

- 1.20 to 1.28 (3)
- 1.00 to < 1.20 (11)
- 0.85 to < 1.00 (23)
- 0.70 to < 0.85 (14)

## Medicare spending by region

There was even greater variation in spending among the 306 hospital referral regions. Spending in the three highest HRRs—Manhattan, the Bronx, and Los Angeles—exceeded spending in the three lowest—Mason City, Iowa; La Crosse, Wisconsin; and Dubuque, Iowa—by almost $46,000 per patient. In some cases, the variation among HRRs located within a single state was nearly as great as that found among all hospital referral regions. For example, in New York, one of the most costly states, Medicare spent more than $75,000 per chronically ill decedent in Manhattan and the Bronx hospital referral regions, $36,824 in Rochester, and a relatively modest $33,271 in Binghamton.




| | All HRRs | New York | California | Florida | Texas | Illinois | Louisiana | Pennsylvania | Michigan | Ohio |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest region: | $81,143 | $81,143 | $77,411 | $71,982 | $67,188 | $62,565 | $62,144 | $58,863 | $54,248 | $48,478 |
| U.S./state average: | $46,412 | $55,718 | $57,914 | $50,810 | $50,905 | $47,857 | $52,827 | $46,624 | $45,995 | $42,926 |
| Lowest region: | $29,116 | $33,271 | $41,596 | $37,032 | $36,198 | $35,812 | $44,858 | $35,054 | $35,329 | $39,919 |
| Extremal ratio: | 2.79 | 2.44 | 1.86 | 1.94 | 1.86 | 1.75 | 1.39 | 1.68 | 1.54 | 1.21 |
| Interquartile ratio: | 1.26 | 1.75 | 1.27 | 1.10 | 1.18 | 1.39 | 1.09 | 1.10 | 1.29 | 1.11 |
| Coefficient of variation: | 19.4 | 37.5 | 16.2 | 15.9 | 16.9 | 18.8 | 9.8 | 14.3 | 15.5 | 6.7 |

**Figure 2.1. Total Medicare Spending per Decedent During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Hospital Referral Regions (Deaths Occurring 2001–05)**

Among regions, per decedent Medicare reimbursements during the last two years of life varied by a factor of three, from about $29,000 to more than $80,000. The data on the far left represent the 306 hospital referral regions in the United States, with each point representing a region. States with at least 10 hospital referral regions were selected for emphasis. The table beneath the figure gives, for each group of points, the highest spending region, the state average, and the lowest spending region; the ratio of the highest to the lowest region; the ratio of the region at the 75th percentile to the region at the 25th percentile; and the coefficient of variation.

Perhaps not surprisingly, the majority of the care given to chronically ill Medicare patients was delivered in the inpatient setting. Patients with severe chronic illnesses are generally very sick in their last two years of life, and among those who died during the period 2001–05, more than 50% of the total spending for their care occurred in an acute care hospital. This hospital spending included hospital facility charges as well as physician visits, procedures, and diagnostic tests. Less than half of the money spent on the chronically ill went toward care that was delivered outside the hospital. More than 15% of spending occurred in physicians' offices and outpatient clinics; a little less than 15% in skilled nursing and other long-term care facilities; about 5% in both hospices and in patients' homes; and about 5% in ambulances and other locations.[ii]

[ii] The designation "location undetermined" includes spending for durable medical equipment such as wheelchairs, oxygen, orthotic devices, and medical and surgical supplies. It also includes payments to independent laboratories.

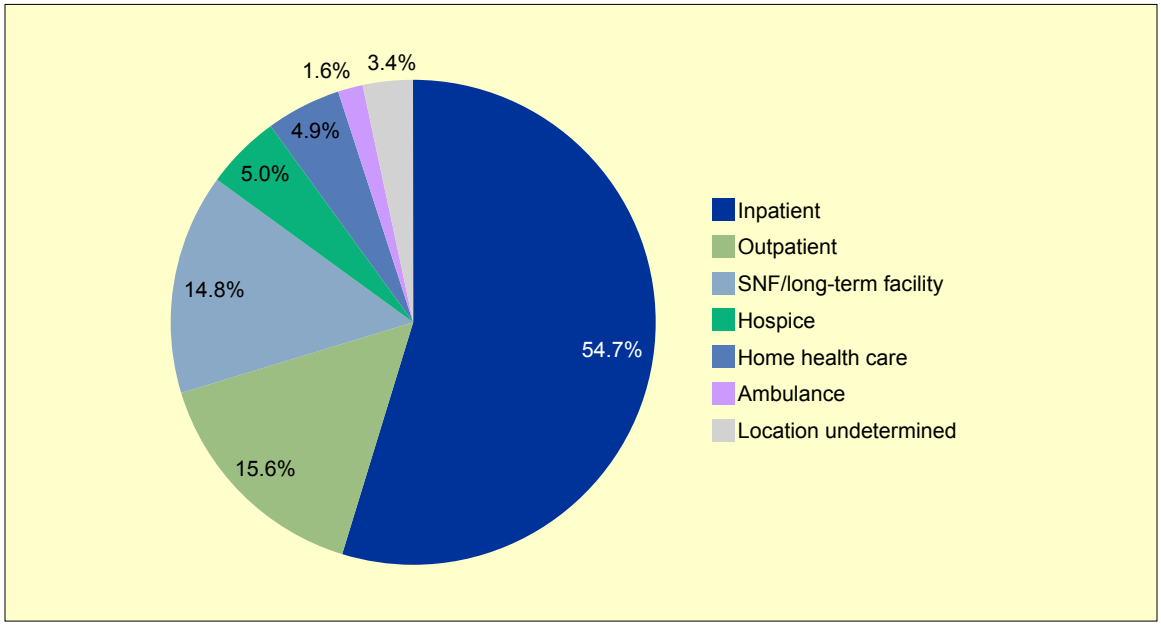



**Figure 2.2. Percent of Medicare Spending by Sector in the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions (Deaths Occurring 2001–05)**

## The relationship between spending, price, and volume

The majority of the variation in spending we observe among states and hospital referral regions is due to differences in spending on inpatient care. But what is not as well understood is the fact that most of that variation in spending is due to the volume of care delivered per capita, not to the local price per unit of care delivered.

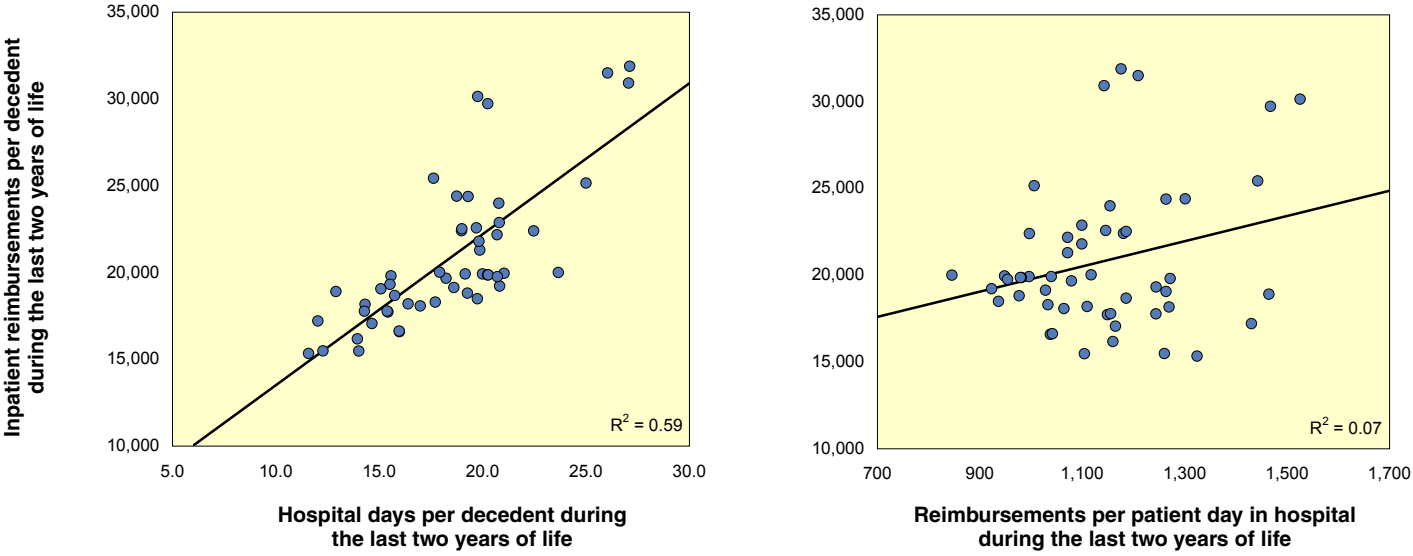



**Figure 2.3a: Volume**

**Figure 2.3b: Price**

**Figure 2.3. Relationships Between Inpatient Reimbursements, Volume, and Price of Care During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among States (Deaths Occurring 2001–05)**

Figure 2.3 illustrates this for inpatient facility reimbursements[iii] among states. The number of days patients spent in hospital during the last two years of life was highly correlated with variation in reimbursements per capita ($R^2 = 0.59$). The difference in average price per day in the hospital was slightly correlated, accounting for much less of the variation ($R^2 = 0.07$). The volume effect was strong for all Medicare sectors, including outpatient care, hospice, home health care, long-term care and rehabilitation (LTC/RH) hospitals, and skilled nursing facilities; and across both states and regions. Price, by contrast, played a much smaller role in explaining variations in Medicare spending (Table 2.1).

[iii] For this example, we are referring only to Medicare Part A payments made to the hospital for inpatient care; we do not include Part B payments for services occurring within the hospital.

**Table 2.1. Relationships Between Spending, Volume, and Price of Care Delivered During the Last Two Years of Life ($R^2$ values) for Patients with At Least One of Nine Chronic Conditions Among States and Hospital Referral Regions (Deaths Occurring 2001–05)**

At the state level, inpatient reimbursements (Part A) were highly positively correlated with per capita inpatient days ($R^2$ = 0.59) but only weakly associated with unit price per day ($R^2$ = 0.07). The same pattern held for the association between volume and price per unit for most other sites of care except home health care, where price was inversely correlated with spending. Spending at the regional level followed a nearly identical pattern.

| Inpatient facility reimbursements | State | HRR |
|---|---|---|
| Volume (hospital days) | 0.59 | 0.56 |
| Price (reimbursements per day) | 0.07 | 0.17 |
| **Physician visit spending** | | |
| Volume (physician visits) | 0.85 | 0.90 |
| Price (payments per visit) | 0.38 | 0.43 |
| **Skilled nursing facility payments** | | |
| Volume (SNF days) | 0.82 | 0.66 |
| Price (payments per day) | 0.14 | 0.26 |
| **Hospice payments** | | |
| Volume (hospice days) | 0.86 | 0.86 |
| Price (payments per day) | 0.00 | 0.03 |
| **Home health agency payments** | | |
| Volume (HHA visits) | 0.91 | 0.87 |
| Price (payments per visit) | 0.12* | 0.01* |
| **LTC/RH facility payments** | | |
| Volume (LTC/RH days) | 0.97 | 0.97 |
| Price (payments per day) | 0.07 | 0.02 |

*Indicates negative association

This finding—that volume, rather than price, drives reimbursement rates—has significant implications for policies concerning Medicare spending. The Centers for Medicare and Medicaid Services (CMS) has put a good deal of effort into controlling Medicare prices, an effort that has been more or less successful. By contrast, policies aimed at controlling the volume of care delivered, which have traditionally been targeted through Medicare's physician peer review programs (such as Quality Improvement Organizations) have not shown much success.

## The relationship between sectors of care

Medicare's other strategy for controlling spending—making non-hospital sites of care available—has met with a similar lack of success. Many policy makers have argued that the way to reduce unnecessary hospitalizations is to make care in other settings more readily available. If there were more skilled nursing and rehabilitation facilities, goes the argument, doctors would send their chronically ill patients there, rather than keep them in the acute care hospital. If hospice care were more widespread, fewer patients would be subjected to dying in intensive care. Based on this assumption, Medicare has over the years added benefits for home health care, hospice, and skilled nursing facilities in an effort to reduce unnecessary—and often unwanted—inpatient hospitalizations.

The data in this Dartmouth Atlas suggest that making other kinds of care more readily available does not necessarily lead to a decline in hospitalizations or in inpatient spending. In fact, at both the state and regional levels, higher utilization and spending in ambulatory settings, skilled nursing facilities, and home health care was associated with *higher* utilization and spending for inpatient care. Hospice care was the only setting that showed a weak inverse association with inpatient days in hospital and inpatient spending (Table 2.2). The association between higher spending and utilization of ambulatory care, particularly physician visits, with greater numbers of inpatient visits was particularly strong.

**Table 2.2. Relationships Between Spending and Volume of Care Delivered During Inpatient Hospitalizations and in Other Sectors During the Last Two Years of Life ($R^2$ values) for Patients with At Least One of Nine Chronic Conditions Among States and Hospital Referral Regions (Deaths Occurring 2001–05)**

| Inpatient spending | State | HRR |
|---|---|---|
| Outpatient spending | 0.19 | 0.17 |
| SNF spending | 0.13 | 0.32 |
| Home health spending | 0.07 | 0.20 |
| Hospice spending | 0.05* | 0.01* |
| LTC/RH spending | 0.05 | 0.03 |
| **Inpatient days** | | |
| Ambulatory visits | 0.12 | 0.06 |
| SNF days | 0.01 | 0.11 |
| HHA visits | 0.03 | 0.16 |
| Hospice days | 0.01* | 0.01* |
| LTC/RH days | 0.09 | 0.08 |
| **Inpatient visits** | | |
| Ambulatory visits | 0.24 | 0.13 |
| SNF days | 0.03 | 0.12 |
| HHA visits | 0.03 | 0.16 |
| Hospice days | 0.00 | 0.00 |
| LTC/RH days | 0.23 | 0.19 |

**Indicates negative association*

When per patient inpatient spending was compared to outpatient spending, there was a positive correlation at both the state and regional level ($R^2$ = 0.19 and 0.17, respectively). Similarly, inpatient days were positively correlated with ambulatory visits, at both the state and regional level ($R^2$ = 0.12 and 0.06). Only hospice care was associated with a small decrease in inpatient spending and days.

What can account for these paradoxical findings? First, under traditional Medicare, there is no link in reimbursement between the sectors of care. Medicare pays for each type of utilization (e.g., inpatient, SNF, home health) without regard to the level of spending in the other sectors in managing those with chronic illness. Second, we argue that the culture of medicine itself assures that available capacity is utilized. When patients experience acute episodes of their underlying chronic illnesses, most physicians continue to believe that more intensive rescue care is better; the availability of inpatient beds makes the use of the hospital the path of least resistance, even when other sites of care are in place. The supply of hospital-based resources in the region where they live influences how intensely they are treated. Third, the positive association between the use of inpatient facilities and use of skilled nursing facilities and home health agencies makes clinical sense: these facilities are important in planning for the discharge of chronically ill patients from acute care hospitals. When more patients are hospitalized, more are discharged to other care sectors, creating "demand" for such services.

The tendency to admit patients to the hospital even when alternatives are available is further exacerbated by the fragmented nature of much of the care that is delivered to chronically ill elderly patients. As the Institute of Medicine and others have pointed out, there is little coordination between primary care physicians and the many specialists that the chronically ill often find themselves seeing; nor is there coordination of care between the various alternative sites where care can be delivered. Patients in nursing homes may be admitted for inpatient care for each crisis, leading to a hospitalized "high-tech" death, even when they have expressed strong preferences to avoid such an ending. Care transitions (i.e., "hand-offs") in particular—between primary care and specialist physicians; between nursing homes and hospitals; between home health care and primary care; and between acute care and hospice and palliative care—are often plagued with miscommunications about the patient's medical needs and care preferences, leaving patients in the wrong facility or receiving the wrong care. In the ambulatory setting, for instance, patients with chronic heart failure are routinely hospitalized during acute episodes of the underlying disease that often could have been controlled with better disease management and coordination between physicians.

Some have argued that the fragmentation of care is due to a shortage of primary care physicians, who should be coordinating care between a patient's various doctors and the different sectors of care. But simply increasing the number of primary care physicians alone will not improve coordination. Spending on ambulatory visits, many of them to primary care physicians, is positively correlated with inpatient days and inpatient physician visits, in part because the payment system fails to reward office-based physicians for managing disease and coordinating care. As we argue in Chapter Five, improving care coordination for chronically ill Americans should be a top priority for health care reform, and it will take more than simply increasing the number of primary care physicians or making non-inpatient care more readily available. The findings in this chapter underscore the need for care coordination, reform of the payment system, and focusing on capacity.

The remainder of this chapter provides a detailed look at the variation in spending among states and regions by sector, and demonstrates the fact that simply making alternative sites of care available does not reduce hospitalizations among the chronically ill.

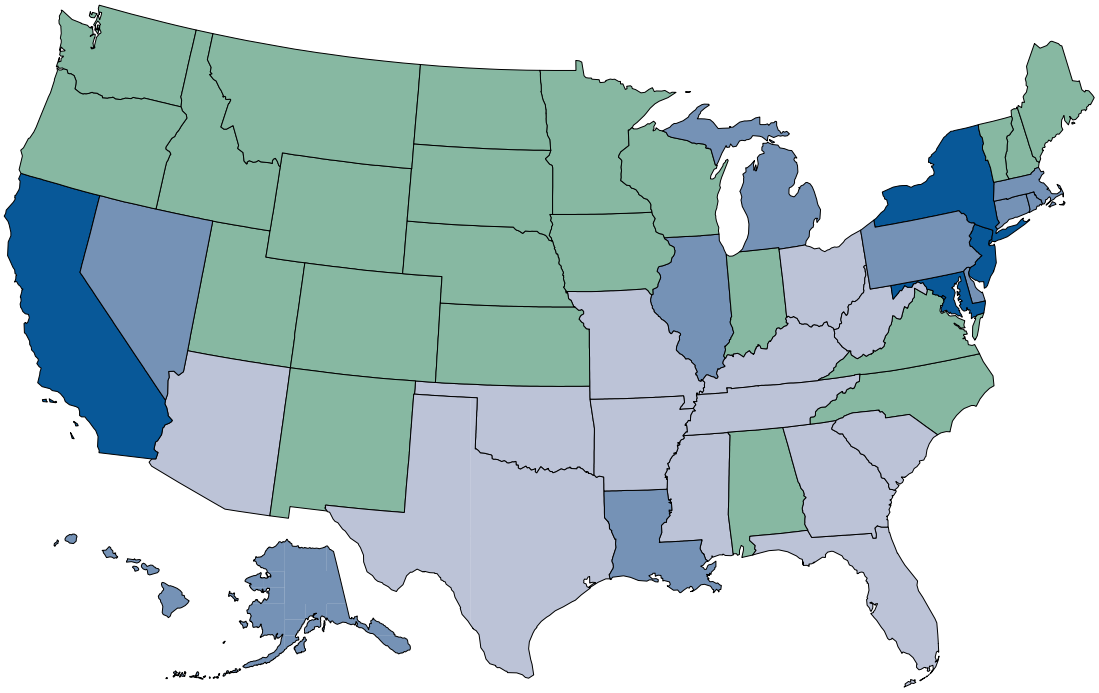
## Medicare inpatient spending

### Inpatient sector spending by state

Medicare spent almost $140 billion for inpatient care of severely ill patients in traditional Medicare who died during the period from 2001 to 2005. The average per capita spending during the last two years of life on care in the inpatient setting—payments to physicians for inpatient services as well as payments to hospitals themselves—was about $25,000. Fifteen states had inpatient spending levels above the national average; 35 states were below, and 22 of these were 15% or more below the national average. The states where inpatient spending was 30% or more above the national average included New Jersey ($37,040), New York ($34,956), Maryland ($33,715), and California ($33,706). In three states—North Dakota ($17,256), Utah ($17,140), and Idaho ($17,135)—spending was more than 30% below the national average, with spending about half as much as the four highest states.

**Map 2.2. Medicare Spending for Hospitalizations and Inpatient Physician Services in the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions, by State (Deaths Occurring 2001–05)**

| 1.20 to 1.46 | | | 1.00 to < 1.20 | | | 0.85 to < 1.00 | | | 0.67 to < 0.85 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NJ | $37,040 | (1.46) | HI | $28,040 | (1.10) | FL | $25,250 | (1.00) | VA | $21,553 | (0.85) |
| DC | $36,525 | (1.44) | AK | $27,659 | (1.09) | TX | $25,210 | (0.99) | NC | $21,537 | (0.85) |
| NY | $34,956 | (1.38) | IL | $27,571 | (1.09) | OH | $22,978 | (0.91) | AL | $21,249 | (0.84) |
| MD | $33,715 | (1.33) | MA | $27,434 | (1.08) | AZ | $22,763 | (0.90) | VT | $21,174 | (0.83) |
| CA | $33,706 | (1.33) | CT | $27,408 | (1.08) | MS | $22,742 | (0.90) | MN | $21,119 | (0.83) |
| | | | DE | $26,401 | (1.04) | MO | $22,635 | (0.89) | WA | $20,858 | (0.82) |
| | | | NV | $26,351 | (1.04) | KY | $22,621 | (0.89) | NH | $20,839 | (0.82) |
| | | | MI | $25,721 | (1.01) | TN | $22,619 | (0.89) | KS | $20,761 | (0.82) |
| | | | LA | $25,695 | (1.01) | SC | $22,578 | (0.89) | CO | $20,535 | (0.81) |
| | | | PA | $25,661 | (1.01) | WV | $22,461 | (0.89) | IN | $20,485 | (0.81) |
| | | | RI | $25,482 | (1.00) | GA | $22,406 | (0.88) | ME | $20,225 | (0.80) |
| | | | | | | OK | $22,377 | (0.88) | NE | $20,001 | (0.79) |
| | | | | | | AR | $21,777 | (0.86) | WI | $19,933 | (0.79) |
| | | | | | | | | | WY | $19,597 | (0.77) |
| | | | | | | | | | NM | $19,077 | (0.75) |
| | | | | | | | | | OR | $18,935 | (0.75) |
| | | | | | | | | | IA | $18,636 | (0.73) |
| | | | | | | | | | SD | $18,624 | (0.73) |
| | | | | | | | | | MT | $17,921 | (0.71) |
| | | | | | | | | | ND | $17,256 | (0.68) |
| | | | | | | | | | UT | $17,140 | (0.68) |
| | | | | | | | | | ID | $17,135 | (0.68) |



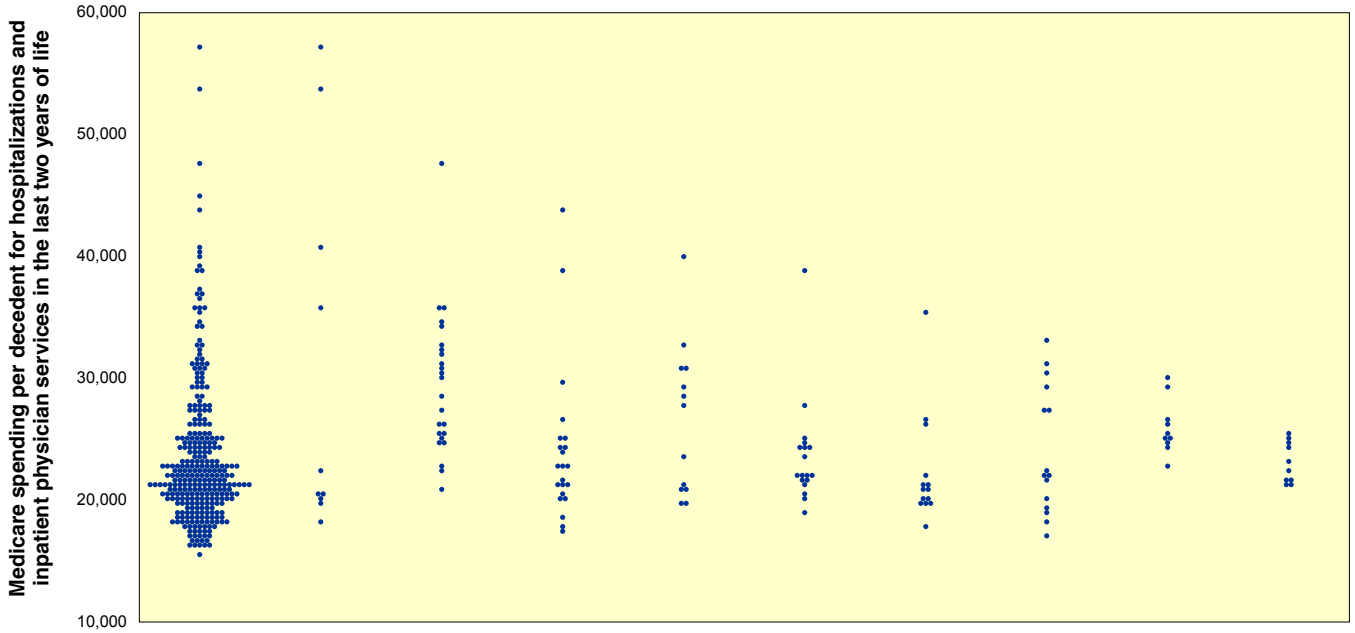
**Ratio of state to the U.S. average of Medicare reimbursements in an inpatient setting during the last two years of life**

by State (deaths occurring 2001-05)

- 1.20 to 1.46 (5)
- 1.00 to < 1.20 (11)
- 0.85 to < 1.00 (13)
- 0.67 to < 0.85 (22)

## Inpatient sector spending by region

Among hospital referral regions, per patient spending on inpatient care varied almost fourfold, from about $15,000 in Dubuque, Iowa to more than $57,000 in Manhattan. In New York, inpatient spending was highest in Manhattan ($57,360) and the Bronx ($53,716); it was about one-third of that level in Binghamton ($18,339) and Elmira ($19,664). In Rochester it was $20,681. In California, inpatient spending was highest in Los Angeles ($47,797) and lowest in Santa Barbara ($20,984). Inpatient spending per patient during the last two years of life in Sacramento was $25,455. Among Florida regions, spending on inpatient care was highest in Miami ($39,007); spending was less than half of the Miami level in Tallahassee ($18,942). Regions in Texas varied two and a half times, from $43,660 in Harlingen to $17,486 in San Angelo. Inpatient spending in Houston was $29,829, while in Dallas it was about 20% lower, at $24,117.




| | All HRRs | New York | California | Texas | Illinois | Florida | Pennsylvania | Michigan | Louisiana | Ohio |
|---|---|---|---|---|---|---|---|---|---|---|
| **Highest region:** | $57,360 | $57,360 | $47,797 | $43,660 | $40,019 | $39,007 | $35,543 | $32,939 | $29,855 | $25,292 |
| **U.S./state average:** | $25,376 | $34,956 | $33,706 | $25,210 | $27,571 | $25,250 | $25,661 | $25,721 | $25,695 | $22,978 |
| **Lowest region:** | $15,336 | $18,339 | $20,984 | $17,486 | $19,726 | $18,942 | $17,824 | $17,245 | $22,704 | $21,254 |
| **Extremal ratio:** | 3.74 | 3.13 | 2.28 | 2.50 | 2.03 | 2.06 | 1.99 | 1.91 | 1.31 | 1.19 |
| **Interquartile ratio:** | 1.26 | 1.96 | 1.28 | 1.20 | 1.47 | 1.13 | 1.10 | 1.45 | 1.07 | 1.13 |
| **Coefficient of variation:** | 25.7 | 48.5 | 19.9 | 26.1 | 23.3 | 18.6 | 20.3 | 21.9 | 8.4 | 6.9 |

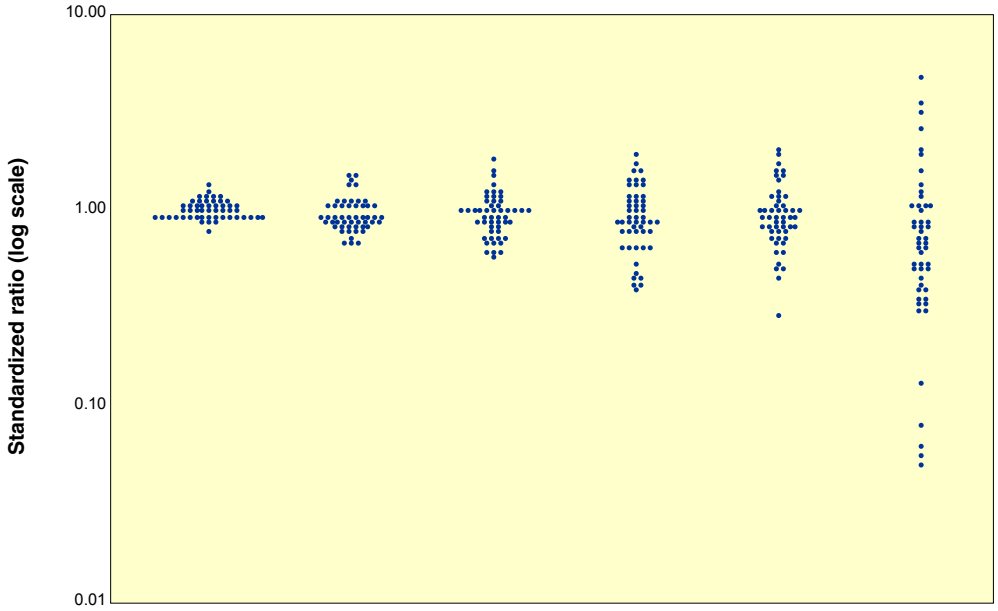
**Figure 2.4. Medicare Spending per Decedent for Hospitalizations and Inpatient Physician Services in the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Hospital Referral Regions (Deaths Occurring 2001–05)**

Per decedent Medicare reimbursements during inpatient hospitalizations in the last two years of life varied from about $15,000 to $57,000. Each point represents one of the 306 hospital referral regions in the United States. States with at least 10 hospital referral regions were selected for emphasis. The table beneath the figure gives, for each group of points, the highest spending region, the state average, and the lowest spending region; the ratio of the highest to the lowest region; the ratio of the region at the 75th percentile to the region at the 25th percentile; and the coefficient of variation.

## Medicare spending according to sector

### Variation among states

While variation among states and regions in spending during acute hospitalizations was high, there was even more variation in spending for care that occurred in other settings. Only spending for care in ambulatory (office- or clinic-based) settings varied less than the variation seen in acute hospitalizations. For ambulatory care, rates varied by a factor of about 1.7, with Maryland ($9,219) and Florida ($9,069) ranked highest, and West Virginia ($5,532) and Kentucky ($5,966) ranked lowest. Spending (including facility and physician costs) for care delivered in skilled nursing facilities varied threefold from the lowest to the highest state; spending was highest in Connecticut ($9,332) and lowest in New Mexico ($3,087). Payments to home health agencies for services delivered in patients' homes varied almost fivefold among states, from $877 per patient in North Dakota to $4,201 in Louisiana. Payments for hospice care varied by a factor of almost seven among states, with Alaska ($662) at the low extreme and Utah ($4,481) at the high end; and reimbursements for extended stays in long-term care and rehabilitation facilities varied by more than 100 times among states, from $64 per patient in Vermont to $6,567 per patient in Louisiana.




| | Outpatient | Inpatient | SNF | Home health | Hospice | LTC/RH |
|---|---|---|---|---|---|---|
| Highest state: | $9,219 | $37,040 | $9,332 | $4,201 | $4,481 | $6,567 |
| U.S. average: | $7,257 | $25,376 | $5,490 | $2,262 | $2,336 | $1,373 |
| Lowest state: | $5,532 | $17,135 | $3,087 | $877 | $662 | $64 |
| Extremal ratio: | 1.67 | 2.16 | 3.02 | 4.79 | 6.77 | 102.81 |
| Interquartile ratio: | 1.15 | 1.25 | 1.37 | 1.51 | 1.42 | 2.64 |
| Coefficient of variation: | 10.9 | 20.6 | 25.9 | 36.3 | 37.5 | 100.7 |

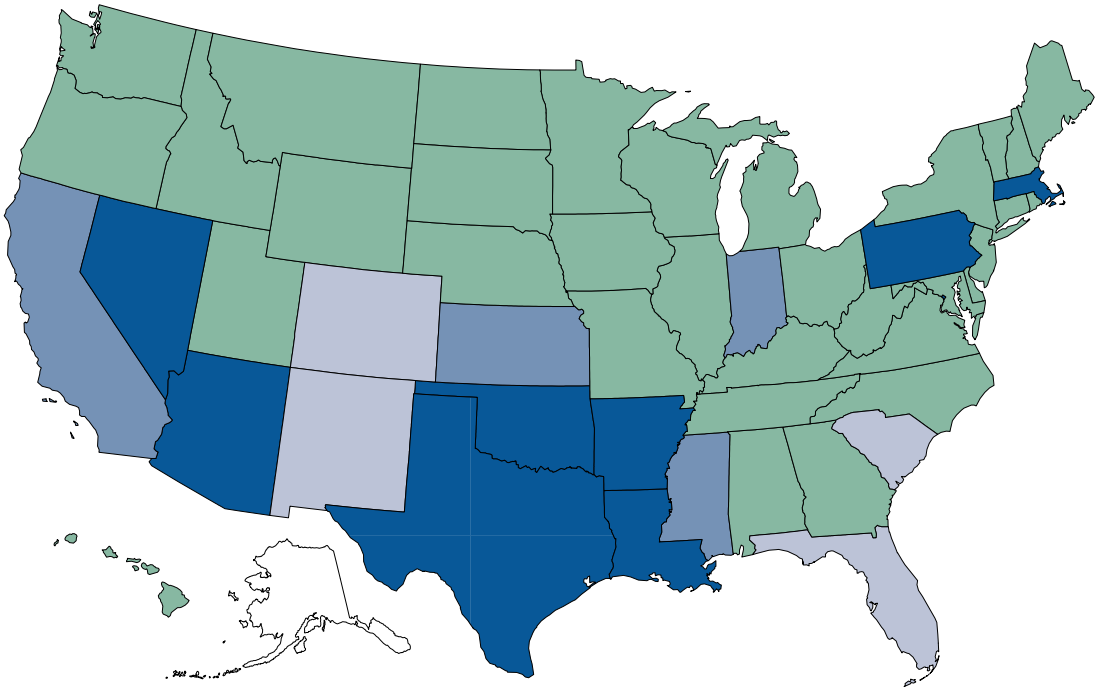
**Figure 2.5. Medicare Spending by Sector During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among States (Deaths Occurring 2001–05)**

Each point represents one of the 50 states or the District of Columbia. The table beneath the figure gives, for each sector of care, the highest spending state, the United States average, and the lowest spending state; the ratio of the highest to the lowest state; the ratio of the state at the 75th percentile to the state at the 25th percentile; and the coefficient of variation.

Because the variation was so large for long-term care and rehabilitation specialty hospitals (LTC/RHs), they deserve special attention. LTC/RHs provide more intensive services than are available in skilled nursing facilities or outpatient facilities. In contrast to most hospitals, they are paid by Medicare on the basis of the reasonable cost per case, rather than a diagnosis-specific prospective payment. In four states, per decedent spending exceeded $3,000 per decedent: Louisiana ($6,567); Nevada ($4,627); Texas ($4,181), and Massachusetts ($3,476). For residents of Wyoming, Iowa, Oregon, Montana, and Vermont it was less than $200 per decedent during the last two years of life. In nine states, spending was $1,500 per decedent or more; in 22 it was less than $800 per decedent. As we have observed, states and regions with higher spending for LTC/RHs did not incur lower costs for skilled nursing or acute hospital care.

**Map 2.3. Medicare Spending in Long-Term Care and Rehabilitation Hospitals in the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions, by State (Deaths Occurring 2001–05)**

| 1.20 to 4.79 | | | 1.00 to < 1.20 | | | 0.85 to < 1.00 | | | 0.04 to < 0.85 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LA | $6,567 | (4.78) | MS | $1,614 | (1.18) | CO | $1,353 | (0.99) | TN | $1,160 | (0.85) |
| NV | $4,627 | (3.37) | CA | $1,418 | (1.03) | NM | $1,273 | (0.93) | MI | $1,086 | (0.79) |
| TX | $4,181 | (3.05) | IN | $1,406 | (1.02) | FL | $1,183 | (0.86) | WV | $1,073 | (0.78) |
| MA | $3,476 | (2.53) | KS | $1,386 | (1.01) | SC | $1,179 | (0.86) | NE | $1,060 | (0.77) |
| OK | $2,776 | (2.02) | | | | | | | OH | $1,050 | (0.77) |
| DC | $2,523 | (1.84) | | | | | | | KY | $988 | (0.72) |
| AR | $2,096 | (1.53) | | | | | | | AL | $939 | (0.68) |
| AZ | $1,776 | (1.29) | | | | | | | UT | $919 | (0.67) |
| PA | $1,666 | (1.21) | | | | | | | GA | $901 | (0.66) |
| | | | | | | | | | NJ | $866 | (0.63) |
| | | | | | | | | | IL | $864 | (0.63) |
| | | | | | | | | | NH | $792 | (0.58) |
| | | | | | | | | | MD | $712 | (0.52) |
| | | | | | | | | | MO | $708 | (0.52) |
| | | | | | | | | | HI | $705 | (0.51) |
| | | | | | | | | | ID | $679 | (0.49) |
| | | | | | | | | | ND | $668 | (0.49) |
| | | | | | | | | | DE | $648 | (0.47) |
| | | | | | | | | | RI | $588 | (0.43) |
| | | | | | | | | | WI | $573 | (0.42) |
| | | | | | | | | | MN | $527 | (0.38) |
| | | | | | | | | | NC | $512 | (0.37) |
| | | | | | | | | | CT | $466 | (0.34) |
| | | | | | | | | | NY | $462 | (0.34) |
| | | | | | | | | | ME | $447 | (0.33) |
| | | | | | | | | | WA | $446 | (0.32) |
| | | | | | | | | | VA | $421 | (0.31) |
| | | | | | | | | | SD | $414 | (0.30) |
| | | | | | | | | | WY | $173 | (0.13) |
| | | | | | | | | | IA | $105 | (0.08) |
| | | | | | | | | | OR | $86 | (0.06) |
| | | | | | | | | | MT | $74 | (0.05) |
| | | | | | | | | | VT | $64 | (0.05) |



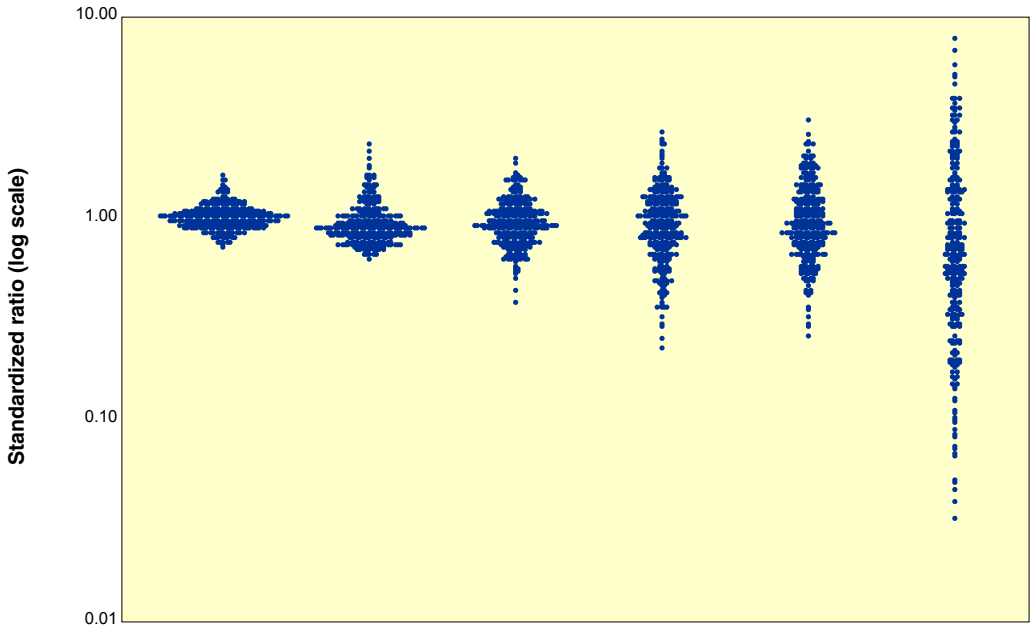
**Ratio of state to the U.S. average of Medicare reimbursements in long-term care facilities during the last two years of life**

by State (deaths occurring 2001-05)

- 1.20 to 4.79 (9)
- 1.00 to < 1.20 (4)
- 0.85 to < 1.00 (4)
- 0.04 to < 0.85 (33)
- Insufficient data (1)

## Variation among regions

The pattern of variation in spending for care in settings other than the hospital is just as great at the regional level as across states. For care in ambulatory (office- or clinic-based) settings, we saw a more than twofold variation, with two Florida regions, Fort Lauderdale ($11,480) and Sarasota ($10,582), ranked highest; and Florence, South Carolina ($5,018) and Meridian, Mississippi ($5,218) ranked lowest. Spending for care delivered in skilled nursing facilities varied by a factor of five from the lowest region—Bend, Oregon ($2,046)—to the highest, the Bronx, New York region ($10,371). Payments to home health agencies for services delivered in patients' homes varied more than elevenfold among regions, from $504 per patient in Rochester, Minnesota to $5,914 in Provo, Utah. Payments for hospice care varied by a factor of almost twelve among regions, from $587 in McAllen, Texas to $7,014 in Meridian, Mississippi; and reimbursements for extended stays in long-term care facilities varied more than 250 times among regions, from $42 per patient in Syracuse, New York to $10,479 per patient in New Orleans.




| | Outpatient | Inpatient | SNF | Home health | Hospice | LTC/RH |
|---|---|---|---|---|---|---|
| **Highest region:** | $11,480 | $57,360 | $10,371 | $5,914 | $7,014 | $10,479 |
| **U.S. average:** | $7,257 | $25,376 | $5,490 | $2,262 | $2,336 | $1,373 |
| **Lowest region:** | $5,018 | $15,336 | $2,046 | $504 | $587 | $42 |
| **Extremal ratio:** | 2.29 | 3.74 | 5.07 | 11.74 | 11.96 | 250.76 |
| **Interquartile ratio:** | 1.18 | 1.26 | 1.37 | 1.66 | 1.68 | 3.80 |
| **Coefficient of variation:** | 14.0 | 25.7 | 25.9 | 40.8 | 42.9 | 107.7 |

**Figure 2.6. Medicare Spending by Sector During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Hospital Referral Regions (Deaths Occurring 2001–05)**

Each point represents one of the 306 hospital referral regions in the United States. The table beneath the figure gives, for each place of service, the highest spending region, the United States average, and the lowest spending region; the ratio of the highest to the lowest region; the ratio of the region at the 75th percentile to the region at the 25th percentile; and the coefficient of variation.

## Conclusions

Spending on the chronically ill varies widely across states and regions, and even within states. The lion's share of spending goes toward inpatient care. Contrary to popular assumptions, the *volume* of care delivered in states and regions accounts for the variation we see, far more than do differences in local *prices* of care. Finally, efforts to reduce unnecessary hospitalizations by increasing the availability of ambulatory services, skilled nursing and other long-term care facilities, hospice, and home health care do not appear to have the desired effect. Indeed, spending on inpatient care is positively correlated with spending on care in other sectors: there are no tradeoffs. This finding suggests that other means must be found to reduce overtreatment of the chronically ill in the inpatient setting, particularly by improving the coordination of care. Suggestions for accomplishing this goal can be found in Chapter Five.

Chapter Three

# How America's Best Hospitals Manage Chronic Illness

It is widely recognized that academic medical centers, particularly those associated with medical schools, have special responsibilities. They educate medical students and other health professionals, they provide postgraduate specialist training, and they play a leading role in continuing medical education. These activities constitute the clinical environments and role models that are essential for creating a professional identity, or sense of duty and standards of behavior for physicians. Academic medicine is also responsible for establishing the scientific basis of the medical care provided to aging Americans, most of whom will die from costly chronic illnesses that must be managed but cannot be cured.

This chapter examines the variation among America's academic medical centers (AMCs) in how they treat patients with chronic illness. We focus on three measures: the per capita resources the AMCs have available; utilization, or the amount of care delivered per capita; and per capita spending. The focus is on the primary teaching hospitals of U.S. medical schools, but special attention is given to the five AMCs that *U.S.News & World Report* (USN&WR) placed at the top of its 2007 Honor Roll for America's Best Hospitals: Johns Hopkins University Hospital, the Mayo Clinic's St. Mary's Hospital, the University of California hospital in Los Angeles (UCLA), the Cleveland Clinic Foundation Hospital, and the Massachusetts General Hospital (MGH).[1]

Just as we saw with regions and states, academic medical centers vary widely on all three measures—resources, utilization, and spending—a finding that raises a serious challenge to the assumption that clinical science plays a dominant role in determining the patterns of medical practice at these prestigious hospitals. How can the "science" on which they are supposed to be basing the care they deliver result in such different utilization rates and styles of care and still be considered science? How can America's best hospitals practice medicine so differently and still be the best?

This chapter addresses the question of why utilization and spending vary so widely among academic medical centers and the consequences for patients. The variations are largely independent of the specific chronic conditions patients have, the severity of their illnesses, and socio-demographic factors that predict individual risk for the need for medical care, such as age, sex, race, and income. The patterns among academic medical centers are consistent with the capacity effect described in Chapter One; the intensity of care for supply-sensitive services is driven by the subliminal influence of available resources on clinical decision-making.

Thus, the hospitals that spend the most per capita are, for the most part, also the hospitals that have the highest per capita utilization and have invested in the highest per capita level of resources. For example, UCLA, one of USN&WR's honor roll hospitals, spent more than $63,000 per patient over the last two years of life on care delivered within the hospital. The Mayo Clinic's flagship St. Mary's Hospital, by contrast, spent a little more than half that amount on similar patients over the same period of time (Figure 3.1). When we look at utilization, these differences

in cost make perfect sense. Chronically ill patients in their last two years of life had twice as many physician visits at UCLA compared with St. Mary's, and they spent 47% more days in the hospital (see Tables 3.1 and 3.2). When we look at the resources available at these two hospitals, we see equally large differences. Compared to the Mayo Clinic, UCLA used almost twice the number of full-time equivalent physicians, and about one and a half times the number of beds in managing similar patients (see Tables 3.3 and 3.4). Yet there is no evidence that greater care intensity at UCLA resulted in better outcomes. As noted in Chapter One, greater intensity of care at academic medical centers is associated with worse outcomes for patients and higher costs.[2] More is not better.

Given the catastrophic rate at which health care costs are rising, it seems clear that a way to measure the efficiency of hospitals is needed. In the health care market, efficient providers are those delivering comparable outcomes and patient satisfaction for the lowest cost. The Mayo Clinic and the Cleveland Clinic, for instance, allocate relatively fewer resources per capita and spend less per capita than their peers, while simultaneously receiving high marks on established quality measures. Other academic medical centers use far more resources, deliver far more supply-sensitive care, and cost significantly more per capita, but with no better quality or outcomes. We propose employing the spending, resource input, and utilization profiles of the relatively efficient academic medical centers as benchmarks for gauging the performance of the rest.

In this chapter, we use the principal academic medical center of the Mayo Clinic as this benchmark. It is not the least costly hospital, but it enjoys a strong national reputation for quality, while simultaneously keeping utilization and costs relatively low. It is part of a well-organized health care system. These qualities make it a credible model for other academic medical centers to emulate as they begin to rethink how they might more efficiently allocate such resources as beds and physicians. In this chapter, this benchmark serves as the basis for estimating the amount of excess capacity and the overuse of care at less efficient providers, as well as the potential savings that would accrue if these less efficient hospitals were to adopt practice patterns that were more like those of the benchmark institution. In Chapter Five, we will suggest a way to use benchmarking as part of a strategy to reduce overuse of the acute care sector in managing chronic illness. We will also argue that our measures of resource allocation can be used to influence such decisions as when to build or close hospital facilities; when to hire physicians, nurses, or other personnel; and when to purchase capital equipment in a manner that matches the actual needs of the population of patients served.

In addition to resource use and relative efficiency, this chapter looks for evidence of the coordination of care by academic medical centers among the various sectors involved in treating the chronically ill. As was the case among states and regions, we found little evidence for care coordination. Using more home health care, ambulatory physician care, and long-term care was not associated with lower utilization of expensive acute care hospital services (or lower costs); rather, with the exception of hospice, utilization and spending were positively correlated among the sectors of care.

We also look at the patterns of practice among the hospitals within the Mayo Foundation multi-hospital system for evidence of consistency in the way chronic illness is managed. Even there, variation exists. There is no characteristic "Mayo Clinic approach" to care. The variation within one of the nation's most prestigious academic medical systems further underscores the importance of improving the scientific basis of clinical practice.

Finally, we discuss how patients and their families might find hospital-specific information useful in making decisions on which academic medical center is best for them. Suggestions for how payers, providers, patients, and others might use the information in this Atlas will be presented in greater detail in the Afterword following Chapter Five.

## Variation among America's best hospitals

Most of the data in this section are based on a five-year study conducted on deaths that occurred in 2001 through 2005. The data for 93 academic medical centers are available in Appendix Table 1. First we look at spending patterns among AMCs, including an examination of the relative importance of volume versus price in determining variation in per capita spending on inpatient care. We then examine the differences among AMCs in their use of the physician workforce: the per capita numbers of physicians used in managing care and the mix between primary care physicians and medical specialists. Finally, we profile the differences in care intensity—the frequency of physician visits and use of intensive care units and hospice care—during the last six months of life.

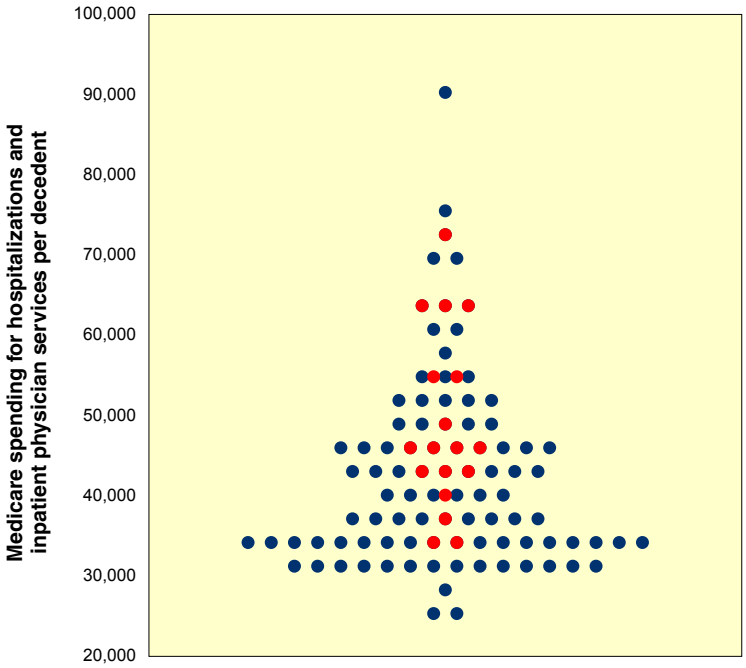



**Figure 3.1. Medicare Spending for Hospitalizations and Inpatient Physician Services per Decedent in the Last Two Years of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of their Care from Selected COTH Integrated Academic Medical Centers (Deaths Occurring 2001–05)**

Among COTH integrated academic medical centers, per decedent Medicare reimbursements for inpatient care during the last two years of life varied by a factor of four, from about $24,000 to almost $92,000. Each point represents one of the 93 selected COTH academic medical centers. The 18 hospitals on USN&WR's Honor Roll for 2007 are highlighted in red.

| Selected Academic Medical Center Data | |
|---|---|
| Cedars-Sinai Medical Center | $71,637 |
| UCLA Medical Center | $63,900 |
| Johns Hopkins Hospital | $63,079 |
| New York-Presbyterian Hospital | $62,773 |
| UCSF Medical Center | $54,669 |
| Hospital of the University of Pennsylvania | $54,455 |
| Brigham and Women's Hospital | $50,156 |
| University of Washington Medical Center | $46,891 |
| University of Michigan Hospitals | $46,397 |
| University of Chicago Hospital | $45,718 |
| Stanford Hospital and Clinics | $44,997 |
| UPMC Presbyterian Shadyside | $43,504 |
| Yale-New Haven Hospital | $43,325 |
| Massachusetts General Hospital | $43,058 |
| Barnes-Jewish Hospital | $40,681 |
| Duke University Hospital | $37,751 |
| Cleveland Clinic Foundation | $34,437 |
| Mayo Clinic (St. Mary's Hospital) | $34,372 |

## How much does Medicare spend for inpatient care of chronically ill patients?

The answer to this question depends on the academic medical center. Figure 3.1 gives the distribution in per decedent spending for inpatient care over the last two years of life among patients who received most of their inpatient care from 93 selected teaching hospitals designated as integrated

academic medical centers by the Council of Teaching Hospitals (COTH).[i] The data include spending for physician services delivered in the hospital and for reimbursements to hospitals for inpatient care. Spending varied fourfold among the 93 academic medical centers, from $23,849 per decedent at Scott & White Memorial Hospital in Temple, Texas, to $91,738 at Hahnemann University Hospital in Philadelphia. There was considerable variation among the five USN&WR honor roll AMCs. Medicare reimbursements at the Cleveland Clinic Foundation hospital were $34,437 per decedent, while reimbursements for similar patients at UCLA were nearly twice as high ($63,900).

## Volume or price: Which matters most?

Most efforts to control medical spending have focused on containing the price of care, under the assumption that variation in price is the major factor influencing variation in per capita spending. However, per capita spending is determined more by the per capita utilization (volume) of services than by the price per unit of care. Because our data are population-based, the Dartmouth Atlas Project is able to provide data on the combined effect of variations in price and volume of care on variation in per capita spending. We have developed the "medical care cost equation," which makes transparent the relative contributions of volume and price to per capita spending for hospital care and for physician visits. The equation can be expressed in terms of actual dollar amounts, as well as ratios to a benchmark.

### Reimbursements for inpatient hospital care

The cost equation for payment to hospitals for inpatient care[ii] during the last two years of life comprises three factors: (1) the average payment per decedent, using the population loyal to a given hospital as the denominator for calculating the rate; (2) the average number of patient days per decedent, using the same denominator; and (3) the average price per day in hospital, which is calculated by dividing the average payment per decedent by the average number of days per decedent.

For example, for those who received most of their care at MGH, the average payment to the hospital per decedent for those dying during the period 2001–05 was $38,844 per patient, and the number of patient days was 28.9 per capita. We then divided the average payment by the number of days in hospital to calculate the average reimbursement per day spent in the hospital, which for patients loyal to MGH was $1,344. The cost equation thus reflects the combined contributions of volume (days in hospital per decedent) and price (average reimbursements per day in hospital) in determining the bottom line cost to the Medicare program:

$38,844 per decedent = 28.9 days per decedent x $1,344 per day

The cost equation for a given hospital can also be expressed as a series of ratios to a benchmark hospital. For example, benchmarked to the cost equation for the Mayo Clinic's St. Mary's Hospital, the MGH cost equation looks like this: 1.22 = 1.36 x 0.90. The equation can be read as follows; com-

[i] These hospitals were selected according to the following criteria: at least 100 deaths among chronically ill decedents included in a 20% sample of Medicare Part B claims; and designation as an integrated academic medical center by the AAMC. Integrated academic medical center hospitals are those which are under common ownership with a college of medicine, or have the majority of medical school department chairmen serve as the hospital chiefs of service; are a non-Federal member of the AAMC's Council of Teaching Hospitals and Health Systems (COTH); and provide short-stay, general hospital service. See http://www.aamc.org/data/ocd/fielddefinitions.htm

[ii] For this example, we are referring only to Medicare Part A payments made to the hospital for inpatient care; we do not include Part B payments for services occurring within the hospital.

pared to St. Mary's Hospital, per capita reimbursements to MGH for inpatient care were 22% higher, achieved because the volume of inpatient care (patient days per decedent) was 36% greater, while the price (reimbursements per patient day) was 10% lower.

Table 3.1 provides the medical care cost equation for Medicare inpatient reimbursements per decedent over the last two years of life for nine different academic medical centers. A profile is provided for each of the five hospitals ranked as the best in 2007 by USN&WR, as well as the two highest and two lowest ranked among the 93 AMCs in terms of inpatient spending. The medical care cost equation is standardized to the Mayo Clinic's St. Mary's Hospital.

**Table 3.1. The Medical Care Cost Equation for Inpatient Reimbursements During the Last Two Years of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of Their Inpatient Care from Selected Academic Medical Centers (Deaths Occurring 2001–05)**

| Academic Medical Center | Inpatient reimbursements per decedent | Hospital days per decedent | Reimbursements per day | Ratio to Mayo Clinic | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Inpatient reimb. | = | Hospital days | x | Reimb. per day |
| Hahnemann University Hospital | $84,827 | 34.8 | $2,437 | 2.67 | = | 1.64 | x | 1.63 |
| University of Maryland Medical Center | $66,840 | 28.0 | $2,383 | 2.10 | = | 1.32 | x | 1.59 |
| Johns Hopkins Hospital | $59,759 | 28.6 | $2,093 | 1.88 | = | 1.34 | x | 1.40 |
| UCLA Medical Center | $58,557 | 31.3 | $1,871 | 1.84 | = | 1.47 | x | 1.25 |
| Massachusetts General Hospital | $38,844 | 28.9 | $1,344 | 1.22 | = | 1.36 | x | 0.90 |
| Mayo Clinic (St. Mary's Hospital) | $31,816 | 21.3 | $1,497 | 1.00 | = | 1.00 | x | 1.00 |
| Cleveland Clinic Foundation | $31,252 | 23.9 | $1,307 | 0.98 | = | 1.13 | x | 0.87 |
| Buffalo General Hospital | $22,463 | 24.3 | $926 | 0.71 | = | 1.14 | x | 0.62 |
| Scott & White (Texas A&M) | $22,069 | 15.9 | $1,384 | 0.69 | = | 0.75 | x | 0.92 |

Here are some highlights concerning variation among the USN&WR-designated five best hospitals:

- Johns Hopkins Hospital ranked highest in inpatient spending, with a per decedent rate of $59,759, 88% higher than inpatient spending at the Mayo Clinic. This was a result of higher volume of care (patient day ratio was 1.34, reflecting a rate that was 34% higher) as well as higher average price per day (1.4 times, or 40% higher) than the Mayo Clinic.

- Massachusetts General Hospital's inpatient spending was 22% higher, a result of its 36% greater volume; the price per day was actually 10% lower than the Mayo benchmark.

- Inpatient reimbursements per decedent at UCLA Medical Center exceeded the Mayo benchmark by 84% because the volume was 47% higher and the price was 25% higher.

- Cleveland Clinic's inpatient reimbursements were 2% lower than the Mayo benchmark; while its volume (inpatient days per decedent) was 13% greater, its price per day was 13% lower.

Table 3.1 indicates a nearly fourfold variation among the 93 AMCs in per decedent reimbursements during the last two years of life. The highest ranked hospital was Hahnemann University Hospital, with inpatient reimbursements per decedent more than two and a half times higher than St. Mary's Hospital. This was achieved because both the volume (patient days per decedent) and the price per day were more than 60% higher.

Scott & White Memorial Hospital, the lowest-ranked AMC in per decedent inpatient spending, achieved its low rate through lower volume—25% fewer patient days than the Mayo Clinic—with a price per day that was 8% lower. The second lowest in per capita spending, the University of Buffalo's teaching hospital, achieved a low overall spending rate even though its patient day rate per decedent was 14% higher than the Mayo Clinic benchmark, because the price per day in hospital was 38% lower. Once again, the take-home message is that when it comes to spending, volume of care counts, often—but not always—more than price.

## Spending for physician visits

Evaluation of the medical care cost equation for physician visits indicates an even greater contribution of volume—the number of visits per person—in determining variation in per capita Medicare spending for physician services. Table 3.2 illustrates striking variations in per decedent spending for physician visits among the top five USN&WR honor roll hospitals:

- Medicare reimbursements for physician visits at UCLA were 2.26 times higher than for the Mayo Clinic, largely because visit rates were about twice as high.
- Reimbursements for patients at MGH were 71% higher, a result of 48% greater volume and 16% higher prices.
- Cleveland Clinic and Johns Hopkins reimbursement rates were 22% and 17% higher, respectively, primarily because of greater volume.

**Table 3.2. The Medical Care Cost Equation for Physician Visit Payments During the Last Two Years of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of Their Inpatient Care from Selected Academic Medical Centers (Deaths Occurring 2001–05)**

| Academic Medical Center | Payments for MD visits per decedent | MD visits per decedent | Payments per visit | Ratio to Mayo Clinic | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | MD payments | = | MD visits | x | Payments per visit |
| Cedars-Sinai Medical Center | $10,307 | 155.8 | $66 | 3.90 | = | 3.06 | x | 1.27 |
| NYU Medical Center | $10,194 | 142.6 | $71 | 3.86 | = | 2.81 | x | 1.37 |
| UCLA Medical Center | $5,971 | 101.3 | $59 | 2.26 | = | 1.99 | x | 1.13 |
| Massachusetts General Hospital | $4,532 | 75.3 | $60 | 1.71 | = | 1.48 | x | 1.16 |
| Cleveland Clinic Foundation | $3,225 | 62.8 | $51 | 1.22 | = | 1.24 | x | 0.99 |
| Johns Hopkins Hospital | $3,099 | 56.9 | $54 | 1.17 | = | 1.12 | x | 1.05 |
| Mayo Clinic (St. Mary's Hospital) | $2,644 | 50.8 | $52 | 1.00 | = | 1.00 | x | 1.00 |
| University of Wisconsin Hospital | $1,843 | 41.9 | $44 | 0.70 | = | 0.82 | x | 0.84 |
| Parkland Hospital | $1,679 | 38.6 | $43 | 0.64 | = | 0.76 | x | 0.84 |

Cedars-Sinai Medical Center had the highest payments for physician visits, nearly four times higher on a per decedent basis than the Mayo Clinic. Its high spending rate was primarily volume-driven, with visit rates per decedent three times greater than the Mayo Clinic. New York University Medical Center ranked second, with per decedent payments 3.86 times higher than the Mayo Clinic, again, primarily because its volume of visits was high: more than 2.8 times the number of visits per decedent than Mayo. The lowest ranked hospital, Parkland Health and Hospital System in Dallas, had visit rates 24% lower than the Mayo benchmark, with the price per visit about 16% lower. The University of Wisconsin had volume and price rates 18% and 16% lower than the Mayo Clinic's, respectively.

What all of this says is that volume is generally more important than price when it comes to controlling variation in medical spending at the hospital level, just as it was at the regional level. The policy implications seem evident. While Medicare policies have controlled physician prices for the most part, and have been partially successful in limiting variation in the price of inpatient care through the DRG program, they have had little effect in constraining overall variation in Medicare spending. Dealing with unwarranted variation in spending will require attention to the amount of care used, not just its unit price.

## How are resources used?

The Dartmouth Atlas seeks to make transparent the amount of resources providers use in managing their patient populations. Information on per capita resource use has not been routinely available for fee-for-service providers, largely because the population of patients served by a given provider has not been known. By studying just the chronically ill population, the Dartmouth Atlas methodology substantially overcomes this limitation. The numbers of chronically ill patients loyal to a given provider can be counted to provide the denominator for calculating population-based measures of resource input, or per capita measure of the resources available at a particular hospital.

This section illustrates how we have measured resource inputs of physician labor and acute care hospital beds, and estimated "need" for registered nurses based on proposed minimum staffing requirements. It sheds light on the sometimes remarkable variation in the ways academic medical centers use physician labor in managing chronic illness, and it illustrates how poorly even the nation's most prestigious hospitals match their resource inputs—physician labor, hospital and ICU beds, and nurses—to the illness levels of the populations they serve.

### Physician labor inputs

Physicians who work at academic medical centers often work only part-time treating patients. We have standardized physician labor input to represent an FTE, or full-time equivalent, quantity. In fee-for-service medicine, Medicare reimbursements to physicians for a given billed service are calculated using Work Relative Value Units (W-RVUs), which are based on estimates of the time and complexity of the service the physician provides. Thus, the workload invested in a given patient population can be estimated by summing the W-RVUs generated over a fixed period of time. This calculation can be made for each specialty. Studies of physician productivity have resulted in estimates of the total number of W-RVUs that the average full-time physician of a given specialty

performs over the course of a year. By dividing total W-RVUs for a specialty by the average number of W-RVUs per physicians per year, an estimate of the specialty-specific standardized FTE labor input per patient can be made.

**Table 3.3. Physician FTE Labor Input per 1,000 Decedents over the Last Two Years of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of Their Inpatient Care from Selected Academic Medical Centers (Deaths Occurring 2001–05)**

| Academic Medical Center | Total physician FTE labor inputs | Medical specialist FTE labor inputs | Primary care physician FTE labor inputs | Ratio of medical specialist to primary care FTE labor inputs |
|---|---|---|---|---|
| Cedars-Sinai Medical Center | 54.2 | 31.6 | 14.6 | 2.16 |
| NYU Medical Center | 50.8 | 30.1 | 13.2 | 2.27 |
| UCLA Medical Center | 38.5 | 21.2 | 9.6 | 2.20 |
| Massachusetts General Hospital | 29.5 | 11.7 | 11.5 | 1.02 |
| Cleveland Clinic Foundation | 26.1 | 10.6 | 8.8 | 1.20 |
| Johns Hopkins Hospital | 25.7 | 8.9 | 10.0 | 0.89 |
| Mayo Clinic (St. Mary's Hospital) | 20.3 | 8.9 | 6.8 | 1.30 |
| Scott & White (Texas A&M) | 16.4 | 6.3 | 6.4 | 0.99 |
| University of New Mexico Hospital | 16.2 | 5.0 | 8.1 | 0.62 |

Table 3.3 profiles physician labor input for the five honor roll hospitals as well as the top two and bottom two ranked AMCs for total physician labor inputs. It measures overall FTE labor input and the inputs for medical specialists and primary care physicians. To illustrate the varying emphasis on primary versus specialty care, the table also provides the ratio of medical specialist to primary care physician labor input.

Among the nation's five best hospitals:

- UCLA allocated the most physician labor in caring for the severely ill: the Mayo Clinic the least. Compared to the Mayo Clinic benchmark, UCLA used 90% more physicians; MGH used 45% more; the Cleveland Clinic 28% more; and Johns Hopkins 27% more.

- The workforce at UCLA was oriented toward medical specialists, while at Johns Hopkins it tended to favor primary care. UCLA used 2.4 times more medical specialist labor than Johns Hopkins; Johns Hopkins used about 4% more primary care. The ratio of medical specialist to primary care labor inputs was 2.20 at UCLA and 0.89 at Johns Hopkins.

- Although the Mayo Clinic was oriented toward medical specialist care (the ratio of medical specialist to primary care labor input was 1.3) and Johns Hopkins toward primary care, the Mayo Clinic used the same number of medical specialists per capita as Johns Hopkins.

There were substantial (threefold or greater) differences in the per capita use of physicians among the 93 AMCs. Cedars-Sinai and NYU Medical Center used the most total physician labor; Scott & White Memorial Hospital and the University of New Mexico Hospital the least. The University of Iowa Hospital and Mount Sinai Hospital in New York used the most primary care physicians: North Carolina Baptist Hospital and the University of Wisconsin Hospital the least. The AMCs with the greatest reliance on primary care, as evidenced by their low ratios of medical specialist to primary care physician labor inputs, were the University of Iowa and University of New Mexico; the hospitals most dependent on medical specialist labor were NYU Medical Center and UCLA.

In considering these facts, it is important to remember that the patients at these different hospitals were very similar to one another. (Our method of looking at patients over a specific period of time before death, and the adjustments made for age, sex, race, and primary chronic diagnosis, ensure that differences among patient populations are unlikely to cause the observed variations in labor use.) Given the similarity in their patient populations, it becomes apparent that academic medicine has no standardized approach for allocating the physician workforce to treat patients who are chronically ill. Each academic medical center seems to have its own rationale for defining its need for physicians. Some, such as the Mayo Clinic and Duke University, get by with relatively few physicians, but depend more on medical specialists than on primary care; others, such as NYU and UCLA, employ many more of both medical specialists and primary care physicians, but depend most heavily on specialists. Still others, like University of New Mexico, emphasize primary care, getting by with very few specialists.

## Hospital bed inputs

Our data record the number of days that patients spend in hospital beds according to three levels of care intensity: high-intensity intensive care unit (ICU) and cardiac care unit (CCU) beds, or so-called "full" ICU beds; intermediate-intensity ICU beds, or "step-down" beds; and medical and surgical unit beds, in which the lowest-intensity care is provided. These distinctions are important because costs and professional resource requirements vary according to bed intensity. For the patient population assigned to a given academic medical center, we measured the number of hospital beds used in managing chronic illness over the last two years of life in terms of "fully occupied" beds. To make the estimate, we counted the total number of days spent in hospital by patients loyal to a given provider and divided by 365 (the number of days in a year). The number of occupied beds was then divided by the number of loyal patients and expressed in terms of bed inputs per 1,000 decedents over the last two years of life. Bed inputs were measured in total and according to intensity level.

**Table 3.4. Hospital Bed Inputs per 1,000 Decedents During the Last Two Years of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of Their Inpatient Care from Selected Academic Medical Centers (Deaths Occurring 2001–05)**

| Academic Medical Center | Bed inputs according to intensity level | | | |
|---|---|---|---|---|
| | All hospital beds | High-intensity ICU/CCU beds | Intermediate-intensity ICU beds | Medical & surgical unit beds |
| NYU Medical Center | 148.7 | 18.2 | 13.8 | 116.7 |
| Cedars-Sinai Medical Center | 117.5 | 14.3 | 20.5 | 82.7 |
| UCLA Medical Center | 85.8 | 13.8 | 24.3 | 47.7 |
| Massachusetts General Hospital | 79.2 | 15.0 | 1.0 | 63.2 |
| Johns Hopkins Hospital | 78.2 | 11.8 | 8.2 | 58.2 |
| Cleveland Clinic Foundation | 65.5 | 14.3 | 4.8 | 46.4 |
| Mayo Clinic (St. Mary's Hospital) | 58.2 | 16.4 | 2.0 | 39.8 |
| University of New Mexico Hospital | 46.2 | 5.8 | 11.5 | 28.9 |
| Scott & White (Texas A&M) | 43.7 | 9.7 | 0.7 | 33.3 |

The table profiles bed input rates for the five best hospitals as well as the top two and bottom two ranked AMCs in terms of total hospital bed inputs. AMCs differed remarkably in their overall use of acute care hospital beds and in the emphasis they place on high-intensity care.

Among the nation's five best hospitals, UCLA stood out in both the overall level of bed inputs and its emphasis on ICU beds, especially intermediate-intensity beds. Compared to the Mayo Clinic's St. Mary's hospital, it used 47% more total beds and 12 times more "step-down" beds. Compared to MGH, UCLA used 8% more total beds and 8% fewer full ICU beds. MGH used the most medical and surgical unit beds, 33% more than UCLA.

Among all 93 integrated AMCs, there were substantial differences in use of hospital beds. NYU Medical Center, the highest ranked in terms of overall bed inputs, used 3.4 times more beds in managing its population of chronically ill than did the lowest ranked, Scott & White Memorial Hospital. NYU used 2.55 times more beds than the Mayo Clinic and 1.88 times more than MGH. Bed resource inputs for patients using NYU were 1.90 times greater than Johns Hopkins and 2.27 times greater than the Cleveland Clinic.

## Inpatient staffing requirements for registered nurses

The variation among academic medical centers in the number of hospital beds used in managing their patient populations implies variation in the number of registered nurses required. To examine the significance of variation in use of acute hospital care for the need for nurses, we have developed a method to estimate the number of nurses required by a given hospital to manage their chronically ill patients according to the number of each type of hospital bed they use.

While nearly everyone is convinced that the nation faces an acute shortage of registered nurses, estimates of the magnitude of the shortage have yet to take into account the implications of practice variation. For example, the variations discussed above in the numbers of different types of hospital beds academic medical centers use in managing their patient populations has direct implications for the number of nurses they need for inpatient care. Because nurses do not bill directly for their services, we cannot use the W-RVU-based approach to estimate labor inputs for registered nurses. We also could not find reliable information on hospital staffing in terms of the number of full-time equivalent (FTE) nurses a hospital uses per patient day. Thus, we do not have an estimate of the number actually employed at a given hospital. We have, however, been able to estimate the number of nurses a hospital would need, given the numbers of beds they use in managing their chronically ill patients.

Our estimate is based on proposed federal staffing requirements set out in legislation currently under consideration by the Congress ("Nurse Staffing Standards for Patient Safety and Quality Care Act of 2007," H.R. 2123[3]).The bill sets out minimum staffing requirements based on the ratio of patients in hospital to the number of FTE registered nurses. The requirements differ according to the intensity of the care setting. For high-intensity ICUs and cardiac care units (CCUs), the standard is no more than two patients for every nurse; for "step-down," or intermediate ICUs, the standard is no more than three patients per nurse; and for medical and surgical units, the minimum standard is four patients per registered nurse.

Table 3.5 provides an estimate of the number of nurses that selected academic medical centers would need to employ to meet the proposed standard, given their current practice patterns with regard to use of inpatient acute care beds (as illustrated in Table 3.4). Since the utilization of high-intensity ICUs and CCUs, intermediate-intensity (step-down) ICUs, and medical and surgical units by the chronically ill varies extensively among academic medical centers, so does the number of nurses per 1,000 decedents required under the proposed federal mandate.

**Table 3.5. Inpatient Nurse Staffing Requirements per 1,000 Decedents to Meet Proposed Federal Standards of Care During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Receiving Most of their Inpatient Care from Selected Academic Medical Centers (Deaths Occurring 2001–05)**

| Academic Medical Center | Nurse requirements according to level of bed intensity | | | |
|---|---|---|---|---|
| | Total | High-intensity ICU/CCU beds | Intermediate-intensity ICU beds | Medical & surgical unit beds |
| NYU Medical Center | 128.7 | 27.3 | 13.8 | 87.5 |
| Cedars-Sinai Medical Center | 104.0 | 21.5 | 20.5 | 62.1 |
| UCLA Medical Center | 80.7 | 20.7 | 24.3 | 35.8 |
| Massachusetts General Hospital | 70.9 | 22.6 | 1.0 | 47.4 |
| Johns Hopkins Hospital | 69.6 | 17.7 | 8.2 | 43.7 |
| Cleveland Clinic Foundation | 61.1 | 21.5 | 4.8 | 34.8 |
| Mayo Clinic (St. Mary's Hospital) | 56.5 | 24.6 | 2.0 | 29.9 |
| University of New Mexico Hospital | 41.9 | 8.7 | 11.5 | 21.7 |
| Scott & White (Texas A&M) | 40.2 | 14.6 | 0.7 | 25.0 |

Among the nation's five best hospitals:

- Based on its patterns of use of hospital beds, UCLA would need to employ 43% more registered nurses per 1,000 patients than would the Mayo Clinic and 32% more than the Cleveland Clinic, according to the proposed federal minimum standards. Under this standard, 56% of the inpatient registered nurse workforce would be employed in intensive care units—20.7 nurses per 1,000 decedents in full ICUs and 24.3 per 1,000 in step-down units—and only 35.8 per 1,000 in medical and surgical beds.

- To comply with the proposed regulations, MGH would need the fewest nurses for high-intensity beds: 22.6 per 1,000 in full ICUs and only one in step-down beds. The MGH allocation of the nurse workforce is strikingly different from UCLA's: only 33% would be allocated to ICU beds, compared to 56% at UCLA.

Among the 93 AMCs, NYU would require the most nurses, primarily because it used many more medical and surgical beds per 1,000 patients than any other academic medical center; Scott & White would require the fewest nurses, only 31% as many as NYU. Cedars-Sinai Medical Center ranks second in staffing requirements, largely because of its high need for intermediate-intensity ICU nurses under its current practice pattern.

In considering these facts, we emphasize again that the estimated numbers of nurses these academic medical centers would be required to employ is on a per capita basis for loyal patients who are similarly ill from one AMC to another. Since most if not all of these hospitals very likely already meet or exceed minimum standards, the differences probably approximate the real differences in registered nurse inputs that already existed among them in managing their chronically ill populations over the last two years of life for deaths occurring during the period 2001–2005. As we discuss in Chapter Five, in light of the evidence that greater use of inpatient care is not associated with better outcomes, reducing the overuse of acute care hospitals would not only save money, it would also free up essential professionals for more productive work, and help resolve the national shortage in the registered nurse workforce.

## How intensely are patients treated?

We have studied variation in the frequency of use of physician visits and intensive care units during the last six months of life, the period of time in the management of chronic illness when intervention generally reaches its peak. Most Dartmouth Atlas measures of utilization are borrowed from epidemiology and mainstream health services research. The rates are for fixed periods of time: in this case, the last six months of life. Utilization measures used in this section include the percentage of patients who died during a stay in hospital in which they were treated in intensive care (both high- and intermediate-intensity ICU beds), days spent in intensive care, and physician visits, calculated on a per capita basis. The denominator for calculating all rates is the number of decedents assigned to each academic medical center: all deaths, not just those who died in hospital. The results are summarized in Table 3.6.

**Table 3.6. Utilization Rates During the Last Six Months of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of Their Inpatient Care from Selected Academic Medical Centers (Deaths Occurring 2001–05)**

| Academic Medical Center | ICU days per decedent | Percent of deaths associated with ICU admission | Percent admitted to hospice | Physician visits per decedent | Medical specialist visits per decedent | Primary care visits per decedent |
|---|---|---|---|---|---|---|
| **Highest ranked** | 12.5 | 40.0 | 48.4 | 79.3 | 55.8 | 24.2 |
| **2nd highest** | 11.6 | 37.9 | 47.0 | 76.9 | 54.4 | 21.2 |
| **UCLA Medical Center** | 11.6 | 37.9 | 28.8 | 52.8 | 35.3 | 13.7 |
| **Johns Hopkins Hospital** | 4.9 | 23.2 | 35.2 | 28.9 | 12.2 | 13.0 |
| **Cleveland Clinic Foundation** | 4.2 | 23.1 | 36.6 | 33.1 | 16.1 | 13.2 |
| **Mayo Clinic (St. Mary's Hospital)** | 4.2 | 21.8 | 29.1 | 23.9 | 11.6 | 10.4 |
| **Massachusetts General Hospital** | 3.0 | 22.5 | 23.8 | 39.5 | 19.0 | 17.6 |
| **2nd lowest** | 1.7 | 14.8 | 12.2 | 19.5 | 8.0 | 7.0 |
| **Lowest ranked** | 1.5 | 13.0 | 8.4 | 18.4 | 6.2 | 6.7 |

*Note: in this table, the highest, 2nd highest, 2nd lowest, and lowest ranked hospitals are determined on the basis of each individual measure. UCLA was the 2nd highest ranked hospital for ICU days and deaths associated with intensive care, but it was not among the top two for the other measures.*

Here are some highlights of the differences uncovered among America's five best hospitals:

- The UCLA Medical Center was by far the most aggressive in managing chronic illness, as measured by the use of medical specialists and intensive care units, as well as the total number of physician visits. It ranked seventh among the 93 AMCs in total number of physician visits (52.8 visits per patient), 2.2 times more than the Mayo Clinic. The practice style of UCLA physicians was strongly oriented to the use of specialists; its patients received 35.3 visits from medical specialists per decedent over the last six months of life, which was 2.57 times the number of visits from primary care physicians. UCLA topped the list in its use of the intensive care unit. Its patients averaged 11.6 days in ICUs during the last six months of life and 37.9% of decedents experienced a "high-tech death" involving a stay in the ICU.

- Massachusetts General Hospital patients received an average of 39.5 visits during the last six months of life, 1.65 times more than the Mayo Clinic. MGH physician visits were relatively closely divided among medical specialists and primary care physicians. MGH patients received relatively little care in intensive care units—3.0 days per decedent during the last six months of life—the lowest among the five best hospitals and 15th lowest among the 93 AMCs; and 22.5% of its patients experienced an ICU at the time of death.

- Mayo Clinic's St. Mary's Hospital physicians provided an average of 23.9 visits during the last six months of life, the least among the top five best hospitals—only 45% as many as UCLA—and ranked 72nd out of the 93 AMCs. The Mayo Clinic practice style tilted slightly toward medical specialists, with 11% more specialist visits than primary care visits. Mayo Clinic ranked 48th in ICU days, averaging 4.2 days per decedent, and only 21.8% of deaths were associated with an ICU admission.

Among the 93 AMCs, the number of physician visits per decedent varied more than fourfold, from 18.4 visits per decedent for those using the University of Wisconsin Hospital in Madison, to more than to 79 visits for those using Cedars-Sinai Medical Center. The visit rate for the second lowest-ranked hospital, the University of New Mexico Hospital, was 19.5; for the second highest-ranked hospital, New York University Medical Center, it was 76.9 per decedent, almost four times greater. The use of intensive care units varied more than eightfold, from a high of 12.5 days at Thomas Jefferson University Hospital, to a low of 1.5 days at Scott & White Memorial Hospital.

Such hospital-specific data can be used by clinicians and the managers of hospitals to determine where their institutions fit on the spectrum of care intensity. As we discuss in Chapter Five, the documentation of variation in clinical practices among the nation's most prestigious hospitals should motivate academic medical centers to undertake research to improve the scientific basis for clinical decision making, so that their allocation of resources, and consequent utilization, might be based more on evidence and less on the supply of resources, which currently drives the overuse of supply-sensitive services.

## Evaluating the relative efficiency of academic medical centers

While many policy makers have long recognized the relationship between Medicare spending (and spending by private insurers) and unwarranted variation in supply-sensitive care, there has been little agreement about which rate of per capita utilization is right. What has been needed is a method for identifying efficient hospitals, which could be rewarded for their efficiency, and a method to curb utilization and spending by inefficient providers. (Remember, efficiency here means using less money and fewer resources to achieve high-quality care in treating a similar set of patients over a given period of time.) Chapter One introduced the idea of evaluating relative efficiency: identifying providers that use fewer resources to manage chronic illness while maintaining good reputations for high-quality care, and then using these relatively efficient hospitals as benchmarks for other, less efficient providers. The resource inputs and utilization of the benchmark institutions can be used to quantify overuse and set targets for reduction in excess capacity among less efficient providers.

This concept of relative efficiency will not satisfy those who want all the evidence before making decisions about how to allocate resources. For supply-sensitive care, such evidence is simply not currently available. As we discuss in Chapter Five, obtaining the information necessary to base the management of chronic illness on cost-effectiveness criteria should be a national priority. In the meantime, we can be fairly certain that greater intensity of care, even at academic medical centers, does not produce better outcomes. Recently, Dartmouth researcher Elliott Fisher and colleagues have shown that what is true for regions is also true for academic medical centers: AMCs whose practice patterns exhibit greater care intensity tend to have worse long-term (up to five-year) survival rates for patients with hip fracture, heart attack, and colon cancer, probably because while greater intensity of care does not improve outcomes, it does expose patients to the risk of fatal medical errors associated with higher rates of hospitalization.[2] Given the absence of evidence for marginal gain, providers with lower costs and fewer resource inputs, as well as relatively good quality measures, should be viewed as more efficient because they achieve the same or better outcomes using fewer resources and spending less money.

This section uses a comparison between UCLA Medical Center and the Mayo Clinic's St. Mary's Hospital to illustrate the economic consequences if UCLA were to reduce its resource allocation and its utilization rates to look more like the St. Mary's benchmark.

According to CMS Hospital Compare statistics[4], these two academic medical centers both achieved high scores in 2005 for management of heart attacks and congestive heart failure (92% or higher), but for pneumonia care, UCLA fell well below St. Mary's (66% versus 89%). But UCLA's resource use in managing similarly ill patients was much higher. During the last two years of life (for deaths occurring between 2001–05), UCLA used 1.47 times more hospital beds and 2.07 times more intensive care (high- and intermediate-intensity) beds per capita than St. Mary's. UCLA also used much more physician labor: almost double the amount of total FTE physician labor, which included 2.39 times more medical specialists and 1.42 times more primary care physicians. By definition, compared to UCLA, St. Mary's was relatively efficient. It achieved equal or better quality of care, using many fewer resources. St. Mary's thus qualifies as a benchmark against which to measure overuse at UCLA.

Once the benchmark is selected, the Dartmouth data can be used to quantify overuse. For example, for hospital beds, UCLA used 85.8 beds per 1,000 and St. Mary's used 58.2 per 1,000 over the last two years of life. Overuse at UCLA relative to St. Mary's during this period is the difference between UCLA's and St. Mary's rates, expressed as a percent of the UCLA rate: [(85.8 - 58.2) / 85.8 x 100 = 32.1%].

Here is a summary of the estimates of overuse at UCLA for hospital and physician resources:

**Table 3.7. Overuse of Hospital and Physician Resources Used to Treat Patients with At Least One of Nine Chronic Conditions During the Last Two Years of Life at UCLA Compared to St. Mary's Hospital (Deaths Occurring 2001–05)**

| | Excess UCLA beds according to St. Mary's benchmark | | Excess UCLA physician labor according to St. Mary's benchmark | | |
|---|---|---|---|---|---|
| | Hospital | ICU | Total | Primary care | Medical specialist |
| **UCLA resource input per 1,000** | 85.8 | 38.1 | 38.5 | 9.6 | 21.2 |
| **St. Mary's resource input per 1,000** | 58.2 | 18.4 | 20.3 | 6.8 | 8.9 |
| **Ratio of UCLA rate to St. Mary's** | 1.47 | 2.07 | 1.90 | 1.42 | 2.39 |
| **Percent excess capacity** | 32.1% | 51.6% | 47.3% | 29.4% | 58.2% |

## Benchmarking excess spending due to overuse of hospitals and physician visits

We have already used the medical care cost equation to show how differences in volume and price contributed to the differences in per capita spending among the patients using UCLA and St. Mary's (Tables 3.1 and 3.2). In this section, we illustrate the savings that would accrue if the higher volume of care at UCLA—patient days and physician visits per person—had been reduced to the St. Mary's benchmark.

First, it is worth recalling why we focus on the volume of care. Because the price of care reflects, in part, variation in local and regional costs of labor (and, in the case of teaching hospitals, includes subsidies for medical education), cost is to an extent outside the control of hospital administrators, who must pay the local market price. By contrast, the volume of care (utilization) is at least in theory subject to some control, if hospitals want to reduce costs and if Medicare wants to reduce spending. Disaggregating per capita spending into the volume and price components is thus useful for estimating the potential savings that would accrue if the volume of services provided in more conservative, less resource-intense regions were the standard of practice, while the price of care remained unaltered.

How do we use the medical care cost equation to estimate waste in spending due to overuse of care? The medical care cost equation is first reset to calculate what spending would have been if the utilization rates for a high-use provider were reduced to the benchmark. For example, Table 3.2 showed that the medical care cost equation for reimbursements for physician visits for UCLA was:

| | | | | |
|---|---|---|---|---|
| $5,971 | = | 101.3 | x | $59 |
| (reimb/patient) | | (visits/ patient) | | (reimb/visit) |

At St. Mary's Hospital, for the same period of time and for similar patients, the volume averaged 50.8 visits per patient. Resetting the UCLA visit rate to the St. Mary's benchmark estimates per capita payments for physician services of $2,998 per person (50.8 x $59 = $2,998). The net saving per person is thus $5,971 - $2,998, or $2,974. The same calculations can be made for the hospital payment cost equation (Table 3.1), leading to an estimated net saving per patient of almost $19,000.

The next step is to estimate the total amount of wasted dollars (hospital and physician payments) for care over the last two years of life according to the St. Mary's benchmark. This is calculated by multiplying the number of deaths at UCLA (1,657 for five years) by the average overspending per decedent. Here are the annual estimates of savings:

**Table 3.8. Annual Savings at UCLA Medical Center if Volume Achieved Level of St. Mary's Hospital**

| | Savings per decedent | Annual estimate of savings (2003 dollars in millions) | Percent saved over five years |
|---|---|---|---|
| **Inpatient care** | $18,785 | $6.2 | 32.1% |
| **Physician visits** | $2,974 | $1.0 | 49.8% |
| **Total** | $21,758 | $7.2 | 33.7% |

If UCLA had adopted the St. Mary's benchmark for the volume of inpatient care—days per 1,000—spending on inpatient care per decedent would have been about $19,000 less, resulting in a 32% reduction in per capita spending and a net saving of $6.2 million per year. If the St. Mary's benchmark for physician visits had been achieved, reimbursements per decedent for physician services would have been almost $3,000 less, for a total savings of $1 million, or 49.8%.[iii] Practicing more efficient medical care in the many hospitals that currently fail to meet the St. Mary's benchmark for the general Medicare population would save billions of dollars every year.

## Evaluating performance

### Discerning the effects of capacity

As this chapter has shown, academic medical centers vary in the per capita number of physicians and beds they use relative to the size of the patient populations they serve. Dartmouth researchers have long been interested in the effect of capacity on clinical decision making. In the case of supply-sensitive care, the effect is revealed in a hospital's "medical signature," a characteristic pattern of practice that persists over time and is consistent across different diseases. In research conducted in the 1970s and 1980s, we looked at hospitalization rates for patients with chronic illnesses who lived in Boston, Massachusetts, where Harvard's medical school is located, and New Haven, Connecticut, home to Yale University's medical center.[5] This research found that hospitalization rates for medical (non-surgical) conditions were consistently higher in Boston, where there were more hospital beds per capita. The increased Boston rates were independent of the specific illness; admission rates were uniformly higher compared to New Haven's rates for similar patients, regardless of the conditions for which they were hospitalized.

[iii] In 2006 dollars, the annual estimates of savings would be $6.9 million for inpatient care and $1.1 million for physician visits, for a total estimated annual savings of $8.0 million.

We see a similar pattern among the 93 academic medical centers: hospitals with low utilization rates for one chronic condition tend to have low rates for other chronic conditions, and vice versa. Figure 3.2 shows the relationship between hospital day rates for patients with cancer and with congestive heart failure (CHF). Similar correlations are observed between other chronic illnesses. The association ($R^2$) between hospital day rates for patients with chronic obstructive pulmonary disease (COPD) and CHF was 0.84; between patients with COPD and cancer the $R^2$ was 0.73. For physician visits the associations were as follows: between patients with COPD and CHF, $R^2 = 0.72$; COPD and cancer, $R^2 = 0.75$; and cancer and CHF, $R^2 = 0.69$.

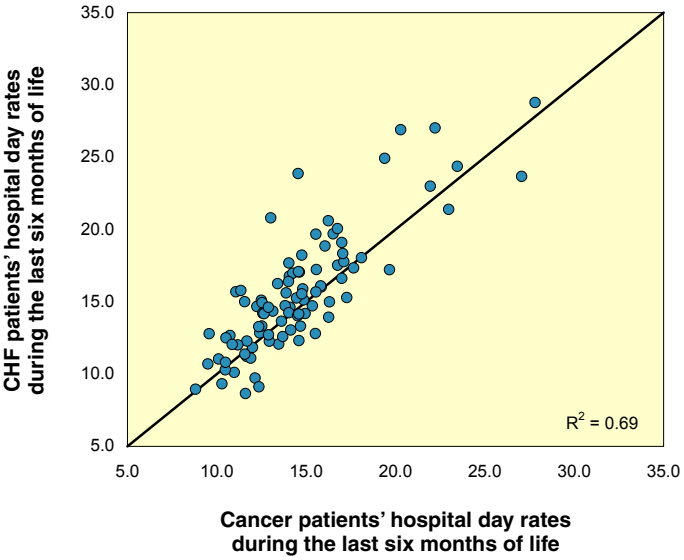



**Figure 3.2. Association Between Hospital Day Rates per Decedent for Patients with Cancer and CHF During the Last Six Months of Life Among Patients Receiving Most of their Care at Selected Academic Medical Centers (Deaths Occurring 2001–05)**

A hospital's medical signature also holds true for patients with different socio-demographic backgrounds. In the research comparing Boston and New Haven, for example, there was a consistent pattern of hospitalization rates, regardless of whether patients were male or female, young or old, black or white, low-income or not. This is a curious finding, since socio-demographic variables are known to predict the need for care, yet they seem to have little bearing on how much care is given. For example, among academic medical centers, the correlation between hospital day rates for low-income patients (measured by Medicaid buy-in) and all other patients using the same hospital is very high ($R^2 = 0.87$) (Figure 3.3). While income is a recognized factor in predicting need for care, it has little influence on utilization rates. Hospital day rates for Medicaid patients tended to be about the same as for non-low income patients using the same hospital (as indicated by the tight clustering of the data around the 45 degree line in the figure). Where patients got their care, or the "hospital effect," was similarly important for black and white patients ($R^2 = 0.66$), younger and older Medicare patients ($R^2 = 0.84$), and male and female patients ($R^2 = 0.93$). Correlations between these groups were also high for physician visit rates.

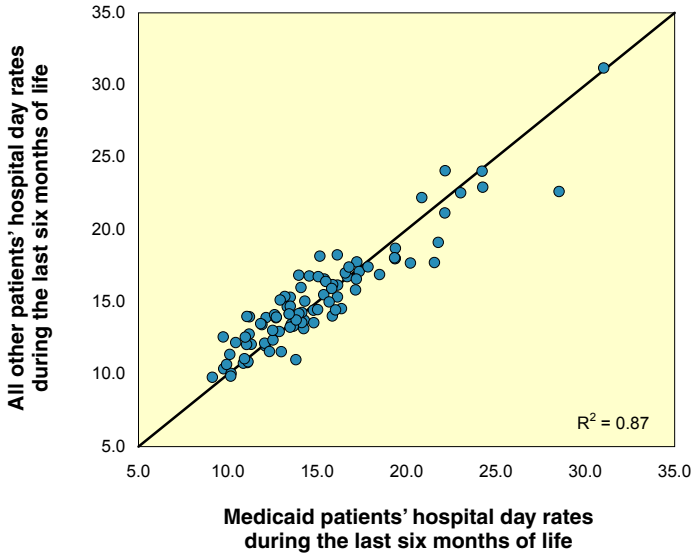



**Figure 3.3. Association Between Hospital Day Rates per Decedent for Patients with and without Medicaid During the Last Six Months of Life Among Patients with At Least One of Nine Chronic Conditions Receiving Most of their Care at Selected Academic Medical Centers (Deaths Occurring 2001-05)**

This hospital effect, or medical signature, is also consistent over time. Previous research has shown that the variation in care among regions during the last six months of life is strongly correlated with care variation in previous periods during the lives of the same patients, even though patients who were further from death were less severely ill.[6] In other words, hospitals that tended to deliver high-intensity care in the last six months of life, when patients were sickest, also delivered relatively high-intensity care in the previous eighteen months of life, when patients were not as ill. We observed the same phenomenon among academic medical centers; it was evident in the close correlation between frequency of care among academic medical centers in the last six months of life (measured by hospitalization and physician visits) and frequency of care in previous intervals of time prior to death. In Figures 3.4 and 3.5, close relationships are shown between hospitalization and visit rates during the last six months of life and during the 19–24 months prior to death. That patients were less ill during the earlier period is reflected in the fact that hospitalization rates and physician visits were roughly three to five times greater during the last six months of life. But the variation in rates among hospitals was striking during both periods, and it was highly correlated for each individual hospital. In light of these associations, the intensity of care during the last six months of life can be viewed as a valid illness-adjusted indicator of a specific provider's practice style for managing chronic illness overall, not just a measure of "end-of-life" care during the terminal phase of illness.

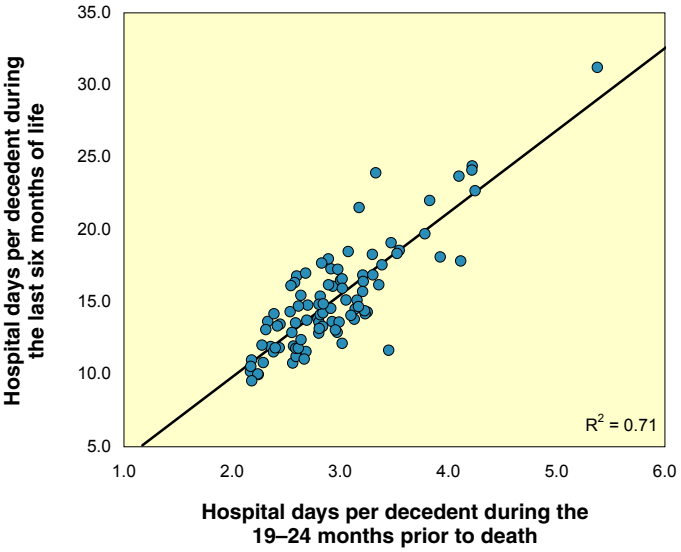



**Figure 3.4. The Relationship Between Hospital Day Rates During the Six Months and 19–24 Months prior to Death Among Patients with At Least One of Nine Chronic Conditions Receiving Most of their Care at Selected Academic Medical Centers (Deaths Occurring 2001–05)**

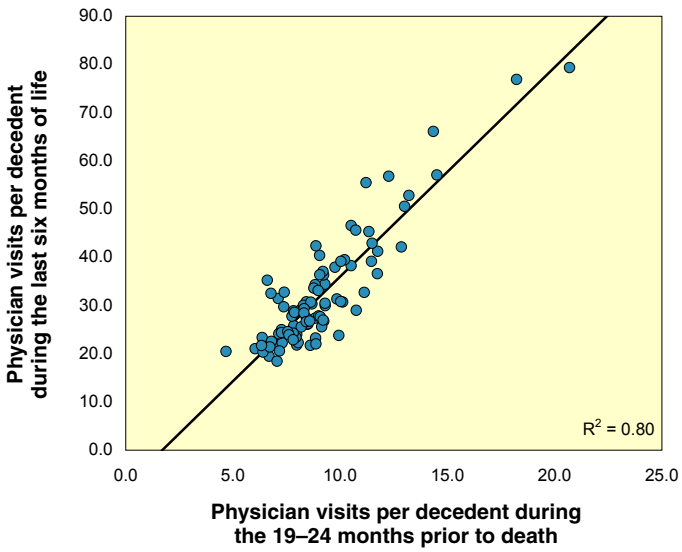



**Figure 3.5. The Relationship Between Physician Visit Rates During the Six Months and 19–24 Months prior to Death Among Patients with At Least One of Nine Chronic Conditions Receiving Most of their Care at Selected Academic Medical Centers (Deaths Occurring 2001–05)**

The patterns of practice revealed in the correlations in Figures 3.2–3.5 are borne out in the patterns of practice at USN&WR's five best hospitals. Consider, for example, the differences between the Mayo Clinic's St. Mary's Hospital and UCLA:

- Hospital day rates per decedent during last six months of life at UCLA were 1.55 times those of the Mayo Clinic; for patients with cancer, CHF, and COPD they were 1.64, 1.37, and 1.50 times higher.

- Physician visit rates per decedent during the last six months of life at UCLA were 2.21 times greater than the Mayo Clinic; when physician visit rates were separated for patients with cancer, CHF, and COPD, they were 2.10, 2.24, and 2.02 times greater at UCLA.

- Hospital day rates per decedent for low-income patients were 1.78 times greater at UCLA than at the Mayo Clinic; for older patients they were 1.61 times greater; for younger patients, 1.65; for males, 1.53; and for females, 1.57.

- Hospital day rates during the last six months of life were more than four times higher than during the 19–24 months prior to death for patients at both UCLA and the Mayo Clinic. But during both periods, rates at UCLA exceeded rates at the Mayo Clinic by at least 20%.

In Chapter Five, we will discuss how these measures of relative intensity can be used to monitor changes in the patterns of care as hospitals reform their capacity and actively manage chronic illness.

## Assumptions and facts concerning coordination between sectors of care

Through its reimbursement policies, Medicare has encouraged communities and hospitals to increase investment in health care sectors other than acute care hospitals. This policy has to a large extent been based on the assumption that in health care markets, tradeoffs occur; that is, investments in ambulatory care, skilled nursing facilities, long-term care hospitals and rehabilitation facilities, home health services, and hospice care result in reduced demand for acute care hospitals. If this assumption were true, we would expect to see an inverse relationship between the utilization of these community-based services and utilization of acute care in hospitals.

As described in the previous chapter, we saw no evidence that higher spending in non-hospital settings was associated with lower spending on care delivered in hospitals, with the exception of hospice care, where we found that higher spending was associated with slightly lower inpatient spending. The findings reported in this section should therefore come as no surprise. We examined the relationships between utilization rates of community-based care and inpatient acute care at AMCs during the last two years of life, measured in terms of patient days spent in hospitals and physician visits that occurred during an acute care hospital admission. Among the 93 academic medical centers we found that:

- Physician visits in ambulatory settings (offices, outpatient facilities, and emergency rooms) varied by a factor of 2.9 and were associated with greater numbers of inpatient visits ($R^2$ = 0.35), greater numbers of inpatient days ($R^2$ = 0.26), and higher Medicare inpatient spending ($R^2$ = 0.25).

- Home health agency visits varied more than eightfold and were positively correlated with inpatient days ($R^2$ = 0.12), inpatient visits ($R^2$ = 0.14), and inpatient spending ($R^2$ = 0.08).

- Patient days in skilled nursing facilities varied more than fourfold, and use of inpatient rehabilitation and long-term care hospitals varied almost 300 times. However, utilization of these facilities measured in patient days of care per decedent was essentially uncorrelated with inpatient day rates: $R^2$ = 0.00 for both skilled nursing facilities and long-term hospital utilization. Medicare inpatient sector spending was also unrelated ($R^2$ = 0.00) to skilled nursing facility day rates, and positively correlated ($R^2$ = 0.02) with long-term hospital day rates.

- Only in the case of hospice care did a lower-cost, community-based service appear to substitute for high-cost inpatient care. Hospice utilization, measured as days enrolled in hospice per decedent, varied by a factor of 19 among the 93 academic medical centers. Hospice utilization was associated with lower inpatient day rates ($R^2$ = 0.17; negative association), lower inpatient visit rates ($R^2$ = 0.10; negative association), and lower inpatient spending ($R^2$ = 0.20; negative association). There was also a negative relationship between the percent of patients using hospice and the percent of inpatient deaths associated with an ICU admission ($R^2$ = 0.09; negative association).

These data suggest that there is little coordination between sectors of care, a finding that raises the question of who should be in charge: who should coordinate a patient's care? Is it the responsibility

of the acute care hospital? The primary care physician? The patient's family? The answer to this question has implications both for the cost of care and for its quality.

## Assumptions and facts concerning "systemness"

The Institute of Medicine has made achievement of "systemness" a goal of health care reform, under the assumption that organized care is best because it can take a "systems" approach to health care delivery. But where do we find this systemness? Many policy makers argue that systemness, or organization, is an attribute of large group practices such as the Mayo Clinic. The Dartmouth Atlas provides evidence that group practices generally use fewer resources, have lower spending, and provide higher quality care, at least when compared to less well organized providers. However, the assumption that a large group practice constitutes a "system" of care, in the sense that care among its constituent providers follows a defined and replicable model of management, has yet to be critically examined. In this section, we apply the tools of provider-specific performance measurement to look for evidence of consistency in the care provided to chronically ill patients who use the various hospitals (and associated physicians) belonging to the Mayo Foundation health system.

Over the years, the Mayo Foundation system has grown beyond its original Rochester site to establish group practices in Phoenix, Arizona; Jacksonville, Florida; Eau Claire and La Crosse, Wisconsin; and several other communities in Minnesota and Iowa. In this section we compare resource inputs and care intensity patterns for patients using the Mayo Clinic affiliated hospitals in Phoenix (Mayo Clinic Hospital), Jacksonville (St. Luke's Hospital), Eau Claire (Luther Hospital), and La Crosse (Franciscan Skemp Hospital) to the system's flagship AMC, St. Mary's Hospital in Rochester. The analysis uncovers surprising variation within the Mayo system. Indeed, the spectrum of approaches to caring for patients with severe chronic illness ranges from a low resource input, low-intensity end-of-life pattern favoring primary care to high resource input, high-intensity end-of-life care relying on medical specialists. In short, we find no evidence that providers in these systems use a distinctly Mayo Clinic strategy for allocating resources and managing chronic illness.

Appendix Table 2 profiles the performance measures among providers in the Mayo system. Here is a summary of the variation:

- The La Crosse Mayo site exemplified a low resource/high quality practice pattern dominated by primary care. ICU bed inputs were low: 11.0 beds per 1,000. Total physician workforce inputs were well below those for St. Luke's in Jacksonville, St. Mary's in Rochester, and the Mayo Clinic Hospital in Phoenix, with primary care labor inputs exceeding medical specialist inputs by 2.5 to 1. During the last six months of life, both physician visit rates and the intensity of terminal care were low, with only 13.6% of deaths associated with a stay in intensive care. The CMS quality scores were excellent, well above the national average.

- The Eau Claire Mayo exemplified a low resource/reasonable quality practice pattern associated with a workforce predominantly comprised of medical specialists. While the total physician labor used in caring for chronically ill patients over the last two years of their lives was relatively low, the mix favored specialists. Indeed, the workforce configuration for Eau Claire Mayo was even more oriented toward medical specialists than Mayo Phoenix (as indicated by the ratio

of medical specialist to primary care labor input: 1.25 for Eau Claire, 1.09 for Mayo Phoenix). ICU bed use was low: 10.7 beds per 1,000. Although physician visit rates during the last six months of life tended to be higher than for La Crosse, the intensity of care measured by the proportion of deaths associated with ICUs was lower. The quality score was above average, but the lowest of the profiled sites.

- The Phoenix Mayo had a mixed resource use profile. Physician labor input was relatively high—19% greater than St. Mary's—and, like St. Mary's, the mix favored specialty care, though to a lesser extent than seen at St. Mary's and the Jacksonville Mayo site. However, ICU bed use was relatively low: 11.5 per 1,000, about 62% of the amount used by St. Mary's. While physician visit rates during the last six months of life were relatively high, the intensity of terminal care was low, with about 11% of patient deaths associated with a stay in an ICU. The quality score was the highest among all Mayo sites.

- The Jacksonville Mayo exemplified a high resource use/reasonable quality practice pattern. ICU bed inputs were 25.7 beds per 1,000, 40% more than at Mayo's flagship St. Mary's Hospital, and more than two times higher than at Phoenix Mayo. Physician labor input over the last two years of life averaged 31.7 physicians per 1,000 decedents, 56% more than similar patients treated at St. Mary's, and 85% more than for La Crosse Mayo. The Jacksonville physician workforce orientation tilted toward medical specialists, with 14.6 specialists and 10.7 primary care physicians per 1,000 decedents, for a medical specialist/primary care labor input ratio of 1.37, the highest among the sites. During the last six months of life, St. Luke's (Jacksonville) patients averaged 41.8 visits per person, 75% more visits than St. Mary's and twice as many as La Crosse Mayo's patients. The quality score for Jacksonville Mayo was above the national average.

In Chapter Five we will return to the apparent efficiencies of group practices and the leadership role that they should play, along with other integrated health care systems, in reducing unwarranted variation, promoting improvement in clinical science, and achieving accountability for population-based management of chronic illness. An important first step would be to examine inconsistencies within systems.

## Care intensity and patient choice

Many Americans are concerned about the care they are likely to receive at the end of life and express their wishes for the care they would prefer through advance directives. Yet as we have seen in this and previous chapters, the patient's wishes have less to do with the intensity of care he or she receives than the practice patterns at the hospital where care is delivered. Hospital-specific data that make end-of-life practice patterns transparent could help patients and families identify providers whose care patterns correspond more closely to their preferences. For those who seek more conservative, less aggressive care, the Dartmouth Atlas can point to those hospitals and associated physicians whose practice patterns match this preference. For those who want as much care as possible, the data show which providers appear to meet this need. Several of the academic medical centers in our study are located within the same communities. Inspection of the data in Appendix Table 1 indicates that within some of these communities, patients have choices when it comes to end-of-life care. For example:

- Among Boston teaching hospitals, Beth Israel Hospital had the most conservative practice patterns, emphasizing primary care and low use of ICUs; the chance of dying in an ICU was relatively low (23.5%). Tufts-New England Medical Center was the most aggressive; patients using this hospital can expect more intensive care and those dying between 2001 and 2005 had a 28.5% chance of dying a high-intensity, ICU-associated death.

- Among Philadelphia's teaching hospitals, the practice patterns were decidedly in favor of medical specialist care and aggressive management of terminal care. The major difference was in intensive care. The Hospital of the University of Pennsylvania would have been the best bet for avoiding a "high-tech" death; the chance that death was associated with an ICU admission was about 25%. Thomas Jefferson was the most aggressive: 35.9% of deaths involved a stay in an ICU.

- Among Manhattan teaching hospitals, the patterns of practice were particularly aggressive at New York University Medical Center. At NYU, visit rates were among the highest among all of the academic medical centers, and care was strongly dominated by medical specialists (the ratio of specialist to primary care visits was 3.15). ICU use was exceptionally high, with 35.1% of deaths associated with a stay in an ICU. For those seeking less aggressive end-of-life care, Mount Sinai would have been the best bet among Manhattan's academic medical centers. Its use of ICUs was relatively low, with 20.2% of deaths associated with an ICU admission, but patients had many physician visits, mostly to medical specialists.

- Among Baltimore teaching hospitals, Johns Hopkins emphasized primary care and was substantially more conservative in its use of ICUs than the University of Maryland teaching hospital. The risk of dying a high-tech, ICU-associated death was about 23% for Hopkins' patients; it was about 36% at the University of Maryland.

Patients and their families who choose hospitals that tend to deliver more intense care at the end of life may have to pay for that extra care out of pocket. Medicare sets the overall price for physician services and pays 80% of that amount directly to the physician, leaving patients responsible for the remaining 20%, which they must pay out of pocket unless they have supplemental insurance or are covered by Medicaid. Medicare also requires a 20% co-payment for durable medical equipment (DME), such as wheelchairs and oxygen for home use. Not surprisingly, the patient's share of the cost of care at the end of life can vary considerably depending upon which hospital is chosen. For example, based on our data, patients dying between 2001 and 2005 who were loyal to Scott & White Memorial Hospital in Temple, Texas could have expected to have 45 physician visits in the last two years of life and incur charges for physician services and durable medical equipment of $10,404 dollars. Of those charges, Medicare would have reimbursed $8,185. Patients who did not have supplemental insurance or Medicaid would have had to come up with $2,219 on their own to pay these bills. By contrast, patients who got their care at UCLA could have expected to visit a physician more than 100 times and ended up responsible for $4,835 dollars to pay for physician services and durable medical equipment. In the next chapter we will look in greater detail at variations among hospitals in the Los Angeles region and provide estimates for how much patients might spend at different hospitals there.

To briefly illustrate the out-of-pocket expenses patient might have incurred at various academic medical centers within a given region, Appendix Table 1 lists the patient's share of physician and DME costs during end-of-life care at the 93 selected AMCs. Here are a few examples:

- Among Boston teaching hospitals, the patient's share of costs would have amounted to $2,979 at Boston Medical Center during the last two years of life. Patients loyal to Beth Israel Deaconess Medical Center faced a more expensive proposition; they could have expected to pay, on average, $3,338 for physician services and durable medical equipment.

- The cost of care in the last two years of life in a Manhattan academic medical center was lowest at New York-Presbyterian Hospital, where patients were responsible for $3,905, on average. Patients would have paid considerably more if they were cared for at NYU Medical Center: we estimate their out-of-pocket payments at $5,544.

- In the greater Washington, D.C. area, Johns Hopkins was more conservative in its use of physician services and durable medical equipment than Georgetown University Hospital, but Hopkins patients would still have been responsible for $3,390. At Georgetown, the cost to patients was $3,526.

## Conclusions

In this chapter, we applied a new tool for evaluating performance to study how America's academic medical centers performed in managing chronic illness. Because the snapshots of performance were taken at fixed intervals of time prior to death, and because we have adjusted for socio-demographic factors and type of chronic disease, we are confident that differences among patients or in severity of illness are not important explanations for variation among academic medical centers. The patterns of care that emerge in this chapter pose several major challenges for academic medicine.

The first challenge concerns the number of physicians needed not just at individual hospitals but also by the nation. The varying patterns of use of the physician workforce at different academic medical centers demonstrate the lack of consensus on how many physicians to use and the preferred mix between specialists and primary care physicians. If there is no consensus on how to use the current supply of physicians, how can academic medicine provide a meaningful estimate of how many the nation now needs, much less what will be needed in the future? The current debate over the projected need for physicians cannot be resolved without understanding the effects that physician workforce supply and mix currently have on utilization patterns.

The varying patterns of care intensity—the frequency of physician visits, hospitalizations, and use of intensive care—appear chaotic when looking at all 93 integrated academic medical centers. Yet care intensity comes into focus when viewed as a function of available resources. For a given provider, this pattern is consistent over time and across patients with different chronic diseases and characteristics. We also see few tradeoffs between various sectors of care. The fact that different academic medical centers can deliver such different care to similar patients challenges the claim that science governs the day-to-day clinical decisions that go into managing chronic illness, even at the nation's best hospitals.

In Chapter Five, we will consider how academic medical centers might meet the challenges of practice variation. The next chapter takes a look at the patterns of care in Los Angeles, evaluated against the benchmarks of three relatively efficient, organized health care systems.

## Endnotes

[1] "Best Hospitals 2007," *U.S.News & World Report*: http://health.usnews.com/usnews/health/best-hospitals/honorroll.htm.

[2] Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ. Variations in the longitudinal efficiency of academic medical centers. *Health Affairs* web exclusive, 7 Oct 2004.

[3] GovTrack.us. H.R. 2123—110th Congress (2007): Nurse Staffing Standards for Patient Safety and Quality Care Act of 2007, *GovTrack.us (database of federal legislation)* http://www.govtrack.us/congress/bill.xpd?tab=summary&bill=h110-2123 (accessed Sep 25, 2007).

[4] Hospital Compare is available on the Internet at http://www.hospitalcompare.hhs.gov/.

[5] Wennberg JE, Freeman JL, Culp WJ. Are hospital services rationed in New Haven or over-utilized in Boston? *Lancet* 1987;1(8543):1185–88.

Wennberg JE, Freeman JL, Shelton RM, Bubolz TA. Hospital use and mortality among Medicare beneficiaries in Boston and New Haven. *N Engl J Med* 1989;321:1168–73.

[6] Wennberg JE, Fisher ES, Sharp SM, McAndrew M, Bronner KK. *The Care of Patients with Severe Chronic Illness: A Report on the Medicare Program by the Dartmouth Atlas Project*. The Trustees of Dartmouth College, 2006:32.

Chapter Four

# Evaluating the Management of Chronic Illness in Los Angeles

In previous chapters, we argued that there is considerable inefficiency in the way chronic illness is treated in the United States. We know this because of the wide variation in the care given to the chronically ill in different parts of the country and the failure of higher utilization to produce better outcomes. Because of the close association between capacity and utilization characteristic of supply-sensitive services, finding a remedy for the overuse of acute care hospitals will depend not just on improving the evidence base at the clinical level; it will also depend upon reorganizing how care is delivered and helping providers control capacity and learn to use resources more efficiently.

In the previous chapter, we introduced the concept of using the spending, resource input, and utilization profiles of relatively efficient providers as the principal measuring stick for evaluating the efficiency of other hospitals. Measuring relative efficiency offers a means not only to rank hospitals; it also gives less efficient providers models for how to allocate resources more rationally and to base their investments in physician labor and hospital beds on the actual size of the chronically ill populations they serve. We can now judge providers on the basis of overall per capita spending, as well as on spending and resource inputs according to the site where care is delivered: acute care hospitals, ambulatory settings, skilled nursing facilities, long-term care hospitals, patients' homes, and hospices. Providers can also be evaluated on the basis of their utilization (volume) of care. The quality of care can be evaluated using accepted technical process measures such as those that can now be found on the Centers for Medicare & Medicaid Services (CMS) website, Hospital Compare.[1] Patient experience—in terms of care intensity during the last six months of life and the average co-payments patients and their families are responsible for—should also be taken into account when judging provider efficiency. If CMS were to use these measures as the basis for reimbursement, we predict that most hospitals would soon find ways to reduce overcapacity and overtreatment and become more efficient.

What this might mean in real terms for patients can be estimated by looking at hospitals in Los Angeles, a hospital referral region that epitomizes high-cost, resource-intensive, high-intensity health care. The region as a whole ranked third among the 306 Atlas hospital referral regions in Medicare spending, second in intensive care bed use per 1,000 in the chronically ill Medicare population, and second in per capita physician labor input during the last two years of life for patients dying during the five-year period 2001–05. Care intensity during the last six months of life was also very high. Los Angeles patients were near the top of the national distribution in "high-tech" deaths: more than 30% of deaths were associated with intensive care, third highest in the nation. Because of its high-intensity pattern of care, Los Angeles also ranked near the top (third out of 306 regions) in the amount of co-payments for which patients were responsible.

But the health care providers serving any given region are not all alike, including the providers in Los Angeles. Some deliver a greater volume of per capita inpatient care and physician visits, use more beds and physician labor, and have higher prices than others. Perhaps surprisingly, some Los Angeles hospitals, at least compared to the standards of the region, are relatively efficient; they

use many fewer resources but score well on available measures of quality, and their patients have lower co-payment burdens and experience lower care intensity at the end of life. As we will discuss in the next chapter, hospital-specific information on performance in managing severe chronic illness—resource inputs, contributions of volume and price to per person spending, and profiles of care intensity—will be vital both to designing pay-for-performance interventions aimed at improving efficiency, and helping patients and their families choose providers whose patterns of practice fit their preferences for end-of-life care.

This chapter looks at the Los Angeles region as a case study of how Dartmouth Atlas data can be used to evaluate the performance of providers. There are 77 individual hospitals located within the Los Angeles hospital referral region with sufficient numbers of patients to meet our statistical standards for performance measurement.[i] Eighteen are located within central Los Angeles; the remaining 59 are in surrounding communities. Hospitals in Los Angeles tend to be relatively small. According to information provided by the American Hospital Association's 2005 Annual Survey, only two had more than 600 beds: Cedars-Sinai (855) and the Los Angeles County teaching hospital associated with the University of Southern California (737). The number of beds at 19 hospitals ranged from 300 to 600; 31 were between 150 and 299; and 25 hospitals had fewer than 150 beds.[2]

The chapter first focuses on examining the pattern of variation among Los Angeles hospitals and comparing their rates to three benchmark providers. All three benchmarks are organized systems. They used fewer resources per capita than even the most efficient Los Angeles hospital, and they had composite Hospital Compare quality scores above the Los Angeles average. Patients using the benchmark providers experienced lower care intensity and paid lower co-payments. The benchmark systems are the Mayo Foundation system hospitals serving the Rochester, Minnesota region; the Intermountain Healthcare (IHC) hospitals located in the Salt Lake City and Ogden, Utah regions; and the Sutter system hospitals serving the Sacramento, California region. Each of these systems actively encourages coordination of care among its physicians, all of whom are on staff and practice in multi-specialty groups. The benchmark systems differ in one key feature. Sutter and IHC evolved from the consolidation of several hospitals into integrated systems, where the organization of the physician staff into group practices remains an ongoing process. The Mayo Clinic began as a group practice in Rochester and has since grown to include a large number of communities in Minnesota, Iowa, and Wisconsin as well as practices located in Jacksonville, Florida and Phoenix, Arizona.

The second part of this chapter focuses on how Dartmouth Atlas data can be applied to evaluate the performance of individual hospitals belonging to a given hospital system or located within a given community. Performance is evaluated along three dimensions: Medicare spending, information of particular relevance to payers and policy makers; resource allocation, which should be useful to those responsible for making decisions that affect the capacity of a given provider relative to the size of the population it serves; and care intensity during the last six months of life and during the terminal phase of care, information about the patient experience that should be useful to patients with severe chronic illness and their families in making decisions about where to get their care.

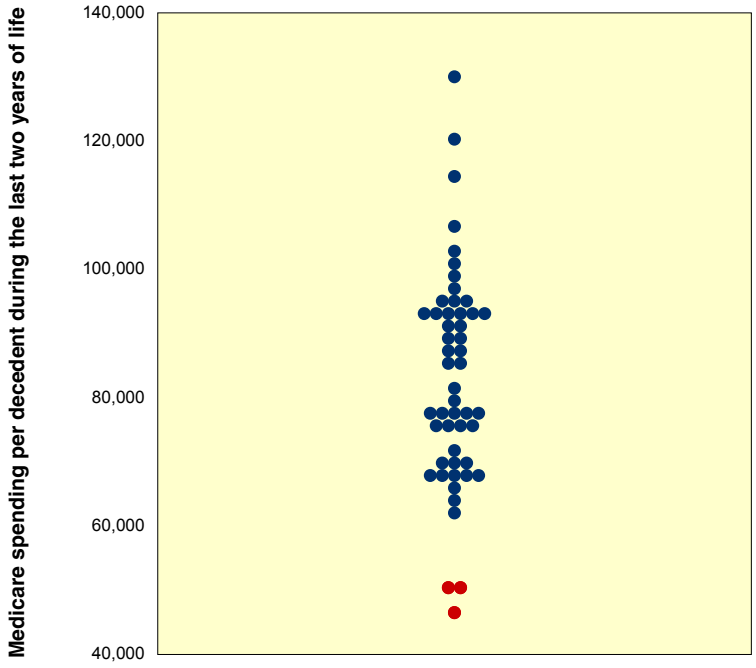
[i] Hospitals belonging to the Kaiser Permanente system are not included in our study, since they do not serve the fee-for-service Medicare population.

## How Health Care Varies Among Los Angeles Hospitals

### Variations in Medicare spending during the last two years of life

The hospitals in the Los Angeles basin varied substantially in the amount of Medicare dollars they spent in managing chronic illness over the last two years of life. Medicare spending at the most costly hospital was about $131,000, more than two times higher than the lowest-spending Los Angeles hospital, where the rate was about $61,200 per decedent. Compared to the three benchmark regional care systems, per decedent spending for similar patients at the most costly Los Angeles hospital was 2.58 times higher than the Sutter system, 2.61 times higher than the Mayo system, and 2.82 times higher than Intermountain Healthcare. As we discuss in more detail below, many of the most expensive hospitals in Los Angeles are not academic medical centers, but relatively unknown community hospitals, a number of which are located outside of the city center. It is worth noting that the $61,200 per person spending rate at the least costly Los Angeles hospital, while low by Los Angeles standards, still exceeded the organized care system benchmarks by 21% for Sutter, 22% for the Mayo Clinic, and 32% for IHC. Figure 4.1 illustrates the variation among Los Angeles hospitals.[ii]

[ii] The profiles in Figures 4.1 through 4.5 are based on the 48 hospitals that had 400 or more deaths from chronic illness over the five-year period from 2001–05 (i.e., restricted to hospitals that meet the sample requirements for use of the 20% physician [Part B] database). Los Angeles hospitals are compared to one another and to the three organized hospital systems.



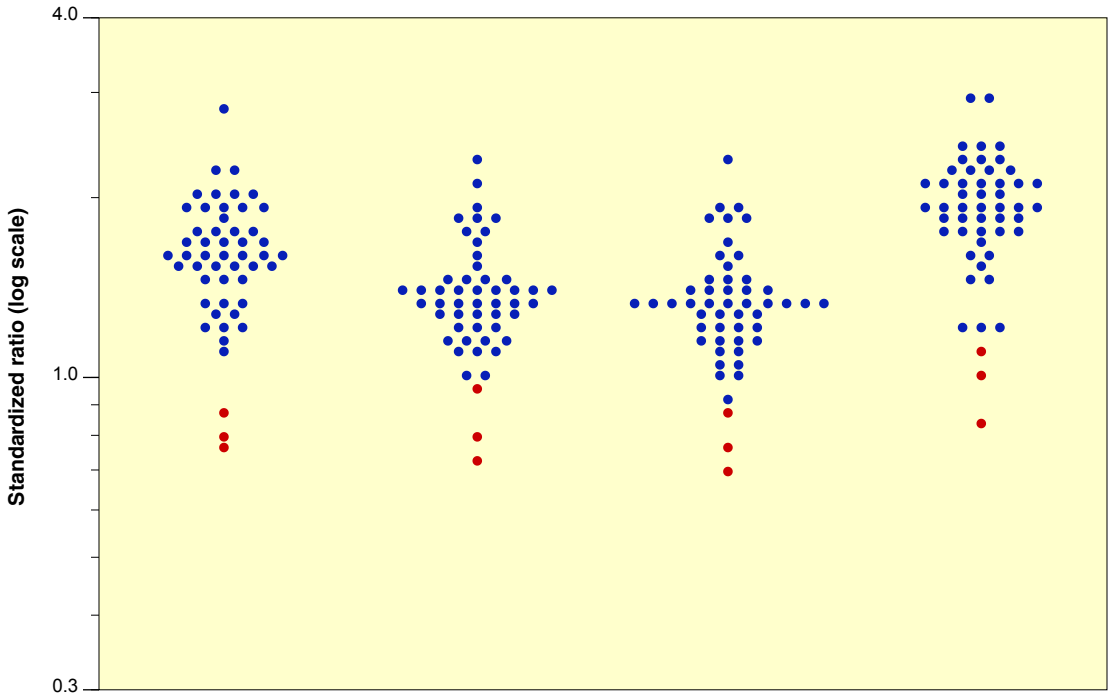

| | Rate | Ratio to IHC |
|---|---|---|
| Highest | $130,992 | 2.82 |
| 2nd highest | $120,756 | 2.60 |
| 75th percentile | $93,862 | 2.02 |
| L.A. hospitals average | $84,317 | 1.82 |
| 25th percentile | $74,120 | 1.60 |
| 2nd lowest | $63,661 | 1.37 |
| Lowest | $61,239 | 1.32 |
| Sutter (Sacramento) | $50,718 | 1.09 |
| Mayo (Rochester) | $50,273 | 1.08 |
| IHC (SLC/Ogden) | $46,377 | 1.00 |

**Figure 4.1. Medicare Spending per Decedent During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Los Angeles Hospitals and Selected Benchmark Systems (Deaths Occurring 2001–05)**

Each dot represents one of 48 hospitals in the Los Angeles HRR. The positions of the three benchmark organized care systems are also noted. The table accompanying the figure gives the rates for the two hospitals with the highest spending; the hospital located at the 75th percentile; the average for all included Los Angeles hospitals; the hospital at the 25th percentile; the two lowest Los Angeles hospitals; the rates for the Sutter, Mayo, and IHC systems; and the ratio to the IHC system. Appendix Table 3 gives hospital-specific data for all Los Angeles hospitals with 400 or more deaths.

## Variations in resource inputs during the last two years of life

Variations among Los Angeles hospitals in the amount of physician labor and hospital resources devoted to the management of chronic illness were equally striking.




| | Physician labor | | RN labor requirement | | Hospital beds | | ICU beds | |
|---|---|---|---|---|---|---|---|---|
| | Rate | Ratio to IHC | Rate | Ratio to IHC | Rate | Ratio to IHC | Rate | Ratio to IHC |
| **Highest** | 67.7 | 3.66 | 130.8 | 3.11 | 145.2 | 3.36 | 48.5 | 3.61 |
| **2nd highest** | 54.2 | 2.93 | 118.4 | 2.81 | 124.0 | 2.87 | 46.4 | 3.45 |
| **75th percentile** | 45.0 | 2.43 | 83.5 | 1.98 | 92.1 | 2.13 | 35.1 | 2.61 |
| **L.A. hospitals average** | 41.3 | 2.23 | 81.1 | 1.93 | 88.8 | 2.06 | 32.3 | 2.40 |
| **25th percentile** | 36.2 | 1.96 | 69.9 | 1.66 | 77.8 | 1.80 | 28.5 | 2.12 |
| **2nd lowest** | 28.6 | 1.55 | 58.2 | 1.38 | 63.2 | 1.46 | 19.5 | 1.45 |
| **Lowest** | 27.2 | 1.47 | 57.1 | 1.36 | 59.7 | 1.38 | 19.3 | 1.44 |
| **Sutter (Sacramento)** | 21.4 | 1.16 | 44.6 | 1.06 | 49.0 | 1.13 | 18.0 | 1.34 |
| **Mayo (Rochester)** | 19.4 | 1.05 | 53.5 | 1.27 | 56.2 | 1.30 | 16.5 | 1.22 |
| **IHC (SLC/Ogden)** | 18.5 | 1.00 | 42.1 | 1.00 | 43.2 | 1.00 | 13.4 | 1.00 |

**Figure 4.2. Physician Labor, Inpatient Registered Nurse Requirements, and Bed Inputs per 1,000 Patients with At Least One of Nine Chronic Conditions in the Last Two Years of Life Among Los Angeles Hospitals and Selected Benchmark Systems (Deaths Occurring 2001–05)**

Each dot represents one of 48 hospitals in the Los Angeles HRR. The positions of the three benchmark organized care systems are also noted. The table beneath the figure identifies the two hospitals with the highest labor and bed inputs; the hospital located at the 75th percentile; the average for all included Los Angeles hospitals; the hospital at the 25th percentile; the two lowest Los Angeles hospitals; the rates for the Sutter, Mayo, and IHC systems; and the ratio to the IHC system. Appendix Table 3 gives hospital-specific data for all Los Angeles hospitals with 400 or more deaths.

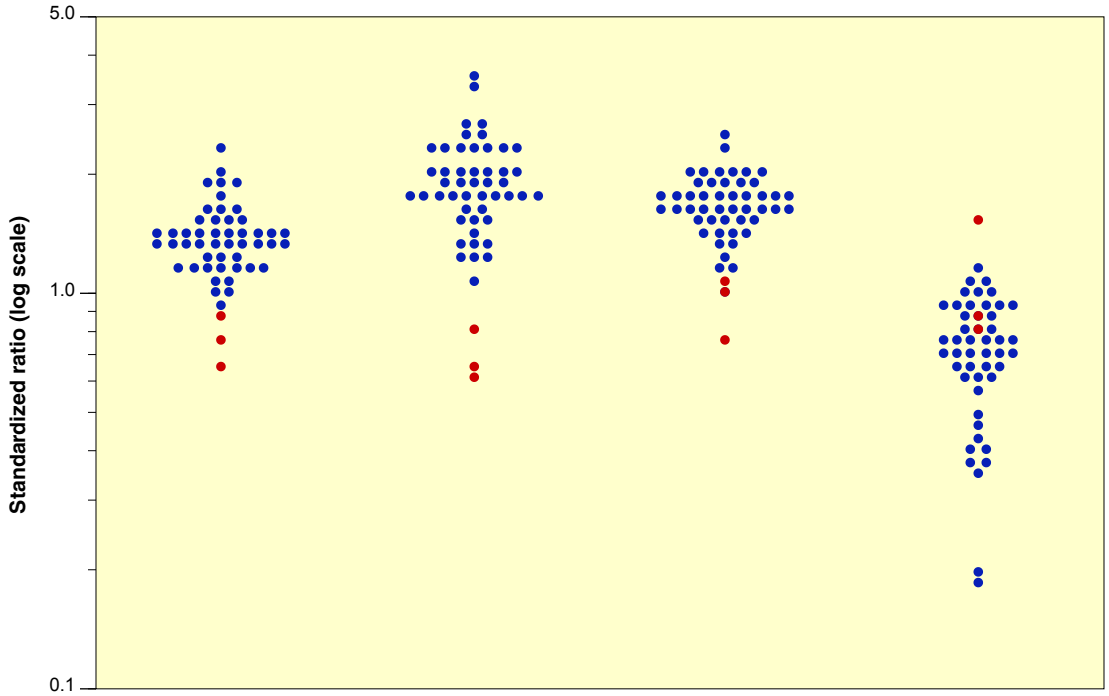
This figure shows that the full-time equivalent (FTE) physician labor per 1,000 patients during the last two years of life varied by a factor of 2.5, from 27.2 to 67.7 FTEs. Again, every Los Angeles hospital exceeded the benchmarks provided by the three organized care systems. Using IHC as the benchmark suggests that the excess of physician labor in Los Angeles hospitals ranged from 47% to 266%: more than three and a half times the number of full-time equivalent physicians used to care for similar patients in the IHC system. The Mayo Clinic benchmark predicted nearly the same excess physician labor: from 40% excess at the lowest Los Angeles hospital to 248% at the highest.

According to the proposed federal requirements for inpatient registered nurse staffing discussed in Chapter Three, the highest-ranked hospital in Los Angeles would have needed 2.3 times as many nurses (130.8 per 1,000 patients) as the lowest ranked hospital (57.1) and more than three times as many nurses as IHC (42.1) to manage similar patients. The lowest ranked hospital would have needed 36% more nurses than IHC under this standard.

Hospital bed inputs ranged from 59.7 to 145.2 beds per 1,000 patients during the last two years of life among Los Angeles hospitals, a factor of 2.43. Compared to the benchmarks, every hospital in Los Angeles had excess capacity. ICU bed inputs (high- and intermediate-intensity) varied more than two and a half times, from 19.3 to 48.5 beds per 1,000 patients during the last two years of life. Every Los Angeles hospital exceeded the IHC benchmark by at least 40%; the highest Los Angeles hospital used 3.61 times more ICU beds than IHC. Compared to the Mayo Clinic system, the highest Los Angeles hospital used 2.95 times more ICU beds, while the lowest hospital exceeded the benchmark by a factor of 1.17; the corresponding estimates for excess capacity based on the Sutter benchmark were 2.70 for the highest Los Angeles hospital and 1.07 for the lowest.

## Variations in patient experience at the end of life

The care delivered to patients in the Los Angeles region varied substantially in its intensity during the last six months of life, exceeding the benchmarks from organized care systems in most cases by wide margins.




| | Hospital days | | Physician visits | | Percent of deaths with ICU admission | | Percent admitted to hospice | |
|---|---|---|---|---|---|---|---|---|
| | Rate | Ratio to IHC | Rate | Ratio to IHC | Rate | Ratio to IHC | Rate | Ratio to IHC |
| **Highest** | 30.0 | 3.41 | 123.7 | 6.16 | 49.6 | 3.48 | 35.7 | 0.79 |
| **2nd highest** | 26.7 | 3.03 | 110.6 | 5.51 | 45.8 | 3.22 | 33.3 | 0.74 |
| **75th percentile** | 20.1 | 2.28 | 75.8 | 3.78 | 35.5 | 2.49 | 27.6 | 0.61 |
| **L.A. hospitals average** | 18.8 | 2.14 | 65.1 | 3.25 | 33.1 | 2.33 | 22.7 | 0.50 |
| **25th percentile** | 15.8 | 1.80 | 54.9 | 2.73 | 29.6 | 2.08 | 18.7 | 0.42 |
| **2nd lowest** | 13.2 | 1.49 | 40.8 | 2.03 | 21.7 | 1.53 | 6.2 | 0.14 |
| **Lowest** | 12.3 | 1.40 | 35.9 | 1.79 | 19.8 | 1.39 | 5.5 | 0.12 |
| **Sutter (Sacramento)** | 10.3 | 1.17 | 27.0 | 1.34 | 21.2 | 1.49 | 24.8 | 0.55 |
| **Mayo (Rochester)** | 11.6 | 1.32 | 23.0 | 1.15 | 19.4 | 1.36 | 26.9 | 0.60 |
| **IHC (SLC/Ogden)** | 8.8 | 1.00 | 20.1 | 1.00 | 14.2 | 1.00 | 45.1 | 1.00 |

**Figure 4.3. Care Intensity During the Last Six Months of Life for Patients with At Least One of Nine Chronic Conditions Among Los Angeles Hospitals and Selected Benchmark Systems (Deaths Occurring 2001–05)**

Each dot represents one of 48 hospitals in the Los Angeles HRR. The positions of the three benchmark organized care systems are also noted. The table beneath the figure identifies the two hospitals with the highest hospital days, physician visits, percent of deaths associated with an ICU admission, and percent admitted to hospice; the hospital located at the 75th percentile; the average for all included Los Angeles hospitals; the hospital at the 25th percentile; the two lowest Los Angeles hospitals; the rates for the Sutter, Mayo, and IHC systems; and the ratio to the IHC system. Appendix Table 3 gives hospital-specific data for all Los Angeles hospitals with 400 or more deaths.

Days spent in hospital during the last six months of life varied from 12.3 to 30.0 per decedent; every hospital exceeded the IHC, Mayo Clinic, and Sutter benchmarks. Physician visit rates varied from 35.9 visits per decedent to 123.7, a more than threefold range of variation. The second highest visit rate was 110.6 visits per decedent, 2.7 times higher than the hospital with the second lowest rate (40.8 visits per decedent). Visit rates for patients using the three benchmark organized care systems were substantially lower than even the lowest Los Angeles hospital. The Los Angeles hospital with the highest visit rate exceeded the IHC benchmark by a factor of 6.16; the Mayo Clinic benchmark by a factor of 5.37; and the Sutter benchmark by 4.58 times. The lowest hospital visit rate was 1.79 times the IHC benchmark, 1.56 times the Mayo Clinic, and 1.33 times the Sutter benchmark.

The intensity of care delivered during the terminal phase of illness, measured as the percent of deaths associated with a stay in an intensive care unit, varied from 19.8% and 21.7% of deaths at the two least aggressive Los Angeles hospitals to 45.8% and 49.6% at the two hospitals with the most aggressive care patterns. In keeping with the emphasis on acute care rescue medicine, Los Angeles providers managed terminal care much more aggressively than providers in the three organized care benchmark systems. The most striking contrast was provided by the difference between Los Angeles hospitals and the IHC benchmark. In the Intermountain system, only 14.2% of deaths were associated with a stay in an intensive care unit. The most conservative Los Angeles acute care hospital exceeded this benchmark by a factor of 1.39: the most aggressive by a factor of 3.48.

The use of hospice care, measured as the percent of decedents who were enrolled in hospices during the last six months of life at Medicare's expense, varied among Los Angeles hospitals from only 5% to 6% of decedents in the hospitals with the lowest frequency of use to 33% to 36% of decedents in the two hospitals with the greatest use of hospice care. Hospice use in the IHC system was higher than every Los Angeles hospital.

It is important to remember that care intensity during the last six months is not just a measure of what happens at the end of life; it is part of a pattern of care that can be seen in the way a given group of providers treats chronically ill patients during the months and even years before death. The intensity of care provided during this period is an indicator of relative aggressiveness in managing chronic illness during previous periods over the course of disease (see Chapter Three, Figures 3.4 and 3.5). In light of the evidence discussed in Chapter One showing that greater use of hospitals, ICUs, and physician services is not associated with improved average outcomes for Medicare patients with chronic illness, the high-intensity care given to those who are dying should not be viewed as a rational cost incurred as part of a successful strategy to increase life expectancy.

The quality of life experienced by those nearing death—and the quality of their deaths—should be a primary concern to patients and families, particularly those who prefer to die at home, free from unwanted and invasive attempts at heroic care. Our measures of hospice and ICU use during terminal care may be particularly helpful in focusing attention on the issue of the quality of care delivered to patients who are dying. As discussed in the Afterword, these measures may also be useful in helping patients identify providers whose patterns of practice correspond to their preferences for managing severe chronic illness.

### Variation in patient co-payments

Higher utilization means greater spending per decedent, which means higher co-payments. For example, for physician services and durable medical equipment, the co-payment is 20% of the amount Medicare allows providers to charge. Patients without Medicaid or supplemental insurance must bear these costs on an out-of-pocket basis. Because Medicare patients using Los Angeles providers have higher utilization rates, they face higher co-payments than Medicare patients using the Sutter system, Intermountain Healthcare, or the Mayo Clinic. On average, Medicare co-payments during the last two years of life for patients hospitalized in Los Angeles were 2.04 times greater than for patients hospitalized in the Mayo system, 1.99 times those for IHC patients, and 1.58 times those for Sutter patients. There was also striking variation among Los Angeles providers, reflecting the underlying differences in utilization rates. The highest average co-payment charge was $6,524, an amount 2.76 times greater than that paid by patients using the Mayo Clinic. The average for the Los Angeles hospital with the lowest co-payment was $3,230, an amount that, while low by Los Angeles standards, was still almost 40% greater than the average amount paid by Mayo Clinic patients. Such information about co-payments may be useful in helping patients and their families choose among providers, a possibility we discuss later in this chapter.

## The relationship between volume and price among Los Angeles providers

This section examines the relative importance of variations in volume and price in explaining per capita variation in spending for physician visits and inpatient hospitalizations among Los Angeles hospitals. Since the data are confined to a single region, differences in labor costs should not contribute significantly to price variation. Looking at different hospitals within a region can lead to further insight into how well (or poorly) Medicare has succeeded in controlling volume and prices in a given market.

### Reimbursements for physician visits

Figure 4.4a shows the relationship between reimbursements per decedent for physician evaluation and management (E&M) services (vertical axis) and physician visits per decedent (horizontal axis) among hospitals in the Los Angeles region. Figure 4.4b shows the relationship between reimbursements per decedent and average payments per visit. Each dot represents the rate for patients assigned to one of the 48 hospitals in Los Angeles with 400 or more deaths between 2001 and 2005. The data are for services provided during the last two years of life.

Physician payments varied more than three and a half times, from about $3,600 per decedent to more than $13,600. Physician visits varied threefold, from 78 to 235 per decedent. Price varied much less, from $46 to $73 per visit (a factor of 1.6). It is clear from these figures that the variation in spending among hospitals in Los Angeles was due to variation in volume—visits per person—with an $R^2$ relationship of 0.89. Differences in price, by contrast, explained none of the variation.

These figures show that CMS has been quite successful in controlling the price of physician services (at least for evaluation and management services) but has had little influence on the volume of care.

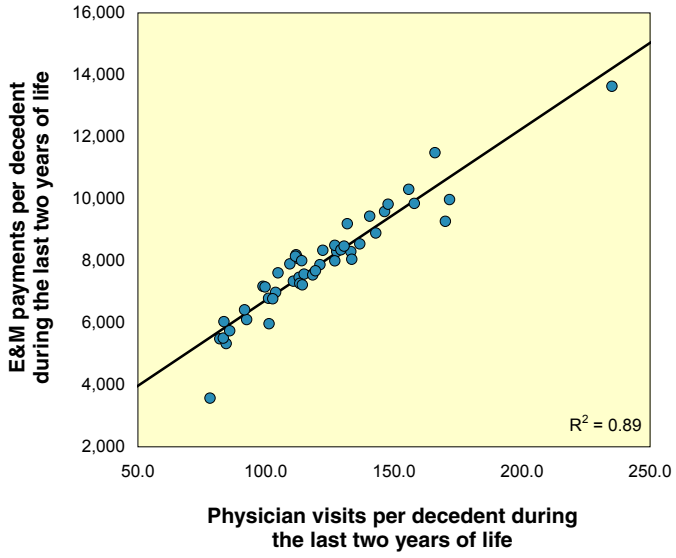



Figure 4.4a: Volume

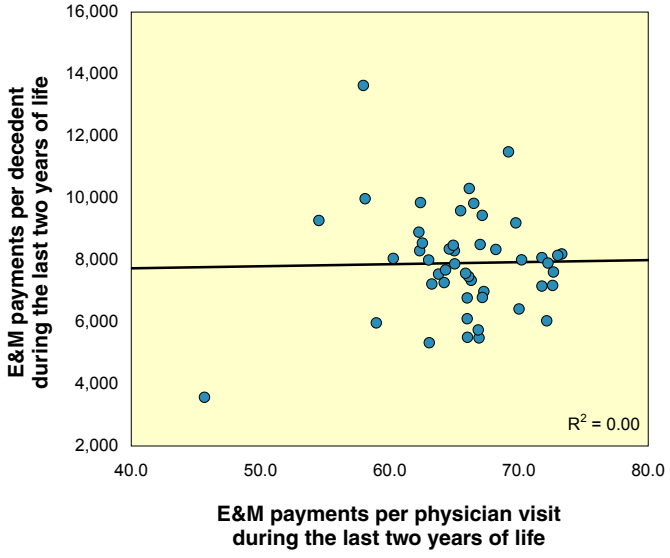



Figure 4.4b: Price

**Figure 4.4. Relationships Between Spending for Physician E&M Services, Volume, and Price of Care During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Los Angeles Hospitals (Deaths Occurring 2001–05)**

## Reimbursements to acute care hospitals

Figure 4.5a shows the relationship between reimbursements to hospitals for inpatient care per decedent (vertical axis) and hospital days per decedent (volume) (horizontal axis). Figure 4.5b shows reimbursements for inpatient care per decedent and reimbursements per day in hospital (price). The data are for the same hospitals displayed in Figures 4.4a and 4.4b. Reimbursements per decedent varied by a factor of almost 2.6 among the 48 hospitals. Patient days per decedent varied by a factor of 2.4 and reimbursements per day by 2.0. Both volume and price were strongly correlated with per decedent spending, with $R^2$ associations of 0.67 and 0.46, respectively.

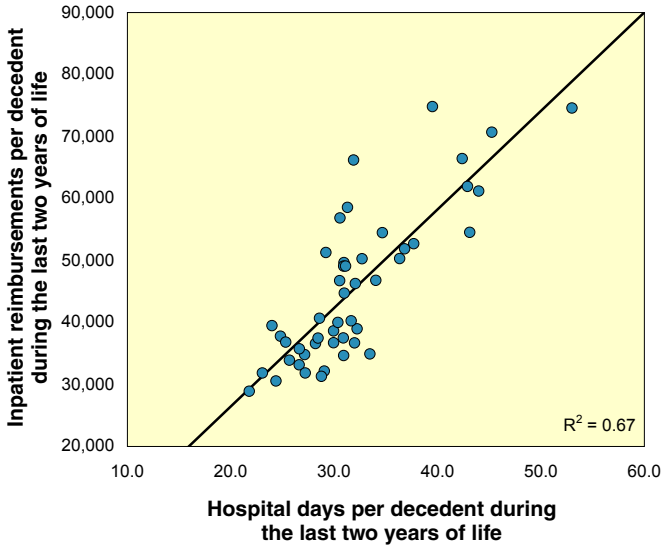



Figure 4.5a: Volume

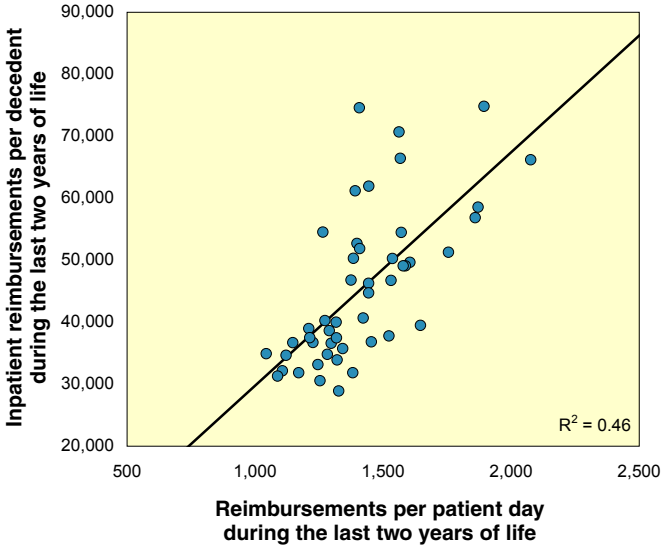



Figure 4.5b: Price

**Figure 4.5. Relationships Between Inpatient Reimbursements, Volume, and Price of Care During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Los Angeles Hospitals (Deaths Occurring 2001-05)**

It is evident from this figure that CMS—at least within Los Angeles—has been unsuccessful in constraining either hospital utilization (volume) or price.

## Measuring the Performance of Los Angeles Hospitals

## Evaluating the performance of Catholic Healthcare West hospitals in Los Angeles

In the last chapter we found that the Mayo Clinic was a more efficient provider than most academic medical centers, due in large measure to its more parsimonious use of hospital beds, ICU beds, and FTE physicians. We also noted some important differences among hospitals belonging to the Mayo Foundation system in the supply of resources they devoted to caring for patients. We would expect to—and indeed, we do—find similar variations in relative efficiency among non-academic networks.

During the period 2001–05, Catholic Healthcare West (CHW) was affiliated with 31 hospitals in California, five of which were located in the Los Angeles region. To illustrate how Dartmouth data can be used to evaluate the performance of individual hospitals, we compare the performance of these five hospitals one to another and to the relative efficiency standard provided by the Mayo Clinic system hospitals located in the Rochester, Minnesota hospital referral region.

Performance is evaluated in terms of total Medicare spending and spending according to sector of care; resource inputs (total hospital and ICU beds, physician labor, and requirements for inpatient staffing of registered nurses); and the patient experience of care (care intensity at the end of life and average co-payments) according to the hospital where care was provided.

### Medicare spending

**Table 4.1. Medicare Spending per Decedent During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Catholic Healthcare West's Los Angeles Hospitals Compared to the Mayo Clinic's Rochester, MN Hospitals (Deaths Occurring 2001–05)**

| Hospital name | Total Medicare spending | Inpatient sector spending | Outpatient sector spending | SNF/long-term care spending | Home health spending | Hospice spending | Durable medical equipment | Other spending |
|---|---|---|---|---|---|---|---|---|
| St. Mary Medical Center | $98,315 | $63,918 | $14,234 | $11,598 | $3,594 | $1,300 | $1,941 | $1,730 |
| California Hospital Medical Center | $96,561 | $64,537 | $7,622 | $12,997 | $5,234 | $732 | $2,082 | $3,357 |
| San Gabriel Valley Medical Center | $93,367 | $61,522 | $8,185 | $14,792 | $3,792 | $1,157 | $1,837 | $2,082 |
| Glendale Memorial Hospital | $91,060 | $57,183 | $10,327 | $11,408 | $5,731 | $2,421 | $2,004 | $1,987 |
| Northridge Hospital Medical Center | $76,784 | $46,760 | $9,150 | $11,530 | $4,071 | $1,748 | $1,829 | $1,696 |
| Mayo Foundation (Rochester) | $50,273 | $32,309 | $7,307 | $6,683 | $581 | $1,866 | $993 | $535 |
| Ratio of highest hospital to Mayo | 1.96 | 2.00 | 1.95 | 2.21 | 9.87 | 1.30 | 2.10 | 6.28 |
| Ratio of lowest hospital to Mayo | 1.53 | 1.45 | 1.04 | 1.71 | 6.19 | 0.39 | 1.84 | 3.17 |

St. Mary Medical Center was the most costly hospital for Medicare. Total spending was $98,315 per decedent during the last two years of life, 28% higher than spending for patients served primarily by the Northridge Hospital, where Medicare spending averaged $76,784 per decedent. Per decedent spending for all five Catholic Healthcare West hospitals was substantially higher than that of the Mayo system hospitals in Rochester; the most costly hospital was 96% more expensive on a per capita basis for the Medicare program, while the least expensive was 53% more costly.

The cost data show considerable variation among the five CHW hospitals for each sector of care. Inpatient spending per decedent varied by a factor of 1.38, while spending in ambulatory settings varied 1.87 times. Spending for stays in skilled nursing and other long-term care facilities varied 1.30 times; home care spending by a factor of 1.59; and hospice spending—which varied the most—by a factor of 3.31.

Compared to the Mayo system, Medicare spending for each sector of care was uniformly greater, with the exception of hospice care. Medicare spending for inpatient care at the *least* costly CHW hospital exceeded the Mayo benchmark by 45%; outpatient care was 4% greater; SNF/long-term care spending was 71% greater; and home health care spending was six times greater than the Mayo Clinic benchmark. By contrast, spending for hospice care was lower than the Mayo benchmark for all but one hospital. Hospice spending for patients loyal to Glendale Memorial Hospital was 30% higher than hospice spending for Mayo system patients in Rochester.

## Resource inputs

**Table 4.2. Resource Inputs per 1,000 Decedents During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Among Catholic Healthcare West's Los Angeles Hospitals Compared to the Mayo Clinic's Rochester, MN Hospitals (Deaths Occurring 2001–05)**

| Hospital name | Hospital bed inputs | ICU bed inputs | | | Physician labor inputs | | | RN staffing requirements |
|---|---|---|---|---|---|---|---|---|
| | | Total | High-intensity | Intermediate-intensity | Total | Medical specialist | Primary care | |
| St. Mary Medical Center | 118.1 | 34.9 | 11.2 | 23.8 | 47.8 | 26.9 | 15.2 | 102.9 |
| San Gabriel Valley Medical Center | 103.3 | 38.8 | 22.4 | 16.4 | 48.0 | 22.9 | 19.5 | 98.4 |
| Northridge Hospital Medical Center | 88.3 | 34.0 | 12.2 | 21.8 | 43.4 | 22.2 | 15.3 | 80.8 |
| Glendale Memorial Hospital | 84.8 | 31.8 | 12.5 | 19.3 | 43.4 | 22.6 | 15.2 | 77.8 |
| California Hospital Medical Center | 83.8 | 33.9 | 13.5 | 20.3 | 38.3 | 17.7 | 15.2 | 78.1 |
| Mayo Foundation (Rochester) | 56.2 | 16.5 | 14.5 | 2.0 | 19.4 | 7.6 | 7.4 | 53.5 |
| Ratio of highest hospital to Mayo | 2.10 | 2.36 | 1.55 | 12.04 | 2.47 | 3.54 | 2.64 | 1.92 |
| Ratio of lowest hospital to Mayo | 1.49 | 1.93 | 0.77 | 8.29 | 1.97 | 2.33 | 2.05 | 1.45 |

CHW member hospitals in Los Angeles exhibited considerable variation in resource inputs within the system. California Hospital Medical Center registered the most frugal use of inpatient beds—83.8 per 1,000—though ICU bed use at Glendale Memorial Hospital was lower. St. Mary Medical Center used the most hospital beds (118.1 per 1,000), and San Gabriel Valley Medical Center the most ICU beds (38.8). Note the considerable variation in the type of ICU beds used. High-intensity ICU bed inputs varied twofold among the five hospitals, while intermediate-intensity ICU beds varied by a factor of 1.45.

Physician labor input among the five CHW hospitals also varied considerably. Total physician labor input was 48 per 1,000 patients for those who received most of their care at San Gabriel Valley Medical Center and 38.3 per 1,000 for patients using California Hospital Medical Center, a range in variation of 1.25. The variation in primary care physician inputs was higher (range = 1.29), primarily due to San Gabriel Valley Medical Center's greater use of primary care physician labor. Variation in the way medical specialist labor was used among the five hospitals was higher still. St. Mary's medical specialist input rate was 26.9 per 1,000 decedents during the last two years of life, 1.52 times greater than California Hospital's (17.7 per 1,000). The number of registered nurses required to support inpatient utilization patterns according to proposed staffing standards varied by a factor of 1.32.

Inspection of Table 4.2 reveals that each of the five CHW hospitals was relatively inefficient compared to the Mayo system benchmark; every CHW hospital used substantially more resources, with the exception of high-intensity ICU beds. Total hospital bed inputs exceeded the Mayo benchmark by 49% at the lowest ranked hospital. Total ICU bed inputs were 93% higher at the lowest ranked hospital and 136% higher at the highest; while high-intensity ICU bed inputs were actually lower than Mayo's Rochester hospitals at four of the five hospitals, intermediate-intensity bed inputs were 8 to 12 times higher. Because they used greater numbers of inpatient beds, particularly ICU beds, CHW's Los Angeles hospitals would have needed to employ considerably more registered nurses to meet the proposed minimum federal standards. The lowest ranked CHW hospital would have needed 45% more nurses on a per patient basis than the Mayo Clinic's system in Rochester.

The differences in use of physician labor were also striking. The level of physician labor input achieved at the most efficient CHW hospital exceeded the Mayo benchmark by 97%. Primary care physician inputs at the CHW hospital with the lowest inputs exceeded the Mayo benchmark by 105%; medical specialist inputs by 133%.

## The patient's experience of care

**Table 4.3. Care Intensity During the Last Six Months of Life and Average Co-Payments During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions at Catholic Healthcare West's Los Angeles Hospitals Compared to the Mayo Clinic's Rochester, MN Hospitals (Deaths Occurring 2001–05)**

| Hospital name | Physician visits | Hospital days | ICU days | | | Percent of deaths with ICU admission | Percent admitted to hospice | Estimated co-payments (last two years) |
|---|---|---|---|---|---|---|---|---|
| | | | Total | High-intensity | Intermediate-intensity | | | |
| San Gabriel Valley Medical Center | 87.8 | 21.6 | 10.6 | 6.8 | 3.8 | 36.5 | 18.5 | $4,576 |
| St. Mary Medical Center | 82.1 | 23.1 | 9.0 | 3.2 | 5.7 | 30.5 | 20.9 | $6,099 |
| Glendale Memorial Hospital | 65.6 | 17.7 | 8.5 | 3.9 | 4.6 | 34.4 | 23.3 | $5,208 |
| Northridge Hospital Medical Center | 65.0 | 19.1 | 8.7 | 3.7 | 5.0 | 31.5 | 22.5 | $4,665 |
| California Hospital Medical Center | 60.1 | 18.6 | 10.2 | 4.7 | 5.5 | 39.1 | 11.7 | $5,387 |
| Mayo Foundation (Rochester) | 23.0 | 11.6 | 3.5 | 3.1 | 0.3 | 19.4 | 26.9 | $2,360 |
| Ratio of highest hospital to Mayo | 3.81 | 1.99 | 3.06 | 2.17 | 16.78 | 2.02 | 0.86 | 2.58 |
| Ratio of lowest hospital to Mayo | 2.61 | 1.53 | 2.44 | 1.03 | 11.22 | 1.57 | 0.43 | 1.94 |

Care intensity during the last six months of life, measured by the average number of physician visits and the number of days patients spent in the hospital and the intensive care unit, varied substantially among the five hospitals. Patients who used San Gabriel Valley Medical Center experienced an average of 87.8 visits per person, a rate that was 46% higher than that experienced by patients using California Hospital, where the average was 60.1 visits. St. Mary Medical Center patients spent an average of 23.1 days in hospital, compared to 17.7 days among patients at Glendale Memorial. The number of days spent in high-intensity ICU beds varied more than twofold; patients with the greatest exposure were those using San Gabriel Valley Medical Center, where the average number of high-intensity ICU days during the last six months of life was 6.8. Those with the least exposure were patients using St. Mary (3.2 days).

The likelihood of experiencing a "high-tech" death—measured by the percent of decedents who died during a hospitalization that included an ICU stay—also differed according to hospital. California Hospital Medical Center provided the most aggressive terminal care; about 39% of patient deaths among chronically ill Medicare enrollees were "high-tech." By contrast, the likelihood of a high-tech death in the least aggressive hospital was 30.5%. The likelihood of entering hospice care also varied substantially. According to Medicare records, only 11.7% of patients loyal to California Hospital were enrolled in hospice care, while more than 23% of those using Glendale Memorial were so enrolled.

The amount of money for which patients were responsible through co-payments also varied among the five hospitals. Average co-payments over the last two years of life for patients using St. Mary were about $6,100 per decedent, an amount that was 33% higher than for patients using San Gabriel Valley.

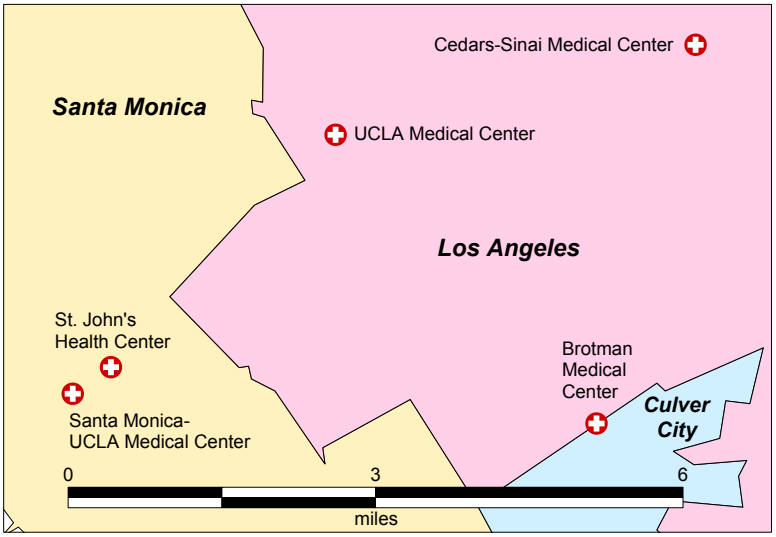
Care intensity in each of the five Los Angeles hospitals belonging to the Catholic Healthcare West system exceeded the Mayo system benchmark by a wide margin. During the last six months of life, physician visits, patient days in hospital, and days spent in ICU at the most conservative (low use) hospital exceeded the Mayo benchmark by 161%, 53% and 144%, respectively. Patients using the Mayo system were less likely to experience an ICU at the time of death; 19.4% of deaths were "high-tech" in the Mayo system compared to 30.5% at the least aggressive CHW hospital. Patients using the Mayo system also faced much lower co-payment liabilities. The low cost, low utilization pattern of care resulted in average co-payments for care over the last two years of life of $2,360. For patients using San Gabriel Valley Medical Center, co-payments were $4,576, almost twice as high as the Mayo system benchmark.

What about the quality of care? The composite quality scores for 2005 for the five CHW hospitals ranged from 79.9 to 92.7. The Mayo Foundation system hospitals in Rochester achieved an average composite score of 94.1, among the highest scores in the nation.

As we discuss in the next chapter, hospital systems could play an important role in moving the nation toward more organized, integrated care, and they should provide leadership in reducing excess acute care capacity and improving the technical quality of care. In the next chapter, we use Catholic Healthcare West's hospitals as an example of how a partnership between CMS and hospital networks might be forged in a new strategy to coordinate care for Medicare's chronically ill. But first, we will look at how the performance of hospitals within a given community can be evaluated. Several of these communities are served by a CHW hospital. The community-based profiles would allow CHW managers to evaluate the performance of their hospitals relative to others serving the same market.

## Spotlighting variation within Los Angeles neighborhoods

Analysis of the patterns of practice within Los Angeles revealed remarkable variation among hospitals serving the same or neighboring communities. This is important information because it sets up the opportunity for payers as well as patients and their families to make informed choices among hospitals. This section compares performance among hospitals located within five to ten miles of each other in five different sections of Los Angeles. A full set of performance measures similar to those presented above for Catholic Healthcare West is available in Appendix Table 3. The following discussion concentrates on variations in total per capita spending, bed and physician labor inputs, and variation among local providers in care that directly impacts the patient's experience: differences among local providers in the intensity of end-of-life care they provide and in the co-payments patients without Medicaid or supplemental insurance can expect to pay.




**Map 4.1. West Los Angeles & Santa Monica**

We begin our tour of communities located within the greater Los Angeles hospital referral region with a stop in West Los Angeles and Santa Monica. This part of Los Angeles is served by three community hospitals[iii]: Brotman Medical Center, St. John's Health Center, and Santa Monica-UCLA Medical Center. The two largest referral hospitals in the Los Angeles region—UCLA Medical Center and Cedars-Sinai Medical Center—are also located in this part of Los Angeles. These hospitals are located within ten miles of each other.

[iii] One community hospital in this neighborhood, Olympia Medical Center, did not meet the sample requirements for use of the 20% physician (Part B) database. Another hospital, Century City Doctors Hospital, was closed for a substantial period of time during the study period so has been omitted.

**Table 4.4. Medicare Spending, Resource Inputs, and Care Intensity Among Hospitals in West Los Angeles and Santa Monica (Deaths Occurring 2001–05)**

| | Cedars-Sinai Medical Center | Brotman Medical Center | UCLA Medical Center | Santa Monica-UCLA Medical Center | St. John's Health Center | Ratio high to low |
|---|---|---|---|---|---|---|
| **Medicare spending in last two years of life** | | | | | | |
| Total Medicare spending per decedent | $106,951 | $102,909 | $93,842 | $76,808 | $75,151 | 1.42 |
| **Resource use during last two years of life** | | | | | | |
| Hospital beds | 117.5 | 120.5 | 85.8 | 82.0 | 91.7 | 1.47 |
| FTE physician labor | 54.2 | 54.0 | 38.5 | 38.6 | 47.6 | 1.41 |
| **Care intensity during last six months of life** | | | | | | |
| Physician visits | 79.3 | 92.3 | 52.8 | 55.3 | 68.3 | 1.75 |
| Hospital days | 24.4 | 24.9 | 18.5 | 17.8 | 18.7 | 1.40 |
| % of deaths with ICU admission | 40.0 | 34.5 | 37.9 | 32.9 | 30.3 | 1.32 |
| % admitted to hospice | 19.6 | 14.4 | 28.8 | 27.9 | 28.2 | 1.99 |
| **Estimated co-payments per decedent (last two years)** | **$6,524** | **$5,692** | **$4,835** | **$4,322** | **$5,883** | **1.51** |
| **Hospital Compare composite quality score*** | **96.5** | **n/a** | **83.9** | **86.2** | **83.1** | **1.16** |

**all enrollees, 2005*

We found remarkable variations in per capita spending. Two hospitals—Cedars-Sinai Medical Center, a major teaching hospital, and Brotman Medical Center, a community hospital—cost Medicare more than $100,000 per patient for care during the last two years of life. The other major academic medical center, UCLA Medical Center, spent over $93,000 per patient. Medicare spent the least for patients who used Santa Monica-UCLA Medical Center ($76,808) and St. John's Health Center ($75,151). Per capita spending at Cedars-Sinai exceeded spending at St. John's by 42%. Appendix Table 3 gives per capita spending according to care sector. Variation in inpatient spending (by far the most costly sector) varied even more than overall spending, with rates for Brotman patients ($72,282) exceeding those for St. John's patients ($41,981) by 72%. Payers—for example, those interested in contracting with efficient providers for services under Medicare's capitated Medicare Advantage Program—should find this information of interest.

Given the importance of capacity as a driver of utilization and costs, those responsible for decisions on hiring physicians or credentialing the physician staff—namely boards of trustees and managers of hospitals—should be interested in knowing the size of the physician workforce relative to the size of the patient population. There were remarkable differences in the deployment of physician labor among these five hospitals. Fifty-four physicians per 1,000 were deployed to serve patients at both Cedars-Sinai and Brotman, 40% more than UCLA used in treating its patients (38.5). Brotman Medical Center used more of both primary care physicians and medical specialists than did either UCLA or Santa Monica-UCLA.

As mentioned earlier, the Los Angeles region ranked third from the top of the national distribution in intensity of terminal care, measured as the percent of inpatient deaths associated with a stay in an ICU. There was considerable variation in this and other measures of patient experience among the five hospitals under study. At Cedars-Sinai Medical Center, 40% of patients experienced a "high-

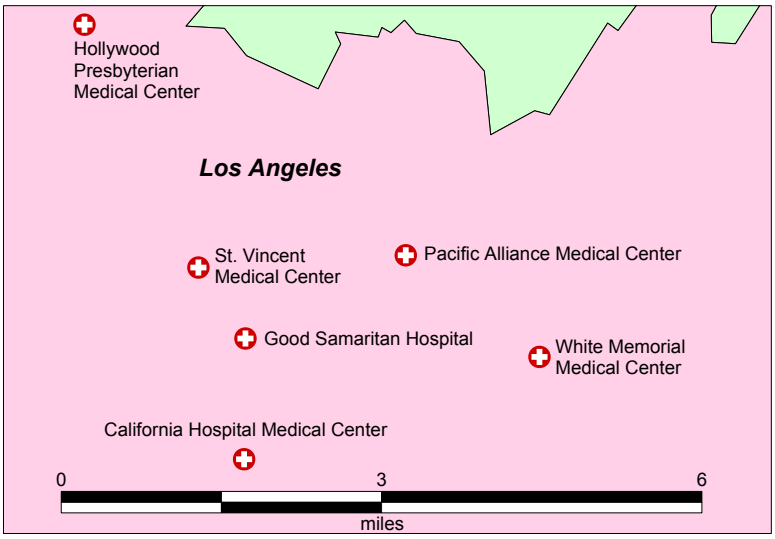
tech" death associated with an ICU stay, while only 30% of St. John's patients experienced an ICU admission at the time of death. Patients loyal to Brotman Medical Center spent almost 25 days in the hospital during the last six months of life, 40% more than patients using Santa Monica-UCLA Medical Center (17.8 days). Patients using the UCLA Medical Center were the most likely among this group to be enrolled in hospice during the last six months of life; 28.8% of UCLA's patients used hospice care, compared to less than 15% of Brotman's patients.

Brotman Medical Center had the highest number of physician visits during the last six months of life—92.3 per patient—75% higher than UCLA, which had a visit rate of 52.8 per patient. UCLA's lower visit rate translated into relatively low co-payments per patient; patients using this hospital were responsible for an estimated $4,835 in costs over their last two years of life. Patients using Cedars-Sinai were responsible for covering about $6,500 in costs, either out of pocket or through supplemental insurance or Medicaid.

This information could be useful to patients and families living in the area who wish to avoid high co-payments and experience lower care intensity while still remaining close to home.[iv] In this case, the best bet would have been Santa Monica-UCLA Medical Center, where patients had a relatively low chance of dying in association with an ICU admission, had relatively high use of hospice, and had the lowest co-payments among the five hospitals. If an academic medical center was preferred, UCLA had a lower risk of high-tech death than Cedars-Sinai, higher use of hospice, and decidedly lower co-payments. While both hospitals have strong reputations for high quality, the measures of technical process quality posted on the CMS Hospital Compare website indicated Cedars-Sinai's superior performance. Quality information was not reported for Brotman, the highest-intensity community hospital.

[iv] As shown below, if the patient is willing to travel farther, there are hospitals with considerably lower intensity and co-payments in other parts of the Los Angeles region.

**Map 4.2. Central Los Angeles**




There are six community hospitals clustered in central Los Angeles, all within about six miles of one another.[v] Per capita Medicare spending during the last two years of life varied 48%, from about $88,600 for patients using Good Samaritan Hospital to almost $131,000 for those using White Memorial. Physician labor inputs varied 32% from the lowest hospital, California Hospital Medical Center (38.3 FTE physicians per 1,000), to the highest, Hollywood Presbyterian Medical Center (50.4). Every central Los Angeles hospital except California Hospital used more physician resources per capita than UCLA (38.5) (see Table 4.4); and California Hospital's relatively low rate was twice that of the Mayo system benchmark in Rochester, MN (see Table 4.2). More than 120 beds per 1,000 were used to treat patients loyal to Hollywood Presbyterian Medical Center. Bed use was lower at California Hospital—83.8 beds per 1,000—which was conservative compared to other central Los Angeles hospitals, but 49% higher than the Mayo system benchmark.

[v]Three hospitals in this neighborhood—Temple Community Hospital, USC University Hospital, and L.A. County-USC Medical Center—did not have large enough sample sizes to meet our inclusion criteria.

**Table 4.5. Medicare Spending, Resource Inputs, and Care Intensity Among Hospitals in Central Los Angeles (Deaths Occurring 2001–05)**

| | White Memorial Medical Center | Hollywood Presbyterian Medical Center | Pacific Alliance Medical Center | California Hospital Medical Center | St. Vincent Medical Center | Good Samaritan Hospital | Ratio high to low |
|---|---|---|---|---|---|---|---|
| **Medicare spending in last two years of life** | | | | | | | |
| Total Medicare spending per decedent | $130,992 | $115,097 | $101,671 | $96,561 | $90,655 | $88,575 | 1.48 |
| **Resource use during last two years of life** | | | | | | | |
| Hospital beds | 108.3 | 124.0 | 116.1 | 83.8 | 89.6 | 100.9 | 1.48 |
| FTE physician labor | 48.9 | 50.4 | 48.5 | 38.3 | 47.7 | 42.2 | 1.32 |
| **Care intensity during last six months of life** | | | | | | | |
| Physician visits | 69.4 | 80.9 | 110.6 | 60.1 | 75.9 | 68.4 | 1.84 |
| Hospital days | 22.4 | 26.7 | 25.6 | 18.6 | 20.0 | 21.7 | 1.44 |
| % of deaths with ICU admission | 36.5 | 45.8 | 39.9 | 39.1 | 35.2 | 39.6 | 1.30 |
| % admitted to hospice | 12.5 | 6.2 | 5.5 | 11.7 | 11.9 | 15.7 | 2.84 |
| **Estimated co-payments per decedent (last two years)** | **$6,252** | **$5,341** | **$4,838** | **$5,387** | **$5,664** | **$5,157** | **1.29** |
| **Hospital Compare composite quality score*** | **80.8** | **76.4** | **45.2** | **88.4** | **72.2** | **79.7** | **1.95** |

**all enrollees, 2005*

The care intensity profile during the last six months of life showed considerable variation in the frequency of physician visits, which ranged from about 60 visits per decedent at California Hospital Medical Center to more than 110 visits per decedent at Pacific Alliance Medical Center. The likelihood of a high-tech death was high in all central Los Angeles hospitals, with the percent of deaths occurring in association with an ICU stay ranging from 35% to 46%, compared to about 19% in the Mayo system in Rochester (see Figure 4.3). Use of hospice care was low in every hospital, ranging from 5% to almost 16% of sick patients. Co-payments were high, ranging from $4,838 to $6,252 per decedent.

If Medicare Advantage plans were seeking to lower their costs for care management for chronically ill patients in the last two years of life, they would be well-advised to avoid networking with physicians using White Memorial and Hollywood Presbyterian Medical Centers and favor physicians associated with Good Samaritan Hospital, where care is lower cost and of equal quality. CHW's California Hospital Medical Center cost about $8,000 more than Good Samaritan on a per decedent basis for care provided in the last two years of life.

Patients with chronic illness seeking lower co-payments and lower care intensity would not find a clearly better choice among hospitals located in central Los Angeles. Though there is variation among them, care intensity and co-payments were high in all six hospitals.

**Map 4.3. Glendale & Pasadena**

The Glendale and Pasadena communities are served by four hospitals with varying levels of Medicare spending. Glendale Adventist Medical Center and Glendale Memorial Hospital had per person spending rates of about $92,500 and $91,100, respectively, compared to $71,000 at Huntington Memorial and $67,800 at Verdugo Hills Hospital.

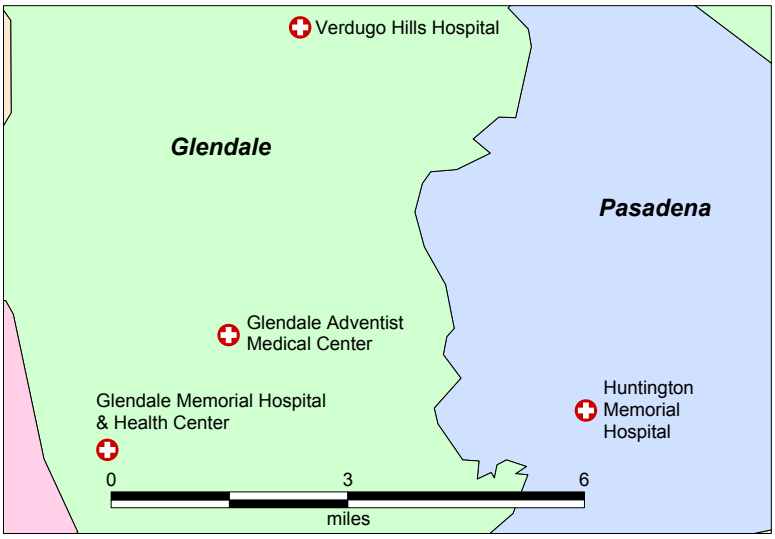


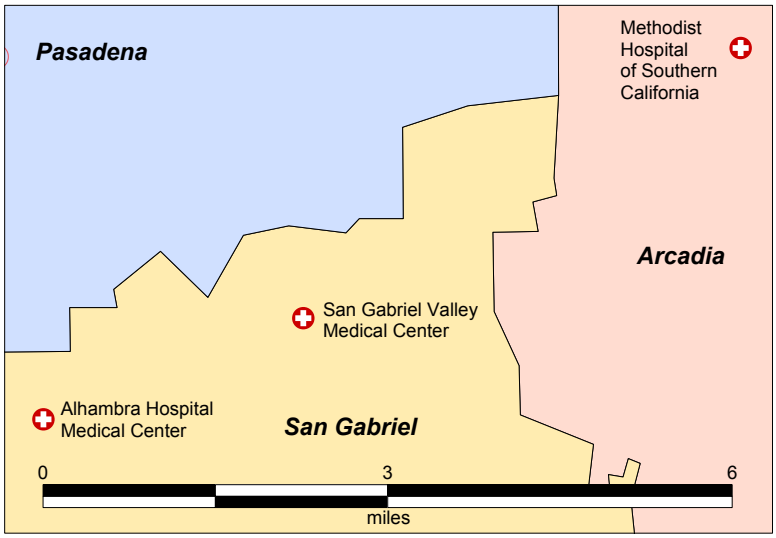

**Table 4.6. Medicare Spending, Resource Inputs, and Care Intensity Among Hospitals in Glendale and Pasadena (Deaths Occurring 2001–05)**

| | Glendale Adventist Medical Center | Glendale Memorial Hospital & Health Center | Huntington Memorial Hospital | Verdugo Hills Hospital | Ratio high to low |
|---|---|---|---|---|---|
| **Medicare spending in last two years of life** | | | | | |
| Total Medicare spending per decedent | $92,529 | $91,060 | $71,026 | $67,783 | 1.37 |
| **Resource use during last two years of life** | | | | | |
| Hospital beds | 99.6 | 84.8 | 87.6 | 74.5 | 1.34 |
| FTE physician labor | 47.0 | 43.4 | 37.4 | 32.7 | 1.44 |
| **Care intensity during last six months of life** | | | | | |
| Physician visits | 79.0 | 65.6 | 61.2 | 51.0 | 1.55 |
| Hospital days | 20.3 | 17.7 | 18.9 | 15.1 | 1.34 |
| % of deaths with ICU admission | 36.4 | 34.4 | 29.4 | 26.7 | 1.36 |
| % admitted to hospice | 17.9 | 23.3 | 25.0 | 23.1 | 1.39 |
| **Estimated co-payments per decedent (last two years)** | **$5,208** | **$5,208** | **$4,043** | **$3,707** | **1.40** |
| **Hospital Compare composite quality score*** | **79.7** | **91.1** | **76.7** | **76.4** | **1.19** |

**all enrollees, 2005*

Payers seeking hospitals with lower costs for managing chronic illness would favor Huntington Memorial and Verdugo Hills Hospitals; Glendale Adventist and CHW's Glendale Memorial Hospital had substantially higher per capita costs.

While technical quality of care was highest at Glendale Memorial Hospital, for patients seeking less intense care at the end of life and lower co-payments, Huntington Memorial and Verdugo Hills hospitals would have been the hospitals of choice. Patients using these hospitals were less likely to experience an ICU stay during the terminal phase of care. They also faced lower co-payments for care, and were most likely to be enrolled in hospice at Huntington Memorial Hospital.




**Map 4.4. San Gabriel & Arcadia**

The three hospitals located within this community were strikingly different in Medicare spending, resource inputs, care intensity, and co-payments. From the payer's perspective, the 76% range of variation in per capita spending would amount to huge differences in outlays. Over the five-year period 2001–05, Medicare spent a total of $38 million ($52,000 per patient) more during the last two years of life for patients using Alhambra Hospital and $33 million ($25,000 per patient) more for patients using CHW's San Gabriel Valley Medical Center than it would have spent had the per decedent spending levels at these hospitals been equal to spending for patients using the Methodist Hospital of Southern California. Payers should be highly motivated to selectively contract with providers associated with Methodist Hospital.

**Table 4.7. Medicare Spending, Resource Inputs, and Care Intensity Among Hospitals in San Gabriel and Arcadia (Deaths Occurring 2001–05)**

| | Alhambra Hospital Medical Center | San Gabriel Valley Medical Center | Methodist Hospital of Southern California | Ratio high to low |
|---|---|---|---|---|
| **Medicare spending in last two years of life** | | | | |
| Total Medicare spending per decedent | $120,756 | $93,367 | $68,726 | 1.76 |
| **Resource use during last two years of life** | | | | |
| Hospital beds | 145.2 | 103.3 | 79.6 | 1.82 |
| FTE physician labor | 67.7 | 48.0 | 40.2 | 1.69 |
| **Care intensity during last six months of life** | | | | |
| Physician visits | 123.7 | 87.8 | 58.7 | 2.11 |
| Hospital days | 30.0 | 21.6 | 16.7 | 1.80 |
| % of deaths with ICU admission | 49.6 | 36.5 | 30.8 | 1.61 |
| % admitted to hospice | 10.5 | 18.5 | 24.9 | 2.37 |
| **Estimated co-payments per decedent (last two years)** | **$5,890** | **$4,576** | **$4,089** | **1.44** |
| **Hospital Compare composite quality score*** | **n/a** | **79.9** | **79.0** | **1.01** |

**all enrollees, 2005*

Resource input measures indicate substantial differences in the way these hospitals used resources relative to the size of the populations they served. The patient experience also differed remarkably. During the last six months of life, the average patient using Alhambra Hospital was seen by a doctor about 124 times. San Gabriel Valley's visit rate during the last six months of life was about 88 per decedent, and Methodist's was about 59. Almost half of Alhambra's patients died a high-tech death involving an ICU, compared to 36.5% for San Gabriel Valley's patients and 30.8% for Methodist's. Only 10.5% of Alhambra Hospital's patients used hospice care at the end of life, compared to 18.5% of San Gabriel Valley patients and almost 25% of Methodist's. The greater intensity of care

meant that co-payments for Alhambra patients were much higher over the last two years of life: about $5,900 per patient, compared to San Gabriel's average patient co-payment of $4,600 and Methodist Hospital's $4,100 per patient. Patients and families who wish to avoid high-tech terminal care and high co-payments have a clear choice.

**Map 4.5. Long Beach**

The Long Beach community is served by three acute care hospitals located within three miles of each other. Over the five-year period from 2001 to 2005, patients loyal to St. Mary Medical Center cost the Medicare program about $98,000 per patient, 9% more than Pacific Hospital of Long Beach ($90,000 per patient) and 22% more than Long Beach Memorial Hospital ($81,000).

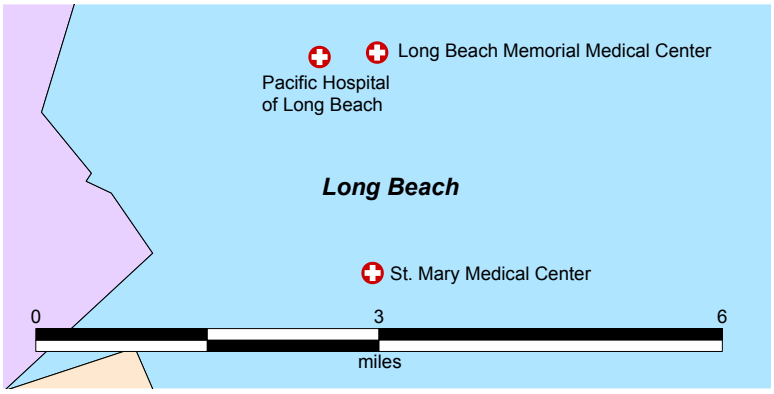



**Table 4.8. Medicare Spending, Resource Inputs, and Care Intensity Among Hospitals in Long Beach (Deaths Occurring 2001–05)**

| | St. Mary Medical Center | Pacific Hospital of Long Beach | Long Beach Memorial Medical Center | Ratio high to low |
|---|---|---|---|---|
| **Medicare spending in last two years of life** | | | | |
| Total Medicare spending per decedent | $98,315 | $89,937 | $80,710 | 1.22 |
| **Resource use during last two years of life** | | | | |
| Hospital beds | 118.1 | 84.7 | 78.3 | 1.51 |
| FTE physician labor | 47.8 | 32.3 | 40.8 | 1.48 |
| **Care intensity during last six months of life** | | | | |
| Physician visits | 82.1 | 58.0 | 61.0 | 1.42 |
| Hospital days | 23.1 | 18.5 | 15.9 | 1.45 |
| % of deaths with ICU admission | 30.5 | 30.6 | 33.2 | 1.09 |
| % admitted to hospice | 20.9 | 18.8 | 26.0 | 1.38 |
| **Estimated co-payments per decedent (last two years)** | **$6,099** | **$3,996** | **$4,735** | **1.53** |
| **Hospital Compare composite quality score*** | **85.5** | **n/a** | **85.9** | **1.01** |

**all enrollees, 2005*

Use of hospital and physician resources varied substantially at these hospitals. During the last six months of life, patients using St. Mary Medical Center visited physicians about 82 times, compared to 58 times for patients using Pacific Hospital, a 42% difference. The higher use of physician services at St. Mary had real financial consequences not just for payers but also for patients. It translated into much higher co-payments; the average patient with chronic illness who used St. Mary would have paid about $6,100 over the last two years of life, while a patient using Long Beach Memorial would have paid $4,700, and Pacific Hospital patients would have paid $4,000.

## The Los Angeles predicament

All health care is ultimately local, and efforts to improve both its quality and efficiency must include a focus on measuring the performance of the providers serving an area. As we have seen, there is remarkable variation in Medicare spending among hospitals within the Los Angeles basin. In some communities, high priced hospital "systems" exist in close proximity to relatively more efficient hospitals, which have lower resource inputs and utilization patterns. In downtown Los Angeles, virtually all hospitals are high cost. Some achieve high-cost status because of high prices, some because of volume, and others are high cost because both volume and prices are high.

Compared to the Mayo Clinic, Intermountain Healthcare, and Sutter Health systems, all Los Angeles hospitals are high cost. Even hospitals that are relatively efficient by the region's standards are overusing medical resources and providing more care (higher volume) than necessary, according to the practice patterns and per patient utilization of resources set by some of America's most prestigious organized health care systems. To put this in concrete terms, if one uses the average per decedent resource inputs of Sutter, the Mayo Clinic, and IHC as a composite benchmark for efficiency in managing severe chronic illness, Los Angeles hospitals used 81% more hospital beds than needed; 106% more ICU beds; 110% more FTE physicians; and required 75% more registered nurses under proposed federal standards. That amounts to a lot of wasted effort and unnecessary care.

The excess resources available in Los Angeles seem to have no influence on capitalization decisions by administrators to add yet more beds and additional resources to the region's hospitals. During our evaluation of the management of chronic illness in Los Angeles, we learned that many of the region's hospitals are busy building new facilities, motivated in large part by the need to update existing structures to meet new earthquake building codes. Instead of expanding, Los Angeles hospitals could strive to improve efficiency by *reducing* capacity. The Dartmouth data can evaluate hospital-specific resource inputs and could be used to set targets for reducing capacity toward an efficient level. But reduction in capacity means reduction in utilization, and reduction in utilization means lowered revenue, since revenue is tied to utilization. Hospitals would lose not just the cash flow to pay for current capacity; many not-for-profit hospitals are in debt to the bond market. Failure to meet these obligations would mean bankruptcy. Managers of for-profit hospitals are accountable to investors. It is hard to imagine how information alone would motivate health care organizations to take steps to reduce excess capacity, no matter how such measures might improve the quality of the care they deliver to their patients.

From the point of view of a Los Angeles hospital, the preferred route to improving efficiency would be to expand its market share of chronically ill patients: to increase its "population base" while keeping capacity constant. As we have seen, even the most efficient Los Angeles hospital could substantially increase the number of severely ill chronic patients it treats without reaching the benchmark for efficient use of resources provided by the Mayo Clinic, IHC, or Sutter standards. For example, Long Beach Memorial Hospital could increase its population of severely ill Medicare patients by 39% before it would reach the Mayo Clinic benchmark for bed input. If Long Beach could achieve this population growth (and did not increase its bed, ICU, physician, or other such critical resource capacity that drives supply-sensitive care), then overall per capita Medicare spending and utilization should show a comparable 39% drop. (If this seems paradoxical, take another look at the discussion in Chapter One on the nature of supply-sensitive care.)

How might Long Beach Memorial Hospital increase its share of chronically ill Medicare patients? Clearly not by attracting severely ill Medicare patients from other regions or more distant parts of Los Angeles. Patients with severe chronic illness are not that mobile. The most likely source would be patients who already are living in the Long Beach area: those who now use Catholic Healthcare West's St. Mary Medical Center, for instance. As we have seen, Medicare spending over the last two years of life is about $17,600 per person more for patients who use St. Mary than Long Beach Memorial. Thus, $17,600 is the expected reduction in cost for caring for an "average" chronically patient with two years of life expectancy who transfers to Long Beach Memorial from St. Mary. Imagine more and more patients moving from St. Mary to Long Beach Memorial. The costs of managing chronic illness at Long Beach Memorial on a per person basis would decrease even further. For example, if the Mayo Clinic benchmark for hospital bed use were reached at Long Beach Memorial, the estimated per decedent spending for inpatient and physician services would drop from $80,710 to $57,912.

The motivation for taking the necessary steps to achieve a change in loyalty would rest primarily with insurance companies, employers, and, conceivably, Long Beach Memorial Hospital itself. The winners in such a scenario would be patients, who would be subjected to less unnecessary invasive care. Insurance plans that are at risk for Medicare payments—namely those in Medicare Advantage, which receive a fixed fee for managing chronic illness—would also benefit. Information that the average costs for care management are significantly lower should motivate payers to direct patients toward physicians affiliated with Long Beach Memorial. Since Medicare Advantage payments are based to a large extent on the average costs in a region (and, increasingly, are risk-adjusted), sending patients to providers with cost and utilization profiles that are below average for the region should guarantee profitability.[vi]

The winners could also include employers with large numbers of older workers and retirees with chronic illness who have rich benefit plans. For example, Boeing has long maintained a large workforce in the Long Beach area, and it might seek to direct its chronically ill employees or retirees to the more efficient Long Beach Memorial Hospital. The Long Beach Memorial Hospital could become a primary beneficiary if it were willing and able to take risks, based on the knowledge that its costs were below average, and actively seek contracts with Medicare Advantage plans and area employers to offer it a better deal than its competitors in managing chronic illness over time.

Perhaps the greatest benefit would accrue to the Medicare enrollees who, by virtue of their change in hospital, would experience improved quality of care and would be exposed to less risk from acute care hospitalization and high-intensity care at the end of life. According to CMS Hospital Compare measures, the quality of care for Long Beach Memorial already ranks higher than for St. Mary.

But the situation is not "win-win." The immediate losers are the Medicare enrollees who remain loyal to St. Mary. The same logic and the same empirical evidence that predicts a decrease in per patient volume of care for Long Beach Memorial predicts an increase for patients remaining loyal to St. Mary. Unless, by some unforeseen mechanism, capacity at St. Mary was reduced in proportion to its decreasing population, per capita care intensity and Medicare spending would go up. St. Mary patients would experience more physician visits, hospitalizations, and stays in intensive care,

[vi] Provided, of course, that risk adjustment accurately predicts average costs.

and incur greater out-of-pocket costs for co-payments because the medical resources available per patient in the population would increase. And Medicare, because it currently pays for utilization, not efficient management of the chronically ill over time, would experience no decline in overall costs. Any savings through increased efficiency at Long Beach Memorial would likely be lost in paying for increased utilization at St. Mary.

## Conclusions

As our Dartmouth colleague Paul Batalden is fond of saying, "every system is perfectly designed to get the results it gets." As the expansion occurring in acute care hospitals in Los Angeles illustrates, the existing level of per capita resources appears to have little influence on decisions to build more, confirming research that we began more than 30 years ago in Vermont.[3] Because information on resource inputs relative to the size of the population has rarely been available and, when available, has been largely ignored, decisions to expand capacity have been made without reference to the size of the population a provider serves.

But more information alone will not be enough to persuade hospital administrators to "rightsize" medical resources relative to the size of the population served. Because Medicare and most private insurance companies pay for utilization, not for quality or longitudinal (long-term) management of illness, there is little to no incentive for health care providers to pay attention to the volume of care they provide; to take costs into account when expanding capacity; or to develop systems of care for managing chronic illness outside of the acute care pattern that most clinicians are trained (and rewarded) to maintain. Apart from the relatively uncommon examples of large group practices like the Mayo Clinic, and integrated health care organizations like the Sutter system, most American health care is disorganized and often chaotic. Without changes in the reimbursement system, it is unlikely that organized care will take root and grow, or that organizations like the Mayo Clinic or Intermountain Healthcare can expand into new markets. Without improvements in the scientific basis for managing chronic illness, it is unlikely that we will know the true cost and value of health care, or understand how to reform the reimbursement system to truly "pay for performance." The next chapter addresses these issues.

Endnotes

[1] Hospital Compare is available on the Internet at http://www.hospitalcompare.hhs.gov/.

[2] *AHA Annual Survey 2005*. © 2005 Health Forum LLC, an affiliate of the American Hospital Association.

[3] Wennberg J, Gittelsohn A. Small area variations in health care delivery: A population-based health information system can guide planning and regulatory decision-making. *Science* 1973;182:1102–1108.

Chapter Five

# Dealing with Unwarranted Variation

Over the last 50 years, the nation has invested heavily in such medical resources as specialists, acute care hospitals, intensive care beds, and expensive imaging equipment, much of which is allocated to the management of patients with chronic illnesses. Underlying this investment is the assumption that more intensive management of the chronically ill results in better health outcomes and greater patient satisfaction. That assumption is being challenged by the hospice and palliative care movement, by the growing chronic disease management industry, and by population-based chronic care models that emphasize continuous and coordinated management of patients over time and among sectors of care.

The assumption that more care is better is also under scientific assault. As discussed in Chapter One, people with severe chronic illness who live in communities where they receive more intensive inpatient care do not appear to have improved survival, better quality of life, or better access to care than patients who live in communities where they receive less care. Indeed, outcomes appear to be worse. What is clear is that the care of people with severe chronic illnesses living in high-resource, high-utilization areas costs a lot more than the care that is provided to equally sick people who live in areas where resources such as hospital beds and medical specialists are fewer and care is less intensive. Moreover, the patient experience of care is much different; those in high-resource versus low-resource communities receive a much more aggressive brand of medicine, visiting medical specialists more frequently, spending more days in the hospital, and dying in ICU beds more often than those in lower care intensity areas.

The most important factor determining whether a community overtreats the chronically ill is the size of its acute care sector relative to the number of chronically ill patients who need treatment. In high-cost regions, providers have over-built their acute care sectors; those serving low-cost regions have been more frugal, using fewer hospital and intensive care beds, less physician labor, and less of expensive technologies such as medical imaging devices. Organized systems of care—group practices such as the Mayo Clinic and integrated hospital systems such as Intermountain Healthcare—typically use the fewest resources, particularly physician labor, though, as we saw in Chapter Three, unwarranted variations are common even among such relatively efficient and well-organized systems.

Most Americans and policy makers agree the U.S. health care system is broken, but most proposals for reforming it have focused almost exclusively on extending coverage to the uninsured. Attaining this goal, important as it is, will leave untouched the underlying major structural problems behind the unwarranted variations we have documented. These problems include poor science, poor coordination of care, and overuse of care, particularly of acute care hospitals. As the baby boomers age and the numbers of chronically ill increase, failure to address these problems will surely fate the nation to an unsustainable rise in health care costs, unless we find ways to increase care coordination and decrease the overuse of acute care hospitals. Achieving these twin goals will not be easy.

This chapter lays out a strategy for improving the scientific basis of clinical management of severe chronic illness and for moving the nation toward organized delivery systems: systems capable of improving care coordination and reducing the overuse of care.

## A strategy for improving the scientific basis of clinical care

The remarkable variation in the way academic medical centers manage chronic illness is testimony to the weakness in the scientific basis of medicine. The neglect of the evaluative sciences—those sciences whose mission is to evaluate medical theory, understand patient preferences, and establish the cost-effectiveness of clinical practice—has left the nation unprepared to deal with unwarranted variation. The consequences of today's poor science for patient well-being are easily seen in the contrasting performance of the University of California teaching hospitals in Los Angeles (UCLA) and San Francisco (UCSF). While each is acclaimed for delivering high-quality care, and each enjoys a strong reputation for scientific excellence, they differ to an extraordinary degree in their impact on patients' lives. During their last six months of life, patients using UCLA had 72% more physician visits and spent 37% more days in the hospital, with 63% of these days in intensive care units, compared to only 25% of UCSF patients' days. Terminal care was much more intense at UCLA; 38% of all deaths occurring to patients loyal to UCLA were associated with ICU use, compared to 23% for UCSF. Largely because of UCLA's more aggressive approach to managing chronic illness, co-payments for Medicare patients using UCLA were an estimated 56% higher than for UCSF.

The consequences for public policy should be obvious. Weaknesses in evaluative science mean that resource allocation among academic medical centers is not based on clinical evidence or patient preferences. That means that the policy recommendations made by academic medicine on future needs for physicians, nurses, ICU beds, imaging equipment, and so on, should carry little or no authority. They are not based on science, nor, given the variation among academic medical centers, are they based on an empirical consensus that might serve as a guideline for public investment in resources. Again, the contrasts between UCLA and UCSF illustrate the predicament. In managing chronic illness over the last two years of life, on a per capita basis, UCLA used 49% more FTE physicians and depended far more on medical specialists, using 2.3 times more than UCSF. By contrast, 43% of the physician workforce managing patients loyal to UCSF comprised primary care physicians, compared to 25% for UCLA. Under the proposed federal staffing requirements for registered nurses, UCLA patients would require 42% more registered nurses for managing inpatient care during the last two years of life compared to UCSF. Yet there is no evidence that UCLA is delivering better outcomes to patients than its sister hospital to the north.

Today, there is virtually no clinical research that focuses on variation in care intensity. The nation needs a crash program to transform the management of chronic illness to a rational system where what happens to patients is based primarily on illness severity, medical evidence, and the patient's wishes, and where resource allocation and Medicare spending can be guided more and more by knowledge of what is needed to produce cost-effective, high-quality care. We view this program as essential for any effort to move toward organized, coordinated care that will be capable of reducing overuse and reallocating resources to more productive ends. Rationalizing how much care, what types of care, who should receive it and when is essential to any effort to organize the care of the chronically ill, most of whose illnesses will persist until death. Detailed specification of the clinical pathways for managing chronic illness, and validation of those pathways through outcomes research, is necessary before we can pay for performance on the basis of cost-effectiveness and efficiency.

The support of such research needs to be the responsibility primarily of federal science policy. It makes no sense for the government to invest in biomedical research (such as most of the research funded by the National Institutes of Health) without complementary research aimed at determining how new and existing treatments affect the outcomes of care, the lives of patients, and the efficiency of clinical practice. The research needs to be conducted in real time at the institutions where patients receive care. It should be conducted by established group practices and integrated provider systems that are capable of organizing care over the span of an individual patient's severe chronic illness. To ensure full attention to the research agenda, participating organizations should be fairly compensated for conducting the research. Academic medical centers such as UCLA and UCSF should be encouraged to participate. As we discuss in the next section, they should be given incentives to participate in a proposed shared savings program with the Centers for Medicare and Medicaid Services (CMS) designed to encourage the coordination of care and the reduction of overuse.

## A strategy for promoting the growth of organized care and reducing overuse

Achieving better care coordination and reducing overuse of acute care hospital services will require new policies and new ways of thinking about how to organize and finance care. Providers must be motivated to reduce the overuse of the inpatient acute care sector, and become organized and responsible for managing chronically ill patients over the course of their lives. This will undoubtedly require reform of the payment system that currently rewards high-intensity inpatient care handsomely; pays relatively little for primary care and other components of care essential for population-based, community-wide management of chronic illness; does not compensate hospitals for losses associated with reduction in acute care capacity; and fails to reward high quality performance more than low. We believe that pay-for-performance strategies, already in place to reward providers who achieve high quality care for selected technical process measures, should be extended to reward providers that improve efficiency and become accountable for the coordinated management of their chronically ill patient populations.

Because of current weaknesses in clinical science, pay-for-performance would necessarily be based initially on the relative efficiency standard for measuring performance discussed in Chapter Three. Participation would presumably be voluntary, based on a provider's willingness to put into place organized delivery systems for chronic illness and to reduce overuse of the acute care sector. The relative efficiency standard points to potentially large recovery of Medicare dollars now wasted in overuse of acute care hospitals, particularly in regions such as Los Angeles, Miami, and Manhattan.

It is not reasonable to think about recovering that money if it bankrupts hospitals. Recovery would be feasible, however, through some form of shared savings that would compensate providers for the costs associated with downsizing. Part of the savings accrued to Medicare would be earmarked for this purpose. Another part of the savings would be pooled into a national fund to be shared by all providers who participate in pay-for-performance programs to offset the costs of the infrastructure required to build organized care. These include IT systems and patient management strategies, which have not traditionally been reimbursed adequately by fee-for-service payment.

An example of a patient management strategy would be a program for calling heart failure patients on a daily basis to check their weight and ensure they are not retaining fluid in their lungs. Such seemingly simple measures can prevent the acute episodes that often send heart failure patients to the emergency room, saving money for payers. Yet traditional fee-for-service reimbursement fails to reward providers for employing such strategies. A final share of the savings pool would be used to reward providers such as the Mayo Clinic and Intermountain Healthcare, which are already relatively efficient, for implementing specific improvements in their coordinated systems of care.

As clinical evidence for what constitutes effective care becomes available through research, pay-for-performance would increasingly be based on the actual costs of providing such care efficiently. In response to the pay-for-performance incentives, the number of health care organizations capable of delivering coordinated, accountable care would increase to the point where Medicare enrollees with chronic illness would have access to superior care in all parts of the country. With the completion of this transition, health policy makers might decide that only accountable care organizations

capable of providing evidence-based care would be eligible for Medicare reimbursement for routine management of chronic illness.

A major premise of this scenario is that coordinated care systems can increase in numbers sufficient to play a leading role in the way the nation manages chronic illness. This would occur as the result of a national policy led by CMS. Consider a scenario in which CMS would offer shared savings partnerships to providers who agree to coordinate care among the various sectors of care—inpatient, ambulatory, home health care, chronic institutional care, and hospice—and to implement long-term budgets aimed at achieving the resource input and utilization benchmarks similar to those of a relatively efficient provider. As a participating provider reduces overuse of acute care and coordinates care among the various sectors, savings in Medicare spending would be shared between the provider and CMS, according to a formula negotiated as part of the partnership agreement. The cost-sharing provision would create revenue for the provider partner to manage the financial consequences of downsizing its acute care component in the process of creating an organized system. These costs might include the amortization of debts to bond holders and employee buyouts. Savings would also be allocated to pay for the infrastructure required to build organized care, such as the IT systems required, and services for caring for the chronically ill that are not funded under traditional Medicare Part A and B, such as nurse coaches and other key personnel required for active disease management.

Providers in all regions would be invited to participate, including those that are already efficient compared to their peers and thus cannot be expected to contribute as much to the shared savings pool by reducing overuse of acute care. This avoids the potential for punishing providers that are already doing a good job. Even these relatively efficient providers can improve their care further by coordinating it, and by taking advantage of opportunities to improve infrastructure. CMS should be prepared to invest a significant proportion of the savings obtained from high-cost providers in IT systems and patient management strategies for providers in regions with low resource use and utilization rates, provided they agree to establish organized care delivery systems.

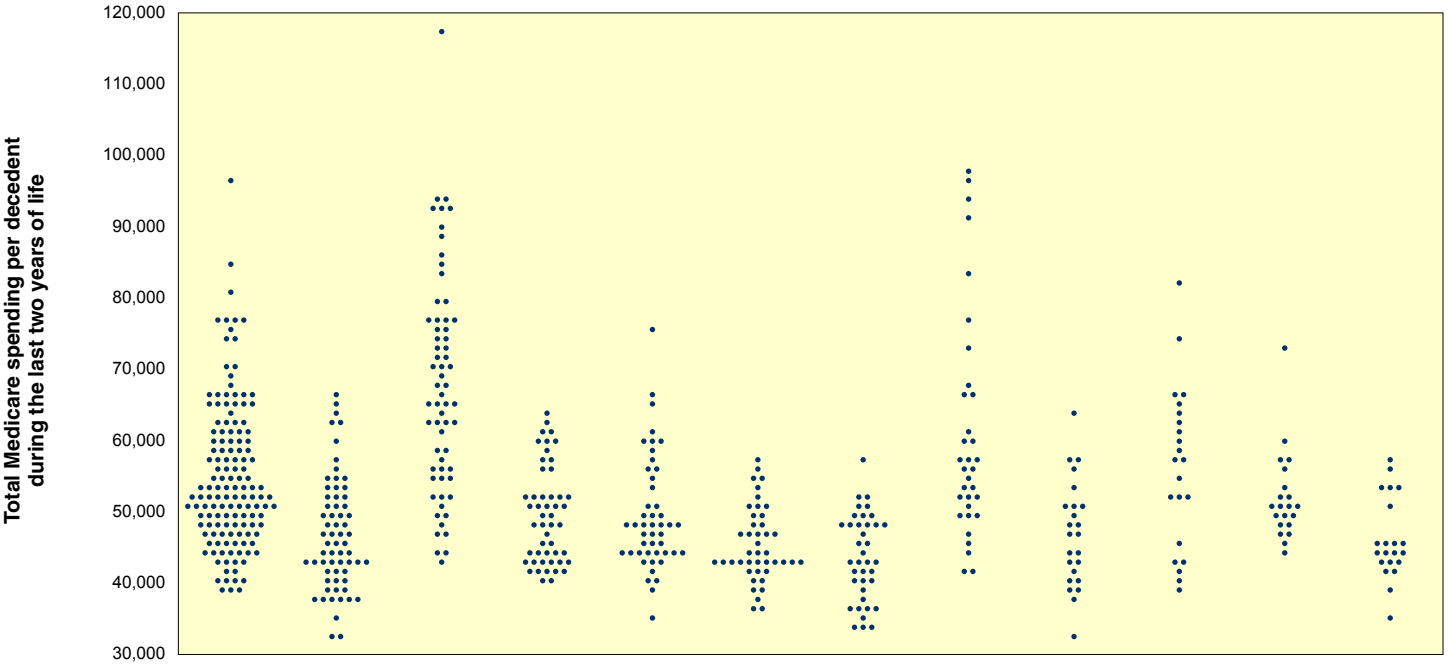
## How hospitals might respond

Hospitals should be highly motivated to take advantage of the cost-sharing provisions, particularly if it becomes clear that over the long run, pay-for-performance will be based on the actual costs of providing evidence-based care efficiently. Using the Dartmouth Atlas database, hospitals can learn quickly where they stand on the relative efficiency scale, and those with acute hospital resource inputs and utilization that are substantially in excess of efficient practice benchmarks set by providers like the Mayo Clinic and Intermountain Healthcare will understand that in the long run, CMS may penalize them for providing high-cost, high-intensity, chaotic care. Under the shared savings model, CMS would offer a strong financial incentive for hospitals to organize their care.

We recognize that many individual hospitals may not have sufficient resources to respond appropriately. Multi-hospital systems, on the other hand, may be in the best position to respond to the new incentives, and they could serve as the nucleus for the rapid growth of organized care. Over the past few decades, a number of hospital systems have developed around the country, some not-for-profit, some for-profit, some associated with academic medical centers, others not. By 2005, fully 30% of traditional Medicare patients hospitalized for chronic illness during the last two years of life were treated primarily in hospitals belonging to networks with 10 or more member facilities. There are striking variations between hospital systems as well as among hospitals within networks, suggesting there is room for better management even within these systems.

Figure 5.1 summarizes variations in Medicare spending among hospitals that, according to the American Hospital Association's Annual Survey Database 2005, belonged to networks. The data are limited to hospital systems comprising 20 or more hospitals, with 400 or more deaths at each hospital occurring between 2001 and 2005. There was extensive variation among hospitals belonging to networks. For example, the weighted average per capita reimbursement among hospitals belonging to the Hospital Corporation of America (HCA) was about $55,000 per decedent. But among the 139 HCA hospitals with more than 400 deaths, Medicare reimbursements varied by a factor of 2.5, from about $38,500 per decedent to more than $95,000. Per decedent spending during the last two years of life varied by a factor of 1.27 between the hospital at the 75th percentile ($61,000) and the hospital at the 25th percentile ($48,000). There was even more variation among the hospitals belonging to the Tenet Healthcare Corporation (indeed, the highest per decedent spending among all hospitals belonging to a network was seen at Tenet hospitals). Among faith-based networks, Catholic Healthcare West and Catholic Health East exhibited the greatest variation.

Faced with the prospect of payment reform, the administrators of hospital networks might be motivated to push their facilities to organize themselves better and do a better job of managing their chronically ill patients.




| | HCA | Commun. Health Systems, Inc. | Tenet Health-care Corp. | Health Mgmt. Assoc. | Ascension Health | Triad Hospitals, Inc. | Catholic Health Initiatives | Catholic Health-care West | Trinity Health | Catholic Health East | Adventist Health System Sunbelt | Catholic Health-care Partners |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | $95,901 | $66,576 | $117,998 | $64,172 | $75,627 | $56,775 | $56,723 | $98,315 | $64,215 | $82,478 | $73,425 | $57,813 |
| 75th percentile | $60,781 | $51,668 | $76,566 | $52,510 | $54,012 | $48,945 | $48,062 | $65,887 | $51,090 | $63,334 | $52,926 | $51,354 |
| System average | $55,027 | $48,190 | $65,364 | $49,731 | $51,110 | $46,014 | $45,670 | $59,832 | $49,243 | $57,025 | $53,780 | $47,413 |
| 25th percentile | $47,777 | $41,923 | $55,711 | $43,359 | $44,055 | $42,464 | $39,094 | $50,703 | $41,825 | $46,987 | $47,959 | $42,623 |
| Minimum | $38,501 | $31,835 | $43,118 | $40,076 | $35,587 | $36,077 | $33,778 | $41,468 | $32,403 | $39,379 | $44,439 | $35,699 |

**Figure 5.1. Medicare Spending During the Last Two Years of Life for Patients with At Least One of Nine Chronic Conditions Receiving Most of their Care from a Hospital Belonging to One of Twelve Hospital Systems (Deaths Occurring 2001–05)**

## How Catholic Healthcare West might respond

Consider the opportunities that would be available for Catholic Healthcare West, which in 2005 comprised 33 hospitals, five of which were located in the high-cost Los Angeles region, and six in low-cost Sacramento. Dartmouth data show that 5,290 deaths occurred among chronically ill patients using Catholic Healthcare West's Los Angeles hospitals during 2001–05. Over the last two years of these patients' lives, per capita Medicare spending was $90,662, with Medicare outlays totaling $480 million. By contrast, per patient spending for similar patients treated in Catholic Healthcare West hospitals serving Sacramento was $49,157 per patient. Because they achieve better quality using fewer resources (Table 5.1), the Catholic Healthcare West hospitals in Sacramento can serve as a benchmark for the network to evaluate the relative efficiency of the system's hospitals in Los Angeles. Had the five Los Angeles hospitals spent at the rate of the Sacramento benchmark, care at Catholic Healthcare West's hospitals in Los Angeles would have amounted to only $260 million. The difference between actual and predicted spending under the Sacramento benchmark—almost $220 million (almost $244 million in 2006 dollars)—indicates the amount available for the shared savings pool if Catholic Healthcare West hospitals in Los Angeles were to successfully reach the Sacramento benchmark for relative efficiency in managing chronic illness.[i]

How might Catholic Healthcare West hospitals in Los Angeles achieve the efficiency of their sister hospitals in Sacramento? The task for managers would be to develop a plan to move toward coordinated care, manage capacity, and address the inefficiencies profiled in the Dartmouth Atlas data, so that per capita resources allocated to the Los Angeles hospitals matched those of the network's Sacramento hospitals. The plan would serve as the basis for setting targets and negotiating the cost-sharing agreement with CMS. It would include strategies for:

**Care coordination** Beginning first with its own physician staff and referring physicians, how would the various components of chronic care management be integrated? A plan would include the specification of new roles for providers in managing chronic illness, perhaps worked out with the support of disease management companies that could help provide some of the missing infrastructure. Special focus would be on filling gaps in care management that result in unnecessary (preventable) exacerbation of underlying disease. The plan would focus on coordination of care at transition points between care sectors, particularly the hand-offs between primary care and specialist care: between hospitals and skilled nursing/long-term care facilities and nursing homes; between home health care and primary care; and between acute care and hospice and palliative care.

[i] For this example and the next, we did not reduce only the volume of services while holding the prices constant, as we did in Chapter Three (Table 3.8); this example assumes that expenditures can decline to the benchmark hospital despite potential differences in prices. While there are regional differences in costs within states, they are not as pronounced as the differences across the country. Labor costs are actually higher in Sacramento than in Los Angeles; the wage index proposed by CMS for 2006 was 1.18 for Los Angeles and 1.29 for Sacramento (from CMS Table 4A, "FY 2006 proposed wage index and capital geographic adjustment factor (GAF) for urban areas by CBSA"). The corresponding wage index values for Miami and Tallahassee are 0.97 and 0.87, respectively.

**Table 5.1. Benchmarking Care for Patients with At Least One of Nine Chronic Conditions Using Catholic Healthcare West Hospitals Located in Los Angeles to Those Located in Sacramento (Deaths Occurring 2001–05)**

| | CHW hospitals in Los Angeles | CHW hospitals in Sacramento | Ratio of CHW L.A. to CHW Sac. average | Annual savings (2006 dollars in millions) |
|---|---|---|---|---|
| **Medicare spending during last two years of life** | | | | |
| Total Medicare spending | $90,662 | $49,157 | 1.84 | $48.7 |
| Inpatient sector | $58,126 | $27,360 | 2.12 | $36.1 |
| Outpatient sector | $10,112 | $7,704 | 1.31 | $2.8 |
| SNF/long-term sector | $12,466 | $7,617 | 1.64 | $5.7 |
| Home health sector | $4,429 | $2,347 | 1.89 | $2.4 |
| Hospice sector | $1,590 | $1,394 | 1.14 | $0.2 |
| Durable medical equipment | $1,920 | $1,524 | 1.26 | $0.5 |
| All other | $2,018 | $1,212 | 1.67 | $0.9 |
| **Resource inputs during last two years of life** | | | | |
| Hospital beds | 96.7 | 44.9 | 2.15 | |
| ICU beds | 34.8 | 17.4 | 2.00 | |
| High-intensity | 14.8 | 6.1 | 2.44 | |
| Intermediate-intensity | 20.1 | 11.4 | 1.76 | |
| FTE physician labor | | | | |
| All physicians | 45.0 | 20.5 | 2.20 | |
| Medical specialists | 23.0 | 7.9 | 2.90 | |
| Primary care physicians | 16.2 | 8.9 | 1.82 | |
| Required RNs under minimum standard | 88.6 | 41.1 | 2.16 | |
| **Care intensity during last six months of life** | | | | |
| Physician visits | 73.7 | 26.0 | 2.83 | |
| Hospital days | 20.1 | 9.8 | 2.05 | |
| ICU days | 9.3 | 3.9 | 2.39 | |
| High-intensity | 4.5 | 1.4 | 3.20 | |
| Intermediate-intensity | 4.8 | 2.5 | 1.93 | |
| % of deaths with ICU admission | 33.9 | 19.8 | 1.71 | |
| % admitted to hospice | 20.4 | 22.6 | 0.90 | |
| **Estimated co-payments per decedent during last two years of life** | **$5,137** | **$2,635** | **1.95** | |
| **CMS composite quality score (all enrollees, 2005)** | **87.5** | **92.7** | **0.94** | |

**Reducing overuse of inpatient beds** How would Catholic Healthcare West address the efficiency benchmarks? Table 5.1 indicates the opportunity to reduce inpatient bed use for the chronically ill in their Los Angeles hospitals by 54% and ICU bed use by 50% (high-intensity ICU beds by 59% and intermediate-intensity beds by 43%). A plan for reducing excess capacity so that it approaches the Sacramento benchmark would begin with the re-examination of plans already on the drawing board to expand existing capacity or replace substandard beds: for example, those that fail to meet seismic regulations.[ii] As illustrated in Table 4.2 in the previous chapter, Dartmouth Atlas data show considerable variation in resource inputs among the five Catholic Healthcare West sites in Los Angeles and draw attention to the possibility that the relative efficiency goals could be reached by phasing out inpatient services at certain sites, while adding patients to other hospitals.

**Reducing physician overuse** For Catholic Healthcare West hospitals in Los Angeles to reach the Sacramento benchmarks, the total physician workforce providing visits and performing procedures for chronically ill patients would need to be reduced by about 54%, with medical specialists being cut by about 66%. A plan would include an analysis of the age composition of the existing workforce, projecting (on a specialty-specific basis) retirements and otherwise estimating the decline that would occur if no additions were made to the current workforce providing services to Los Angeles patients. Options for using shared saving funds to support the redeployment of professional staff to new tasks to organize care identified under the plan would be addressed. Possible uses of shared savings to improve the professional workforce would be identified, such as periodic sabbaticals to help providers learn new skills or retool for new assignments and refresh their professional careers. Such programs could play an important role in reducing the oversupply of providers involved in acute hospital sector management of chronic illness.

**A shared savings plan** A key requirement would be a financial plan (negotiated with CMS) that specifies how the closure of beds and reallocation of physician labor would influence revenue flow. This plan would estimate the targeted shared savings to be recovered from reduction of acute care hospital use and project how much of the targeted savings would need to be held in reserve to offset the costs of retiring beds and redeploying the workforce. It would also address the use of shared savings to build the infrastructure for managing chronic illness.

[ii] Los Angeles hospitals, like all California hospitals, are required by state government to achieve new standards for withstanding earthquakes, requiring many hospitals to rebuild.

**Table 5.2. Benchmarking Care for Patients with At Least One of Nine Chronic Conditions Using HCA Hospitals Located in Miami to Capital Region Medical Center in Tallahassee (Deaths Occurring 2001–05)**

| | HCA hospitals in Miami | Capital Regional Medical Center | Ratio of HCA Miami average to Capital Regional | Annual savings (2006 dollars in millions) |
|---|---|---|---|---|
| **Medicare spending during last two years of life** | | | | |
| Total Medicare spending | $89,984 | $49,394 | 1.82 | $30.9 |
| Inpatient sector | $50,275 | $22,765 | 2.21 | $21.0 |
| Outpatient sector | $10,056 | $5,896 | 1.71 | $3.2 |
| SNF/long-term sector | $10,930 | $12,585 | 0.87 | ($1.3) |
| Home health sector | $7,118 | $2,686 | 2.65 | $3.4 |
| Hospice sector | $2,593 | $2,987 | 0.87 | ($0.3) |
| Durable medical equipment | $7,202 | $1,816 | 3.97 | $4.1 |
| All other | $1,811 | $659 | 2.75 | $0.9 |
| **Resource inputs during last two years of life** | | | | |
| Hospital beds | 92.5 | 54.7 | 1.69 | |
| ICU beds | 41.1 | 25.4 | 1.62 | |
| High-intensity | 14.5 | 15.5 | 0.94 | |
| Intermediate-intensity | 26.6 | 9.9 | 2.68 | |
| FTE physician labor | | | | |
| All physicians | 46.2 | 26.4 | 1.75 | |
| Medical specialists | 18.8 | 11.8 | 1.60 | |
| Primary care physicians | 21.3 | 10.7 | 1.99 | |
| Required RNs under minimum standard | 86.9 | 55.1 | 1.58 | |
| **Care intensity during last six months of life** | | | | |
| Physician visits | 65.7 | 34.4 | 1.91 | |
| Hospital days | 19.9 | 12.0 | 1.66 | |
| ICU days | 11.8 | 6.3 | 1.87 | |
| High-intensity | 4.8 | 3.8 | 1.25 | |
| Intermediate-intensity | 7.1 | 2.5 | 2.81 | |
| % of deaths with ICU admission | 35.5 | 23.9 | 1.49 | |
| % admitted to hospice | 31.9 | 41.3 | 0.77 | |
| **Estimated co-payments per decedent during last two years of life** | **$6,409** | **$2,703** | **2.37** | |
| **CMS composite quality score (all enrollees, 2005)** | **73.4** | **83.4** | **0.88** | |

## Hospital Corporation of America in Florida

A similar opportunity to improve relative efficiency exists for Hospital Corporation of America in Florida, where HCA owns some 40 hospitals. Capital Regional Medical Center in Tallahassee is among the network's most efficient hospitals. Its least efficient are Cedars Medical Center and Kendall Regional Medical Center, both located in Miami. These three hospitals are all "full service" facilities, offering most subspecialty services, including cardiac surgery. Over the five-year period 2001–05, they treated approximately the same number of patients with severe chronic illness: about 1,700 in each hospital were in the last two years of life. However, this is where the similarity ends. The two HCA hospitals in Miami spent 1.82 times more on a per decedent basis than did Capital Regional: $90,000 versus $49,400. If spending levels in the two Miami hospitals had been at the level of Capital Regional, the annual savings to Medicare would have been about $31 million. Most of the savings—$21 million—would have come from reduced spending on acute inpatient care. As illustrated in Table 5.2, resource inputs—physician labor and hospital beds—were substantially greater at the Miami hospitals, and this excess capacity was used to deliver much greater care intensity: 91% more physician visits during the last six months of life, more days in hospital and intensive care, and a higher proportion of "high-tech" deaths, measured by the chance of dying in an ICU. At the same time, the quality of care, measured by the CMS Hospital Compare composite quality score, was substantially worse in the Miami hospitals than at Capital Regional, as was the direct cost to patients as measured by average co-payment.

## How physicians might respond

Well-established, multi-specialty group practices such as Kaiser Permanente, the Mayo Clinic, and the Cleveland Clinic would presumably be well situated to take advantage of Medicare incentives to expand group practice, particularly if they were able to affiliate with relatively efficient hospitals in high-cost regions, creating alliances between progressive hospitals and progressive physicians who could move the nation toward coordinated care. Primary care may offer another potential force for organizing systems of care. Patients with severe chronic illness would presumably benefit most from the kind of care coordination under the "medical home" primary care concept proposed by the American College of Physicians and others.[1] An advantage of a primary care "medical home" as the focus for organizing care would be that primary care networks organized around these ideas could negotiate with other providers involved in chronic care. These would include acute care hospitals, skilled nursing facilities, long-term care/rehabilitation facilities, home health agencies, and hospices.

Information profiling the relative efficiency of hospitals in a given community would help the organizers of such primary care networks decide to which hospitals they should send their patients. For example, as discussed in the last chapter, primary care groups in Long Beach, California might choose to bring Long Beach Memorial Medical Center or Pacific Hospital into their network, rather than the less efficient St. Mary Medical Center. In the Arcadia and San Gabriel communities, primary care physicians would want to affiliate with Methodist Hospital, avoiding high-cost Alhambra Hospital Medical Center. In the Glendale and Pasadena communities, the choice for affiliation would be Verdugo Hills Hospital or Huntington Memorial.

The primary care "medical home" could provide a model for coordinating care among sectors and ensuring that patients' transitions between sectors run smoothly. In this role, primary care physicians would have an advantage, because in today's health care markets, most primary care physicians do not have entangling owner relationships with acute care hospitals, skilled nursing facilities, or long-term care facilities. They are thus in a better position to help reduce the remarkable variation among these sectors of care.[iii] We believe that CMS should develop strong financial incentives for primary physicians to assume a leadership role in coordinating care and reducing overuse of acute care hospitals.

## Concerning feasibility

Given the complex, entangled web of economic incentives and false assumptions that currently operate in today's health care system, is it possible to successfully address the underlying major structural problems behind the unwarranted variation phenomenon: poor science, poor coordination of care, and overuse of care, particularly of acute care hospitals? The first step, we suggest, is to understand the causes and consequences of variation in the way chronic illness is managed from state to state, from region to region, and from provider to provider. Much of this edition of the Atlas has been devoted to this task. The next step is to implement reforms that can address unwarranted variation. In this chapter, we have outlined a general approach to reducing variation. The end game is the establishment of science-based, cost-effective, and coordinated management of chronic illness through care that is also sensitive to patient preferences and supported by adequate infrastructure. An adequate infrastructure includes the personnel and technology that serve as the means for both guiding and monitoring quality and efficiency. Eventually, reimbursement should be determined on the basis of these measures.

Until then, the use of relative efficiency benchmarks and the creation of a shared savings program are a bridge to the future. Medicare claims can provide a common database for negotiating shared savings partnerships and monitoring progress. They provide a means for calculating provider-specific, illness-adjusted estimates of current Medicare spending for managing chronic illness, and for comparing performance to the spending levels, resource use, and care intensity patterns that efficient providers use. The claims data also provide the means for monitoring changes in provider performance. The strong correlations that exist between spending, resource use, and care intensity levels during the last months of life, and the levels of use during previous periods in the progression of chronic illness (Chapter Three) suggest that it is reasonable to use data from the last six months of life as illness-adjusted measures of a provider's overall performance in managing chronic illness. Trends in spending, resource use, and care intensity during the last six months of life can be used to monitor changes in provider-specific performance in managing chronic illness. This is an important feature, because performance measures can be updated on a periodic, close to real-

[iii] The fact that physicians who step forward to assume the responsibility for care coordination have no direct responsibility for the overall performance of the acute care facilities they use does, however, add complexity to CMS's negotiation of a cost-sharing agreement. A reduction in rates of spending in the other sectors through care coordination, without a corresponding reduction in capacity, leaves beds or home health agency services available to be filled by patients under the care of other physicians. Thus "shared savings" calculated on the basis of the group practice's success in reducing inpatient spending toward an efficient benchmark may not be savings at all; our understanding of the market for supply-sensitive care predicts that, in the absence of a reduction in capacity, the shared savings calculated on the basis of the performance of group practice will be offset by increased volume and per capita spending by those who are not similarly motivated. This eventuality may need to be addressed, through regulation or otherwise. The good news is that evidence that cost shifting is occurring would be transparent in near real time in the claims data.

time basis using claims incurred immediately prior to death, which are available within a few months after death.

Success would depend on CMS's ability to motivate providers to coordinate care. The principle incentives here are the offer of shared savings (the carrot) and the possibility that, eventually, only organized care systems would qualify for taking care of Medicare's chronically ill (the stick). The good news is that the conceptual framework and perhaps enough legislative authority to undertake the shared savings program may have already been granted by Congress in CMS demonstration authority, particularly under Section 646 of the Medicare Modernization Act of 2003. Under the provisions of CMS's group practice demonstration projects and Section 646, shared savings partnership agreements could be forged with providers (such as Catholic Healthcare West, under a plan like the one described above) who agree to move toward organized care models, and who adopt benchmarks of relatively efficient providers as targets and models for reducing overuse of acute care. Since there is no time limit or restriction on the number of participants under the 646 provision, CMS could conceivably use this authority to implement a national policy to accelerate the growth of organized care. Success will also require a sustained investment in research to make it possible to base clinical practice and pay for performance on strong scientific evidence regarding the resources and clinical strategies required to provide high-quality, cost-effective care.

The real test of feasibility would come after several years, at the time of transition from shared savings to prospective payment based on successful completion of the research agenda. Under a pessimistic scenario, disorganized, high-cost providers would continue to exercise a significant impact on the politics and economics of health care, making it exceedingly difficult to move toward cost-effective care. Under an optimistic scenario, most providers who want to be involved in managing chronic illness would, by that time, be associated with an organized system, and they would have learned how to practice cost-effective care over the course of a patient's chronic illness. Moreover, organized care would be widely available to Medicare patients throughout the country.

By then, the CMS move to reimburse providers based on the actual costs of providing evidence-based care would be well accepted by the leaders of academic medicine. Clinical researchers practicing in organized systems would be solid supporters of, and contributors to, the movement toward cost-effective care. In our vision of a better system, the medical profession would be in charge of the clinical evaluation of new technologies and the design of new clinical pathways, and research will, by that time, have established the scientific basis of chronic illness management to the point where the supply of medical resources would no longer drive the use of care. Instead, patients would receive care based on their preferences and a body of valid medical evidence. As new technologies, procedures, and clinical pathways emerge, they would be subjected to research.

The prospects for a progressive resolution to the structural problems plaguing the way America currently manages severe chronic illness will depend on the coming together of the various stakeholders. The emerging awareness among primary care physicians (who still comprise about half of U.S. physicians) of the special role they might play in care coordination bodes well for the prospect that the medical community at large will support such an effort. We hope that some hospitals and hospital systems, reading the handwriting on the wall, will be inspired to lead the movement toward better management of chronic illness. Yet much depends on CMS and its key role in the financing of

health care, which means that Congress will need to act. There are two compelling reasons for taking action. One is the inevitability of rapidly rising costs, driven by increasing numbers of chronically ill patients as the baby boomers age, and by current trends among providers toward escalating their investment in resources—physicians, hospital facilities, and technologies—devoted to the care of those nearing the end of life. The other reason to act is the impact that excess care is having on the quality of life of the chronically ill.

## Endnotes

[1] American College of Physicians. "The Advanced Medical Home: A Patient Centered, Physician-Guided Model of Health Care." Policy Monograph, 2006, http://www.acponline.org/hpp/adv_med.pdf.

# Afterword

## Accessing Information on the Dartmouth Atlas Website

This edition of the Dartmouth Atlas illustrates how medical practice varies for those with severe chronic illnesses from state to state, from region to region, and from hospital to hospital, even among hospitals in the same region. Much of the variation is unwarranted, in the sense that it cannot be explained on the basis of illness, medical evidence, or informed patient choice. We have suggested that information about the performance of different hospitals and regions in managing severe chronic illness may be helpful to various stakeholders, who come to health care with different perspectives, responsibilities, and needs.

Some stakeholders are primarily concerned about the impact of health care on patient populations:

- policy makers and government officials concerned about the remarkable variations in utilization and quality across all types of hospitals (whether in their own districts or elsewhere);
- payers and employers concerned about reducing costs and improving efficiency;
- care managers, hospital administrators, and boards of trustees who make decisions about how to improve the services they provide;
- clinical scientists interested in remedying the weaknesses in clinical science that contribute to variation; and
- journalists and bloggers interested in writing about or commenting on stories about local or national practice variation.

Other stakeholders are more concerned about the impact on individuals:

- patients and families, who want to find caregivers whose practice patterns fit their preferences for chronic or end-of-life care; and
- physicians and other caregivers who want to help their patients receive the care they want.

Reports containing selected performance measures are available on the Atlas website. In this Afterword, we describe these reports, illustrate how the website's basic tool kit can be used to access them, and provide examples of how selected stakeholders might use them.

There are three basic reports: the Medicare Spending Report; the Resource Allocation Report; and the Patient Experience Report (see box 1). The methods used to calculate the measures in each report are described in the Appendix on Methods. The basic reports contain data on patients who died over the five-year period from 2001 to 2005. The measures are available for states, for the 306 hospital referral regions (HRRs) defined by the Dartmouth Atlas Project, and for 2,826 U.S. hospitals with 400 or more deaths between 2001 and 2005. The Atlas Project foresees that these reports will be updated on an annual basis as data become available.

To help users access the reports that compare specific providers, we have developed a "drill-down" strategy that uses an index to locate states, regions, and hospitals according to their propensity to rely on the acute care hospital in managing chronic illness. We call this metric the hospital care intensity index, or HCI. It reflects both the amount of time spent in hospital and the intensity of phy-

## Components of the Basic Reports for Medicare Patients with At Least One of Nine Common Chronic Conditions*

**The Medicare Spending Report**
*Spending per Medicare patient during the last two years of life*
- Total Medicare spending
- Inpatient site of care
- Outpatient site of care
- Skilled nursing/long-term care facility
- Home health care
- Hospice care
- Durable medical equipment

**The Resource Allocation Report**
*Resource inputs per 1,000 Medicare patients during the last two years of life*
- Hospital beds
- Intensive care unit (ICU) beds
  - High-intensity ICU beds
  - Intermediate-intensity ICU beds
- Full-time equivalent (FTE) physician labor
  - All physicians
  - Primary care physicians
  - Medical specialists
- Registered nurses (RNs) required under proposed federal standards

**The Patient Experience Report**
*Care during the last six months of life*
- Average number of days spent in hospital per patient
- Average number of physician visits per patient
- Percent of patients seeing ten or more physicians

*Terminal care*
- Percent of deaths associated with intensive care
- Percent of patients enrolled in hospice

Average patient co-payments for physician care and durable medical equipment during the last two years of life

**See Appendix on Methods to learn how measures were computed.*

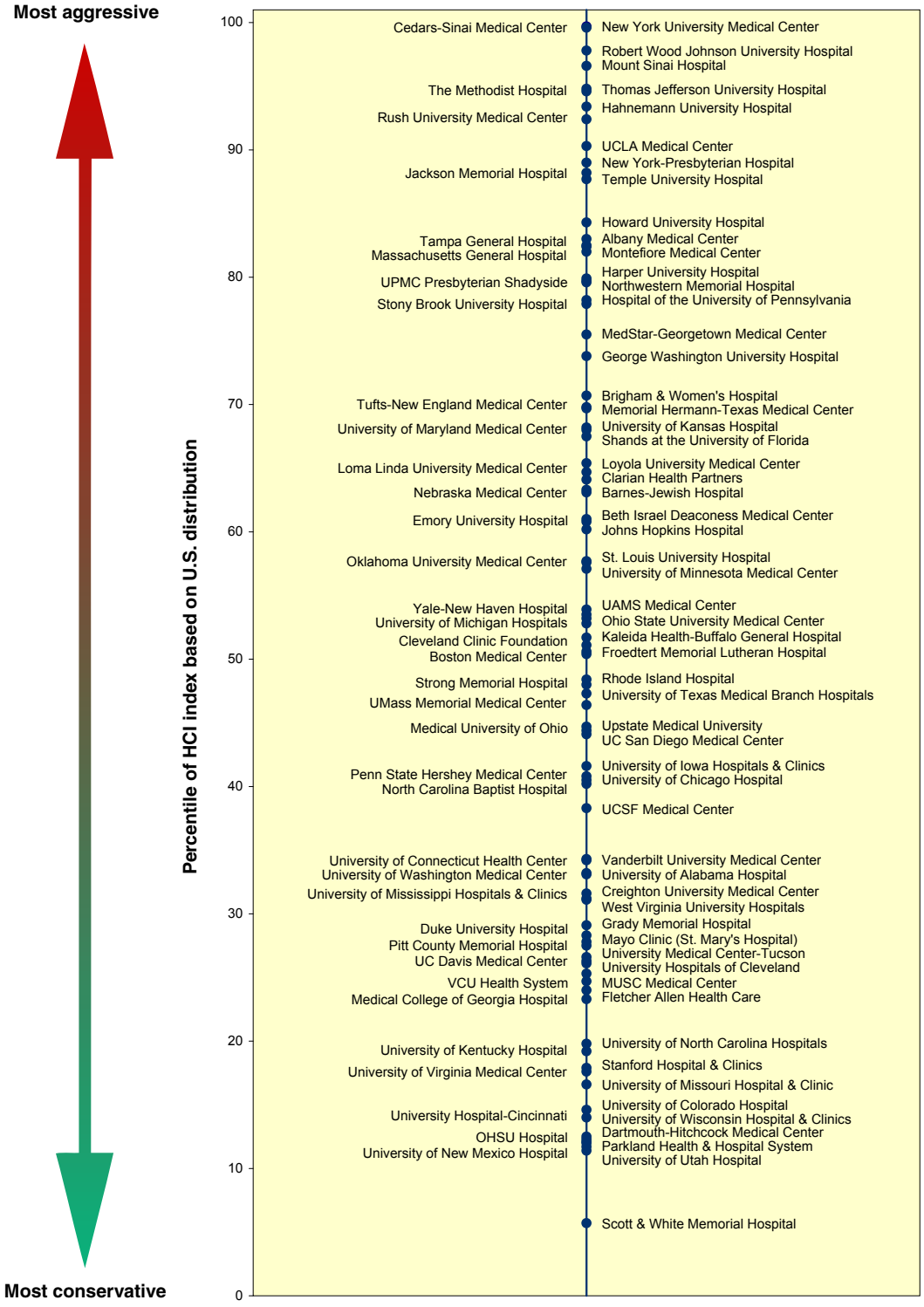
**Box 1**

sician services delivered in the hospital (see box 2). Figure A.1 (a facsimile of the website display) shows the location on the index of each of the 93 academic medical centers (AMCs) discussed in Chapter Three. Hospitals toward the top in the figure rank at or above the 50th percentile nationally: those at the bottom rank below the 50th percentile among the hospitals included in the database. As this figure shows, there is remarkable variation in the propensity to use inpatient care among academic medical centers. The most aggressive academic medical center ranks above the 99th percentile; the most conservative ranks below the 10th percentile.

The HCI is based on two variables: the number of days patients spent in the hospital and the number of physician encounters (visits) they experienced as inpatients. It is computed as the age-sex-race-illness standardized ratio of patient days and visits. For each variable, the ratio of a given hospital's utilization rate to the national average was calculated, and these two ratios were averaged to create the index. States, regions, and hospitals with high scores on this index used inpatient care much more than those with low scores. The HCI for regions and hospitals was converted into a percentile score calculated according to where that region or hospital fell in the ranking of all regions and hospitals for which we had an index estimate. We have calculated the percentile ranking so that approximately 1% of the hospitals in the database fall into each percentile.

**Box 2**

**Figure A.1. Hospital Care Intensity Index for Academic Medical Centers (Deaths Occurring 2001–05)**



## Examples of routine reports

In previous chapters, we discussed how Atlas data might be useful to many of the stakeholders listed above. Here we provide examples of basic reports that might be used by three of these stakeholders. One example is oriented toward those responsible for overseeing the health care provided to patient populations: in this case the board of directors of a hospital system. The other examples are designed to help patients and families choose providers whose practice patterns most closely fit their preferences, and to help physicians and patients (and their families) negotiate care plans to ensure that those with progressive chronic illness receive the end-of-life care they prefer. Users of the Atlas website can drill down to access one or more of the basic reports for hospitals of special interest to them.

## What hospital boards might want to know

Here we imagine how the members of a hospital or health system board might use these data to understand the impact its health care organization is having on the population it serves. For example, the Board of Regents of the University of California is ultimately responsible for the performance of the five academic medical centers that belong to the University of California system. The Medicare Spending Report should be of interest; because the University of California (UC) system is a major recipient of Medicare dollars, The Regents should know the spending status of the system's hospitals in their management of patients with chronic illness. The Resource Allocation Report should also be of interest because it addresses issues directly related to The Regents' fiduciary responsibility for overseeing decisions made by managers of the UC system concerning hiring physicians, constructing hospital beds, and purchasing diagnostic equipment. These decisions have a direct bearing on health care costs because they affect the capacity of the UC hospitals relative to the size of the patient populations they serve in Los Angeles, San Diego, Orange County, San Francisco, and Sacramento. Finally, the Patient Experience Report should be of interest to The Regents because it uncovers the striking variation in the way patients—including retired university faculty and staff—are treated, depending on which hospital they use. The University system, through its health insurance plan, is responsible for the Medicare co-payments its retirees incur.

**Table A.1. Dartmouth Atlas Routine Report for University of California System Hospitals (Deaths Occurring 2001–05)**

| | UCLA Medical Center | UC Irvine Medical Center | UCSF Medical Center | UC San Diego Medical Center | UC Davis Medical Center |
|---|---|---|---|---|---|
| **The Medicare Spending Report** | | | | | |
| ***Medicare spending per patient during last two years of life*** | | | | | |
| Total Medicare spending | $93,842 | $88,584 | $78,046 | $71,118 | $70,139 |
| Inpatient site of care | $63,900 | $58,493 | $54,669 | $44,837 | $49,424 |
| Outpatient site of care | $14,125 | $13,680 | $10,713 | $9,791 | $7,665 |
| Skilled nursing/long-term care facility | $6,891 | $8,627 | $5,524 | $7,368 | $6,345 |
| Home health care | $3,994 | $2,182 | $3,220 | $2,791 | $1,882 |
| Hospice care | $1,649 | $2,641 | $1,707 | $3,788 | $1,936 |
| Durable medical equipment | $2,128 | $1,592 | $1,206 | $1,434 | $1,685 |
| **The Resource Allocation Report** | | | | | |
| ***Resource inputs per 1,000 decedents during last two years of life*** | | | | | |
| Hospital beds | | | | | |
| Total hospital beds | 85.8 | 73.9 | 61.5 | 68.3 | 55.5 |
| Total intensive care (ICU) beds | 38.1 | 30.7 | 15.8 | 27.9 | 25.0 |
| High intensity | 13.8 | 14.8 | 13.3 | 8.7 | 9.7 |
| Intermediate intensity | 24.3 | 15.9 | 2.6 | 19.2 | 15.4 |
| FTE physician labor | | | | | |
| All physicians | 38.5 | 31.2 | 25.9 | 22.4 | 22.8 |
| Primary care physicians | 9.6 | 10.5 | 11.2 | 8.8 | 8.7 |
| Medical specialists | 21.2 | 12.6 | 9.2 | 8.9 | 9.2 |
| Required RNs under proposed federal standard | 80.7 | 70.5 | 56.8 | 62.6 | 52.7 |
| **The Patient Experience Report** | | | | | |
| ***Care during last six months of life*** | | | | | |
| Hospital days per patient | 18.5 | 16.0 | 13.5 | 13.9 | 11.9 |
| Physician visits per patient | 52.8 | 42.3 | 30.8 | 27.4 | 25.8 |
| Percent seeing 10 or more physicians | 52.9 | 46.8 | 46.7 | 40.2 | 41.1 |
| ***Terminal care*** | | | | | |
| Percent of deaths associated with ICU admission | 37.9 | 29.5 | 23.3 | 26.2 | 28.6 |
| Percent admitted to hospice | 28.8 | 39.1 | 24.2 | 44.9 | 28.6 |
| **Average co-payments for physician services and durable medical equipment during the last two years of life** | **$4,835** | **$3,876** | **$3,102** | **$3,012** | **$2,687** |

A member of the Board of Regents who accessed the report posted on the Atlas website would be able to download the reports in Table A.1. The Medicare Spending Report shows striking variation in spending among the sister hospitals in the University of California system, with UCLA spending more than $93,000 per patient, over 30% more than UC San Diego. Spending at UCLA was high in all sectors of care, with the exception of hospice care. Perusal of the Resource Allocation Report shows greater use of hospital beds, FTE physician labor, and the need for many more nurses on a per capita basis than the other hospitals, without documented improvement in outcomes or quality of care.

The differences in spending and resource use are reflected in very different styles of care. The Patient Experience Report makes it easy for The Regents to see the striking variation in the intensity of care experienced by chronically ill patients depending upon where they received most of their care. The pattern of care at UCLA was the most aggressive, at UC Davis the most conservative: during the last six months of life patients spent 1.55 times more days in hospital, experienced twice as many physician visits, and almost 53% of their patient population saw ten or more different physicians, compared to about 41% at UC Davis. The percent of patients seeing ten or more physicians was even lower at UC San Diego than at UC Davis. Care intensity among the other hospitals fell in between.

UCLA was the most aggressive in its efforts to rescue patients at the very end of life, with 37.9% of patients admitted to an ICU during terminal care. At UCSF, by contrast, 23.3% of patients who died were so managed. The University of California hospital in San Diego showed the greatest propensity to use hospice, with 44.9% of patients enrolled, 1.85 times the enrollment seen at UCSF. Co-payments for physician services varied according to place of care, primarily as a function of variation in the per capita volume of care. Patients using UCLA incurred co-payments of about $4,800 during the last two years of life, almost 80% more than UC Davis' patients.

## What patients and families might want to know

Here are two scenarios that illustrate how patients and their families might use the Atlas to make choices about where to get their medical care: to match their provider's practice patterns to their own individual needs and wants.

**Deciding where to live:** Consider first how a son who is helping his elderly parents plan a move to Florida might use the Dartmouth Atlas website to help with the decision. The parents have already established advance directives stating their preferences to avoid aggressive end-of-life care if it can be reasonably avoided. They want to relocate to southern Florida but have not yet settled on a community. Their son, knowledgeable that the intensity of end-of-life care varies substantially from community to community, visits the Dartmouth Atlas website and accesses a graph that ranks all states on the HCI index (Figure A.2, left). He notes that Florida is well above the national average in the intensity of inpatient care. But the Florida HCI score is an average for the entire state. By clicking on Florida, the tool displays the location of each of the Dartmouth Atlas hospital referral regions within Florida, ranked according to the percentile of the region across all U.S. regions. He notes that the east coast regions in southern Florida—Miami and Fort Lauderdale—rank high on the HCI index, while Fort Myers ranks slightly below the 50th percentile among all U.S. hospitals (Figure A.2, middle).

Intrigued that the Fort Myers region might be an appropriate match for his parents, he drills down farther to access the HCI index for the hospitals located in the region (Figure A.2, right) and discovers considerable diversity. Three hospitals have HCI scores above the 70th percentile among U.S. hospitals; two are between the 40th and 60th percentile; and four hospitals fall toward the conservative end of the spectrum, ranking below the 35th percentile. Using the hospital cities indicated on the figure, he finds that the three high-intensity hospitals are located in or near Port Charlotte, the hospitals near the median are in Naples, and the four most conservative hospitals are located in and around the central Fort Myers community. At least in terms of the match between his parents' preferences and the local style of practice, the Fort Myers community is the best choice in southern Florida.

**Figure A.2. Hospital Care Intensity Index for States (left), Florida HRRs (middle), and Fort Myers Area Hospitals (right) (Deaths Occurring 2001–05)**

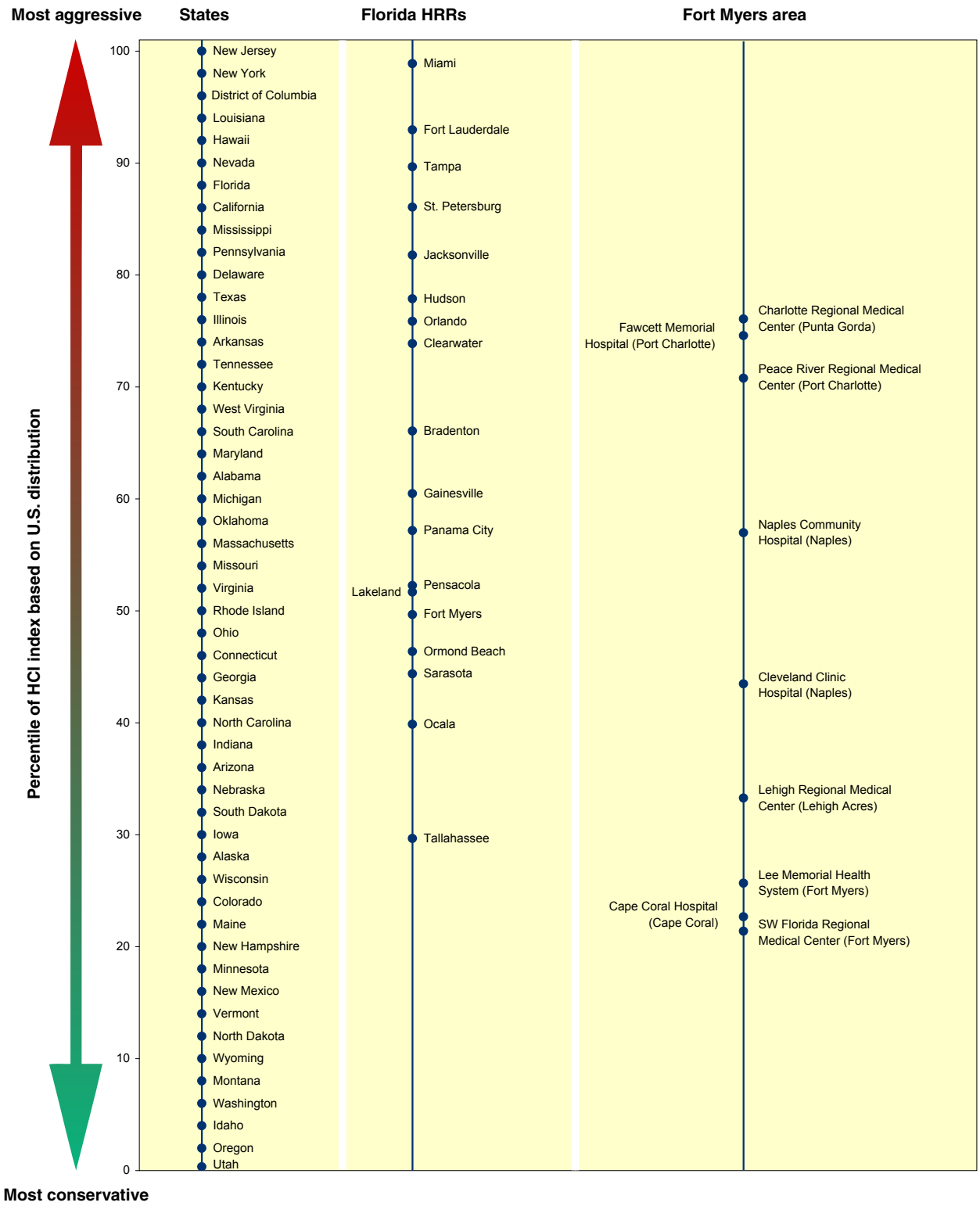
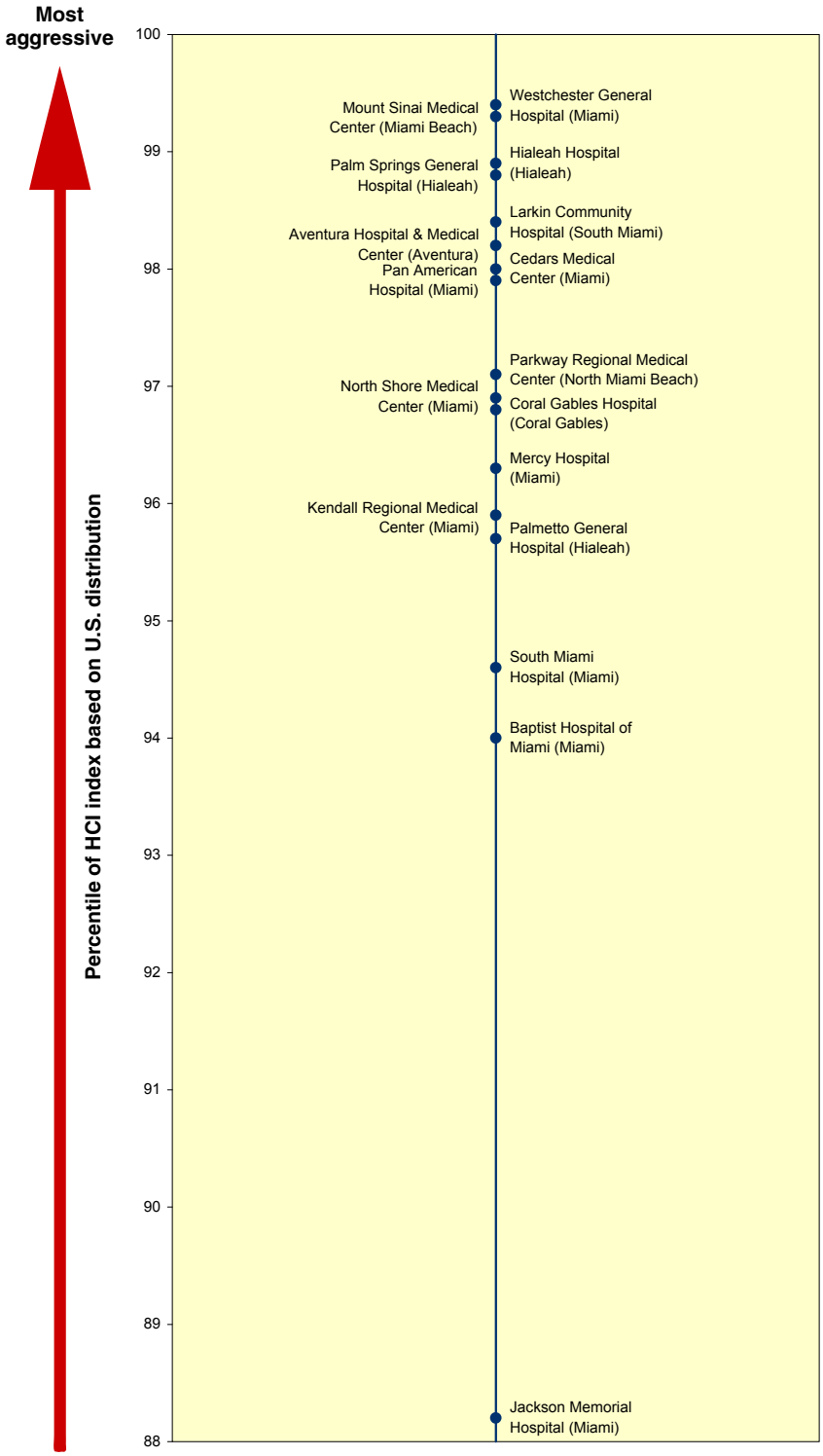


**Figure A.3. Hospital Care Intensity Index for Miami Area Hospitals (Deaths Occurring 2001–05)**




**Choosing a provider in an urban environment:** Consider now the case of families trying to help their elderly parents who live in Miami choose a provider. What options exist for those families concerned about chronic illness management or terminal care? The website provides data on 17 hospitals located in Miami, Miami Beach, and Hialeah, all in close proximity. A query of the Atlas website displays the hospitals located within Miami, all of which rank in the 88th percentile or higher on the HCI scale (Figure A.3). The least aggressive is Jackson Memorial Hospital, the principal teaching hospital of the University of Miami. Westchester General Hospital and Mount Sinai Medical Center are the most aggressive, ranking at or above the 99th percentile.

To learn more, the Patient Experience Report can be accessed for these individual hospitals. To illustrate the diversity in practice patterns among these 17 hospitals, Table A.2 provides an example of a report for the three highest and the three lowest hospitals in the Miami area according to HCI ranking. For patients who want to manage their chronic illness aggressively and who want everything possible done to rescue them no matter how ill or near death they may be, Westchester General Hospital stands out; more than 36% of deaths in 2001–05 among those using this hospital were associated with an admission to intensive care, placing it in the 99th percentile in the country for aggressive end-of-life care. Over the last six months of life, patients experienced an ample number of physician visits (about 85 per person), and they received care from numerous different physicians, with over 67% of patients seeing ten or more doctors. Because of the high volume of physician services, patients' co-payment costs were high; based on historical patterns, the expected co-payment would be more than $6,000 per patient for physician services incurred over the last two years of life.

**Table A.2. The Patient Experience Report for Miami-Area Hospitals with the Three Highest and Lowest HCI Index Scores (Deaths Occurring 2001–05)**

| | Westchester General Hospital | Mount Sinai Medical Center | Hialeah Hospital | South Miami Hospital | Baptist Hospital of Miami | Jackson Memorial Hospital |
|---|---|---|---|---|---|---|
| **The Patient Experience Report** | | | | | | |
| ***Care during last six months of life*** | | | | | | |
| Hospital days per patient | 24.8 | 25.4 | 21.1 | 19.3 | 18.8 | 18.6 |
| Physician visits per patient | 84.8 | 73.9 | 75.5 | 56.0 | 58.2 | 45.3 |
| Percent seeing 10 or more physicians | 67.5 | 63.5 | 64.8 | 62.8 | 62.3 | 44.1 |
| ***Terminal care*** | | | | | | |
| Percent of deaths associated with ICU admission | 36.5 | 35.4 | 38.2 | 25.6 | 25.0 | 27.5 |
| Percent admitted to hospice | 30.2 | 33.2 | 28.8 | 43.8 | 46.0 | 37.7 |
| **Average co-payments for physician services and durable medical equipment during the last two years of life** | **$6,661** | **$5,483** | **$6,172** | **$5,043** | **$5,416** | **$4,950** |

The hospital with the lowest HCI score may come as a surprise; it is the University of Miami Medical School's principal academic medical center, Jackson Memorial Hospital. It provided the fewest physician visits, and less than 45% of its patients saw ten or more doctors. The percent of deaths associated with intensive care was relatively low (27.5%), but not as low as Baptist Hospital of Miami (25.0%) or South Miami Hospital (25.6%). Patients and families who would like to get their care at an academic medical center could choose Jackson Memorial in the knowledge that, by Miami standards, this hospital is one of the most conservative available. For those for whom the most important factor is low use of intensive care during the terminal phase of illness, Baptist Hospital may be a better choice.

## What physicians and patients might want to know

**Negotiating a care plan:** In most situations, patients with chronic illness may be reluctant to change hospitals if they have an established relationship with a trusted physician, even if the patterns of care at the hospital where their physician practices run counter to their wishes. Patients and their families should seek assistance from their primary care physicians (or other clinicians, if they do not have a primary care provider) to develop care plans that match their preferences. These care plans can be expressed through advance directives or other means (such as the Physician Orders for Life-Sustaining Treatments or "POLST"[1]).

In the absence of information regarding local practice patterns, patients and physicians are having conversations about care intensity in managing chronic illness and about advance directives for end-of-life care without specific awareness as to what to expect from a given hospital system. The Patient Experience Report fills in part of this information gap. Physicians, as well as their patients, can access these reports and learn how care intensity at the hospital they routinely use compares to other hospitals. And, as illustrated in Chapter Four, comparisons can be made to other hospitals in the community; to others in the region; and to benchmarks provided by well-known and respected health care organizations such as the Mayo Clinic system in Minnesota. Based on this information, a pattern of care may be identified as the preferred strategy and a strong doctor-patient relationship may lead to the realization of the patient's goals.

However, as discussed in the last chapter, in the absence of public policy that addresses the underlying structural problems, the weakness of our clinical science, and reimbursement systems that reward utilization, the dynamics that result in overuse of acute care hospitals and poor care coordination may not be held in check, even with the help of a trusted and vigilant physician serving as the patient's advocate. Ultimately, it may be the baby boomers themselves who will tip the balance and play a decisive role in influencing public policy. Today, increasing numbers are involved in their parents' struggles with the final years of life, the time when severe chronic illness intrudes on the lives of most Americans. From this experience, some baby boomers will learn the perils of overtreatment. But translating personal experience into effective public policy will require a debate over the quality of care, the quality of death, and the persistent and widespread assumption that more is better. It is our hope that the Dartmouth Atlas will continue to stimulate wider public discourse regarding these matters.

## Endnotes

[1] Hickman SE, Hammes BJ, Moss AH, Tolle SW. Hope for the future: achieving the original intent of advance directives. The Hastings Center Report Special Report. 2005;35(6):S26–S30.

Information regarding Physician Orders for Life-Sustaining Treatments (POLST) is available at http://www.ohsu.edu/polst/index.shtml.

# Appendix on Methods

The methods used in the current report, *"Tracking the Care of Patients with Severe Chronic Illness: The Dartmouth Atlas of Health Care 2008"* were developed over a number of years and have been described in detail in peer-reviewed publications.[1,2,3] This appendix provides a summary of these methods.

## Databases used in the analysis

The primary database is derived from eight CMS research files for traditional (fee-for-service) Medicare: the Denominator file (which provides information on all Medicare beneficiaries' demographic data, eligibility status and date of death) and files that contain records of Medicare claims, namely, the MedPAR file (acute care discharges and stays in skilled nursing, rehabilitation, psychiatric, and other long-stay facilities), the Inpatient file (used to classify intermediate- and high-intensity subtypes of intensive care unit stays), Physician/Supplier Part B (physician services for a 20% sample of Medicare beneficiaries), the Outpatient file (the facility component of outpatient services), and Home Health Agency, Hospice, and Durable Medical Equipment files.

## Study populations

The follow-back from death studies reported in this edition of the Atlas are for two study populations, one based on assignment of decedents to the hospital they most frequently used in the last two years of life (Chapters 3, 4, and 5), the other on place of residence at time of death (Chapter 2). To allow for two years of follow-back for all patients, the populations are restricted to those whose age on the date of death was 67 to 99 years, and to those having full Part A and Part B entitlement throughout the last two years of life. Persons enrolled in managed care organizations were excluded from the analysis.

**Populations assigned to specific hospitals.** We identified Medicare beneficiaries who died over the five-year period from January 1, 2001 to December 31, 2005 and who were hospitalized in an acute care hospital at least once during the last two years of life for a medical (non-surgical) condition. Patients with surgical admissions only were excluded, because the surgery may not have been offered by the hospital and medical staff that usually provided their care; in other words, a patient whose only hospital admission was for bypass surgery could only be assigned to the hospital where the surgery was performed, even if most of his or her care was provided by physicians associated with another hospital. Excluding these patients also reduces the likelihood that a surgical complication was the cause of death. We further restricted the analysis to patients who had one or more of nine chronic illnesses associated with a high probability of death[4] coded on at least one of their hospital discharge claims. Patients were assigned a primary chronic condition based on the first qualifying ICD-9-CM diagnosis code encountered on the claim closest to death. Discharge claims were then used to assign each patient to the hospital to which the patient was admitted most often during the last two years of life. In the case of a tie (equal number of discharges from more than one hospital), patients were assigned to the hospital associated with the discharge closest to date of death. Because seriously ill patients are highly loyal to the hospital where they receive their care—

as has been shown elsewhere[5]—hospital-specific utilization rates reflect the approach to chronic disease management of the physicians who practice in association with that hospital. In some instances there were too few deaths at the hospital to calculate reliable measures and a numeric rate is not reported. The minimum population count for reporting hospital measures based on the MedPAR, Inpatient, Hospice, HHA, and DME files is 80 deaths; for the Part B and Outpatient files it is 400 deaths.

**Populations grouped by place of residence:** The state- and region-level analyses are based on patients who were residents of a given geographic area at the date of death. Data are a 20% sample of deaths occurring over the five-year period 2001–05 (specifically, those deaths that were included in the CMS Part B claims of a 20% beneficiary sample). The state and regional analyses include all hospitalizations (including the patients excluded in the hospital-specific studies who only had surgical hospitalizations) and all patients who had one or more of the nine chronic illnesses, whether or not they were hospitalized. Non-hospitalized patients with chronic illness were identified as those with two or more physician encounters (on different days) with one or more of the nine chronic conditions coded; each patient's primary chronic condition was that which occurred most frequently in the physician encounter claims data for their last two years of life.

Table A provides information on the number of decedents according to primary chronic condition for the *hospital-specific chronic illness cohort* and the *geographic chronic illness cohort*. Table B describes the characteristics of decedents who were hospitalized, according to their cause of hospitalization (and thus whether they are included in the hospital-specific chronic illness cohort). Table C describes the characteristics of decedents and chronic illness and hospitalization status.

**Table A. Number of Decedents According to Cohort and Primary Chronic Condition, 2001–05**

| Primary Chronic Condition | 2001–05 Hospital-Specific Chronic Illness Cohort* | 2001–05 Geographic Chronic Illness Cohort** |
|---|---|---|
| | Number of Decedents | Number of Decedents |
| Malignant Cancer/Leukemia | 815,409 | 207,807 |
| Congestive Heart Failure | 1,519,795 | 381,972 |
| Chronic Pulmonary Disease | 914,867 | 231,486 |
| Dementia | 614,170 | 166,396 |
| Diabetes with End Organ Damage | 56,906 | 18,196 |
| Peripheral Vascular Disease | 120,654 | 37,996 |
| Chronic Renal Failure | 277,821 | 59,240 |
| Severe Chronic Liver Disease | 52,843 | 35,280 |
| Coronary Artery Disease | 359,983 | 109,568 |
| **Total Number of Decedents** | **4,732,448** | **1,247,941** |

** From a 100% sample of Medicare beneficiaries.*

*** From a 20% sample of Medicare beneficiaries.*

**Table B. Hospital-Specific Chronic Illness Cohort and Excluded Hospitalized Decedents, 2001–05**

| | 2001–05 Hospitalized Decedents | |
|---|---|---|
| | Number of Decedents | Percent of Decedents |
| Hospital-Specific Chronic Illness Cohort | 4,732,448 | 69.99 |
| Hospitalized Decedents Excluded from Cohort: | | |
| Chronic Illness, Surgery Only | 344,241 | 5.09 |
| Other Medical Illness | 487,331 | 7.21 |
| Other Surgery | 99,568 | 1.47 |
| Assigned to Non-U.S.* Hospitals | 635 | 0.01 |
| All Hospitalized Decedents | 5,664,223 | 83.77 |

**Non-U.S. hospitals include those in U.S. territories such as Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and others.*

The hospital-specific chronic illness cohort includes only those hospitalized with at least one medical admission and a diagnosis for one of the nine chronic illnesses listed in Table A on at least one admission record. Data are based upon a 100% sample of Medicare enrollees.

**Table C. Decedents 2001–05, According to Cohort Membership Status**

| | 2001-05 Geographic Database | | |
|---|---|---|---|
| | Number of Decedents | *Percent of Decedents* | |
| | | % of Chronically Ill | % of All Decedents |
| **Chronic Illness Cohort** | | | |
| Hospital-Specific Cohort | 946,458 | 75.84 | 70.05 |
| Chronic Illness, Hospital Surgery Only | 68,738 | 5.51 | 5.09 |
| Hospital, Other Medical Illness | 65,361 | 5.24 | 4.84 |
| Hospital, Other Surgery | 13,656 | 1.09 | 1.01 |
| Assigned to Non-U.S. Hospitals | 179 | 0.01 | 0.01 |
| Not Hospitalized | 153,549 | 12.30 | 11.36 |
| **Excluded Decedents (without chronic illness)** | | | |
| Hospitalized Decedents | 37,997 | | 2.81 |
| Not Hospitalized | 65,215 | | 4.83 |
| **Total Decedents** | **1,351,153** | | **100.00** |

The Chronic Illness Cohort includes all decedents with one of the nine chronic illnesses listed in Table A, regardless of whether they were hospitalized during the last two years of life. The Hospital-Specific Chronic Illness cohort corresponds to the cohorts described in Tables A and B, but is smaller due to the use of a 20% sample of beneficiaries.

## Measures of resource inputs

Measures of resource inputs, including physician labor, hospital beds, intensive care beds, and Medicare program spending (reimbursements), are presented as summary measures over the last six months or two years of life. Bed input rates were calculated by summing patient days and dividing by 365. Physician labor inputs were measured by summing the work relative value units (W-RVUs) on a specialty-specific basis and dividing by the average annual number of W-RVUs produced by that specialty. The measure was used to estimate the standardized full-time equivalent (FTE) physician clinical labor input. Both bed and FTE physician resources are expressed as inputs per 1,000 decedents.

Inpatient reimbursements were calculated by summing Medicare reimbursements from the MedPAR record and reflect *total* reimbursements, including indirect costs for medical education, disproportionate share payments, and outlier payments. Part B payments are for all services included in the Part B Physician Supplier file; likewise, payments for outpatient, SNF, hospice, home health, and DME services reflect all services included in their respective files. Inpatient reimbursements and payments from Part B and all other files are measured as spending per decedent. All resource input rates were calculated based on the total experience of the population over the given period of time, not only from the care received at the assigned hospital or physicians associated with that hospital. In the case of the geographic studies, it includes care given by providers located out of region as well as in region.

## Measures of utilization

We calculated hospital days, intensive care unit days (high-intensity and intermediate-intensity days, overall and separately), and physician visits (overall and separately for primary care physicians and medical specialists) for each patient over the last six months and the last two years of life; additional measures included home health visits, and days spent in SNFs, long-term and rehabilitation hospitals, and hospice. Physician visits were also calculated by place of service, by grouping selected HCPCS codes from Part B line item data. We also included visits to rural health centers and federally qualified health centers, obtained from the Outpatient file. Utilization rates were calculated on the total experience of the cohort, not just the services provided by the hospital and the physicians associated with the hospital to which the decedent was assigned. The proportion of total hospital care provided by the assigned hospital (loyalty) was high, so the variations in utilization among hospital cohorts primarily reflect clinical choices made by the associated physicians.[6] Similarly, in the geographic studies, most care was provided by hospitals and physicians located within the state or region. The measures of utilization—patient days in hospital and other facilities, patient days in intensive care units, and physician visits—are traditional epidemiologic, population-based rates of events occurring over a designated period of time.

## Quality of care indicators

Three claims-based quality of care measures were used. The percent of patients seeing ten or more physicians is a measure of the propensity to refer patients. High scores on this measure could indicate lack of continuity of care. The percent of deaths occurring during a hospitalization that involved one or more stays in an ICU is an indicator of the aggressiveness with which terminal

patients were treated. In light of the evidence that more aggressive care in managing patient populations with chronic illness does not lead to longer length of life or improved quality of life, higher scores on this measure can be viewed as an indicator of lower quality of death. By contrast, the percent of decedents receiving hospice benefits indicates less aggressive end-of-life care.

We also report quality measures regarding the processes of care, specifically the underuse of effective care derived from the consensus measure set of the Hospital Quality Alliance (HQA), the first initiative to routinely report data on U.S. hospitals nationally. Data are posted on the CMS Hospital Compare website.[7] We provide summary scores on five measures for managing acute myocardial infarction (AMI); two for congestive heart failure (CHF); and three for pneumonia, for all reporting hospitals located within each hospital referral region (HRR).[8] In addition, we report a composite score, which is the weighted average of the three condition-specific summary scores. For individual hospitals, summary scores are based on measures for which there are 25 or more eligible patients. In this edition of the Dartmouth Atlas the data correspond to the CMS release covering calendar year 2005.

## Statistical methods

We compared measures of resource inputs, utilization, and quality at fixed intervals prior to death among geographic regions and hospitals. All utilization and resource input measures were further adjusted for differences in age, sex, race, primary chronic condition, and whether patients had more than one of the nine chronic conditions. The adjustments used ordinary least squares to adjust Medicare spending variables[9] and used overdispersed Poisson regression models for all other variables; 95th percentile confidence limits were calculated for all variables. The HQA technical process quality of care measures were not adjusted for differences in case mix among hospitals, as they are specifically restricted to those patients eligible for the specific treatment and therefore do not need adjustment.

## Caveats and limitations

Certain limitations of our measures need to be mentioned.

**Sample sizes and data issues.** The data are for the traditional Medicare (Part A and Part B) program and do not include Medicare enrollees enrolled in managed care organizations under Medicare Part C. The measures of physician resource input and utilization are based on a 20% sample, reducing the precision of our estimates. For hospital-specific cohorts, we addressed this by limiting reporting for these services to 2,878 hospitals with 400 decedents (expected 20% sample size for 5 years = 80 deaths). Data fields for measures based on Part B are left blank for hospitals with fewer than 400 decedents. Approximately 15% of hospitals failed to report on their use of intensive care beds, and, for these hospitals, measures related to intensive care utilization are left blank. Our measure of the propensity to use multiple physicians—the percent of decedents seeing ten or more physicians—depends on the accuracy of the coding of individual physician encounters using the UPIN number; if a given patient was seen by multiple physicians but only one UPIN number was recorded, this would result in an underestimate of the number of individual physicians seen.

**Denominator for hospital-specific cohorts.** The hospital-specific studies are based on Medicare decedents with one or more medical hospitalizations during the last two years of life (as shown in Table B). Because we had no reliable method for assigning non-hospitalized patients with chronic illness to hospitals, decedents who were not hospitalized were not included in the denominator used in calculating population-based resource input and utilization rates for the hospital-specific cohort. This limitation does not exist at the regional level where patients were assigned to regions on the basis of their place of residence, making it possible to identify patients who were not hospitalized.

To estimate the impact of not including non-hospitalized patients with chronic illness in the denominator for calculating rates for the hospital-specific cohort, we compared rates for regions calculated without the inclusion of non-hospitalized chronically ill decedents in the denominator (Hospitalized Cohort Denominator Method) to rates calculated with the inclusion of non-hospitalized decedents (Full Cohort Denominator Method). This analysis compared rates under each of these two methods, which were calculated for the 306 regions for deaths occurring in 2000–03. The key findings were:

- The proportion of Medicare decedents with severe chronic illness who were not hospitalized at least once for a medical (non-surgical) admission varied substantially from region to region—from less than 15% to more than 35% among regions.
- Regions with *lower* percentages not hospitalized tended to have *higher* per capita utilization rates. The correlation among regions between the percent of chronically ill decedents who were not hospitalized during the last two years of life and patient days per decedent calculated under the Hospitalized Cohort Denominator Method had an $R^2 = 0.39$ (negative association) (Figure A); and the same correlation using the patient days calculated under the Full Cohort Denominator Method had an $R^2 = 0.49$ (negative association) (Figure B).

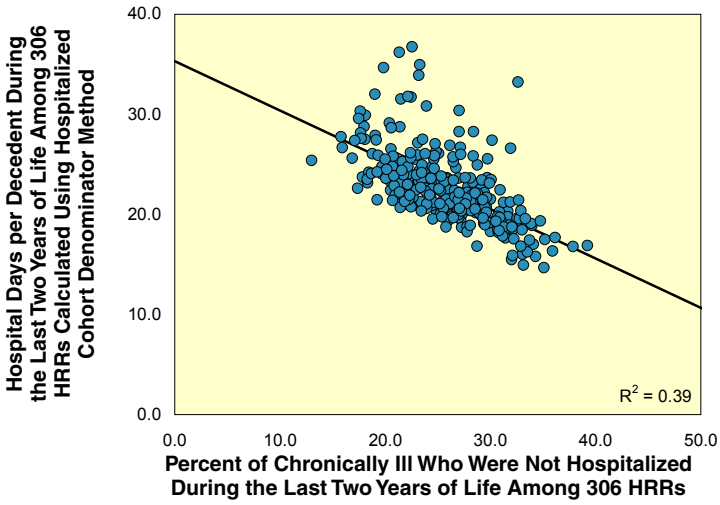



**Figure A. The Relationship Between the Percent Not Hospitalized and Hospital Days per Decedent During the Last Two Years of Life (Hospitalized Cohort Denominator Method) Among Hospital Referral Regions (Deaths Occurring 2000–03)**

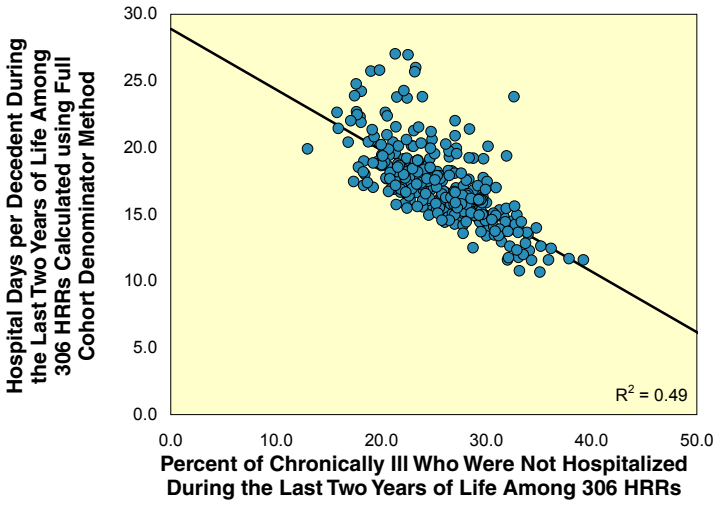



**Figure B. The Relationship Between the Percent Not Hospitalized and Hospital Days per Decedent During the Last Two Years of Life (Full Cohort Denominator Method) Among Hospital Referral Regions (Deaths Occurring 2000–03)**

- In examining the estimates of patient days per decedent obtained by the two methods, it became apparent that (1) the correlation between rates generated using the two methods was very high: $R^2 = 0.97$ (Figure C); and (2) variation was less (measured by the extremal range, interquartile ratio, and coefficient of variation) when the rates were calculated using the Hospitalized Cohort Denominator Method (Figure D).

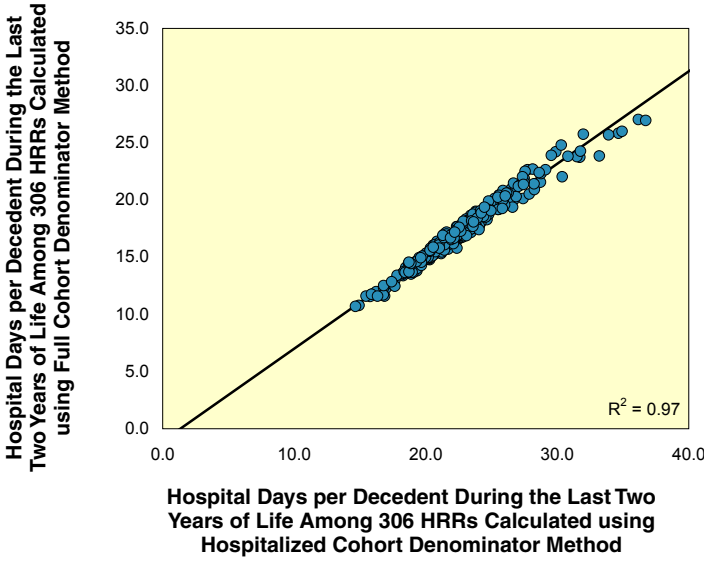
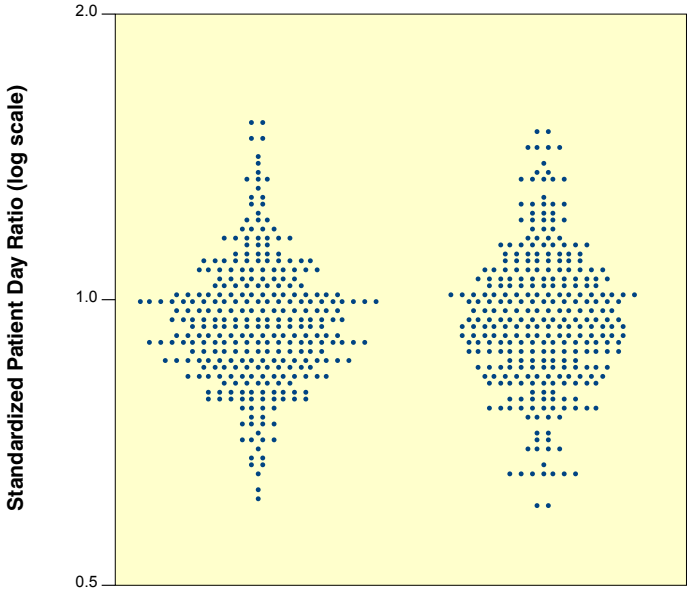



**Figure C. The Relationship Between Hospital Days per Decedent During the Last Two Years of Life Among Hospitalized Cohort and Full Cohort Denominators Among Hospital Referral Regions (Deaths Occurring 2000–03)**




| | Hospitalized Cohort Denominator Method | Full Cohort Denominator Method |
|---|---|---|
| Extremal ratio | 2.50 | 2.53 |
| Interquartile ratio | 1.19 | 1.23 |
| Coefficient of variation | 15.9 | 17.2 |

**Figure D. Hospital Days per Decedent During the Last Two Years of Life Among Hospitalized Cohort and Full Cohort Denominators Among Hospital Referral Regions (Deaths Occurring 2000–03)**

These studies show that the Hospitalized Cohort Denominator Method (which we use for our hospital-specific analyses) underestimates the "true" population-based rates to a greater extent in regions with lower utilization rates. A reasonable inference would be that our hospital-specific analyses underestimate the variation among hospitals, and that those hospitals with lower patient day rates would actually be even more conservative (have even lower rates) than we report if we were able to include all decedents cared for by the hospital and its associated physicians.

**Exclusion of isolated surgical hospitalizations.** The hospital-specific follow-back studies of the chronically ill were designed to require at least one medical (non-surgical) hospitalization to qualify for inclusion. This was done to avoid confusing (1) a surgical referral as evidence that a given hospital was involved in the medical management of chronic illness and (2) a surgical death as a death from chronic illness. In the regional analysis, our interest in accounting for all Medicare spending and utilization in patients with chronic illness led us to include all Medicare hospitalizations (and Part B services) in the rates.

Endnotes

[1] Wennberg J, Gittelsohn A. Small area variations in health care delivery: a population-based health information system can guide planning and regulatory decision-making. *Science*. 1973;182:1102–08.

[2] Wennberg JE, Fisher ES, Stukel TA, Skinner JS, Sharp SM, Bronner KK. 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. *BMJ*. 2004;328:607–10.

[3] Wennberg JE, Fisher ES, Baker L, Sharp SM, Bronner KK. Evaluating the efficiency of California providers in caring for patients with chronic illness. *Health Affairs* web exclusive, 16 Nov 2005.

[4] See L.I. Iezzoni, T. Heeren, S.M. Foley, J. Daley, J. Hughes, and G.A. Coffman, "Chronic Conditions and Risk of In-Hospital Death." *Health Serv Res* (1994), 29:435–60. Over the five-year period, 6,762,021 deaths occurred among Medicare beneficiaries who were enrolled in Medicare Parts A and B (and not enrolled in managed care organizations). The vast majority (92.4%) had serious chronic illnesses, defined as the presence of one or more of nine conditions specified by Iezzoni. Almost 90% of these were hospitalized at least once (87.7%). Our study population for the hospital-specific analyses comprised 4,732,448 beneficiaries who had one or more non-surgical admissions for chronic illness during the five-year period.

[5] Wennberg JE, Fisher ES, Stukel TA, Sharp SM. Use of Medicare claims data to monitor provider-specific performance among patients with severe chronic illness. *Health Affairs* web exclusive, 7 Oct 2004.

[6] Loyalty measures for hospitals are available on the Atlas website: http://www.dartmouthatlas.org.

[7] Hospital Compare is available on the Internet at http://www.hospitalcompare.hhs.gov/.

[8] The five performance measures for acute myocardial infarction are the percent of eligible patients receiving (1) aspirin at time of admission; (2) aspirin at time of discharge; (3) ACE inhibitor for left ventricular dysfunction; (4) beta-blocker at admission; and (5) beta-blocker at discharge. The two congestive heart failure measures are percent of patients with (1) assessment of left ventricular function and (2) ACE inhibitor for left ventricular dysfunction. For pneumonia, the three measures are percent of patients with (1) oxygenation assessment; (2) pneumococcal vaccination; and (3) timing of initial antibiotic therapy. The summary scores are equally weight-averaged for the items in each category. Hospital-specific summary scores are given only for those hospitals for which 4 of the 5 heart attack and all of the congestive heart failure and pneumonia measures were based on 25 or more patients. See A.K. Jha, Z. Li, E.J. Orav, and A.M. Epstein, "Care in U.S. Hospitals–the Hospital Quality Alliance program," *N Engl J Med* (2005 July 21), 353(3):265–74. (Regional scores in this study are based on the average for each measure, obtained by summing numerator and denominator information across all reporting hospitals.)

[9] Where hospital spending is reported by sectors (e.g., Part B spending by place of service), a "partitioning approach" has been used: each hospital's (fully-modeled) total Part B payments were partitioned into components based on the proportional distribution of its crude component spending rates. Similarly, MedPAR payments for inpatient, long-term and SNF stays, and hospice, home health, and DME payments were partitioned from the hospital's (fully modeled) total reimbursement rate based on the sum of payments from all these 100%-type files.

# Appendix Tables

## Appendix Table 1. Performance Report for Selected Academic Medical Centers

**Appendix Table 1a. Medicare spending per decedent during the last two years of life (deaths occurring 2001-05)**

| Hospital name | City | State | Number of deaths (2001-05) | Total Medicare spending | Inpatient sector spending* | Outpatient sector spending* | SNF/long-term care spending* | Home health care spending* | Hospice spending* | DME spending | Other spending |
|---|---|---|---|---|---|---|---|---|---|---|---|
| University of Alabama Hospital | Birmingham | AL | 2,030 | 55,480 | 34,805 | 8,617 | 3,767 | 2,501 | 3,404 | 1,461 | 926 |
| University Medical Center | Tucson | AZ | 1,042 | 56,754 | 33,651 | 9,113 | 7,566 | 1,602 | 2,668 | 1,163 | 992 |
| UAMS Medical Center | Little Rock | AR | 1,073 | 56,130 | 34,993 | 8,830 | 4,467 | 2,056 | 3,677 | 1,223 | 884 |
| Univ. of CA San Diego Medical Center | San Diego | CA | 937 | 71,118 | 44,837 | 9,791 | 7,368 | 2,791 | 3,788 | 1,434 | 1,110 |
| UCLA Medical Center | Los Angeles | CA | 1,657 | 93,842 | 63,900 | 14,125 | 6,891 | 3,994 | 1,649 | 2,128 | 1,155 |
| Loma Linda University Medical Center | Loma Linda | CA | 1,464 | 73,424 | 47,179 | 8,206 | 9,281 | 2,400 | 3,137 | 1,668 | 1,553 |
| Stanford Hospital and Clinics | Stanford | CA | 1,819 | 69,066 | 44,997 | 12,225 | 5,285 | 2,410 | 2,070 | 1,129 | 951 |
| UCSF Medical Center | San Francisco | CA | 1,420 | 78,046 | 54,669 | 10,713 | 5,524 | 3,220 | 1,707 | 1,206 | 1,008 |
| Univ. of CA Davis Medical Center | Sacramento | CA | 1,103 | 70,139 | 49,424 | 7,665 | 6,345 | 1,882 | 1,936 | 1,685 | 1,202 |
| Cedars-Sinai Medical Center | Los Angeles | CA | 4,385 | 106,951 | 71,637 | 16,006 | 7,784 | 6,244 | 1,210 | 2,338 | 1,731 |
| University of Colorado Hospital | Denver | CO | 852 | 56,815 | 33,031 | 10,220 | 5,982 | 2,354 | 3,155 | 1,572 | 501 |
| Yale-New Haven Hospital | New Haven | CT | 2,997 | 73,927 | 43,325 | 9,121 | 11,075 | 3,837 | 3,198 | 1,186 | 2,186 |
| Univ. of Connecticut Health Center | Farmington | CT | 1,235 | 68,105 | 41,606 | 6,869 | 11,744 | 3,081 | 1,567 | 1,073 | 2,165 |
| George Washington Univ. Hospital | Washington | DC | 971 | 69,274 | 44,334 | 12,200 | 6,335 | 2,303 | 1,811 | 1,495 | 795 |
| Howard University Hospital | Washington | DC | 863 | 66,947 | 52,631 | 2,744 | 8,242 | 1,618 | 244 | 977 | 491 |
| MedStar-Georgetown Medical Center | Washington | DC | 871 | 68,078 | 43,193 | 12,686 | 5,613 | 2,503 | 2,167 | 1,256 | 660 |
| Jackson Memorial Hospital | Miami | FL | 1,038 | 81,695 | 50,971 | 8,398 | 7,590 | 4,597 | 3,683 | 5,014 | 1,442 |
| Shands at the University of Florida | Gainesville | FL | 2,778 | 61,090 | 38,610 | 7,991 | 5,719 | 2,090 | 3,880 | 1,798 | 1,002 |
| Tampa General Hospital | Tampa | FL | 1,274 | 61,289 | 38,075 | 7,710 | 6,988 | 2,572 | 3,251 | 1,530 | 1,162 |
| Emory University Hospital | Atlanta | GA | 1,803 | 60,350 | 39,348 | 9,114 | 4,606 | 2,378 | 2,447 | 1,509 | 949 |
| Medical College of Georgia Hospital | Augusta | GA | 1,065 | 52,902 | 34,199 | 6,089 | 6,843 | 1,788 | 1,628 | 1,507 | 848 |
| Grady Memorial Hospital | Atlanta | GA | 1,648 | 48,726 | 33,919 | 3,289 | 5,451 | 2,743 | 1,243 | 1,113 | 968 |
| University of Chicago Hospital | Chicago | IL | 2,060 | 69,134 | 45,718 | 8,627 | 6,005 | 3,811 | 2,762 | 1,400 | 810 |
| Rush University Medical Center | Chicago | IL | 1,752 | 82,075 | 57,473 | 8,466 | 8,324 | 3,450 | 1,988 | 1,327 | 1,047 |
| Loyola University Medical Center | Maywood | IL | 2,205 | 67,679 | 46,176 | 7,950 | 6,881 | 2,545 | 2,291 | 1,195 | 641 |
| Northwestern Memorial Hospital | Chicago | IL | 2,784 | 77,016 | 49,144 | 12,147 | 7,917 | 3,177 | 2,251 | 1,234 | 1,147 |
| Clarian Health Partners | Indianapolis | IN | 4,264 | 55,385 | 31,396 | 8,342 | 10,014 | 1,609 | 1,903 | 1,310 | 810 |
| University of Iowa Hospitals & Clinics | Iowa City | IA | 1,657 | 48,427 | 32,488 | 7,825 | 3,451 | 927 | 2,135 | 1,132 | 469 |
| University of Kansas Hospital | Kansas City | KS | 904 | 61,700 | 42,419 | 8,216 | 4,628 | 2,315 | 2,009 | 1,283 | 831 |
| University of Kentucky Hospital | Lexington | KY | 988 | 52,422 | 32,700 | 6,450 | 5,413 | 2,300 | 2,923 | 1,564 | 1,071 |
| University of Maryland Medical Center | Baltimore | MD | 1,122 | 94,901 | 70,645 | 13,748 | 5,422 | 1,464 | 1,579 | 1,142 | 899 |
| Johns Hopkins Hospital | Baltimore | MD | 1,961 | 85,729 | 63,079 | 13,404 | 3,287 | 1,813 | 2,217 | 1,205 | 724 |
| Boston Medical Center | Boston | MA | 1,529 | 79,672 | 47,921 | 8,774 | 12,372 | 5,579 | 1,644 | 1,096 | 2,286 |
| Massachusetts General Hospital | Boston | MA | 3,886 | 78,666 | 43,058 | 11,509 | 15,149 | 4,718 | 1,503 | 900 | 1,830 |
| Beth Israel Deaconess Medical Center | Boston | MA | 2,815 | 83,345 | 48,053 | 9,896 | 15,904 | 4,858 | 1,561 | 856 | 2,218 |
| Brigham and Women's Hospital | Boston | MA | 1,960 | 87,721 | 50,156 | 14,518 | 13,633 | 4,943 | 1,302 | 1,012 | 2,158 |
| Tufts-New England Medical Center | Boston | MA | 1,070 | 85,387 | 51,197 | 9,047 | 16,185 | 4,519 | 1,208 | 931 | 2,301 |
| UMass Memorial Medical Center | Worcester | MA | 3,527 | 77,265 | 42,083 | 9,743 | 14,290 | 3,764 | 1,204 | 1,129 | 5,052 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 1a. Medicare spending per decedent during the last two years of life (deaths occurring 2001-05)**

| Hospital name | City | State | Number of deaths (2001-05) | Total Medicare spending | Inpatient sector spending* | Outpatient sector spending* | SNF/long-term care spending* | Home health care spending* | Hospice spending* | DME spending | Other spending |
|---|---|---|---|---|---|---|---|---|---|---|---|
| University of Michigan Hospitals | Ann Arbor | MI | 2,312 | 69,446 | 46,397 | 9,962 | 5,060 | 3,016 | 2,722 | 1,423 | 867 |
| Harper University Hospital | Detroit | MI | 1,936 | 73,037 | 50,463 | 8,038 | 5,543 | 4,594 | 2,119 | 1,649 | 630 |
| Mayo Clinic-St. Mary's Hospital | Rochester | MN | 4,236 | 53,432 | 34,372 | 7,557 | 7,114 | 662 | 2,054 | 1,075 | 597 |
| Univ. of Minnesota Medical Center | Minneapolis | MN | 1,030 | 63,652 | 41,774 | 9,197 | 7,255 | 1,667 | 2,244 | 1,117 | 400 |
| Univ. of Mississippi Hospitals & Clinics | Jackson | MS | 841 | 44,933 | 30,512 | 3,376 | 3,130 | 3,023 | 3,021 | 1,239 | 633 |
| Barnes-Jewish Hospital | St. Louis | MO | 4,168 | 63,281 | 40,681 | 10,577 | 5,398 | 2,834 | 1,352 | 1,430 | 1,009 |
| St. Louis University Hospital | St. Louis | MO | 1,190 | 67,124 | 45,579 | 7,808 | 7,358 | 2,818 | 1,268 | 1,033 | 1,260 |
| University of Missouri Hospital & Clinic | Columbia | MO | 898 | 50,326 | 30,667 | 9,220 | 5,132 | 1,804 | 1,598 | 1,159 | 745 |
| Nebraska Medical Center | Omaha | NE | 2,340 | 52,276 | 31,516 | 8,690 | 6,738 | 1,806 | 1,540 | 1,370 | 615 |
| Creighton University Medical Center | Omaha | NE | 890 | 51,635 | 33,867 | 6,951 | 5,679 | 1,637 | 1,556 | 1,295 | 650 |
| Dartmouth-Hitchcock Medical Center | Lebanon | NH | 2,019 | 53,356 | 30,641 | 10,860 | 5,771 | 2,736 | 1,492 | 975 | 881 |
| Robert Wood Johnson Univ. Hospital | New Brunswk. | NJ | 2,607 | 78,907 | 53,382 | 11,119 | 7,985 | 2,146 | 1,786 | 1,362 | 1,128 |
| University of New Mexico Hospital | Albuquerque | NM | 698 | 48,919 | 28,537 | 4,970 | 7,470 | 1,574 | 3,787 | 1,548 | 1,032 |
| Kaleida Health-Buffalo Gen. Hospital | Buffalo | NY | 6,739 | 46,077 | 25,529 | 7,621 | 6,709 | 2,412 | 1,395 | 1,447 | 965 |
| Albany Medical Center | Albany | NY | 1,418 | 54,551 | 35,749 | 7,635 | 4,558 | 1,979 | 1,972 | 1,405 | 1,252 |
| Mount Sinai Hospital | New York | NY | 4,985 | 96,798 | 68,299 | 9,671 | 9,561 | 5,015 | 1,179 | 1,608 | 1,463 |
| Montefiore Medical Center | Bronx | NY | 4,888 | 89,610 | 59,912 | 7,912 | 14,221 | 3,474 | 1,120 | 1,288 | 1,682 |
| New York-Presbyterian Hospital | New York | NY | 6,061 | 91,113 | 62,773 | 10,514 | 9,687 | 4,400 | 1,354 | 1,348 | 1,038 |
| New York University Medical Center | New York | NY | 2,534 | 105,068 | 75,622 | 13,663 | 5,545 | 5,996 | 1,905 | 1,302 | 1,035 |
| Upstate Medical University | Syracuse | NY | 1,390 | 51,302 | 31,727 | 9,492 | 4,786 | 1,974 | 1,327 | 1,156 | 840 |
| Strong Memorial Hospital | Rochester | NY | 2,059 | 50,944 | 32,154 | 7,986 | 4,395 | 3,036 | 1,419 | 1,203 | 752 |
| Stony Brook University Hospital | Stony Brook | NY | 1,739 | 70,609 | 46,462 | 8,199 | 9,329 | 2,420 | 1,810 | 1,232 | 1,157 |
| Duke University Hospital | Durham | NC | 3,317 | 57,411 | 37,751 | 9,375 | 4,098 | 1,669 | 2,328 | 1,455 | 735 |
| Pitt County Memorial Hospital | Greenville | NC | 4,024 | 49,040 | 30,031 | 8,721 | 3,511 | 2,173 | 1,204 | 1,520 | 1,880 |
| North Carolina Baptist Hospital | Winst.-Salem | NC | 3,126 | 56,162 | 35,636 | 9,858 | 4,328 | 1,966 | 2,348 | 1,164 | 861 |
| University of North Carolina Hospitals | Chapel Hill | NC | 2,401 | 53,894 | 34,418 | 8,558 | 4,992 | 2,086 | 1,798 | 1,330 | 713 |
| University Hospital | Cincinnati | OH | 1,174 | 58,505 | 37,882 | 7,339 | 7,189 | 1,523 | 2,278 | 1,291 | 1,003 |
| Medical University of Ohio | Toledo | OH | 1,142 | 58,669 | 36,446 | 7,448 | 8,204 | 1,831 | 2,662 | 965 | 1,113 |
| Ohio State University Medical Center | Columbus | OH | 1,373 | 63,871 | 40,813 | 7,659 | 8,580 | 2,119 | 1,656 | 1,437 | 1,607 |
| University Hospitals of Cleveland | Cleveland | OH | 3,241 | 55,643 | 33,036 | 8,041 | 6,767 | 2,551 | 2,822 | 1,227 | 1,199 |
| Cleveland Clinic Foundation | Cleveland | OH | 2,864 | 55,333 | 34,437 | 8,906 | 5,101 | 2,194 | 2,485 | 1,428 | 782 |
| Oklahoma University Medical Center | OK City | OK | 1,240 | 58,017 | 33,908 | 7,489 | 7,443 | 3,387 | 3,573 | 1,448 | 769 |
| OHSU Hospital | Portland | OR | 814 | 57,608 | 40,088 | 7,096 | 3,651 | 1,963 | 2,622 | 1,196 | 992 |
| Temple University Hospital | Philadelphia | PA | 1,274 | 85,538 | 62,192 | 5,945 | 7,072 | 3,368 | 2,292 | 1,968 | 2,701 |
| Hospital of the Univ. of Pennsylvania | Philadelphia | PA | 1,303 | 80,727 | 54,455 | 12,338 | 5,340 | 2,881 | 2,085 | 2,123 | 1,503 |
| UPMC Presbyterian Shadyside | Pittsburgh | PA | 3,807 | 69,039 | 43,504 | 9,134 | 9,483 | 2,587 | 1,407 | 1,353 | 1,571 |
| Thomas Jefferson University Hospital | Philadelphia | PA | 2,458 | 76,804 | 51,169 | 10,087 | 6,674 | 3,432 | 3,004 | 1,174 | 1,264 |
| Penn State Hershey Medical Center | Hershey | PA | 2,355 | 50,816 | 31,363 | 8,519 | 5,819 | 1,493 | 1,898 | 1,121 | 603 |
| Hahnemann University Hospital | Philadelphia | PA | 614 | 117,998 | 91,738 | 11,135 | 6,348 | 3,239 | 1,784 | 1,918 | 1,836 |
| Rhode Island Hospital | Providence | RI | 2,924 | 59,569 | 35,445 | 8,302 | 8,234 | 3,046 | 1,576 | 1,196 | 1,770 |
| MUSC Medical Center | Charleston | SC | 1,498 | 56,759 | 36,267 | 8,561 | 5,097 | 2,126 | 2,553 | 1,561 | 594 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 1a. Medicare spending per decedent during the last two years of life (deaths occurring 2001-05)**

| Hospital name | City | State | Number of deaths (2001-05) | Total Medicare spending | Inpatient sector spending* | Outpatient sector spending* | SNF/long-term care spending* | Home health care spending* | Hospice spending* | DME spending | Other spending |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Vanderbilt University Medical Center | Nashville | TN | 1,696 | 60,611 | 38,225 | 6,875 | 7,410 | 3,080 | 2,062 | 1,714 | 1,246 |
| Parkland Health & Hospital System | Dallas | TX | 800 | 56,738 | 32,593 | 4,960 | 7,975 | 5,891 | 2,510 | 1,620 | 1,190 |
| Univ. of Texas Med. Branch Hospitals | Galveston | TX | 1,899 | 61,440 | 38,565 | 5,763 | 8,374 | 3,605 | 2,290 | 1,503 | 1,342 |
| Scott and White Memorial Hospital | Temple | TX | 1,822 | 44,090 | 23,849 | 7,716 | 5,338 | 1,715 | 3,179 | 1,330 | 963 |
| Memorial Hermann-Texas Med.Ctr. | Houston | TX | 1,249 | 69,098 | 40,955 | 7,409 | 9,810 | 3,931 | 1,705 | 1,828 | 3,458 |
| The Methodist Hospital | Houston | TX | 3,682 | 76,148 | 46,263 | 10,381 | 8,597 | 3,860 | 2,002 | 2,007 | 3,039 |
| University of Utah Hospital | Salt Lake City | UT | 1,304 | 55,581 | 32,970 | 7,739 | 6,838 | 3,389 | 2,295 | 1,568 | 783 |
| Fletcher Allen Health Care | Burlington | VT | 2,751 | 53,934 | 30,713 | 11,297 | 5,211 | 3,227 | 1,350 | 1,019 | 1,116 |
| University of Virginia Medical Center | Charlottesvl. | VA | 2,650 | 53,265 | 34,418 | 7,136 | 5,803 | 2,325 | 1,917 | 1,188 | 477 |
| VCU Health System | Richmond | VA | 1,679 | 48,531 | 33,424 | 5,466 | 3,551 | 2,417 | 1,613 | 1,302 | 758 |
| Univ. of Washington Medical Center | Seattle | WA | 833 | 70,245 | 46,891 | 11,006 | 5,630 | 2,037 | 2,310 | 1,538 | 834 |
| West Virginia University Hospitals | Morgantown | WV | 1,504 | 54,915 | 33,976 | 7,961 | 6,422 | 2,073 | 2,168 | 1,188 | 1,127 |
| Univ. of Wisconsin Hospital & Clinics | Madison | WI | 1,705 | 49,477 | 30,571 | 7,557 | 5,157 | 1,597 | 2,907 | 1,030 | 659 |
| Froedtert Memorial Lutheran Hospital | Milwaukee | WI | 1,932 | 56,940 | 36,848 | 7,568 | 6,451 | 1,634 | 2,477 | 1,203 | 758 |
| **United States** | | **US** | **4,732,448** | **52,838** | **29,495** | **7,967** | **7,989** | **2,633** | **2,091** | **1,482** | **1,181** |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 1b. The Medical Care Cost Equation: Disaggregation of inpatient (facility) reimbursements during the last two years of life into volume (hospital days per patient) and price (reimbursements per patient day) components (deaths occurring 2001-05)**

| Hospital name | Inpatient reimbursements per decedent** | Hospital days per decedent | Reimbursements per patient day | Inpatient reimbursements (U.S. ratio) | = | Hospital days (U.S. ratio) | x | Reimbursements per day (U.S. ratio) |
|---|---|---|---|---|---|---|---|---|
| University of Alabama Hospital | 32,335 | 23.6 | 1,368 | 1.25 | = | 1.00 | x | 1.25 |
| University Medical Center | 30,755 | 18.1 | 1,697 | 1.19 | = | 0.77 | x | 1.55 |
| UAMS Medical Center | 32,521 | 24.7 | 1,317 | 1.26 | = | 1.05 | x | 1.20 |
| Univ. of CA San Diego Medical Center | 42,175 | 24.9 | 1,691 | 1.63 | = | 1.06 | x | 1.54 |
| UCLA Medical Center | 58,557 | 31.3 | 1,871 | 2.26 | = | 1.33 | x | 1.71 |
| Loma Linda University Medical Center | 43,578 | 26.0 | 1,675 | 1.69 | = | 1.10 | x | 1.53 |
| Stanford Hospital and Clinics | 42,419 | 20.3 | 2,090 | 1.64 | = | 0.86 | x | 1.91 |
| UCSF Medical Center | 51,372 | 22.5 | 2,287 | 1.99 | = | 0.95 | x | 2.09 |
| Univ. of CA Davis Medical Center | 46,454 | 20.2 | 2,295 | 1.80 | = | 0.86 | x | 2.09 |
| Cedars-Sinai Medical Center | 61,954 | 42.9 | 1,444 | 2.40 | = | 1.82 | x | 1.32 |
| University of Colorado Hospital | 30,898 | 17.9 | 1,731 | 1.19 | = | 0.76 | x | 1.58 |
| Yale-New Haven Hospital | 39,978 | 27.2 | 1,471 | 1.55 | = | 1.15 | x | 1.34 |
| Univ. of Connecticut Health Center | 38,820 | 22.1 | 1,753 | 1.50 | = | 0.94 | x | 1.60 |
| George Washington Univ. Hospital | 39,397 | 27.1 | 1,452 | 1.52 | = | 1.15 | x | 1.33 |
| Howard University Hospital | 48,216 | 36.7 | 1,313 | 1.86 | = | 1.56 | x | 1.20 |
| MedStar-Georgetown Medical Center | 38,886 | 28.8 | 1,349 | 1.50 | = | 1.22 | x | 1.23 |
| Jackson Memorial Hospital | 45,067 | 30.6 | 1,474 | 1.74 | = | 1.30 | x | 1.35 |
| Shands at the University of Florida | 34,574 | 25.9 | 1,336 | 1.34 | = | 1.10 | x | 1.22 |
| Tampa General Hospital | 33,317 | 27.5 | 1,212 | 1.29 | = | 1.17 | x | 1.11 |
| Emory University Hospital | 36,142 | 27.5 | 1,312 | 1.40 | = | 1.17 | x | 1.20 |
| Medical College of Georgia Hospital | 32,069 | 20.9 | 1,535 | 1.24 | = | 0.89 | x | 1.40 |
| Grady Memorial Hospital | 31,722 | 22.8 | 1,389 | 1.23 | = | 0.97 | x | 1.27 |
| University of Chicago Hospital | 42,600 | 23.0 | 1,852 | 1.65 | = | 0.97 | x | 1.69 |
| Rush University Medical Center | 52,137 | 35.8 | 1,455 | 2.02 | = | 1.52 | x | 1.33 |
| Loyola University Medical Center | 42,712 | 26.1 | 1,638 | 1.65 | = | 1.10 | x | 1.49 |
| Northwestern Memorial Hospital | 44,875 | 30.1 | 1,492 | 1.74 | = | 1.27 | x | 1.36 |
| Clarian Health Partners | 28,397 | 24.9 | 1,141 | 1.10 | = | 1.05 | x | 1.04 |
| University of Iowa Hospitals & Clinics | 30,323 | 24.9 | 1,216 | 1.17 | = | 1.06 | x | 1.11 |
| University of Kansas Hospital | 39,017 | 26.6 | 1,466 | 1.51 | = | 1.13 | x | 1.34 |
| University of Kentucky Hospital | 30,550 | 19.2 | 1,594 | 1.18 | = | 0.81 | x | 1.45 |
| University of Maryland Medical Center | 66,840 | 28.0 | 2,383 | 2.58 | = | 1.19 | x | 2.17 |
| Johns Hopkins Hospital | 59,759 | 28.6 | 2,093 | 2.31 | = | 1.21 | x | 1.91 |
| Boston Medical Center | 44,405 | 24.2 | 1,833 | 1.72 | = | 1.03 | x | 1.67 |
| Massachusetts General Hospital | 38,844 | 28.9 | 1,344 | 1.50 | = | 1.22 | x | 1.23 |
| Beth Israel Deaconess Medical Center | 43,893 | 24.4 | 1,799 | 1.70 | = | 1.03 | x | 1.64 |
| Brigham and Women's Hospital | 46,195 | 26.4 | 1,748 | 1.79 | = | 1.12 | x | 1.59 |
| Tufts-New England Medical Center | 46,823 | 27.7 | 1,690 | 1.81 | = | 1.17 | x | 1.54 |
| UMass Memorial Medical Center | 38,530 | 22.1 | 1,741 | 1.49 | = | 0.94 | x | 1.59 |
| University of Michigan Hospitals | 42,963 | 24.6 | 1,746 | 1.66 | = | 1.04 | x | 1.59 |
| Harper University Hospital | 45,907 | 28.9 | 1,587 | 1.78 | = | 1.23 | x | 1.45 |
| Mayo Clinic-St. Mary's Hospital | 31,816 | 21.3 | 1,497 | 1.23 | = | 0.90 | x | 1.37 |
| Univ. of Minnesota Medical Center | 38,784 | 25.0 | 1,551 | 1.50 | = | 1.06 | x | 1.42 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 1b. The Medical Care Cost Equation: Disaggregation of inpatient (facility) reimbursements during the last two years of life into volume (hospital days per patient) and price (reimbursements per patient day) components (deaths occurring 2001-05)**

| Hospital name | Inpatient reimbursements per decedent** | Hospital days per decedent | Reimbursements per patient day | Inpatient reimbursements (U.S. ratio) | = | Hospital days (U.S. ratio) | x | Reimbursements per day (U.S. ratio) |
|---|---|---|---|---|---|---|---|---|
| Univ. of Mississippi Hospitals & Clinics | 28,671 | 22.1 | 1,297 | 1.11 | = | 0.94 | x | 1.18 |
| Barnes-Jewish Hospital | 37,365 | 27.5 | 1,360 | 1.44 | = | 1.16 | x | 1.24 |
| St. Louis University Hospital | 42,187 | 27.2 | 1,549 | 1.63 | = | 1.15 | x | 1.41 |
| University of Missouri Hospital & Clinic | 28,386 | 18.1 | 1,570 | 1.10 | = | 0.77 | x | 1.43 |
| Nebraska Medical Center | 28,477 | 24.1 | 1,180 | 1.10 | = | 1.02 | x | 1.08 |
| Creighton University Medical Center | 31,541 | 20.3 | 1,557 | 1.22 | = | 0.86 | x | 1.42 |
| Dartmouth-Hitchcock Medical Center | 28,676 | 19.1 | 1,505 | 1.11 | = | 0.81 | x | 1.37 |
| Robert Wood Johnson Univ. Hospital | 46,099 | 38.7 | 1,191 | 1.78 | = | 1.64 | x | 1.09 |
| University of New Mexico Hospital | 26,580 | 16.9 | 1,576 | 1.03 | = | 0.71 | x | 1.44 |
| Kaleida Health-Buffalo Gen. Hospital | 22,463 | 24.3 | 926 | 0.87 | = | 1.03 | x | 0.84 |
| Albany Medical Center | 31,489 | 31.4 | 1,003 | 1.22 | = | 1.33 | x | 0.91 |
| Mount Sinai Hospital | 61,916 | 40.6 | 1,523 | 2.39 | = | 1.72 | x | 1.39 |
| Montefiore Medical Center | 55,217 | 31.2 | 1,767 | 2.14 | = | 1.32 | x | 1.61 |
| New York-Presbyterian Hospital | 58,035 | 38.8 | 1,497 | 2.24 | = | 1.64 | x | 1.37 |
| New York University Medical Center | 65,660 | 54.3 | 1,210 | 2.54 | = | 2.30 | x | 1.10 |
| Upstate Medical University | 29,369 | 26.6 | 1,102 | 1.14 | = | 1.13 | x | 1.01 |
| Strong Memorial Hospital | 29,538 | 26.7 | 1,107 | 1.14 | = | 1.13 | x | 1.01 |
| Stony Brook University Hospital | 42,137 | 31.0 | 1,358 | 1.63 | = | 1.31 | x | 1.24 |
| Duke University Hospital | 35,420 | 22.9 | 1,549 | 1.37 | = | 0.97 | x | 1.41 |
| Pitt County Memorial Hospital | 27,418 | 22.3 | 1,231 | 1.06 | = | 0.94 | x | 1.12 |
| North Carolina Baptist Hospital | 33,078 | 24.5 | 1,351 | 1.28 | = | 1.04 | x | 1.23 |
| University of North Carolina Hospitals | 32,005 | 19.7 | 1,621 | 1.24 | = | 0.84 | x | 1.48 |
| University Hospital | 35,540 | 18.3 | 1,946 | 1.37 | = | 0.77 | x | 1.78 |
| Medical University of Ohio | 33,058 | 23.4 | 1,413 | 1.28 | = | 0.99 | x | 1.29 |
| Ohio State University Medical Center | 37,060 | 26.0 | 1,427 | 1.43 | = | 1.10 | x | 1.30 |
| University Hospitals of Cleveland | 30,145 | 19.8 | 1,524 | 1.17 | = | 0.84 | x | 1.39 |
| Cleveland Clinic Foundation | 31,252 | 23.9 | 1,307 | 1.21 | = | 1.01 | x | 1.19 |
| Oklahoma University Medical Center | 31,245 | 26.4 | 1,185 | 1.21 | = | 1.12 | x | 1.08 |
| OHSU Hospital | 37,693 | 19.2 | 1,964 | 1.46 | = | 0.81 | x | 1.79 |
| Temple University Hospital | 57,032 | 32.5 | 1,753 | 2.21 | = | 1.38 | x | 1.60 |
| Hospital of the Univ. of Pennsylvania | 50,250 | 30.7 | 1,639 | 1.94 | = | 1.30 | x | 1.50 |
| UPMC Presbyterian Shadyside | 39,153 | 27.1 | 1,447 | 1.51 | = | 1.15 | x | 1.32 |
| Thomas Jefferson University Hospital | 45,598 | 37.4 | 1,218 | 1.76 | = | 1.59 | x | 1.11 |
| Penn State Hershey Medical Center | 28,548 | 21.2 | 1,349 | 1.10 | = | 0.90 | x | 1.23 |
| Hahnemann University Hospital | 84,827 | 34.8 | 2,437 | 3.28 | = | 1.48 | x | 2.22 |
| Rhode Island Hospital | 32,209 | 24.6 | 1,312 | 1.25 | = | 1.04 | x | 1.20 |
| MUSC Medical Center | 34,097 | 22.1 | 1,544 | 1.32 | = | 0.94 | x | 1.41 |
| Vanderbilt University Medical Center | 35,626 | 21.7 | 1,642 | 1.38 | = | 0.92 | x | 1.50 |
| Parkland Health & Hospital System | 30,872 | 17.2 | 1,798 | 1.19 | = | 0.73 | x | 1.64 |
| Univ. of Texas Med. Branch Hospitals | 36,029 | 25.3 | 1,422 | 1.39 | = | 1.07 | x | 1.30 |
| Scott and White Memorial Hospital | 22,069 | 15.9 | 1,384 | 0.85 | = | 0.68 | x | 1.26 |
| Memorial Hermann-Texas Med.Ctr. | 35,914 | 22.7 | 1,585 | 1.39 | = | 0.96 | x | 1.45 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 1b. The Medical Care Cost Equation: Disaggregation of inpatient (facility) reimbursements during the last two years of life into volume (hospital days per patient) and price (reimbursements per patient day) components (deaths occurring 2001-05)**

| Hospital name | Inpatient reimbursements per decedent** | Hospital days per decedent | Reimbursements per patient day | Inpatient reimbursements (U.S. ratio) | = | Hospital days (U.S. ratio) | x | Reimbursements per day (U.S. ratio) |
|---|---|---|---|---|---|---|---|---|
| The Methodist Hospital | 40,231 | 31.5 | 1,276 | 1.56 | = | 1.34 | x | 1.16 |
| University of Utah Hospital | 30,797 | 18.2 | 1,695 | 1.19 | = | 0.77 | x | 1.55 |
| Fletcher Allen Health Care | 28,089 | 21.5 | 1,306 | 1.09 | = | 0.91 | x | 1.19 |
| University of Virginia Medical Center | 32,392 | 19.6 | 1,651 | 1.25 | = | 0.83 | x | 1.51 |
| VCU Health System | 31,203 | 21.7 | 1,435 | 1.21 | = | 0.92 | x | 1.31 |
| Univ. of Washington Medical Center | 44,411 | 24.0 | 1,847 | 1.72 | = | 1.02 | x | 1.69 |
| West Virginia University Hospitals | 31,449 | 20.5 | 1,535 | 1.22 | = | 0.87 | x | 1.40 |
| Univ. of Wisconsin Hospital & Clinics | 28,827 | 19.7 | 1,462 | 1.11 | = | 0.84 | x | 1.33 |
| Froedtert Memorial Lutheran Hospital | 34,102 | 25.5 | 1,338 | 1.32 | = | 1.08 | x | 1.22 |
| **United States** | **25,860** | **23.6** | **1,096** | **1.00** | **=** | **1.00** | **x** | **1.00** |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 1c. The Medical Care Cost Equation: Disaggregation of physician payments (Part B and outpatient) during the last two years of life into volume (physician visits per patient) and price payments per visit) components (deaths occurring 2001-05)**

| Hospital name | Payments for physician visits per decedent | Physician visits per decedent | Payments per physician visit | Physician visit payments (U.S. ratio) | = | Physician visits (U.S. ratio) | x | Payments per visit (U.S. ratio) |
|---|---|---|---|---|---|---|---|---|
| University of Alabama Hospital | 2,367 | 49.8 | 48 | 0.56 | = | 0.71 | x | 0.79 |
| University Medical Center | 3,253 | 57.7 | 56 | 0.77 | = | 0.82 | x | 0.94 |
| UAMS Medical Center | 2,499 | 57.4 | 44 | 0.59 | = | 0.82 | x | 0.73 |
| Univ. of CA San Diego Medical Center | 3,636 | 58.6 | 62 | 0.87 | = | 0.84 | x | 1.03 |
| UCLA Medical Center | 5,971 | 101.3 | 59 | 1.42 | = | 1.44 | x | 0.98 |
| Loma Linda University Medical Center | 4,292 | 68.9 | 62 | 1.02 | = | 0.98 | x | 1.04 |
| Stanford Hospital and Clinics | 3,523 | 55.8 | 63 | 0.84 | = | 0.80 | x | 1.05 |
| UCSF Medical Center | 4,069 | 62.7 | 65 | 0.97 | = | 0.89 | x | 1.08 |
| Univ. of CA Davis Medical Center | 2,792 | 53.5 | 52 | 0.66 | = | 0.76 | x | 0.87 |
| Cedars-Sinai Medical Center | 10,307 | 155.8 | 66 | 2.45 | = | 2.22 | x | 1.10 |
| University of Colorado Hospital | 2,469 | 50.8 | 49 | 0.59 | = | 0.72 | x | 0.81 |
| Yale-New Haven Hospital | 3,805 | 58.3 | 65 | 0.91 | = | 0.83 | x | 1.09 |
| Univ. of Connecticut Health Center | 3,657 | 55.3 | 66 | 0.87 | = | 0.79 | x | 1.10 |
| George Washington Univ. Hospital | 5,472 | 75.7 | 72 | 1.30 | = | 1.08 | x | 1.21 |
| Howard University Hospital | 4,284 | 61.7 | 69 | 1.02 | = | 0.88 | x | 1.16 |
| MedStar-Georgetown Medical Center | 4,618 | 72.6 | 64 | 1.10 | = | 1.04 | x | 1.06 |
| Jackson Memorial Hospital | 5,988 | 88.3 | 68 | 1.43 | = | 1.26 | x | 1.13 |
| Shands at the University of Florida | 4,335 | 73.6 | 59 | 1.03 | = | 1.05 | x | 0.98 |
| Tampa General Hospital | 4,795 | 83.2 | 58 | 1.14 | = | 1.19 | x | 0.96 |
| Emory University Hospital | 3,444 | 60.9 | 57 | 0.82 | = | 0.87 | x | 0.94 |
| Medical College of Georgia Hospital | 2,184 | 49.1 | 45 | 0.52 | = | 0.70 | x | 0.74 |
| Grady Memorial Hospital | 2,540 | 44.2 | 58 | 0.60 | = | 0.63 | x | 0.96 |
| University of Chicago Hospital | 3,268 | 55.4 | 59 | 0.78 | = | 0.79 | x | 0.98 |
| Rush University Medical Center | 5,216 | 89.3 | 58 | 1.24 | = | 1.27 | x | 0.97 |
| Loyola University Medical Center | 3,579 | 64.4 | 56 | 0.85 | = | 0.92 | x | 0.93 |
| Northwestern Memorial Hospital | 4,367 | 75.5 | 58 | 1.04 | = | 1.08 | x | 0.96 |
| Clarian Health Partners | 3,185 | 64.9 | 49 | 0.76 | = | 0.93 | x | 0.82 |
| University of Iowa Hospitals & Clinics | 2,219 | 51.1 | 43 | 0.53 | = | 0.73 | x | 0.72 |
| University of Kansas Hospital | 3,085 | 65.0 | 47 | 0.73 | = | 0.93 | x | 0.79 |
| University of Kentucky Hospital | 2,248 | 47.4 | 47 | 0.54 | = | 0.68 | x | 0.79 |
| University of Maryland Medical Center | 3,245 | 60.0 | 54 | 0.77 | = | 0.86 | x | 0.90 |
| Johns Hopkins Hospital | 3,099 | 56.9 | 54 | 0.74 | = | 0.81 | x | 0.91 |
| Boston Medical Center | 3,912 | 57.0 | 69 | 0.93 | = | 0.81 | x | 1.15 |
| Massachusetts General Hospital | 4,532 | 75.3 | 60 | 1.08 | = | 1.07 | x | 1.00 |
| Beth Israel Deaconess Medical Center | 4,922 | 67.1 | 73 | 1.17 | = | 0.96 | x | 1.22 |
| Brigham and Women's Hospital | 4,332 | 72.6 | 60 | 1.03 | = | 1.04 | x | 1.00 |
| Tufts-New England Medical Center | 4,367 | 67.5 | 65 | 1.04 | = | 0.96 | x | 1.08 |
| UMass Memorial Medical Center | 4,259 | 61.8 | 69 | 1.01 | = | 0.88 | x | 1.15 |
| University of Michigan Hospitals | 3,874 | 63.7 | 61 | 0.92 | = | 0.91 | x | 1.02 |
| Harper University Hospital | 4,556 | 77.5 | 59 | 1.08 | = | 1.11 | x | 0.98 |
| Mayo Clinic-St. Mary's Hospital | 2,644 | 50.8 | 52 | 0.63 | = | 0.73 | x | 0.87 |
| Univ. of Minnesota Medical Center | 2,875 | 59.5 | 48 | 0.68 | = | 0.85 | x | 0.81 |

**Appendix Table 1c. The Medical Care Cost Equation: Disaggregation of physician payments (Part B and outpatient) during the last two years of life into volume (physician visits per patient) and price payments per visit) components (deaths occurring 2001-05)**

| Hospital name | Payments for physician visits per decedent | Physician visits per decedent | Payments per physician visit | Physician visit payments (U.S. ratio) | = | Physician visits (U.S. ratio) | x | Payments per visit (U.S. ratio) |
|---|---|---|---|---|---|---|---|---|
| Univ. of Mississippi Hospitals & Clinics | 1,888 | 46.9 | 40 | 0.45 | = | 0.67 | x | 0.67 |
| Barnes-Jewish Hospital | 3,210 | 61.1 | 53 | 0.76 | = | 0.87 | x | 0.88 |
| St. Louis University Hospital | 2,861 | 54.5 | 53 | 0.68 | = | 0.78 | x | 0.88 |
| University of Missouri Hospital & Clinic | 2,122 | 48.2 | 44 | 0.51 | = | 0.69 | x | 0.73 |
| Nebraska Medical Center | 3,149 | 66.7 | 47 | 0.75 | = | 0.95 | x | 0.79 |
| Creighton University Medical Center | 2,444 | 53.2 | 46 | 0.58 | = | 0.76 | x | 0.77 |
| Dartmouth-Hitchcock Medical Center | 2,228 | 43.0 | 52 | 0.53 | = | 0.61 | x | 0.86 |
| Robert Wood Johnson Univ. Hospital | 7,820 | 121.2 | 65 | 1.86 | = | 1.73 | x | 1.08 |
| University of New Mexico Hospital | 2,427 | 43.6 | 56 | 0.58 | = | 0.62 | x | 0.93 |
| Kaleida Health-Buffalo Gen. Hospital | 3,425 | 58.1 | 59 | 0.82 | = | 0.83 | x | 0.98 |
| Albany Medical Center | 4,445 | 75.5 | 59 | 1.06 | = | 1.08 | x | 0.98 |
| Mount Sinai Hospital | 7,536 | 108.6 | 69 | 1.79 | = | 1.55 | x | 1.16 |
| Montefiore Medical Center | 6,270 | 86.5 | 72 | 1.49 | = | 1.23 | x | 1.21 |
| New York-Presbyterian Hospital | 5,733 | 82.9 | 69 | 1.36 | = | 1.18 | x | 1.15 |
| New York University Medical Center | 10,194 | 142.6 | 71 | 2.43 | = | 2.03 | x | 1.19 |
| Upstate Medical University | 2,520 | 52.2 | 48 | 0.60 | = | 0.74 | x | 0.81 |
| Strong Memorial Hospital | 2,703 | 51.9 | 52 | 0.64 | = | 0.74 | x | 0.87 |
| Stony Brook University Hospital | 5,173 | 69.0 | 75 | 1.23 | = | 0.98 | x | 1.25 |
| Duke University Hospital | 2,379 | 50.0 | 48 | 0.57 | = | 0.71 | x | 0.79 |
| Pitt County Memorial Hospital | 2,710 | 50.9 | 53 | 0.65 | = | 0.73 | x | 0.89 |
| North Carolina Baptist Hospital | 2,668 | 53.4 | 50 | 0.64 | = | 0.76 | x | 0.83 |
| University of North Carolina Hospitals | 2,751 | 50.9 | 54 | 0.65 | = | 0.73 | x | 0.90 |
| University Hospital | 2,361 | 47.5 | 50 | 0.56 | = | 0.68 | x | 0.83 |
| Medical University of Ohio | 3,472 | 58.1 | 60 | 0.83 | = | 0.83 | x | 1.00 |
| Ohio State University Medical Center | 3,483 | 57.3 | 61 | 0.83 | = | 0.82 | x | 1.01 |
| University Hospitals of Cleveland | 3,421 | 58.9 | 58 | 0.81 | = | 0.84 | x | 0.97 |
| Cleveland Clinic Foundation | 3,225 | 62.8 | 51 | 0.77 | = | 0.90 | x | 0.86 |
| Oklahoma University Medical Center | 2,786 | 56.6 | 49 | 0.66 | = | 0.81 | x | 0.82 |
| OHSU Hospital | 2,458 | 42.0 | 59 | 0.59 | = | 0.60 | x | 0.98 |
| Temple University Hospital | 5,546 | 83.3 | 67 | 1.32 | = | 1.19 | x | 1.11 |
| Hospital of the Univ. of Pennsylvania | 4,225 | 71.6 | 59 | 1.01 | = | 1.02 | x | 0.98 |
| UPMC Presbyterian Shadyside | 4,394 | 77.9 | 56 | 1.05 | = | 1.11 | x | 0.94 |
| Thomas Jefferson University Hospital | 6,052 | 101.8 | 59 | 1.44 | = | 1.45 | x | 0.99 |
| Penn State Hershey Medical Center | 3,317 | 62.7 | 53 | 0.79 | = | 0.89 | x | 0.88 |
| Hahnemann University Hospital | 6,122 | 97.1 | 63 | 1.46 | = | 1.39 | x | 1.05 |
| Rhode Island Hospital | 3,788 | 57.5 | 66 | 0.90 | = | 0.82 | x | 1.10 |
| MUSC Medical Center | 2,146 | 49.2 | 44 | 0.51 | = | 0.70 | x | 0.73 |
| Vanderbilt University Medical Center | 2,754 | 55.6 | 50 | 0.66 | = | 0.79 | x | 0.83 |
| Parkland Health & Hospital System | 1,679 | 38.6 | 43 | 0.40 | = | 0.55 | x | 0.73 |
| Univ. of Texas Med. Branch Hospitals | 2,807 | 52.1 | 54 | 0.67 | = | 0.74 | x | 0.90 |
| Scott and White Memorial Hospital | 2,215 | 44.9 | 49 | 0.53 | = | 0.64 | x | 0.82 |
| Memorial Hermann-Texas Med.Ctr. | 4,388 | 70.5 | 62 | 1.04 | = | 1.01 | x | 1.04 |

**Appendix Table 1c. The Medical Care Cost Equation: Disaggregation of physician payments (Part B and outpatient) during the last two years of life into volume (physician visits per patient) and price payments per visit) components (deaths occurring 2001-05)**

| Hospital name | Payments for physician visits per decedent | Physician visits per decedent | Payments per physician visit | Physician visit payments (U.S. ratio) | = | Physician visits (U.S. ratio) | x | Payments per visit (U.S. ratio) |
|---|---|---|---|---|---|---|---|---|
| The Methodist Hospital | 5,859 | 104.1 | 56 | 1.39 | = | 1.49 | x | 0.94 |
| University of Utah Hospital | 2,241 | 46.2 | 49 | 0.53 | = | 0.66 | x | 0.81 |
| Fletcher Allen Health Care | 3,066 | 51.4 | 60 | 0.73 | = | 0.73 | x | 0.99 |
| University of Virginia Medical Center | 2,448 | 51.1 | 48 | 0.58 | = | 0.73 | x | 0.80 |
| VCU Health System | 2,224 | 44.6 | 50 | 0.53 | = | 0.64 | x | 0.83 |
| Univ. of Washington Medical Center | 2,598 | 51.7 | 50 | 0.62 | = | 0.74 | x | 0.84 |
| West Virginia University Hospitals | 2,708 | 55.0 | 49 | 0.64 | = | 0.78 | x | 0.82 |
| Univ. of Wisconsin Hospital & Clinics | 1,843 | 41.9 | 44 | 0.44 | = | 0.60 | x | 0.73 |
| Froedtert Memorial Lutheran Hospital | 2,852 | 57.6 | 49 | 0.68 | = | 0.82 | x | 0.83 |
| **United States** | **4,201** | **70.1** | **60** | **1.00** | **=** | **1.00** | **x** | **1.00** |

**Appendix Table 1d. Resource inputs per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total FTE physician labor inputs | Medical specialist labor inputs | Primary care physician labor inputs | Ratio of MS/PC labor inputs | Hospital bed inputs | Intensive and intermediate care bed inputs | High-intensity ICU/CCU bed inputs | Intermediate-intensity bed inputs | Medical/surgical bed inputs |
|---|---|---|---|---|---|---|---|---|---|
| University of Alabama Hospital | 20.5 | 9.6 | 5.4 | 1.77 | 64.8 | 16.6 | 15.1 | 1.5 | 48.1 |
| University Medical Center | 23.5 | 10.1 | 8.3 | 1.22 | 49.7 | 17.9 | 10.3 | 7.6 | 31.8 |
| UAMS Medical Center | 22.4 | 9.3 | 6.9 | 1.36 | 67.7 | 20.9 | 19.7 | 1.2 | 46.7 |
| Univ. of CA San Diego Medical Center | 22.4 | 8.9 | 8.8 | 1.01 | 68.3 | 27.9 | 8.7 | 19.2 | 40.4 |
| UCLA Medical Center | 38.5 | 21.2 | 9.6 | 2.20 | 85.8 | 38.1 | 13.8 | 24.3 | 47.7 |
| Loma Linda University Medical Center | 26.9 | 9.4 | 13.5 | 0.70 | 71.3 | 28.5 | 13.9 | 14.5 | 42.8 |
| Stanford Hospital and Clinics | 22.8 | 9.3 | 8.2 | 1.13 | 55.6 | 18.8 | 10.0 | 8.8 | 36.8 |
| UCSF Medical Center | 25.9 | 9.2 | 11.2 | 0.82 | 61.5 | 15.8 | 13.3 | 2.6 | 45.7 |
| Univ. of CA Davis Medical Center | 22.8 | 9.2 | 8.7 | 1.06 | 55.5 | 25.0 | 9.7 | 15.4 | 30.4 |
| Cedars-Sinai Medical Center | 54.2 | 31.6 | 14.6 | 2.16 | 117.5 | 34.8 | 14.3 | 20.5 | 82.7 |
| University of Colorado Hospital | 21.5 | 9.9 | 6.9 | 1.43 | 48.9 | 14.0 | 8.2 | 5.8 | 35.0 |
| Yale-New Haven Hospital | 22.1 | 9.5 | 6.9 | 1.39 | 74.5 | 15.5 | 14.6 | 1.0 | 58.9 |
| Univ. of Connecticut Health Center | 19.9 | 8.7 | 6.9 | 1.26 | 60.7 | 18.1 | 15.5 | 2.7 | 42.5 |
| George Washington Univ. Hospital | 30.2 | 15.2 | 9.0 | 1.69 | 74.3 | 17.5 | 14.9 | 2.6 | 56.8 |
| Howard University Hospital | 24.4 | 11.5 | 9.1 | 1.25 | 100.6 | 25.0 | 18.2 | 6.9 | 75.6 |
| MedStar-Georgetown Medical Center | 30.0 | 14.8 | 8.0 | 1.86 | 79.0 | 15.7 | 11.0 | 4.7 | 63.3 |
| Jackson Memorial Hospital | 34.4 | 12.9 | 15.1 | 0.85 | 83.7 | 32.5 | 17.5 | 15.0 | 51.3 |
| Shands at the University of Florida | 27.9 | 11.7 | 11.2 | 1.04 | 70.9 | 21.7 | 13.3 | 8.4 | 49.2 |
| Tampa General Hospital | 29.9 | 13.7 | 9.7 | 1.42 | 75.3 | 24.1 | 14.5 | 9.7 | 51.2 |
| Emory University Hospital | 24.0 | 10.7 | 7.9 | 1.36 | 75.5 | 23.3 | 21.4 | 1.8 | 52.2 |
| Medical College of Georgia Hospital | 18.4 | 7.9 | 5.5 | 1.44 | 57.2 | 16.1 | 14.1 | 2.0 | 41.2 |
| Grady Memorial Hospital | 16.7 | 6.6 | 7.7 | 0.86 | 62.6 | 19.2 | 15.9 | 3.3 | 43.4 |
| University of Chicago Hospital | 24.6 | 10.4 | 9.2 | 1.13 | 63.0 | 17.3 | 12.1 | 5.2 | 45.7 |
| Rush University Medical Center | 32.8 | 14.4 | 12.3 | 1.17 | 98.2 | 20.4 | 14.5 | 5.9 | 77.7 |
| Loyola University Medical Center | 25.9 | 12.3 | 7.7 | 1.59 | 71.4 | 26.7 | 10.7 | 16.0 | 44.7 |
| Northwestern Memorial Hospital | 29.2 | 13.2 | 9.9 | 1.34 | 82.4 | 17.6 | 14.0 | 3.6 | 64.8 |
| Clarian Health Partners | 23.4 | 11.5 | 7.2 | 1.60 | 68.2 | 17.1 | 11.6 | 5.5 | 51.0 |
| University of Iowa Hospitals & Clinics | 33.3 | 9.1 | 20.7 | 0.44 | 68.3 | 13.1 | 12.2 | 0.8 | 55.2 |
| University of Kansas Hospital | 27.1 | 9.2 | 11.7 | 0.79 | 72.9 | 25.1 | 10.1 | 15.0 | 47.8 |
| University of Kentucky Hospital | 20.0 | 9.0 | 5.7 | 1.57 | 52.5 | 16.3 | 11.8 | 4.5 | 36.2 |
| University of Maryland Medical Center | 25.8 | 10.6 | 8.4 | 1.26 | 76.8 | 29.5 | 16.2 | 13.3 | 47.3 |
| Johns Hopkins Hospital | 25.7 | 8.9 | 10.0 | 0.89 | 78.2 | 20.0 | 11.8 | 8.2 | 58.2 |
| Boston Medical Center | 23.1 | 11.1 | 7.6 | 1.47 | 66.4 | 17.5 | 15.1 | 2.4 | 48.9 |
| Massachusetts General Hospital | 29.5 | 11.7 | 11.5 | 1.02 | 79.2 | 16.0 | 15.0 | 1.0 | 63.2 |
| Beth Israel Deaconess Medical Center | 27.6 | 11.1 | 10.6 | 1.05 | 66.8 | 16.1 | 15.3 | 0.8 | 50.7 |
| Brigham and Women's Hospital | 29.3 | 12.3 | 9.8 | 1.25 | 72.4 | 23.2 | 11.9 | 11.4 | 49.2 |
| Tufts-New England Medical Center | 26.9 | 11.3 | 10.6 | 1.07 | 75.9 | 18.7 | 17.8 | 0.9 | 57.2 |
| UMass Memorial Medical Center | 25.1 | 11.0 | 9.2 | 1.19 | 60.6 | 16.7 | 16.1 | 0.6 | 43.9 |
| University of Michigan Hospitals | 26.6 | 12.2 | 8.7 | 1.39 | 67.4 | 15.1 | 11.9 | 3.2 | 52.3 |
| Harper University Hospital | 29.7 | 11.7 | 12.8 | 0.91 | 79.2 | 15.8 | 12.7 | 3.1 | 63.4 |
| Mayo Clinic-St. Mary's Hospital | 20.3 | 8.9 | 6.8 | 1.30 | 58.2 | 18.4 | 16.4 | 2.0 | 39.8 |

**Appendix Table 1d. Resource inputs per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total FTE physician labor inputs | Medical specialist labor inputs | Primary care physician labor inputs | Ratio of MS/PC labor inputs | Hospital bed inputs | Intensive and intermediate care bed inputs | High-intensity ICU/CCU bed inputs | Intermediate-intensity bed inputs | Medical/surgical bed inputs |
|---|---|---|---|---|---|---|---|---|---|
| Univ. of Minnesota Medical Center | 23.4 | 7.8 | 10.1 | 0.78 | 68.5 | 16.5 | 10.9 | 5.6 | 52.0 |
| Univ. of Mississippi Hospitals & Clinics | 17.4 | 8.1 | 5.4 | 1.48 | 60.5 | 13.9 | 11.2 | 2.8 | 46.6 |
| Barnes-Jewish Hospital | 25.2 | 10.2 | 9.5 | 1.07 | 75.3 | 19.5 | 12.7 | 6.7 | 55.8 |
| St. Louis University Hospital | 22.7 | 10.0 | 7.8 | 1.28 | 74.6 | 17.3 | 14.0 | 3.3 | 57.3 |
| University of Missouri Hospital & Clinic | 19.7 | 6.7 | 7.8 | 0.85 | 49.5 | 14.2 | 11.2 | 3.0 | 35.4 |
| Nebraska Medical Center | 22.5 | 9.8 | 8.1 | 1.21 | 66.1 | 27.3 | 6.7 | 20.7 | 38.8 |
| Creighton University Medical Center | 17.2 | 6.4 | 7.1 | 0.90 | 55.5 | 19.0 | 16.3 | 2.7 | 36.5 |
| Dartmouth-Hitchcock Medical Center | 17.8 | 6.9 | 6.5 | 1.05 | 52.2 | 12.3 | 11.9 | 0.4 | 39.9 |
| Robert Wood Johnson Univ. Hospital | 40.6 | 23.0 | 10.7 | 2.15 | 106.1 | 37.5 | 28.5 | 9.0 | 68.5 |
| University of New Mexico Hospital | 16.2 | 5.0 | 8.1 | 0.62 | 46.2 | 17.3 | 5.8 | 11.5 | 28.9 |
| Kaleida Health-Buffalo Gen. Hospital | 21.5 | 7.8 | 9.2 | 0.85 | 66.5 | 14.4 | 13.8 | 0.5 | 52.1 |
| Albany Medical Center | 26.8 | 12.7 | 7.8 | 1.62 | 86.1 | 20.3 | 19.5 | 0.8 | 65.8 |
| Mount Sinai Hospital | 37.1 | 15.5 | 15.9 | 0.97 | 111.4 | 18.0 | 17.3 | 0.8 | 93.3 |
| Montefiore Medical Center | 30.1 | 11.6 | 13.8 | 0.84 | 85.6 | 18.9 | 13.4 | 5.5 | 66.7 |
| New York-Presbyterian Hospital | 29.9 | 12.9 | 11.5 | 1.13 | 106.2 | 23.1 | 21.1 | 2.0 | 83.1 |
| New York University Medical Center | 50.8 | 30.1 | 13.2 | 2.27 | 148.7 | 32.0 | 18.2 | 13.8 | 116.7 |
| Upstate Medical University | 19.9 | 9.9 | 5.1 | 1.93 | 73.0 | 12.7 | 12.1 | 0.6 | 60.3 |
| Strong Memorial Hospital | 20.1 | 6.5 | 9.1 | 0.72 | 73.1 | 16.5 | 11.0 | 5.5 | 56.6 |
| Stony Brook University Hospital | 26.5 | 10.8 | 10.1 | 1.07 | 85.0 | 21.8 | 18.2 | 3.7 | 63.2 |
| Duke University Hospital | 21.5 | 9.3 | 6.4 | 1.46 | 62.6 | 16.0 | 14.8 | 1.2 | 46.6 |
| Pitt County Memorial Hospital | 19.4 | 8.0 | 7.0 | 1.14 | 61.0 | 21.9 | 13.0 | 8.9 | 39.1 |
| North Carolina Baptist Hospital | 20.7 | 10.5 | 4.8 | 2.18 | 67.1 | 16.8 | 10.6 | 6.2 | 50.3 |
| University of North Carolina Hospitals | 20.4 | 8.5 | 7.3 | 1.17 | 54.1 | 14.1 | 8.2 | 5.9 | 40.0 |
| University Hospital | 19.6 | 7.7 | 6.7 | 1.16 | 50.0 | 17.7 | 10.0 | 7.7 | 32.4 |
| Medical University of Ohio | 23.5 | 9.9 | 8.2 | 1.20 | 64.1 | 22.7 | 10.3 | 12.4 | 41.4 |
| Ohio State University Medical Center | 24.2 | 11.2 | 7.1 | 1.59 | 71.2 | 18.9 | 15.5 | 3.4 | 52.3 |
| University Hospitals of Cleveland | 24.0 | 9.7 | 8.9 | 1.09 | 54.2 | 12.9 | 11.3 | 1.6 | 41.3 |
| Cleveland Clinic Foundation | 26.1 | 10.6 | 8.8 | 1.20 | 65.5 | 19.2 | 14.3 | 4.8 | 46.4 |
| Oklahoma University Medical Center | 19.2 | 9.2 | 5.2 | 1.76 | 72.2 | 18.7 | 9.9 | 8.8 | 53.5 |
| OHSU Hospital | 18.7 | 7.8 | 6.3 | 1.24 | 52.6 | 13.2 | 12.3 | 1.0 | 39.3 |
| Temple University Hospital | 28.5 | 14.2 | 9.4 | 1.51 | 89.1 | 36.6 | 13.9 | 22.7 | 52.6 |
| Hospital of the Univ. of Pennsylvania | 27.7 | 13.1 | 8.2 | 1.60 | 84.0 | 19.8 | 11.3 | 8.4 | 64.2 |
| UPMC Presbyterian Shadyside | 29.9 | 14.1 | 9.7 | 1.46 | 74.1 | 16.7 | 15.1 | 1.6 | 57.4 |
| Thomas Jefferson University Hospital | 34.0 | 15.9 | 11.3 | 1.41 | 102.6 | 42.8 | 11.6 | 31.2 | 59.8 |
| Penn State Hershey Medical Center | 22.3 | 9.5 | 7.8 | 1.21 | 58.0 | 21.0 | 6.5 | 14.6 | 37.0 |
| Hahnemann University Hospital | 33.9 | 17.6 | 9.4 | 1.86 | 95.4 | 23.6 | 14.1 | 9.5 | 71.8 |
| Rhode Island Hospital | 22.8 | 7.9 | 9.9 | 0.80 | 67.3 | 18.5 | 12.9 | 5.6 | 48.8 |
| MUSC Medical Center | 20.0 | 9.5 | 5.3 | 1.78 | 60.5 | 25.4 | 9.3 | 16.1 | 35.1 |
| Vanderbilt University Medical Center | 21.4 | 8.6 | 7.4 | 1.17 | 59.4 | 23.0 | 10.9 | 12.1 | 36.4 |
| Parkland Health & Hospital System | 16.5 | 5.9 | 7.7 | 0.76 | 47.0 | 14.1 | 12.5 | 1.6 | 32.9 |
| Univ. of Texas Med. Branch Hospitals | 19.3 | 7.9 | 7.6 | 1.04 | 69.4 | 20.5 | 10.3 | 10.1 | 49.0 |

**Appendix Table 1d. Resource inputs per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total FTE physician labor inputs | Medical specialist labor inputs | Primary care physician labor inputs | Ratio of MS/ PC labor inputs | Hospital bed inputs | Intensive and intermediate care bed inputs | High-intensity ICU/CCU bed inputs | Intermediate-intensity bed inputs | Medical/ surgical bed inputs |
|---|---|---|---|---|---|---|---|---|---|
| Scott and White Memorial Hospital | 16.4 | 6.3 | 6.4 | 0.99 | 43.7 | 10.4 | 9.7 | 0.7 | 33.3 |
| Memorial Hermann-Texas Med.Ctr. | 27.8 | 13.1 | 9.0 | 1.46 | 62.1 | 27.0 | 11.4 | 15.6 | 35.1 |
| The Methodist Hospital | 36.2 | 18.9 | 11.1 | 1.70 | 86.4 | 24.0 | 17.2 | 6.8 | 62.4 |
| University of Utah Hospital | 20.0 | 9.1 | 5.7 | 1.60 | 49.8 | 16.6 | 9.6 | 7.0 | 33.2 |
| Fletcher Allen Health Care | 21.3 | 8.8 | 8.1 | 1.08 | 58.9 | 11.6 | 11.2 | 0.4 | 47.3 |
| University of Virginia Medical Center | 18.9 | 8.9 | 5.7 | 1.56 | 53.8 | 14.8 | 13.8 | 1.0 | 38.9 |
| VCU Health System | 17.5 | 7.3 | 5.8 | 1.26 | 59.6 | 17.1 | 9.8 | 7.3 | 42.5 |
| Univ. of Washington Medical Center | 21.6 | 8.7 | 7.4 | 1.18 | 65.9 | 13.5 | 11.9 | 1.6 | 52.3 |
| West Virginia University Hospitals | 21.7 | 7.6 | 8.3 | 0.92 | 56.1 | 21.3 | 8.7 | 12.7 | 34.8 |
| Univ. of Wisconsin Hospital & Clinics | 17.3 | 7.9 | 4.9 | 1.63 | 54.0 | 11.3 | 10.7 | 0.7 | 42.7 |
| Froedtert Memorial Lutheran Hospital | 22.1 | 9.9 | 7.0 | 1.41 | 69.8 | 12.3 | 9.8 | 2.5 | 57.5 |
| **United States** | **24.7** | **9.8** | **10.4** | **0.95** | **64.7** | **16.3** | **9.2** | **7.2** | **48.3** |

**Appendix Table 1e. Estimated RN labor requirements under proposed federal standard per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total RN labor requirements | High-intensity ICU/CCU | Intermediate-intensity | Medical/surgical |
|---|---|---|---|---|
| University of Alabama Hospital | 60.3 | 22.7 | 1.5 | 36.1 |
| University Medical Center | 46.8 | 15.4 | 7.6 | 23.8 |
| UAMS Medical Center | 65.9 | 29.6 | 1.2 | 35.0 |
| Univ. of CA San Diego Medical Center | 62.6 | 13.1 | 19.2 | 30.3 |
| UCLA Medical Center | 80.7 | 20.7 | 24.3 | 35.8 |
| Loma Linda University Medical Center | 67.5 | 20.9 | 14.5 | 32.1 |
| Stanford Hospital and Clinics | 51.4 | 14.9 | 8.8 | 27.6 |
| UCSF Medical Center | 56.8 | 19.9 | 2.6 | 34.3 |
| Univ. of CA Davis Medical Center | 52.7 | 14.5 | 15.4 | 22.8 |
| Cedars-Sinai Medical Center | 104.0 | 21.5 | 20.5 | 62.1 |
| University of Colorado Hospital | 44.3 | 12.3 | 5.8 | 26.2 |
| Yale-New Haven Hospital | 67.0 | 21.9 | 1.0 | 44.2 |
| Univ. of Connecticut Health Center | 57.8 | 23.2 | 2.7 | 31.9 |
| George Washington Univ. Hospital | 67.6 | 22.4 | 2.6 | 42.6 |
| Howard University Hospital | 90.8 | 27.3 | 6.9 | 56.7 |
| MedStar-Georgetown Medical Center | 68.6 | 16.5 | 4.7 | 47.4 |
| Jackson Memorial Hospital | 79.7 | 26.2 | 15.0 | 38.4 |
| Shands at the University of Florida | 65.3 | 20.0 | 8.4 | 36.9 |
| Tampa General Hospital | 69.8 | 21.7 | 9.7 | 38.4 |
| Emory University Hospital | 73.1 | 32.2 | 1.8 | 39.2 |
| Medical College of Georgia Hospital | 54.0 | 21.1 | 2.0 | 30.9 |
| Grady Memorial Hospital | 59.7 | 23.9 | 3.3 | 32.5 |
| University of Chicago Hospital | 57.6 | 18.1 | 5.2 | 34.3 |
| Rush University Medical Center | 86.0 | 21.7 | 5.9 | 58.3 |
| Loyola University Medical Center | 65.6 | 16.0 | 16.0 | 33.5 |
| Northwestern Memorial Hospital | 73.2 | 21.0 | 3.6 | 48.6 |
| Clarian Health Partners | 61.3 | 17.5 | 5.5 | 38.3 |
| University of Iowa Hospitals & Clinics | 60.6 | 18.4 | 0.8 | 41.4 |
| University of Kansas Hospital | 66.0 | 15.2 | 15.0 | 35.8 |
| University of Kentucky Hospital | 49.3 | 17.7 | 4.5 | 27.2 |
| University of Maryland Medical Center | 73.1 | 24.4 | 13.3 | 35.5 |
| Johns Hopkins Hospital | 69.6 | 17.7 | 8.2 | 43.7 |
| Boston Medical Center | 61.7 | 22.7 | 2.4 | 36.6 |
| Massachusetts General Hospital | 70.9 | 22.6 | 1.0 | 47.4 |
| Beth Israel Deaconess Medical Center | 61.8 | 22.9 | 0.8 | 38.1 |
| Brigham and Women's Hospital | 66.1 | 17.8 | 11.4 | 36.9 |
| Tufts-New England Medical Center | 70.5 | 26.8 | 0.9 | 42.9 |
| UMass Memorial Medical Center | 57.7 | 24.2 | 0.6 | 32.9 |
| University of Michigan Hospitals | 60.3 | 17.9 | 3.2 | 39.2 |
| Harper University Hospital | 69.7 | 19.0 | 3.1 | 47.6 |
| Mayo Clinic-St. Mary's Hospital | 56.5 | 24.6 | 2.0 | 29.9 |
| Univ. of Minnesota Medical Center | 61.0 | 16.3 | 5.6 | 39.0 |

**Appendix Table 1e. Estimated RN labor requirements under proposed federal standard per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total RN labor requirements | High-intensity ICU/CCU | Intermediate-intensity | Medical/ surgical |
|---|---|---|---|---|
| Univ. of Mississippi Hospitals & Clinics | 54.5 | 16.8 | 2.8 | 35.0 |
| Barnes-Jewish Hospital | 67.7 | 19.1 | 6.7 | 41.9 |
| St. Louis University Hospital | 67.3 | 21.0 | 3.3 | 43.0 |
| University of Missouri Hospital & Clinic | 46.3 | 16.8 | 3.0 | 26.5 |
| Nebraska Medical Center | 59.7 | 10.0 | 20.7 | 29.1 |
| Creighton University Medical Center | 54.5 | 24.5 | 2.7 | 27.4 |
| Dartmouth-Hitchcock Medical Center | 48.2 | 17.8 | 0.4 | 29.9 |
| Robert Wood Johnson Univ. Hospital | 103.2 | 42.8 | 9.0 | 51.4 |
| University of New Mexico Hospital | 41.9 | 8.7 | 11.5 | 21.7 |
| Kaleida Health-Buffalo Gen. Hospital | 60.4 | 20.8 | 0.5 | 39.1 |
| Albany Medical Center | 79.4 | 29.2 | 0.8 | 49.3 |
| Mount Sinai Hospital | 96.7 | 25.9 | 0.8 | 70.0 |
| Montefiore Medical Center | 75.6 | 20.1 | 5.5 | 50.0 |
| New York-Presbyterian Hospital | 96.0 | 31.7 | 2.0 | 62.3 |
| New York University Medical Center | 128.7 | 27.3 | 13.8 | 87.5 |
| Upstate Medical University | 64.0 | 18.2 | 0.6 | 45.2 |
| Strong Memorial Hospital | 64.5 | 16.5 | 5.5 | 42.5 |
| Stony Brook University Hospital | 78.3 | 27.2 | 3.7 | 47.4 |
| Duke University Hospital | 58.4 | 22.3 | 1.2 | 35.0 |
| Pitt County Memorial Hospital | 57.8 | 19.5 | 8.9 | 29.3 |
| North Carolina Baptist Hospital | 59.8 | 15.9 | 6.2 | 37.7 |
| University of North Carolina Hospitals | 48.2 | 12.3 | 5.9 | 30.0 |
| University Hospital | 47.0 | 15.0 | 7.7 | 24.3 |
| Medical University of Ohio | 58.9 | 15.5 | 12.4 | 31.1 |
| Ohio State University Medical Center | 65.8 | 23.2 | 3.4 | 39.2 |
| University Hospitals of Cleveland | 49.5 | 17.0 | 1.6 | 30.9 |
| Cleveland Clinic Foundation | 61.1 | 21.5 | 4.8 | 34.8 |
| Oklahoma University Medical Center | 63.8 | 14.8 | 8.8 | 40.1 |
| OHSU Hospital | 48.9 | 18.4 | 1.0 | 29.5 |
| Temple University Hospital | 83.0 | 20.9 | 22.7 | 39.4 |
| Hospital of the Univ. of Pennsylvania | 73.6 | 17.0 | 8.4 | 48.2 |
| UPMC Presbyterian Shadyside | 67.4 | 22.7 | 1.6 | 43.0 |
| Thomas Jefferson University Hospital | 93.4 | 17.4 | 31.2 | 44.8 |
| Penn State Hershey Medical Center | 52.0 | 9.7 | 14.6 | 27.7 |
| Hahnemann University Hospital | 84.5 | 21.2 | 9.5 | 53.8 |
| Rhode Island Hospital | 61.5 | 19.3 | 5.6 | 36.6 |
| MUSC Medical Center | 56.4 | 13.9 | 16.1 | 26.3 |
| Vanderbilt University Medical Center | 55.8 | 16.4 | 12.1 | 27.3 |
| Parkland Health & Hospital System | 45.1 | 18.8 | 1.6 | 24.7 |
| Univ. of Texas Med. Branch Hospitals | 62.3 | 15.5 | 10.1 | 36.7 |
| Scott and White Memorial Hospital | 40.2 | 14.6 | 0.7 | 25.0 |
| Memorial Hermann-Texas Med.Ctr. | 59.0 | 17.1 | 15.6 | 26.3 |

**Appendix Table 1e. Estimated RN labor requirements under proposed federal standard per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total RN labor requirements | High-intensity ICU/CCU | Intermediate-intensity | Medical/ surgical |
|---|---|---|---|---|
| The Methodist Hospital | 79.4 | 25.8 | 6.8 | 46.8 |
| University of Utah Hospital | 46.2 | 14.3 | 7.0 | 24.9 |
| Fletcher Allen Health Care | 52.7 | 16.8 | 0.4 | 35.5 |
| University of Virginia Medical Center | 50.9 | 20.7 | 1.0 | 29.2 |
| VCU Health System | 53.8 | 14.7 | 7.3 | 31.9 |
| Univ. of Washington Medical Center | 58.8 | 17.9 | 1.6 | 39.2 |
| West Virginia University Hospitals | 51.8 | 13.0 | 12.7 | 26.1 |
| Univ. of Wisconsin Hospital & Clinics | 48.7 | 16.0 | 0.7 | 32.0 |
| Froedtert Memorial Lutheran Hospital | 60.3 | 14.7 | 2.5 | 43.2 |
| **United States** | **57.1** | **13.8** | **7.2** | **36.2** |

**Appendix Table 1f. Utilization per decedent during the last six months of life (deaths 2001-05)**

| Hospital name | Hospital days | Intensive and intermediate care days | High-intensity ICU/CCU days | Intermediate-intensity days | Medical/surgical days | Total physician visits | Medical specialist visits | Primary care physician visits | Ratio of MS/PC visits | Percent seeing 10 or more physicians |
|---|---|---|---|---|---|---|---|---|---|---|
| University of Alabama Hospital | 13.6 | 3.4 | 3.1 | 0.2 | 10.3 | 21.8 | 11.3 | 8.0 | 1.42 | 28.2 |
| University Medical Center | 10.8 | 4.4 | 2.7 | 1.8 | 6.4 | 26.7 | 14.0 | 11.0 | 1.28 | 43.7 |
| UAMS Medical Center | 14.8 | 4.3 | 4.1 | 0.2 | 10.5 | 31.5 | 16.8 | 12.8 | 1.31 | 34.5 |
| Univ. of CA San Diego Medical Center | 13.9 | 7.2 | 2.5 | 4.7 | 6.7 | 27.4 | 11.6 | 12.2 | 0.95 | 40.2 |
| UCLA Medical Center | 18.5 | 11.6 | 4.8 | 6.8 | 6.9 | 52.8 | 35.3 | 13.7 | 2.57 | 52.9 |
| Loma Linda University Medical Center | 15.1 | 8.5 | 4.5 | 4.0 | 6.6 | 30.7 | 12.2 | 16.5 | 0.74 | 41.9 |
| Stanford Hospital and Clinics | 11.9 | 4.3 | 2.3 | 2.0 | 7.5 | 23.8 | 10.9 | 10.5 | 1.04 | 30.1 |
| UCSF Medical Center | 13.5 | 3.4 | 2.9 | 0.5 | 10.1 | 30.8 | 12.0 | 15.8 | 0.76 | 46.7 |
| Univ. of CA Davis Medical Center | 11.9 | 7.0 | 3.1 | 3.9 | 4.9 | 25.8 | 11.9 | 12.4 | 0.96 | 41.1 |
| Cedars-Sinai Medical Center | 24.4 | 9.2 | 4.4 | 4.8 | 15.2 | 79.3 | 55.8 | 18.8 | 2.97 | 59.3 |
| University of Colorado Hospital | 10.2 | 3.1 | 1.8 | 1.3 | 7.1 | 21.8 | 10.7 | 9.3 | 1.15 | 30.5 |
| Yale-New Haven Hospital | 16.1 | 3.1 | 3.0 | 0.1 | 13.0 | 27.8 | 15.4 | 9.8 | 1.58 | 41.9 |
| Univ. of Connecticut Health Center | 13.7 | 3.3 | 2.9 | 0.4 | 10.4 | 26.1 | 12.6 | 10.7 | 1.18 | 39.8 |
| George Washington Univ. Hospital | 16.8 | 4.3 | 3.7 | 0.6 | 12.5 | 40.4 | 22.9 | 14.1 | 1.62 | 45.4 |
| Howard University Hospital | 23.9 | 7.2 | 5.3 | 2.0 | 16.7 | 35.2 | 17.9 | 15.2 | 1.18 | 33.3 |
| MedStar-Georgetown Medical Center | 17.3 | 3.5 | 2.7 | 0.8 | 13.8 | 34.4 | 20.4 | 11.2 | 1.82 | 57.7 |
| Jackson Memorial Hospital | 18.6 | 8.1 | 4.9 | 3.2 | 10.5 | 45.3 | 22.1 | 20.3 | 1.09 | 44.1 |
| Shands at the University of Florida | 15.4 | 4.6 | 2.8 | 1.8 | 10.8 | 36.3 | 16.9 | 16.8 | 1.01 | 45.0 |
| Tampa General Hospital | 16.9 | 6.7 | 4.3 | 2.4 | 10.1 | 46.6 | 26.1 | 16.5 | 1.58 | 51.2 |
| Emory University Hospital | 16.4 | 5.8 | 5.4 | 0.4 | 10.6 | 30.3 | 16.6 | 11.1 | 1.49 | 41.0 |
| Medical College of Georgia Hospital | 13.1 | 3.8 | 3.5 | 0.3 | 9.3 | 22.3 | 11.2 | 8.5 | 1.31 | 32.7 |
| Grady Memorial Hospital | 14.3 | 5.0 | 4.1 | 0.9 | 9.3 | 23.4 | 11.2 | 11.2 | 0.99 | 34.8 |
| University of Chicago Hospital | 13.6 | 3.6 | 2.7 | 0.9 | 10.0 | 27.8 | 14.8 | 11.3 | 1.31 | 39.2 |
| Rush University Medical Center | 19.7 | 4.7 | 3.5 | 1.3 | 15.0 | 45.6 | 23.4 | 19.3 | 1.22 | 49.7 |
| Loyola University Medical Center | 15.5 | 7.3 | 3.3 | 4.0 | 8.2 | 32.8 | 18.7 | 11.3 | 1.66 | 46.2 |
| Northwestern Memorial Hospital | 18.0 | 4.1 | 3.5 | 0.7 | 13.9 | 38.3 | 20.9 | 15.1 | 1.39 | 51.3 |
| Clarian Health Partners | 14.5 | 3.7 | 2.6 | 1.1 | 10.8 | 31.3 | 17.9 | 11.4 | 1.57 | 42.1 |
| University of Iowa Hospitals & Clinics | 14.3 | 2.6 | 2.5 | 0.1 | 11.7 | 25.0 | 10.7 | 10.9 | 0.98 | 35.4 |
| University of Kansas Hospital | 16.4 | 6.7 | 3.0 | 3.7 | 9.7 | 34.3 | 13.8 | 18.3 | 0.75 | 45.4 |
| University of Kentucky Hospital | 11.6 | 3.6 | 2.6 | 1.0 | 7.9 | 21.9 | 10.8 | 8.2 | 1.31 | 27.2 |
| University of Maryland Medical Center | 17.7 | 8.7 | 5.2 | 3.5 | 9.0 | 32.5 | 15.6 | 12.6 | 1.24 | 44.2 |
| Johns Hopkins Hospital | 16.5 | 4.9 | 3.1 | 1.8 | 11.6 | 28.9 | 12.2 | 13.0 | 0.94 | 44.6 |
| Boston Medical Center | 14.7 | 4.4 | 3.8 | 0.6 | 10.3 | 29.1 | 15.8 | 11.1 | 1.42 | 47.7 |
| Massachusetts General Hospital | 17.3 | 3.0 | 2.8 | 0.1 | 14.3 | 39.5 | 19.0 | 17.6 | 1.08 | 53.5 |
| Beth Israel Deaconess Medical Center | 14.2 | 3.2 | 3.1 | 0.1 | 11.0 | 30.8 | 13.5 | 14.6 | 0.93 | 50.8 |
| Brigham and Women's Hospital | 16.1 | 6.1 | 3.4 | 2.7 | 10.1 | 37.1 | 18.3 | 15.5 | 1.18 | 55.0 |
| Tufts-New England Medical Center | 17.0 | 4.3 | 4.2 | 0.2 | 12.7 | 33.6 | 16.8 | 13.9 | 1.21 | 53.7 |
| UMass Memorial Medical Center | 13.3 | 3.0 | 3.0 | 0.1 | 10.3 | 30.0 | 14.0 | 13.6 | 1.03 | 46.1 |
| University of Michigan Hospitals | 14.1 | 2.9 | 2.4 | 0.5 | 11.2 | 30.5 | 16.3 | 12.0 | 1.35 | 49.2 |
| Harper University Hospital | 16.9 | 3.1 | 2.5 | 0.5 | 13.8 | 39.2 | 17.8 | 18.9 | 0.94 | 42.9 |
| Mayo Clinic-St. Mary's Hospital | 12.0 | 4.2 | 3.8 | 0.4 | 7.8 | 23.9 | 11.6 | 10.4 | 1.11 | 41.0 |

**Appendix Table 1f. Utilization per decedent during the last six months of life (deaths 2001-05)**

| Hospital name | Hospital days | Intensive and intermediate care days | High-intensity ICU/CCU days | Intermediate-intensity days | Medical/surgical days | Total physician visits | Medical specialist visits | Primary care physician visits | Ratio of MS/PC visits | Percent seeing 10 or more physicians |
|---|---|---|---|---|---|---|---|---|---|---|
| Univ. of Minnesota Medical Center | 13.6 | 3.5 | 2.3 | 1.2 | 10.1 | 30.0 | 11.6 | 15.8 | 0.74 | 44.2 |
| Univ. of Mississippi Hospitals & Clinics | 12.9 | 2.6 | 2.2 | 0.3 | 10.4 | 22.2 | 12.6 | 7.1 | 1.78 | 28.1 |
| Barnes-Jewish Hospital | 16.6 | 4.2 | 3.0 | 1.2 | 12.4 | 30.7 | 14.8 | 13.8 | 1.08 | 43.7 |
| St. Louis University Hospital | 16.2 | 4.0 | 3.5 | 0.5 | 12.2 | 27.4 | 14.9 | 10.0 | 1.48 | 40.5 |
| University of Missouri Hospital & Clinic | 10.8 | 3.3 | 2.7 | 0.6 | 7.5 | 21.7 | 8.6 | 11.2 | 0.77 | 33.5 |
| Nebraska Medical Center | 14.3 | 7.2 | 1.9 | 5.3 | 7.1 | 36.4 | 20.2 | 14.2 | 1.42 | 41.2 |
| Creighton University Medical Center | 11.6 | 4.7 | 3.9 | 0.8 | 6.9 | 26.2 | 11.8 | 12.5 | 0.94 | 29.0 |
| Dartmouth-Hitchcock Medical Center | 11.2 | 2.0 | 2.0 | 0.0 | 9.2 | 21.0 | 8.9 | 10.1 | 0.89 | 33.2 |
| Robert Wood Johnson Univ. Hospital | 23.7 | 10.2 | 7.5 | 2.7 | 13.5 | 66.1 | 45.5 | 15.8 | 2.87 | 62.7 |
| University of New Mexico Hospital | 10.0 | 4.4 | 1.7 | 2.7 | 5.6 | 19.5 | 6.2 | 10.9 | 0.57 | 31.9 |
| Kaleida Health-Buffalo Gen. Hospital | 14.2 | 2.5 | 2.5 | 0.1 | 11.7 | 29.3 | 12.2 | 15.1 | 0.81 | 43.0 |
| Albany Medical Center | 17.8 | 3.8 | 3.7 | 0.1 | 14.1 | 36.6 | 21.8 | 12.3 | 1.77 | 49.3 |
| Mount Sinai Hospital | 24.1 | 3.2 | 3.0 | 0.1 | 21.0 | 57.1 | 28.9 | 24.2 | 1.20 | 63.2 |
| Montefiore Medical Center | 18.4 | 3.6 | 2.6 | 1.0 | 14.8 | 42.2 | 17.9 | 21.2 | 0.84 | 57.5 |
| New York-Presbyterian Hospital | 22.7 | 5.0 | 4.7 | 0.3 | 17.7 | 41.2 | 20.9 | 17.2 | 1.21 | 47.9 |
| New York University Medical Center | 31.2 | 8.9 | 5.5 | 3.4 | 22.4 | 76.9 | 54.4 | 17.2 | 3.15 | 64.8 |
| Upstate Medical University | 15.7 | 1.7 | 1.7 | 0.0 | 14.0 | 23.3 | 14.7 | 6.7 | 2.19 | 32.9 |
| Strong Memorial Hospital | 15.1 | 2.8 | 2.0 | 0.8 | 12.3 | 24.0 | 8.0 | 14.0 | 0.57 | 35.7 |
| Stony Brook University Hospital | 18.1 | 3.9 | 3.3 | 0.5 | 14.3 | 32.7 | 15.3 | 14.3 | 1.07 | 46.4 |
| Duke University Hospital | 13.8 | 3.4 | 3.2 | 0.2 | 10.4 | 24.1 | 13.2 | 8.1 | 1.63 | 39.6 |
| Pitt County Memorial Hospital | 13.3 | 5.3 | 3.4 | 1.9 | 8.0 | 23.4 | 10.9 | 10.6 | 1.03 | 37.5 |
| North Carolina Baptist Hospital | 14.6 | 4.1 | 2.5 | 1.6 | 10.5 | 25.6 | 15.5 | 7.6 | 2.02 | 36.6 |
| University of North Carolina Hospitals | 11.8 | 3.2 | 2.0 | 1.3 | 8.6 | 24.2 | 11.6 | 10.2 | 1.14 | 41.6 |
| University Hospital | 11.0 | 4.4 | 2.6 | 1.8 | 6.6 | 22.6 | 10.4 | 10.0 | 1.04 | 32.6 |
| Medical University of Ohio | 13.1 | 4.8 | 2.6 | 2.2 | 8.3 | 27.7 | 14.2 | 10.5 | 1.35 | 39.8 |
| Ohio State University Medical Center | 16.2 | 4.3 | 3.7 | 0.6 | 11.9 | 28.6 | 15.4 | 10.4 | 1.48 | 42.5 |
| University Hospitals of Cleveland | 11.8 | 2.5 | 2.2 | 0.2 | 9.4 | 28.4 | 12.8 | 12.7 | 1.01 | 39.9 |
| Cleveland Clinic Foundation | 14.8 | 4.2 | 3.2 | 1.0 | 10.6 | 33.1 | 16.1 | 13.2 | 1.22 | 48.2 |
| Oklahoma University Medical Center | 14.4 | 4.4 | 2.7 | 1.7 | 10.0 | 29.7 | 17.1 | 10.2 | 1.67 | 28.0 |
| OHSU Hospital | 11.8 | 3.0 | 2.8 | 0.2 | 8.9 | 20.3 | 9.0 | 9.3 | 0.97 | 31.0 |
| Temple University Hospital | 19.1 | 9.7 | 4.4 | 5.2 | 9.4 | 42.9 | 24.4 | 15.1 | 1.61 | 51.0 |
| Hospital of the Univ. of Pennsylvania | 17.6 | 4.6 | 2.9 | 1.7 | 12.9 | 37.9 | 20.6 | 12.6 | 1.63 | 51.1 |
| UPMC Presbyterian Shadyside | 15.9 | 4.0 | 3.7 | 0.3 | 12.0 | 42.4 | 23.2 | 15.7 | 1.48 | 51.9 |
| Thomas Jefferson University Hospital | 22.0 | 12.5 | 4.1 | 8.4 | 9.6 | 50.6 | 29.9 | 16.7 | 1.79 | 59.6 |
| Penn State Hershey Medical Center | 12.1 | 5.5 | 1.9 | 3.7 | 6.6 | 29.0 | 13.5 | 12.1 | 1.12 | 46.2 |
| Hahnemann University Hospital | 21.5 | 6.0 | 4.0 | 2.0 | 15.5 | 55.5 | 35.0 | 15.8 | 2.21 | 60.3 |
| Rhode Island Hospital | 14.7 | 3.8 | 2.6 | 1.2 | 10.9 | 25.6 | 10.2 | 13.2 | 0.77 | 40.9 |
| MUSC Medical Center | 13.6 | 6.3 | 2.7 | 3.6 | 7.3 | 24.4 | 13.7 | 8.5 | 1.62 | 41.2 |
| Vanderbilt University Medical Center | 12.4 | 5.7 | 2.7 | 3.0 | 6.7 | 26.6 | 12.8 | 11.3 | 1.13 | 38.4 |
| Parkland Health & Hospital System | 10.0 | 2.8 | 2.6 | 0.3 | 7.2 | 20.5 | 9.4 | 9.7 | 0.96 | 27.7 |
| Univ. of Texas Med. Branch Hospitals | 14.9 | 4.9 | 2.6 | 2.2 | 10.0 | 24.6 | 11.5 | 11.6 | 0.99 | 37.7 |

**Appendix Table 1f. Utilization per decedent during the last six months of life (deaths 2001-05)**

| Hospital name | Hospital days | Intensive and intermediate care days | High-intensity ICU/CCU days | Intermediate-intensity days | Medical/ surgical days | Total physician visits | Medical specialist visits | Primary care physician visits | Ratio of MS/PC visits | Percent seeing 10 or more physicians |
|---|---|---|---|---|---|---|---|---|---|---|
| Scott and White Memorial Hospital | 9.6 | 1.5 | 1.4 | 0.1 | 8.0 | 20.6 | 8.9 | 10.3 | 0.86 | 30.8 |
| Memorial Hermann-Texas Med.Ctr. | 13.8 | 8.0 | 3.9 | 4.1 | 5.8 | 39.2 | 23.0 | 13.0 | 1.77 | 45.6 |
| The Methodist Hospital | 18.3 | 6.2 | 4.8 | 1.5 | 12.1 | 56.8 | 38.0 | 15.2 | 2.49 | 50.9 |
| University of Utah Hospital | 10.6 | 4.0 | 2.4 | 1.6 | 6.6 | 21.4 | 11.4 | 8.0 | 1.42 | 31.4 |
| Fletcher Allen Health Care | 11.7 | 1.8 | 1.8 | 0.0 | 9.8 | 22.0 | 9.6 | 11.0 | 0.87 | 33.7 |
| University of Virginia Medical Center | 12.0 | 3.0 | 2.8 | 0.2 | 9.0 | 23.9 | 12.7 | 8.7 | 1.45 | 35.7 |
| VCU Health System | 12.9 | 3.8 | 2.3 | 1.5 | 9.0 | 21.7 | 11.1 | 8.3 | 1.34 | 29.8 |
| Univ. of Washington Medical Center | 13.2 | 2.8 | 2.5 | 0.3 | 10.4 | 22.9 | 11.0 | 10.1 | 1.09 | 28.8 |
| West Virginia University Hospitals | 12.9 | 6.1 | 2.7 | 3.4 | 6.8 | 26.8 | 11.2 | 12.3 | 0.91 | 41.7 |
| Univ. of Wisconsin Hospital & Clinics | 11.1 | 1.9 | 1.8 | 0.1 | 9.2 | 18.4 | 9.7 | 7.0 | 1.38 | 24.9 |
| Froedtert Memorial Lutheran Hospital | 14.1 | 2.5 | 2.2 | 0.4 | 11.5 | 27.0 | 14.4 | 10.2 | 1.42 | 44.3 |
| **United States** | **13.7** | **3.8** | **2.3** | **1.5** | **9.9** | **34.9** | **16.5** | **15.9** | **1.04** | **35.8** |

**Appendix Table 1g. Intensity of terminal care and average co-payments during the last two years of life (deaths 2001-05)**

| | Intensity of terminal care (deaths 2001-05) | | Average co-payments for physician services and durable medical equipment per decedent | | |
|---|---|---|---|---|---|
| Hospital name | Percent of deaths associated with admission to ICU/IMCU | Percent admitted to hospice during the last six months of life | Total co-payments | Part B (physician) co-payment | Durable medical equipment |
| University of Alabama Hospital | 19.2 | 41.1 | $3,297 | $2,893 | $404 |
| University Medical Center | 22.7 | 48.4 | $2,741 | $2,436 | $304 |
| UAMS Medical Center | 22.7 | 42.5 | $2,666 | $2,342 | $324 |
| Univ. of CA San Diego Medical Center | 26.2 | 44.9 | $3,012 | $2,647 | $365 |
| UCLA Medical Center | 37.9 | 28.8 | $4,835 | $4,298 | $537 |
| Loma Linda University Medical Center | 31.0 | 36.8 | $3,224 | $2,785 | $439 |
| Stanford Hospital and Clinics | 24.9 | 31.2 | $3,151 | $2,868 | $283 |
| UCSF Medical Center | 23.3 | 24.2 | $3,102 | $2,790 | $312 |
| Univ. of CA Davis Medical Center | 28.6 | 28.6 | $2,687 | $2,242 | $445 |
| Cedars-Sinai Medical Center | 40.0 | 19.6 | $6,524 | $5,920 | $603 |
| University of Colorado Hospital | 17.4 | 47.0 | $2,416 | $1,992 | $425 |
| Yale-New Haven Hospital | 20.9 | 33.0 | $3,271 | $2,960 | $311 |
| Univ. of Connecticut Health Center | 19.0 | 21.2 | $2,670 | $2,402 | $269 |
| George Washington Univ. Hospital | 25.5 | 30.8 | $4,407 | $4,000 | $407 |
| Howard University Hospital | 37.2 | 8.4 | $2,460 | $2,165 | $295 |
| MedStar-Georgetown Medical Center | 27.1 | 30.1 | $3,526 | $3,197 | $329 |
| Jackson Memorial Hospital | 27.5 | 37.7 | $4,950 | $3,626 | $1,324 |
| Shands at the University of Florida | 20.4 | 44.5 | $3,409 | $2,920 | $489 |
| Tampa General Hospital | 30.2 | 36.3 | $3,584 | $3,172 | $412 |
| Emory University Hospital | 29.0 | 38.7 | $3,534 | $3,128 | $405 |
| Medical College of Georgia Hospital | 24.7 | 30.2 | $2,386 | $1,956 | $430 |
| Grady Memorial Hospital | 27.5 | 26.4 | $1,937 | $1,598 | $339 |
| University of Chicago Hospital | 22.0 | 41.9 | $3,016 | $2,617 | $399 |
| Rush University Medical Center | 25.6 | 35.3 | $3,966 | $3,606 | $360 |
| Loyola University Medical Center | 27.0 | 37.7 | $2,757 | $2,441 | $316 |
| Northwestern Memorial Hospital | 26.5 | 30.2 | $4,445 | $4,120 | $324 |
| Clarian Health Partners | 24.6 | 27.6 | $3,072 | $2,705 | $366 |
| University of Iowa Hospitals & Clinics | 20.9 | 31.0 | $2,196 | $1,908 | $288 |
| University of Kansas Hospital | 28.2 | 32.9 | $3,030 | $2,679 | $350 |
| University of Kentucky Hospital | 21.8 | 36.6 | $2,656 | $2,234 | $422 |
| University of Maryland Medical Center | 35.8 | 27.0 | $3,181 | $2,871 | $310 |
| Johns Hopkins Hospital | 23.2 | 35.2 | $3,390 | $3,068 | $323 |
| Boston Medical Center | 28.6 | 25.1 | $2,979 | $2,674 | $305 |
| Massachusetts General Hospital | 22.5 | 23.8 | $3,409 | $3,174 | $236 |
| Beth Israel Deaconess Medical Center | 23.5 | 25.4 | $3,338 | $3,115 | $222 |
| Brigham and Women's Hospital | 26.2 | 28.2 | $3,729 | $3,463 | $266 |
| Tufts-New England Medical Center | 28.5 | 20.5 | $3,327 | $3,077 | $251 |
| UMass Memorial Medical Center | 20.1 | 20.3 | $3,779 | $3,478 | $301 |
| University of Michigan Hospitals | 20.1 | 44.4 | $3,213 | $2,835 | $378 |
| Harper University Hospital | 18.4 | 42.0 | $3,834 | $3,359 | $475 |

**Appendix Table 1g. Intensity of terminal care and average co-payments during the last two years of life (deaths 2001-05)**

| Hospital name | Intensity of terminal care (deaths 2001-05) | | Average co-payments for physician services and durable medical equipment per decedent | | |
|---|---|---|---|---|---|
| | Percent of deaths associated with admission to ICU/IMCU | Percent admitted to hospice during the last six months of life | Total co-payments | Part B (physician) co-payment | Durable medical equipment |
| Mayo Clinic-St. Mary's Hospital | 21.8 | 29.1 | $2,439 | $2,152 | $286 |
| Univ. of Minnesota Medical Center | 17.5 | 32.7 | $3,110 | $2,815 | $296 |
| Univ. of Mississippi Hospitals & Clinics | 23.5 | 34.1 | $2,395 | $2,036 | $359 |
| Barnes-Jewish Hospital | 24.6 | 30.6 | $3,494 | $3,103 | $392 |
| St. Louis University Hospital | 25.5 | 30.5 | $2,771 | $2,475 | $296 |
| University of Missouri Hospital & Clinic | 27.6 | 26.2 | $2,174 | $1,848 | $326 |
| Nebraska Medical Center | 29.5 | 28.8 | $2,623 | $2,260 | $362 |
| Creighton University Medical Center | 27.2 | 32.2 | $2,478 | $2,111 | $367 |
| Dartmouth-Hitchcock Medical Center | 19.5 | 22.0 | $2,041 | $1,785 | $256 |
| Robert Wood Johnson Univ. Hospital | 37.2 | 27.0 | $4,784 | $4,429 | $355 |
| University of New Mexico Hospital | 25.3 | 43.1 | $2,133 | $1,718 | $415 |
| Kaleida Health-Buffalo Gen. Hospital | 19.6 | 23.6 | $2,804 | $2,415 | $389 |
| Albany Medical Center | 21.3 | 29.4 | $3,390 | $3,016 | $374 |
| Mount Sinai Hospital | 20.2 | 14.0 | $4,661 | $4,237 | $424 |
| Montefiore Medical Center | 19.7 | 12.2 | $3,663 | $3,319 | $343 |
| New York-Presbyterian Hospital | 27.5 | 15.2 | $3,905 | $3,556 | $348 |
| New York University Medical Center | 35.1 | 20.1 | $5,544 | $5,205 | $340 |
| Upstate Medical University | 14.8 | 22.0 | $2,858 | $2,550 | $308 |
| Strong Memorial Hospital | 18.6 | 33.6 | $2,399 | $2,084 | $315 |
| Stony Brook University Hospital | 21.1 | 20.8 | $3,541 | $3,221 | $319 |
| Duke University Hospital | 21.9 | 34.4 | $2,662 | $2,270 | $392 |
| Pitt County Memorial Hospital | 29.8 | 24.2 | $3,152 | $2,706 | $445 |
| North Carolina Baptist Hospital | 27.7 | 34.9 | $2,974 | $2,649 | $325 |
| University of North Carolina Hospitals | 23.5 | 34.0 | $2,374 | $2,011 | $362 |
| University Hospital | 23.9 | 42.1 | $3,023 | $2,658 | $365 |
| Medical University of Ohio | 19.4 | 45.0 | $2,666 | $2,396 | $270 |
| Ohio State University Medical Center | 20.8 | 34.4 | $2,919 | $2,521 | $398 |
| University Hospitals of Cleveland | 17.6 | 44.2 | $2,760 | $2,426 | $335 |
| Cleveland Clinic Foundation | 23.1 | 36.6 | $3,045 | $2,653 | $393 |
| Oklahoma University Medical Center | 24.8 | 39.2 | $3,186 | $2,784 | $402 |
| OHSU Hospital | 19.7 | 44.1 | $2,538 | $2,227 | $311 |
| Temple University Hospital | 29.0 | 33.1 | $3,858 | $3,313 | $545 |
| Hospital of the Univ. of Pennsylvania | 25.0 | 31.9 | $3,980 | $3,424 | $556 |
| UPMC Presbyterian Shadyside | 25.1 | 30.4 | $3,499 | $3,141 | $359 |
| Thomas Jefferson University Hospital | 35.9 | 35.6 | $4,303 | $3,998 | $305 |
| Penn State Hershey Medical Center | 28.8 | 32.4 | $2,485 | $2,193 | $292 |
| Hahnemann University Hospital | 31.1 | 27.1 | $4,893 | $4,377 | $516 |
| Rhode Island Hospital | 23.7 | 27.4 | $2,925 | $2,612 | $314 |
| MUSC Medical Center | 25.0 | 35.1 | $2,532 | $2,097 | $435 |
| Vanderbilt University Medical Center | 27.5 | 31.5 | $2,695 | $2,235 | $459 |

**Appendix Table 1g. Intensity of terminal care and average co-payments during the last two years of life (deaths 2001-05)**

| | Intensity of terminal care (deaths 2001-05) | | Average co-payments for physician services and durable medical equipment per decedent | | |
|---|---|---|---|---|---|
| **Hospital name** | Percent of deaths associated with admission to ICU/IMCU | Percent admitted to hospice during the last six months of life | Total co-payments | Part B (physician) co-payment | Durable medical equipment |
| Parkland Health & Hospital System | 21.5 | 38.6 | $2,503 | $2,026 | $477 |
| Univ. of Texas Med. Branch Hospitals | 21.7 | 42.7 | $2,385 | $1,972 | $412 |
| Scott and White Memorial Hospital | 13.0 | 45.3 | $2,219 | $1,854 | $365 |
| Memorial Hermann-Texas Med.Ctr. | 36.8 | 31.9 | $3,973 | $3,463 | $511 |
| The Methodist Hospital | 29.7 | 33.5 | $4,670 | $4,134 | $536 |
| University of Utah Hospital | 19.7 | 41.0 | $2,411 | $2,008 | $403 |
| Fletcher Allen Health Care | 18.7 | 24.6 | $2,860 | $2,591 | $269 |
| University of Virginia Medical Center | 19.7 | 29.6 | $2,149 | $1,812 | $337 |
| VCU Health System | 25.7 | 28.6 | $2,344 | $1,960 | $385 |
| Univ. of Washington Medical Center | 20.5 | 32.1 | $2,809 | $2,413 | $396 |
| West Virginia University Hospitals | 33.2 | 29.5 | $2,659 | $2,315 | $344 |
| Univ. of Wisconsin Hospital & Clinics | 16.1 | 40.5 | $2,059 | $1,790 | $269 |
| Froedtert Memorial Lutheran Hospital | 20.5 | 36.4 | $2,549 | $2,233 | $315 |
| **United States** | **20.0** | **31.6** | **$3,064** | **$2,669** | **$396** |

| Appendix Table 1h. CMS Hospital Compare quality scores (2005) (all patients) | | | | |
|---|---|---|---|---|
| **Hospital name** | **Composite score** | **AMI score** | **CHF score** | **Pneumonia score** |
| University of Alabama Hospital | 81.5 | 90.4 | 90.0 | 66.0 |
| University Medical Center | 86.9 | 93.2 | 90.5 | 77.3 |
| UAMS Medical Center | 82.1 | 92.2 | 89.5 | 65.8 |
| Univ. of CA San Diego Medical Center | 82.6 | 95.2 | 91.5 | 62.5 |
| UCLA Medical Center | 83.9 | 95.0 | 92.0 | 66.0 |
| Loma Linda University Medical Center | 82.4 | 95.8 | 96.5 | 58.5 |
| Stanford Hospital and Clinics | 83.3 | 89.8 | 85.5 | 74.0 |
| UCSF Medical Center | 87.0 | 96.4 | 94.5 | 71.5 |
| Univ. of CA Davis Medical Center | 82.4 | 93.4 | 88.0 | 65.8 |
| Cedars-Sinai Medical Center | 96.5 | 100.0 | 100.0 | 90.3 |
| University of Colorado Hospital | 83.0 | 95.5 | 88.0 | 68.0 |
| Yale-New Haven Hospital | 90.5 | 95.0 | 88.5 | 85.8 |
| Univ. of Connecticut Health Center | 85.9 | 99.8 | 95.5 | 63.8 |
| George Washington Univ. Hospital | 85.6 | 94.4 | 94.5 | 70.3 |
| Howard University Hospital | 82.5 | 94.4 | 95.0 | 61.5 |
| MedStar-Georgetown Medical Center | n/a | n/a | n/a | n/a |
| Jackson Memorial Hospital | 81.3 | 94.2 | 90.0 | 60.8 |
| Shands at the University of Florida | 82.6 | 91.4 | 87.0 | 69.5 |
| Tampa General Hospital | 85.1 | 94.6 | 89.5 | 71.0 |
| Emory University Hospital | 88.2 | 96.0 | 93.0 | 76.0 |
| Medical College of Georgia Hospital | 84.2 | 97.8 | 91.5 | 63.5 |
| Grady Memorial Hospital | 78.1 | 91.8 | 88.0 | 56.0 |
| University of Chicago Hospital | 84.0 | 90.4 | 85.5 | 75.3 |
| Rush University Medical Center | 90.1 | 99.8 | 98.5 | 73.8 |
| Loyola University Medical Center | 88.5 | 94.0 | 90.5 | 80.5 |
| Northwestern Memorial Hospital | 89.4 | 98.6 | 93.5 | 75.8 |
| Clarian Health Partners | 88.9 | 95.0 | 91.5 | 80.0 |
| University of Iowa Hospitals & Clinics | 88.9 | 98.2 | 91.0 | 76.3 |
| University of Kansas Hospital | 93.0 | 96.4 | 96.0 | 87.3 |
| University of Kentucky Hospital | 81.2 | 95.4 | 88.5 | 59.8 |
| University of Maryland Medical Center | 86.5 | 96.2 | 93.5 | 70.8 |
| Johns Hopkins Hospital | 82.8 | 93.4 | 90.0 | 66.0 |
| Boston Medical Center | 83.5 | 95.0 | 86.0 | 67.8 |
| Massachusetts General Hospital | 87.9 | 96.2 | 91.0 | 76.0 |
| Beth Israel Deaconess Medical Center | 92.5 | 96.4 | 94.5 | 86.5 |
| Brigham and Women's Hospital | 90.8 | 99.2 | 99.0 | 76.3 |
| Tufts-New England Medical Center | 87.3 | 94.6 | 94.5 | 74.5 |
| UMass Memorial Medical Center | 85.6 | 93.4 | 93.0 | 72.3 |
| University of Michigan Hospitals | 93.4 | 99.0 | 99.5 | 83.3 |
| Harper University Hospital | 84.6 | 91.4 | 89.5 | 73.8 |
| Mayo Clinic-St. Mary's Hospital | 94.1 | 97.8 | 95.5 | 88.8 |

**Appendix Table 1h. CMS Hospital Compare quality scores (2005) (all patients)**

| Hospital name | Composite score | AMI score | CHF score | Pneumonia score |
|---|---|---|---|---|
| Univ. of Minnesota Medical Center | 86.0 | 92.2 | 93.5 | 74.5 |
| Univ. of Mississippi Hospitals & Clinics | 80.4 | 92.4 | 90.5 | 60.3 |
| Barnes-Jewish Hospital | 83.0 | 93.4 | 92.5 | 65.3 |
| St. Louis University Hospital | 89.5 | 96.0 | 93.0 | 79.5 |
| University of Missouri Hospital & Clinic | 91.5 | 97.4 | 93.5 | 83.3 |
| Nebraska Medical Center | 86.8 | 94.4 | 93.5 | 74.0 |
| Creighton University Medical Center | 90.9 | 96.2 | 94.5 | 82.5 |
| Dartmouth-Hitchcock Medical Center | 88.3 | 96.0 | 88.5 | 78.5 |
| Robert Wood Johnson Univ. Hospital | 95.1 | 97.8 | 96.5 | 91.0 |
| University of New Mexico Hospital | 81.5 | 91.2 | 93.0 | 63.8 |
| Kaleida Health-Buffalo Gen. Hospital | 82.0 | 88.4 | 83.5 | 73.3 |
| Albany Medical Center | 84.5 | 95.8 | 87.5 | 68.8 |
| Mount Sinai Hospital | 82.2 | 88.6 | 83.5 | 70.7 |
| Montefiore Medical Center | 77.6 | 88.2 | 81.0 | 57.7 |
| New York-Presbyterian Hospital | 82.6 | 95.2 | 90.0 | 56.7 |
| New York University Medical Center | 88.2 | 96.8 | 87.0 | 78.0 |
| Upstate Medical University | 85.9 | 97.6 | 90.5 | 69.0 |
| Strong Memorial Hospital | 85.7 | 96.6 | 84.0 | 73.0 |
| Stony Brook University Hospital | 88.5 | 94.4 | 98.0 | 76.5 |
| Duke University Hospital | 92.4 | 95.2 | 94.0 | 88.0 |
| Pitt County Memorial Hospital | 87.0 | 95.8 | 91.0 | 69.7 |
| North Carolina Baptist Hospital | 89.9 | 95.0 | 92.5 | 82.3 |
| University of North Carolina Hospitals | 85.4 | 96.4 | 95.0 | 66.8 |
| University Hospital | 85.3 | 94.8 | 90.5 | 70.8 |
| Medical University of Ohio | 82.6 | 94.0 | 86.0 | 66.8 |
| Ohio State University Medical Center | 89.7 | 95.8 | 94.0 | 80.0 |
| University Hospitals of Cleveland | 86.5 | 96.4 | 91.5 | 71.5 |
| Cleveland Clinic Foundation | 88.8 | 95.0 | 89.5 | 78.0 |
| Oklahoma University Medical Center | 90.7 | 99.5 | 97.5 | 78.5 |
| OHSU Hospital | 86.8 | 95.8 | 95.5 | 71.3 |
| Temple University Hospital | 88.8 | 90.4 | 93.0 | 84.8 |
| Hospital of the Univ. of Pennsylvania | 79.3 | 92.8 | 93.0 | 55.5 |
| UPMC Presbyterian Shadyside | 88.6 | 92.6 | 89.5 | 83.3 |
| Thomas Jefferson University Hospital | 81.5 | 92.2 | 86.0 | 65.8 |
| Penn State Hershey Medical Center | 77.5 | 92.2 | 74.0 | 61.0 |
| Hahnemann University Hospital | 82.6 | 93.8 | 91.0 | 64.5 |
| Rhode Island Hospital | 89.1 | 97.8 | 94.5 | 75.5 |
| MUSC Medical Center | 91.0 | 96.6 | 93.0 | 83.0 |
| Vanderbilt University Medical Center | 82.2 | 94.2 | 93.5 | 61.5 |
| Parkland Health & Hospital System | 84.1 | 97.6 | 95.0 | 61.8 |
| Univ. of Texas Med. Branch Hospitals | 78.9 | 92.0 | 89.0 | 57.5 |

| Appendix Table 1h. CMS Hospital Compare quality scores (2005) (all patients) | | | | |
|---|---|---|---|---|
| **Hospital name** | **Composite score** | **AMI score** | **CHF score** | **Pneumonia score** |
| Scott and White Memorial Hospital | 91.5 | 98.4 | 96.0 | 80.5 |
| Memorial Hermann-Texas Med.Ctr. | 89.9 | 98.0 | 93.5 | 78.0 |
| The Methodist Hospital | 85.6 | 92.0 | 88.0 | 76.5 |
| University of Utah Hospital | 89.0 | 97.4 | 94.5 | 75.8 |
| Fletcher Allen Health Care | 85.7 | 92.0 | 84.5 | 78.5 |
| University of Virginia Medical Center | 84.6 | 94.6 | 90.0 | 69.5 |
| VCU Health System | 86.1 | 97.2 | 93.0 | 68.8 |
| Univ. of Washington Medical Center | 82.3 | 99.3 | 95.0 | 59.0 |
| West Virginia University Hospitals | 92.6 | 99.0 | 96.0 | 83.0 |
| Univ. of Wisconsin Hospital & Clinics | 91.9 | 96.8 | 92.5 | 85.5 |
| Froedtert Memorial Lutheran Hospital | 91.5 | 97.0 | 94.0 | 83.5 |
| **United States** | **87.2** | **92.2** | **86.4** | **79.5** |

## Appendix Table 2. Performance Report for Selected Hospitals in the Mayo Foundation Health System

**Appendix Table 2a. Medicare spending per decedent during the last two years of life (deaths occurring 2001-05)**

| Hospital name | City | State | Number of deaths (2001-05) | Total Medicare spending | Inpatient sector spending* | Outpatient sector spending* | SNF/long-term care spending* | Home health care spending* | Hospice spending* | DME spending | Other spending |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mayo Clinic Hospital | Phoenix | AZ | 1,847 | 51,731 | 28,851 | 9,584 | 3,973 | 1,744 | 5,077 | 1,644 | 858 |
| St. Luke's Hospital | Jacksonville | FL | 2,431 | 59,649 | 29,631 | 11,605 | 9,069 | 2,484 | 3,620 | 1,956 | 1,285 |
| St. Mary's Hospital | Rochester | MN | 4,236 | 53,432 | 34,372 | 7,557 | 7,114 | 662 | 2,054 | 1,075 | 597 |
| Albert Lea Medical Center | Albert Lea | MN | 967 | 35,017 | 20,050 | 5,597 | 6,818 | 531 | 1,024 | 792 | 204 |
| Rochester Methodist Hospital | Rochester | MN | 888 | 60,907 | 42,178 | 11,139 | 3,029 | 545 | 2,924 | 825 | 268 |
| Immanuel St. Joseph's Health | Mankato | MN | 1,544 | 37,241 | 20,994 | 6,336 | 6,716 | 656 | 1,248 | 790 | 501 |
| Austin Medical Center | Austin | MN | 930 | 41,654 | 26,268 | 4,290 | 8,071 | 296 | 874 | 984 | 872 |
| Fairmont Medical Center | Fairmont | MN | 604 | 41,267 | 22,198 | 8,117 | 7,468 | 709 | 1,145 | 775 | 854 |
| Franciscan Skemp Healthcare | La Crosse | WI | 1,204 | 36,884 | 21,132 | 5,959 | 5,587 | 690 | 1,789 | 1,109 | 619 |
| Luther Hospital | Eau Claire | WI | 1,616 | 42,170 | 21,961 | 8,888 | 6,463 | 930 | 2,266 | 1,059 | 602 |
| Red Cedar Medical Center | Menomonie | WI | 415 | 34,638 | 18,695 | 5,051 | 7,610 | 976 | 823 | 922 | 561 |
| Mayo Foundation system | | | 16,682 | 48,107 | 27,965 | 8,118 | 6,683 | 1,050 | 2,401 | 1,192 | 698 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 2b. The Medical Care Cost Equation: Disaggregation of inpatient (facility) reimbursements during the last two years of life into volume (hospital days per patient) and price**

| Hospital name | Inpatient reimbursements per decedent** | Hospital days per decedent | Reimburse-ments per patient day | Inpatient reimbursements (system ratio) | = | Hospital days (system ratio) | x | Reimburse-ments per day (system ratio) |
|---|---|---|---|---|---|---|---|---|
| Mayo Clinic Hospital | 26,203 | 17.3 | 1,516 | 1.03 | = | 0.91 | x | 1.13 |
| St. Luke's Hospital | 25,458 | 20.9 | 1,219 | 1.00 | = | 1.10 | x | 0.91 |
| St. Mary's Hospital | 31,816 | 21.3 | 1,497 | 1.25 | = | 1.12 | x | 1.12 |
| Albert Lea Medical Center | 18,251 | 15.0 | 1,217 | 0.72 | = | 0.79 | x | 0.91 |
| Rochester Methodist Hospital | 40,302 | 24.5 | 1,647 | 1.59 | = | 1.29 | x | 1.23 |
| Immanuel St. Joseph's Health | 18,855 | 18.2 | 1,034 | 0.74 | = | 0.96 | x | 0.77 |
| Austin Medical Center | 23,516 | 19.1 | 1,232 | 0.93 | = | 1.01 | x | 0.92 |
| Fairmont Medical Center | 20,217 | 17.7 | 1,143 | 0.80 | = | 0.93 | x | 0.85 |
| Franciscan Skemp Healthcare | 19,194 | 15.9 | 1,210 | 0.76 | = | 0.84 | x | 0.90 |
| Luther Hospital | 19,502 | 15.9 | 1,229 | 0.77 | = | 0.84 | x | 0.92 |
| Red Cedar Medical Center | 16,848 | 13.6 | 1,235 | 0.66 | = | 0.72 | x | 0.92 |
| Mayo Foundation system | 25,375 | 18.9 | 1,340 | 1.00 | = | 1.00 | x | 1.00 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 2c. The Medical Care Cost Equation: Disaggregation of physician payments (Part B and outpatient) during the last two years of life into volume (physician visits per patient) and price payments per visit) components (deaths occurring 2001-05)**

| Hospital name | Payments for physician visits per decedent | Physician visits per decedent | Payments per physician visit | Physician visit payments (system ratio) | = | Physician visits (system ratio) | x | Payments per visit (system ratio) |
|---|---|---|---|---|---|---|---|---|
| Mayo Clinic Hospital | 3,216 | 59.9 | 54 | 1.08 | = | 1.08 | x | 1.00 |
| St. Luke's Hospital | 4,880 | 86.5 | 56 | 1.65 | = | 1.57 | x | 1.05 |
| St. Mary's Hospital | 2,644 | 50.8 | 52 | 0.89 | = | 0.92 | x | 0.97 |
| Albert Lea Medical Center | 2,090 | 37.2 | 56 | 0.70 | = | 0.67 | x | 1.05 |
| Rochester Methodist Hospital | 2,179 | 55.2 | 39 | 0.73 | = | 1.00 | x | 0.73 |
| Immanuel St. Joseph's Health | 2,459 | 47.9 | 51 | 0.83 | = | 0.87 | x | 0.95 |
| Austin Medical Center | 2,885 | 45.0 | 64 | 0.97 | = | 0.82 | x | 1.19 |
| Fairmont Medical Center | 2,743 | 49.6 | 55 | 0.92 | = | 0.90 | x | 1.03 |
| Franciscan Skemp Healthcare | 2,610 | 45.8 | 57 | 0.88 | = | 0.83 | x | 1.06 |
| Luther Hospital | 2,789 | 52.0 | 54 | 0.94 | = | 0.94 | x | 1.00 |
| Red Cedar Medical Center | 2,300 | 44.8 | 51 | 0.78 | = | 0.81 | x | 0.96 |
| Mayo Foundation system | 2,965 | 55.2 | 54 | 1.00 | = | 1.00 | x | 1.00 |

**Appendix Table 2d. Resource inputs per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total FTE physician labor inputs | Medical specialist labor inputs | Primary care physician labor inputs | Ratio of MS/PC labor inputs | Hospital bed inputs | Intensive and intermediate care bed inputs | High-intensity ICU/CCU bed inputs | Intermediate-intensity bed inputs | Medical/surgical bed inputs |
|---|---|---|---|---|---|---|---|---|---|
| Mayo Clinic Hospital | 24.1 | 9.7 | 8.9 | 1.09 | 47.4 | 11.5 | 4.6 | 6.9 | 35.9 |
| St. Luke's Hospital | 31.7 | 14.6 | 10.7 | 1.37 | 57.2 | 25.7 | 5.6 | 20.1 | 31.5 |
| St. Mary's Hospital | 20.3 | 8.9 | 6.8 | 1.30 | 58.2 | 18.4 | 16.4 | 2.0 | 39.8 |
| Albert Lea Medical Center | 13.8 | 2.9 | 7.8 | 0.37 | 41.1 | 12.1 | 9.6 | 2.5 | 29.0 |
| Rochester Methodist Hospital | 22.7 | 10.8 | 6.0 | 1.79 | 67.0 | 12.3 | 10.3 | 2.1 | 54.7 |
| Immanuel St. Joseph's Health | 16.8 | 5.2 | 8.4 | 0.62 | 49.9 | 10.9 | 9.7 | 1.2 | 39.0 |
| Austin Medical Center | 18.3 | 3.7 | 11.0 | 0.34 | 52.3 | 16.1 | 14.8 | 1.2 | 36.2 |
| Fairmont Medical Center | 17.0 | 3.8 | 9.7 | 0.39 | 48.5 | 11.5 | 10.5 | 1.0 | 37.0 |
| Franciscan Skemp Healthcare | 17.2 | 4.1 | 10.1 | 0.40 | 43.5 | 11.0 | 10.3 | 0.6 | 32.5 |
| Luther Hospital | 18.6 | 8.0 | 6.4 | 1.25 | 43.5 | 10.7 | 10.3 | 0.4 | 32.8 |
| Red Cedar Medical Center | 15.4 | 2.7 | 9.1 | 0.29 | 37.4 | 7.9 | 7.8 | 0.1 | 29.5 |
| Mayo Foundation system | 21.0 | 8.1 | 8.3 | 0.98 | 51.9 | 15.4 | 10.6 | 4.8 | 36.5 |

**Appendix Table 2e. Estimated RN labor requirements under proposed federal standard per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total RN labor requirements | High-intensity ICU/CCU | Intermediate-intensity | Medical/surgical |
|---|---|---|---|---|
| Mayo Clinic Hospital | 40.7 | 7.0 | 6.9 | 26.9 |
| St. Luke's Hospital | 52.1 | 8.4 | 20.1 | 23.6 |
| St. Mary's Hospital | 56.5 | 24.6 | 2.0 | 29.9 |
| Albert Lea Medical Center | 38.6 | 14.3 | 2.5 | 21.8 |
| Rochester Methodist Hospital | 58.5 | 15.4 | 2.1 | 41.0 |
| Immanuel St. Joseph's Health | 45.0 | 14.5 | 1.2 | 29.3 |
| Austin Medical Center | 50.7 | 22.3 | 1.2 | 27.2 |
| Fairmont Medical Center | 44.5 | 15.7 | 1.0 | 27.8 |
| Franciscan Skemp Healthcare | 40.5 | 15.5 | 0.6 | 24.4 |
| Luther Hospital | 40.4 | 15.4 | 0.4 | 24.6 |
| Red Cedar Medical Center | 33.9 | 11.7 | 0.1 | 22.1 |
| Mayo Foundation system | 48.1 | 16.0 | 4.8 | 27.4 |

**Appendix Table 2f. Utilization per decedent during the last six months of life (deaths 2001-05)**

| Hospital name | Hospital days | Intensive and intermediate care days | High-intensity ICU/CCU days | Intermediate-intensity days | Medical/surgical days | Total physician visits | Medical specialist visits | Primary care physician visits | Ratio of MS/PC visits | Percent seeing 10 or more physicians |
|---|---|---|---|---|---|---|---|---|---|---|
| Mayo Clinic Hospital | 9.4 | 2.1 | 0.8 | 1.2 | 7.3 | 27.3 | 12.6 | 12.9 | 0.97 | 46.0 |
| St. Luke's Hospital | 12.0 | 6.2 | 1.6 | 4.6 | 5.9 | 41.8 | 22.3 | 16.7 | 1.33 | 52.6 |
| St. Mary's Hospital | 12.0 | 4.2 | 3.8 | 0.4 | 7.8 | 23.9 | 11.6 | 10.4 | 1.11 | 41.0 |
| Albert Lea Medical Center | 8.5 | 2.1 | 1.7 | 0.4 | 6.4 | 17.4 | 3.8 | 12.2 | 0.31 | 19.8 |
| Rochester Methodist Hospital | 13.9 | 2.1 | 1.8 | 0.3 | 11.8 | 27.7 | 15.7 | 9.4 | 1.67 | 50.8 |
| Immanuel St. Joseph's Health | 10.1 | 1.5 | 1.3 | 0.2 | 8.6 | 22.6 | 7.7 | 13.4 | 0.57 | 23.4 |
| Austin Medical Center | 11.1 | 3.1 | 2.9 | 0.2 | 8.0 | 20.6 | 5.1 | 14.0 | 0.36 | 28.1 |
| Fairmont Medical Center | 9.7 | 1.7 | 1.6 | 0.1 | 8.0 | 22.2 | 4.8 | 15.6 | 0.31 | 21.0 |
| Franciscan Skemp Healthcare | 8.8 | 1.8 | 1.7 | 0.1 | 7.0 | 20.9 | 5.1 | 14.4 | 0.36 | 23.0 |
| Luther Hospital | 8.6 | 1.4 | 1.4 | 0.0 | 7.2 | 23.3 | 11.8 | 9.6 | 1.22 | 29.5 |
| Red Cedar Medical Center | 7.1 | 1.4 | 1.4 | 0.0 | 5.7 | 19.0 | 2.9 | 14.8 | 0.20 | 15.5 |
| Mayo Foundation system | 10.6 | 3.1 | 2.1 | 1.0 | 7.5 | 25.8 | 11.3 | 12.6 | 0.90 | 36.3 |

**Appendix Table 2g. Intensity of terminal care and average co-payments during the last two years of life (deaths 2001-05)**

| Hospital name | Intensity of terminal care (deaths 2001-05) | | Average co-payments for physician services and durable medical equipment per decedent | | |
|---|---|---|---|---|---|
| | Percent of deaths associated with admission to ICU/IMCU | Percent admitted to hospice during the last six months of life | Total co-payments | Part B (physician) co-payment | Durable medical equipment |
| Mayo Clinic Hospital | 11.1 | 57.6 | $3,597 | $3,192 | $404 |
| St. Luke's Hospital | 21.6 | 51.3 | $4,433 | $3,932 | $501 |
| St. Mary's Hospital | 21.8 | 29.1 | $2,439 | $2,152 | $286 |
| Albert Lea Medical Center | 14.2 | 19.9 | $1,352 | $1,149 | $204 |
| Rochester Methodist Hospital | 14.8 | 35.5 | $3,809 | $3,610 | $199 |
| Immanuel St. Joseph's Health | 12.8 | 24.4 | $1,891 | $1,686 | $204 |
| Austin Medical Center | 18.1 | 16.0 | $1,700 | $1,438 | $262 |
| Fairmont Medical Center | 14.1 | 18.5 | $2,177 | $1,978 | $199 |
| Franciscan Skemp Healthcare | 13.6 | 24.2 | $2,051 | $1,771 | $280 |
| Luther Hospital | 12.7 | 27.9 | $2,368 | $2,091 | $277 |
| Red Cedar Medical Center | 17.0 | 11.4 | $1,735 | $1,508 | $227 |
| Mayo Foundation system | 16.9 | 32.8 | $2,703 | $2,397 | $306 |

**Appendix Table 2h. CMS Hospital Compare quality scores (2005) (all patients)**

| Hospital name | Composite score | AMI score | CHF score | Pneumonia score |
|---|---|---|---|---|
| Mayo Clinic Hospital | 95.8 | 97.2 | 98.5 | 92.8 |
| St. Luke's Hospital | 91.5 | 95.0 | 90.5 | 87.8 |
| St. Mary's Hospital | 94.1 | 97.8 | 95.5 | 88.8 |
| Albert Lea Medical Center | n/a | n/a | n/a | n/a |
| Rochester Methodist Hospital | n/a | n/a | n/a | n/a |
| Immanuel St. Joseph's Health | 85.0 | 99.3 | 81.5 | 72.5 |
| Austin Medical Center | n/a | n/a | n/a | n/a |
| Fairmont Medical Center | n/a | n/a | n/a | n/a |
| Franciscan Skemp Healthcare | 95.7 | 98.6 | 95.5 | 92.3 |
| Luther Hospital | 88.3 | 93.2 | 80.0 | 86.3 |
| Red Cedar Medical Center | n/a | n/a | n/a | n/a |
| Mayo Foundation system | 91.7 | 96.8 | 90.3 | 86.7 |

## Appendix Table 3. Performance Report for Selected Hospitals in the Los Angeles, California Hospital Referral Region

**Appendix Table 3a. Medicare spending per decedent during the last two years of life (deaths occurring 2001-05)**

| Hospital name | City | System | Number of deaths (2001-05) | Total Medicare spending | Inpatient sector spending* | Outpatient sector spending* | SNF/long-term care spending* | Home health care spending* | Hospice spending* | DME spending | Other spending |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alhambra Hospital Medical Center | Alhambra | AHMC, Inc. | 731 | 120,756 | 88,108 | 8,308 | 14,769 | 4,157 | 1,034 | 2,421 | 1,958 |
| Methodist Hospital of Southern California | Arcadia | | 2,030 | 68,726 | 38,368 | 8,347 | 12,062 | 4,330 | 1,848 | 1,974 | 1,797 |
| Providence St. Joseph Center | Burbank | Providence Health & Services | 2,483 | 75,306 | 44,416 | 11,579 | 10,211 | 4,328 | 1,708 | 1,835 | 1,229 |
| West Hills Hospital & Medical Center | Canoga Park | HCA | 1,377 | 68,904 | 36,983 | 9,986 | 12,120 | 4,034 | 2,477 | 1,873 | 1,431 |
| Citrus Valley Medical Center-IC Campus | Covina | Citrus Valley Health Partners | 1,007 | 75,378 | 42,566 | 9,434 | 14,552 | 3,994 | 1,618 | 1,680 | 1,534 |
| Brotman Medical Center | Culver City | | 1,116 | 102,909 | 72,282 | 8,834 | 11,971 | 4,376 | 961 | 2,372 | 2,114 |
| Downey Regional Medical Center | Downey | | 1,271 | 84,602 | 44,469 | 9,142 | 21,956 | 4,075 | 1,191 | 1,643 | 2,125 |
| City of Hope National Medical Center | Duarte | | 431 | 95,781 | 69,073 | 18,046 | 2,227 | 2,491 | 2,177 | 1,305 | 463 |
| Encino-Tarzana Regional Medical Center | Encino | Tenet Healthcare Corporation | 963 | 85,671 | 53,274 | 10,092 | 11,858 | 4,883 | 1,935 | 1,528 | 2,101 |
| Memorial Hospital of Gardena | Gardena | HealthPlus | 509 | 86,986 | 54,301 | 5,742 | 16,246 | 3,641 | 606 | 2,435 | 4,015 |
| Glendale Adventist Medical Center | Glendale | Adventist Health | 1,480 | 92,529 | 58,633 | 10,509 | 13,084 | 5,059 | 1,836 | 1,756 | 1,651 |
| Glendale Memorial Hospital | Glendale | Catholic Healthcare West | 1,341 | 91,060 | 57,183 | 10,327 | 11,408 | 5,731 | 2,421 | 2,004 | 1,987 |
| Verdugo Hills Hospital | Glendale | | 939 | 67,783 | 37,648 | 7,969 | 13,194 | 4,339 | 1,453 | 1,389 | 1,791 |
| Foothill Presbyterian Hospital | Glendora | Citrus Valley Health Partners | 581 | 65,040 | 33,966 | 7,221 | 13,845 | 4,539 | 2,362 | 1,595 | 1,511 |
| Lakewood Regional Medical Center | Lakewood | Tenet Healthcare Corporation | 763 | 75,673 | 44,934 | 8,570 | 13,001 | 4,192 | 1,437 | 1,765 | 1,774 |
| Antelope Valley Hospital | Lancaster | | 1,286 | 70,559 | 42,226 | 10,480 | 9,246 | 3,037 | 1,413 | 2,152 | 2,005 |
| Lancaster Community Hospital | Lancaster | Universal Health Services, Inc. | 676 | 68,341 | 40,657 | 9,902 | 8,417 | 3,758 | 1,104 | 2,377 | 2,126 |
| Long Beach Memorial Medical Center | Long Beach | Memorial Health Services | 2,022 | 80,710 | 47,646 | 11,213 | 13,860 | 3,391 | 1,609 | 1,564 | 1,426 |
| Pacific Hospital of Long Beach | Long Beach | | 421 | 89,937 | 55,184 | 5,320 | 18,945 | 4,276 | 1,555 | 2,094 | 2,563 |
| St. Mary Medical Center | Long Beach | Catholic Healthcare West | 1,054 | 98,315 | 63,918 | 14,234 | 11,598 | 3,594 | 1,300 | 1,941 | 1,730 |
| California Hospital Medical Center | Los Angeles | Catholic Healthcare West | 469 | 96,561 | 64,537 | 7,622 | 12,997 | 5,234 | 732 | 2,082 | 3,357 |
| Cedars-Sinai Medical Center | Los Angeles | | 4,385 | 106,951 | 71,637 | 16,006 | 7,784 | 6,244 | 1,210 | 2,338 | 1,731 |
| Good Samaritan Hospital | Los Angeles | | 1,394 | 88,575 | 59,592 | 10,216 | 11,076 | 3,318 | 1,046 | 1,583 | 1,744 |
| Hollywood Presbyterian Medical Center | Los Angeles | | 1,188 | 115,097 | 80,346 | 8,020 | 15,162 | 6,174 | 655 | 2,441 | 2,298 |
| Pacific Alliance Medical Center | Los Angeles | | 646 | 101,671 | 76,375 | 5,809 | 12,276 | 3,011 | 437 | 2,066 | 1,697 |
| St. Vincent Medical Center | Los Angeles | Daughters of Charity | 1,221 | 90,655 | 57,681 | 12,792 | 10,571 | 4,262 | 770 | 1,949 | 2,631 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 3a. Medicare spending per decedent during the last two years of life (deaths occurring 2001-05)**

| Hospital name | City | System | Number of deaths (2001-05) | Total Medicare spending | Inpatient sector spending* | Outpatient sector spending* | SNF/long-term care spending* | Home health care spending* | Hospice spending* | DME spending | Other spending |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UCLA Medical Center | Los Angeles | University of California | 1,657 | 93,842 | 63,900 | 14,125 | 6,891 | 3,994 | 1,649 | 2,128 | 1,155 |
| White Memorial Medical Center | Los Angeles | Adventist Health | 830 | 130,992 | 83,309 | 14,538 | 21,408 | 5,491 | 770 | 2,422 | 3,054 |
| St. Francis Medical Center | Lynwood | Daughters of Charity | 790 | 94,951 | 59,543 | 9,391 | 14,589 | 4,721 | 897 | 2,242 | 3,568 |
| Providence Holy Cross Medical Center | Mission Hills | Providence Health & Services | 1,159 | 79,783 | 47,832 | 9,762 | 12,563 | 4,358 | 1,333 | 2,215 | 1,719 |
| Doctors Hospital Medical Center | Montclair | AHMC, Inc. | 437 | 93,835 | 48,650 | 3,689 | 32,159 | 3,204 | 1,988 | 2,200 | 1,944 |
| Beverly Hospital | Montebello | | 940 | 92,560 | 54,457 | 11,421 | 15,550 | 4,484 | 1,138 | 1,791 | 3,719 |
| Northridge Hospital Medical Center | Northridge | Catholic Healthcare West | 1,086 | 76,784 | 46,760 | 9,150 | 11,530 | 4,071 | 1,748 | 1,829 | 1,696 |
| Mission Community Hospital | Panorama City | | 458 | 95,860 | 56,888 | 4,229 | 21,644 | 5,165 | 2,828 | 2,433 | 2,673 |
| Huntington Memorial Hospital | Pasadena | | 2,658 | 71,026 | 42,868 | 9,165 | 9,681 | 4,257 | 1,879 | 1,609 | 1,566 |
| Pomona Valley Hospital Medical Center | Pomona | | 998 | 78,051 | 44,328 | 9,874 | 14,934 | 3,458 | 2,002 | 1,883 | 1,571 |
| San Gabriel Valley Medical Center | San Gabriel | Catholic Healthcare West | 1,340 | 93,367 | 61,522 | 8,185 | 14,792 | 3,792 | 1,157 | 1,837 | 2,082 |
| San Pedro Peninsula Hospital | San Pedro | Providence Health & Services | 876 | 61,239 | 37,433 | 7,822 | 8,211 | 3,134 | 1,901 | 1,429 | 1,309 |
| Santa Monica UCLA Medical Center | Santa Monica | University of California | 913 | 76,808 | 44,773 | 9,032 | 12,285 | 4,793 | 2,392 | 2,096 | 1,437 |
| St. John's Health Center | Santa Monica | Sisters of Charity | 1,970 | 75,151 | 41,981 | 15,479 | 8,175 | 4,232 | 2,009 | 2,106 | 1,167 |
| Sherman Oaks Hospital & Health Center | Sherman Oaks | Prime Healthcare Services | 1,122 | 77,441 | 42,798 | 8,458 | 14,955 | 5,525 | 2,247 | 1,556 | 1,902 |
| Encino-Tarzana Regional Medical Center | Tarzana | Tenet Healthcare Corporation | 1,443 | 93,922 | 60,801 | 13,649 | 8,697 | 5,409 | 1,744 | 1,929 | 1,694 |
| Providence-Little Company of Mary | Torrance | Providence Health & Services | 1,922 | 67,311 | 38,582 | 8,903 | 10,923 | 3,335 | 2,249 | 1,787 | 1,533 |
| Torrance Memorial Medical Center | Torrance | | 1,618 | 63,661 | 35,146 | 10,017 | 9,379 | 2,898 | 3,034 | 1,781 | 1,405 |
| Henry Mayo Newhall Memorial Hospital | Valencia | | 1,008 | 69,493 | 41,207 | 9,602 | 9,236 | 3,834 | 2,277 | 1,670 | 1,667 |
| Valley Presbyterian Hospital | Van Nuys | | 1,040 | 76,789 | 46,243 | 9,055 | 11,770 | 5,067 | 1,342 | 1,714 | 1,597 |
| Citrus Valley Medical Center-QV Campus | West Covina | Citrus Valley Health Partners | 917 | 87,825 | 52,632 | 8,487 | 15,567 | 5,742 | 1,152 | 2,478 | 1,766 |
| Presbyterian Intercommunity Hospital | Whittier | | 1,332 | 68,820 | 36,360 | 10,629 | 12,379 | 3,878 | 2,278 | 1,687 | 1,611 |
| **Los Angeles hospitals** | | | **58,298** | **84,317** | **52,051** | **10,538** | **11,980** | **4,376** | **1,636** | **1,928** | **1,808** |
| **Sutter Health (Sacramento)** | | | **5,963** | **50,718** | **28,550** | **8,468** | **6,937** | **2,362** | **1,409** | **1,678** | **1,313** |
| **Mayo Foundation (Rochester)** | | | **7,021** | **50,273** | **32,309** | **7,307** | **6,683** | **581** | **1,866** | **993** | **535** |
| **Intermountain Health Care (SLC/ Ogden)** | | | **8,832** | **46,377** | **21,539** | **7,521** | **7,689** | **3,496** | **3,650** | **1,751** | **731** |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 3b. The Medical Care Cost Equation: Disaggregation of inpatient (facility) reimbursements during the last two years of life into volume (hospital days per patient) and price (reimbursements per patient day) components (deaths occurring 2001-05)**

| Hospital name | Inpatient reimbursements per decedent** | Hospital days per decedent | Reimbursements per patient day | Inpatient reimbursements (L.A. ratio) | = | Hospital days (L.A. ratio) | x | Reimbursements per day (L.A. ratio) |
|---|---|---|---|---|---|---|---|---|
| Alhambra Hospital Medical Center | 74,595 | 53.0 | 1,407 | 1.66 | = | 1.63 | x | 1.02 |
| Methodist Hospital of Southern California | 32,152 | 29.1 | 1,107 | 0.72 | = | 0.90 | x | 0.80 |
| Providence St. Joseph Center | 37,503 | 30.9 | 1,214 | 0.84 | = | 0.95 | x | 0.88 |
| West Hills Hospital & Medical Center | 31,295 | 28.8 | 1,088 | 0.70 | = | 0.89 | x | 0.79 |
| Citrus Valley Medical Center-IC Campus | 35,748 | 26.6 | 1,342 | 0.80 | = | 0.82 | x | 0.97 |
| Brotman Medical Center | 61,196 | 44.0 | 1,391 | 1.36 | = | 1.36 | x | 1.01 |
| Downey Regional Medical Center | 36,822 | 25.3 | 1,454 | 0.82 | = | 0.78 | x | 1.05 |
| City of Hope National Medical Center | 66,198 | 31.9 | 2,077 | 1.48 | = | 0.98 | x | 1.50 |
| Encino-Tarzana Regional Medical Center | 46,781 | 34.0 | 1,375 | 1.04 | = | 1.05 | x | 0.99 |
| Memorial Hospital of Gardena | 46,731 | 30.5 | 1,531 | 1.04 | = | 0.94 | x | 1.11 |
| Glendale Adventist Medical Center | 50,292 | 36.3 | 1,384 | 1.12 | = | 1.12 | x | 1.00 |
| Glendale Memorial Hospital | 49,667 | 30.9 | 1,605 | 1.11 | = | 0.95 | x | 1.16 |
| Verdugo Hills Hospital | 31,845 | 27.2 | 1,171 | 0.71 | = | 0.84 | x | 0.85 |
| Foothill Presbyterian Hospital | 28,905 | 21.8 | 1,327 | 0.64 | = | 0.67 | x | 0.96 |
| Lakewood Regional Medical Center | 37,484 | 28.4 | 1,318 | 0.84 | = | 0.88 | x | 0.95 |
| Antelope Valley Hospital | 36,584 | 28.2 | 1,297 | 0.82 | = | 0.87 | x | 0.94 |
| Lancaster Community Hospital | 34,819 | 27.1 | 1,283 | 0.78 | = | 0.84 | x | 0.93 |
| Long Beach Memorial Medical Center | 40,671 | 28.6 | 1,423 | 0.91 | = | 0.88 | x | 1.03 |
| Pacific Hospital of Long Beach | 49,083 | 30.9 | 1,587 | 1.09 | = | 0.95 | x | 1.15 |
| St. Mary Medical Center | 54,543 | 43.1 | 1,265 | 1.22 | = | 1.33 | x | 0.91 |
| California Hospital Medical Center | 56,853 | 30.6 | 1,860 | 1.27 | = | 0.94 | x | 1.34 |
| Cedars-Sinai Medical Center | 61,954 | 42.9 | 1,444 | 1.38 | = | 1.32 | x | 1.04 |
| Good Samaritan Hospital | 51,866 | 36.8 | 1,409 | 1.16 | = | 1.14 | x | 1.02 |
| Hollywood Presbyterian Medical Center | 70,696 | 45.3 | 1,562 | 1.58 | = | 1.40 | x | 1.13 |
| Pacific Alliance Medical Center | 66,434 | 42.4 | 1,567 | 1.48 | = | 1.31 | x | 1.13 |
| St. Vincent Medical Center | 50,265 | 32.7 | 1,537 | 1.12 | = | 1.01 | x | 1.11 |
| UCLA Medical Center | 58,557 | 31.3 | 1,871 | 1.30 | = | 0.97 | x | 1.35 |
| White Memorial Medical Center | 74,833 | 39.5 | 1,894 | 1.67 | = | 1.22 | x | 1.37 |
| St. Francis Medical Center | 51,278 | 29.2 | 1,755 | 1.14 | = | 0.90 | x | 1.27 |
| Providence Holy Cross Medical Center | 40,273 | 31.6 | 1,273 | 0.90 | = | 0.98 | x | 0.92 |
| Doctors Hospital Medical Center | 39,480 | 24.0 | 1,646 | 0.88 | = | 0.74 | x | 1.19 |
| Beverly Hospital | 46,282 | 32.1 | 1,444 | 1.03 | = | 0.99 | x | 1.04 |
| Northridge Hospital Medical Center | 38,980 | 32.2 | 1,210 | 0.87 | = | 0.99 | x | 0.87 |
| Mission Community Hospital | 49,096 | 31.1 | 1,579 | 1.09 | = | 0.96 | x | 1.14 |
| Huntington Memorial Hospital | 36,690 | 32.0 | 1,147 | 0.82 | = | 0.99 | x | 0.83 |
| Pomona Valley Hospital Medical Center | 37,779 | 24.8 | 1,523 | 0.84 | = | 0.77 | x | 1.10 |
| San Gabriel Valley Medical Center | 52,706 | 37.7 | 1,398 | 1.17 | = | 1.16 | x | 1.01 |
| San Pedro Peninsula Hospital | 33,159 | 26.6 | 1,246 | 0.74 | = | 0.82 | x | 0.90 |
| Santa Monica UCLA Medical Center | 38,626 | 29.9 | 1,290 | 0.86 | = | 0.92 | x | 0.93 |
| St. John's Health Center | 34,926 | 33.5 | 1,044 | 0.78 | = | 1.03 | x | 0.75 |
| Sherman Oaks Hospital & Health Center | 36,715 | 30.0 | 1,226 | 0.82 | = | 0.92 | x | 0.89 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 3b. The Medical Care Cost Equation: Disaggregation of inpatient (facility) reimbursements during the last two years of life into volume (hospital days per patient) and price (reimbursements per patient day) components (deaths occurring 2001-05)**

| Hospital name | Inpatient reimbursements per decedent** | Hospital days per decedent | Reimbursements per patient day | Inpatient reimbursements (L.A. ratio) | = | Hospital days (L.A. ratio) | x | Reimbursements per day (L.A. ratio) |
|---|---|---|---|---|---|---|---|---|
| Encino-Tarzana Regional Medical Center | 54,478 | 34.7 | 1,571 | 1.21 | = | 1.07 | x | 1.14 |
| Providence-Little Company of Mary | 33,910 | 25.7 | 1,320 | 0.76 | = | 0.79 | x | 0.95 |
| Torrance Memorial Medical Center | 30,556 | 24.4 | 1,253 | 0.68 | = | 0.75 | x | 0.91 |
| Henry Mayo Newhall Memorial Hospital | 34,651 | 30.9 | 1,121 | 0.77 | = | 0.95 | x | 0.81 |
| Valley Presbyterian Hospital | 39,992 | 30.4 | 1,317 | 0.89 | = | 0.94 | x | 0.95 |
| Citrus Valley Medical Center-QV Campus | 44,732 | 31.0 | 1,443 | 1.00 | = | 0.96 | x | 1.04 |
| Presbyterian Intercommunity Hospital | 31,854 | 23.1 | 1,381 | 0.71 | = | 0.71 | x | 1.00 |
| **Los Angeles hospitals** | 44,872 | 32.4 | 1,384 | 1.00 | = | 1.00 | x | 1.00 |
| **Sutter Health (Sacramento)** | 25,819 | 17.9 | 1,443 | 0.58 | = | 0.55 | x | 1.04 |
| **Mayo Foundation (Rochester)** | 29,922 | 20.5 | 1,459 | 0.67 | = | 0.63 | x | 1.05 |
| **Intermountain Health Care (SLC/Ogden)** | 19,212 | 15.8 | 1,218 | 0.43 | = | 0.49 | x | 0.88 |

** Includes Part B data for physician services taking place at designated site of care*
***Facility payments only; physician services not included*

**Appendix Table 3c. The Medical Care Cost Equation: Disaggregation of physician payments (Part B and outpatient) during the last two years of life into volume (physician visits per patient) and price payments per visit) components (deaths occurring 2001-05)**

| Hospital name | Payments for physician visits per decedent | Physician visits per decedent | Payments per physician visit | Physician visit payments (L.A. ratio) | = | Physician visits (L.A. ratio) | x | Payments per visit (L.A. ratio) |
|---|---|---|---|---|---|---|---|---|
| Alhambra Hospital Medical Center | 13,631 | 235.2 | 58 | 1.71 | = | 1.92 | x | 0.89 |
| Methodist Hospital of Southern California | 7,273 | 113.3 | 64 | 0.91 | = | 0.93 | x | 0.99 |
| Providence St. Joseph Center | 7,568 | 114.9 | 66 | 0.95 | = | 0.94 | x | 1.01 |
| West Hills Hospital & Medical Center | 6,776 | 102.7 | 66 | 0.85 | = | 0.84 | x | 1.01 |
| Citrus Valley Medical Center-IC Campus | 7,544 | 118.3 | 64 | 0.95 | = | 0.97 | x | 0.98 |
| Brotman Medical Center | 11,490 | 166.1 | 69 | 1.44 | = | 1.36 | x | 1.06 |
| Downey Regional Medical Center | 8,473 | 130.5 | 65 | 1.06 | = | 1.07 | x | 1.00 |
| City of Hope National Medical Center | 3,571 | 78.2 | 46 | 0.45 | = | 0.64 | x | 0.70 |
| Encino-Tarzana Regional Medical Center | 8,194 | 111.8 | 73 | 1.03 | = | 0.91 | x | 1.13 |
| Memorial Hospital of Gardena | 7,610 | 104.7 | 73 | 0.96 | = | 0.86 | x | 1.12 |
| Glendale Adventist Medical Center | 8,896 | 142.9 | 62 | 1.12 | = | 1.17 | x | 0.96 |
| Glendale Memorial Hospital | 8,299 | 127.7 | 65 | 1.04 | = | 1.04 | x | 1.00 |
| Verdugo Hills Hospital | 6,789 | 101.1 | 67 | 0.85 | = | 0.83 | x | 1.03 |
| Foothill Presbyterian Hospital | 6,034 | 83.6 | 72 | 0.76 | = | 0.68 | x | 1.11 |
| Lakewood Regional Medical Center | 8,002 | 114.0 | 70 | 1.00 | = | 0.93 | x | 1.08 |
| Antelope Valley Hospital | 6,102 | 92.5 | 66 | 0.77 | = | 0.76 | x | 1.01 |
| Lancaster Community Hospital | 6,418 | 91.7 | 70 | 0.81 | = | 0.75 | x | 1.08 |
| Long Beach Memorial Medical Center | 7,678 | 119.4 | 64 | 0.96 | = | 0.97 | x | 0.99 |
| Pacific Hospital of Long Beach | 7,179 | 98.9 | 73 | 0.90 | = | 0.81 | x | 1.12 |
| St. Mary Medical Center | 9,977 | 171.7 | 58 | 1.25 | = | 1.40 | x | 0.89 |
| California Hospital Medical Center | 7,900 | 109.3 | 72 | 0.99 | = | 0.89 | x | 1.11 |
| Cedars-Sinai Medical Center | 10,307 | 155.8 | 66 | 1.29 | = | 1.27 | x | 1.02 |
| Good Samaritan Hospital | 7,875 | 121.1 | 65 | 0.99 | = | 0.99 | x | 1.00 |
| Hollywood Presbyterian Medical Center | 9,586 | 146.4 | 65 | 1.20 | = | 1.20 | x | 1.01 |
| Pacific Alliance Medical Center | 9,273 | 170.1 | 55 | 1.16 | = | 1.39 | x | 0.84 |
| St. Vincent Medical Center | 8,051 | 133.6 | 60 | 1.01 | = | 1.09 | x | 0.93 |
| UCLA Medical Center | 5,971 | 101.3 | 59 | 0.75 | = | 0.83 | x | 0.91 |
| White Memorial Medical Center | 9,436 | 140.5 | 67 | 1.18 | = | 1.15 | x | 1.03 |
| St. Francis Medical Center | 8,300 | 133.2 | 62 | 1.04 | = | 1.09 | x | 0.96 |
| Providence Holy Cross Medical Center | 8,146 | 111.6 | 73 | 1.02 | = | 0.91 | x | 1.12 |
| Doctors Hospital Medical Center | 9,825 | 147.7 | 67 | 1.23 | = | 1.21 | x | 1.02 |
| Beverly Hospital | 8,502 | 126.9 | 67 | 1.07 | = | 1.04 | x | 1.03 |
| Northridge Hospital Medical Center | 8,338 | 122.2 | 68 | 1.05 | = | 1.00 | x | 1.05 |
| Mission Community Hospital | 9,195 | 131.8 | 70 | 1.15 | = | 1.08 | x | 1.07 |
| Huntington Memorial Hospital | 7,227 | 114.2 | 63 | 0.91 | = | 0.93 | x | 0.97 |
| Pomona Valley Hospital Medical Center | 7,469 | 113.0 | 66 | 0.94 | = | 0.92 | x | 1.02 |
| San Gabriel Valley Medical Center | 9,852 | 157.9 | 62 | 1.24 | = | 1.29 | x | 0.96 |
| San Pedro Peninsula Hospital | 5,487 | 82.0 | 67 | 0.69 | = | 0.67 | x | 1.03 |
| Santa Monica UCLA Medical Center | 6,982 | 103.8 | 67 | 0.88 | = | 0.85 | x | 1.03 |
| St. John's Health Center | 8,543 | 136.6 | 63 | 1.07 | = | 1.12 | x | 0.96 |
| Sherman Oaks Hospital & Health Center | 8,077 | 112.5 | 72 | 1.01 | = | 0.92 | x | 1.10 |
| Encino-Tarzana Regional Medical Center | 7,998 | 126.9 | 63 | 1.00 | = | 1.04 | x | 0.97 |

**Appendix Table 3c. The Medical Care Cost Equation: Disaggregation of physician payments (Part B and outpatient) during the last two years of life into volume (physician visits per patient) and price payments per visit) components (deaths occurring 2001-05)**

| Hospital name | Payments for physician visits per decedent | Physician visits per decedent | Payments per physician visit | Physician visit payments (L.A. ratio) | = | Physician visits (L.A. ratio) | x | Payments per visit (L.A. ratio) |
|---|---|---|---|---|---|---|---|---|
| Providence-Little Company of Mary | 5,741 | 85.9 | 67 | 0.72 | = | 0.70 | x | 1.03 |
| Torrance Memorial Medical Center | 5,505 | 83.4 | 66 | 0.69 | = | 0.68 | x | 1.01 |
| Henry Mayo Newhall Memorial Hospital | 7,156 | 99.7 | 72 | 0.90 | = | 0.81 | x | 1.10 |
| Valley Presbyterian Hospital | 7,343 | 110.7 | 66 | 0.92 | = | 0.90 | x | 1.02 |
| Citrus Valley Medical Center-QV Campus | 8,355 | 129.3 | 65 | 1.05 | = | 1.06 | x | 0.99 |
| Presbyterian Intercommunity Hospital | 5,329 | 84.5 | 63 | 0.67 | = | 0.69 | x | 0.97 |
| **Los Angeles hospitals** | 7,964 | 122.4 | 65 | 1.00 | = | 1.00 | x | 1.00 |
| **Sutter Health (Sacramento)** | 3,477 | 57.6 | 60 | 0.44 | = | 0.47 | x | 0.93 |
| **Mayo Foundation (Rochester)** | 2,537 | 48.7 | 52 | 0.32 | = | 0.40 | x | 0.80 |
| **Intermountain Health Care (SLC/Ogden)** | 2,751 | 45.2 | 61 | 0.35 | = | 0.37 | x | 0.94 |

**Appendix Table 3d. Resource inputs per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total FTE physician labor inputs | Medical specialist labor inputs | Primary care physician labor inputs | Ratio of MS/PC labor inputs | Hospital bed inputs | Intensive and intermediate care bed inputs | High-intensity ICU/CCU bed inputs | Intermediate-intensity bed inputs | Medical/surgical bed inputs |
|---|---|---|---|---|---|---|---|---|---|
| Alhambra Hospital Medical Center | 67.7 | 34.1 | 28.1 | 1.21 | 145.2 | 46.4 | 20.7 | 25.7 | 98.9 |
| Methodist Hospital of Southern California | 40.2 | 21.2 | 14.1 | 1.51 | 79.6 | 35.5 | 7.4 | 28.1 | 44.1 |
| Providence St. Joseph Center | 39.0 | 20.3 | 12.3 | 1.65 | 84.7 | 27.2 | 10.0 | 17.1 | 57.5 |
| West Hills Hospital & Medical Center | 36.2 | 17.4 | 13.9 | 1.25 | 78.8 | 36.7 | 10.5 | 26.2 | 42.1 |
| Citrus Valley Medical Center-IC Campus | 37.0 | 20.9 | 10.7 | 1.95 | 73.0 | 29.6 | 9.9 | 19.7 | 43.4 |
| Brotman Medical Center | 54.0 | 31.6 | 16.0 | 1.97 | 120.5 | 32.3 | 17.2 | 15.1 | 88.2 |
| Downey Regional Medical Center | 41.5 | 23.6 | 13.5 | 1.74 | 69.4 | 30.7 | 9.8 | 20.9 | 38.7 |
| City of Hope National Medical Center | 31.3 | 13.4 | 9.7 | 1.38 | 87.3 | 23.6 | 18.3 | 5.4 | 63.7 |
| Encino-Tarzana Regional Medical Center | 39.7 | 19.7 | 14.0 | 1.41 | 93.2 | 31.3 | 12.4 | 19.0 | 61.9 |
| Memorial Hospital of Gardena | 37.4 | 15.4 | 16.5 | 0.93 | 83.6 | 24.1 | 14.3 | 9.8 | 59.5 |
| Glendale Adventist Medical Center | 47.0 | 25.7 | 15.5 | 1.66 | 99.6 | 34.9 | 11.2 | 23.7 | 64.7 |
| Glendale Memorial Hospital | 43.4 | 22.6 | 15.2 | 1.49 | 84.8 | 31.8 | 12.5 | 19.3 | 53.0 |
| Verdugo Hills Hospital | 32.7 | 14.5 | 13.1 | 1.11 | 74.5 | 19.5 | 6.7 | 12.8 | 55.1 |
| Foothill Presbyterian Hospital | 29.7 | 12.9 | 12.3 | 1.05 | 59.7 | 19.3 | 15.0 | 4.3 | 40.4 |
| Lakewood Regional Medical Center | 36.2 | 19.8 | 10.4 | 1.90 | 77.9 | 30.4 | 9.7 | 20.7 | 47.5 |
| Antelope Valley Hospital | 31.1 | 15.2 | 11.3 | 1.35 | 77.3 | 19.9 | 8.4 | 11.4 | 57.4 |
| Lancaster Community Hospital | 32.6 | 14.8 | 12.6 | 1.17 | 74.4 | 28.4 | 8.5 | 19.9 | 46.0 |
| Long Beach Memorial Medical Center | 40.8 | 20.4 | 14.3 | 1.43 | 78.3 | 30.5 | 13.4 | 17.1 | 47.8 |
| Pacific Hospital of Long Beach | 32.3 | 14.6 | 13.2 | 1.11 | 84.7 | 35.4 | 12.0 | 23.5 | 49.3 |
| St. Mary Medical Center | 47.8 | 26.9 | 15.2 | 1.77 | 118.1 | 34.9 | 11.2 | 23.8 | 83.2 |
| California Hospital Medical Center | 38.3 | 17.7 | 15.2 | 1.16 | 83.8 | 33.9 | 13.5 | 20.3 | 49.9 |
| Cedars-Sinai Medical Center | 54.2 | 31.6 | 14.6 | 2.16 | 117.5 | 34.8 | 14.3 | 20.5 | 82.7 |
| Good Samaritan Hospital | 42.2 | 21.1 | 15.6 | 1.35 | 100.9 | 39.8 | 30.3 | 9.5 | 61.1 |
| Hollywood Presbyterian Medical Center | 50.4 | 25.8 | 18.3 | 1.41 | 124.0 | 48.5 | 26.6 | 21.9 | 75.4 |
| Pacific Alliance Medical Center | 48.5 | 23.2 | 19.0 | 1.22 | 116.1 | 25.4 | 21.0 | 4.4 | 90.7 |
| St. Vincent Medical Center | 47.7 | 23.2 | 18.7 | 1.24 | 89.6 | 37.5 | 13.5 | 24.0 | 52.1 |
| UCLA Medical Center | 38.5 | 21.2 | 9.6 | 2.20 | 85.8 | 38.1 | 13.8 | 24.3 | 47.7 |
| White Memorial Medical Center | 48.9 | 23.9 | 18.9 | 1.26 | 108.3 | 36.0 | 13.9 | 22.1 | 72.3 |
| St. Francis Medical Center | 39.5 | 22.6 | 11.3 | 2.00 | 80.0 | 28.9 | 12.4 | 16.5 | 51.1 |
| Providence Holy Cross Medical Center | 39.0 | 20.4 | 12.4 | 1.65 | 86.7 | 31.9 | 9.9 | 22.0 | 54.8 |
| Doctors Hospital Medical Center | 48.6 | 16.5 | 28.3 | 0.58 | 65.7 | 31.7 | 13.0 | 18.7 | 34.1 |
| Beverly Hospital | 44.4 | 20.0 | 18.5 | 1.08 | 87.8 | 31.4 | 13.0 | 18.4 | 56.4 |
| Northridge Hospital Medical Center | 43.4 | 22.2 | 15.3 | 1.45 | 88.3 | 34.0 | 12.2 | 21.8 | 54.3 |
| Mission Community Hospital | 41.7 | 19.3 | 18.2 | 1.06 | 85.2 | 28.5 | 17.2 | 11.3 | 56.7 |
| Huntington Memorial Hospital | 37.4 | 17.3 | 14.8 | 1.17 | 87.6 | 29.7 | 7.5 | 22.2 | 57.9 |
| Pomona Valley Hospital Medical Center | 38.1 | 15.9 | 17.7 | 0.90 | 68.0 | 29.2 | 8.9 | 20.3 | 38.7 |
| San Gabriel Valley Medical Center | 48.0 | 22.9 | 19.5 | 1.18 | 103.3 | 38.8 | 22.4 | 16.4 | 64.5 |
| San Pedro Peninsula Hospital | 27.2 | 15.1 | 7.8 | 1.94 | 72.9 | 28.2 | 8.6 | 19.6 | 44.7 |
| Santa Monica UCLA Medical Center | 38.6 | 18.4 | 15.0 | 1.22 | 82.0 | 36.4 | 13.0 | 23.5 | 45.6 |
| St. John's Health Center | 47.6 | 23.8 | 17.0 | 1.40 | 91.7 | 32.6 | 12.8 | 19.8 | 59.1 |
| Sherman Oaks Hospital & Health Center | 38.0 | 17.2 | 15.7 | 1.10 | 82.1 | 29.3 | 13.0 | 16.3 | 52.7 |
| Encino-Tarzana Regional Medical Center | 43.2 | 21.7 | 15.1 | 1.44 | 95.0 | 39.3 | 9.5 | 29.8 | 55.7 |

| Appendix Table 3d. Resource inputs per 1,000 decedents during the last two years of life (deaths 2001-05) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Hospital name** | **Total FTE physician labor inputs** | **Medical specialist labor inputs** | **Primary care physician labor inputs** | **Ratio of MS/ PC labor inputs** | **Hospital bed inputs** | **Intensive and intermediate care bed inputs** | **High-intensity ICU/CCU bed inputs** | **Intermediate-intensity bed inputs** | **Medical/ surgical bed inputs** |
| Providence-Little Company of Mary | 30.2 | 15.3 | 9.6 | 1.60 | 70.4 | 34.6 | 9.7 | 24.9 | 35.8 |
| Torrance Memorial Medical Center | 29.7 | 15.1 | 9.0 | 1.68 | 66.8 | 28.3 | 12.3 | 16.0 | 38.5 |
| Henry Mayo Newhall Memorial Hospital | 35.0 | 19.1 | 10.1 | 1.88 | 84.7 | 25.4 | 22.9 | 2.4 | 59.3 |
| Valley Presbyterian Hospital | 37.2 | 17.5 | 14.7 | 1.20 | 83.2 | 35.0 | 10.9 | 24.1 | 48.2 |
| Citrus Valley Medical Center-QV Campus | 41.2 | 22.2 | 14.1 | 1.57 | 84.9 | 30.8 | 10.6 | 20.2 | 54.1 |
| Presbyterian Intercommunity Hospital | 28.6 | 13.5 | 10.4 | 1.29 | 63.2 | 23.2 | 10.1 | 13.1 | 40.0 |
| **Los Angeles hospitals** | **41.3** | **21.1** | **14.4** | **1.47** | **88.8** | **32.3** | 12.9 | 19.4 | 56.6 |
| **Sutter Health (Sacramento)** | **21.4** | **8.3** | **9.2** | **0.90** | **49.0** | **18.0** | 6.7 | 11.3 | 31.0 |
| **Mayo Foundation (Rochester)** | **19.4** | **7.6** | **7.4** | **1.03** | **56.2** | **16.5** | 14.5 | 2.0 | 39.7 |
| **Intermountain Health Care (SLC/Ogden)** | **18.5** | **7.2** | **7.3** | **0.98** | **43.2** | **13.4** | 12.6 | 0.8 | 29.8 |

**Appendix Table 3e. Estimated RN labor requirements under proposed federal standard per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total RN labor requirements | High-intensity ICU/CCU | Intermediate-intensity | Medical/ surgical |
|---|---|---|---|---|
| Alhambra Hospital Medical Center | 130.8 | 31.0 | 25.7 | 74.2 |
| Methodist Hospital of Southern California | 72.3 | 11.1 | 28.1 | 33.1 |
| Providence St. Joseph Center | 75.3 | 15.1 | 17.1 | 43.1 |
| West Hills Hospital & Medical Center | 73.6 | 15.8 | 26.2 | 31.6 |
| Citrus Valley Medical Center-IC Campus | 67.1 | 14.8 | 19.7 | 32.5 |
| Brotman Medical Center | 107.1 | 25.8 | 15.1 | 66.1 |
| Downey Regional Medical Center | 64.6 | 14.6 | 20.9 | 29.0 |
| City of Hope National Medical Center | 80.5 | 27.4 | 5.4 | 47.8 |
| Encino-Tarzana Regional Medical Center | 84.0 | 18.6 | 19.0 | 46.4 |
| Memorial Hospital of Gardena | 75.9 | 21.5 | 9.8 | 44.6 |
| Glendale Adventist Medical Center | 89.0 | 16.8 | 23.7 | 48.5 |
| Glendale Memorial Hospital | 77.8 | 18.7 | 19.3 | 39.7 |
| Verdugo Hills Hospital | 64.1 | 10.0 | 12.8 | 41.3 |
| Foothill Presbyterian Hospital | 57.1 | 22.6 | 4.3 | 30.3 |
| Lakewood Regional Medical Center | 70.9 | 14.5 | 20.7 | 35.7 |
| Antelope Valley Hospital | 67.1 | 12.7 | 11.4 | 43.1 |
| Lancaster Community Hospital | 67.1 | 12.8 | 19.9 | 34.5 |
| Long Beach Memorial Medical Center | 73.1 | 20.1 | 17.1 | 35.9 |
| Pacific Hospital of Long Beach | 78.4 | 18.0 | 23.5 | 37.0 |
| St. Mary Medical Center | 102.9 | 16.7 | 23.8 | 62.4 |
| California Hospital Medical Center | 78.1 | 20.3 | 20.3 | 37.4 |
| Cedars-Sinai Medical Center | 104.0 | 21.5 | 20.5 | 62.1 |
| Good Samaritan Hospital | 100.7 | 45.4 | 9.5 | 45.8 |
| Hollywood Presbyterian Medical Center | 118.4 | 39.9 | 21.9 | 56.6 |
| Pacific Alliance Medical Center | 103.9 | 31.5 | 4.4 | 68.0 |
| St. Vincent Medical Center | 83.3 | 20.2 | 24.0 | 39.1 |
| UCLA Medical Center | 80.7 | 20.7 | 24.3 | 35.8 |
| White Memorial Medical Center | 97.1 | 20.9 | 22.1 | 54.2 |
| St. Francis Medical Center | 73.4 | 18.6 | 16.5 | 38.3 |
| Providence Holy Cross Medical Center | 78.0 | 14.9 | 22.0 | 41.1 |
| Doctors Hospital Medical Center | 63.7 | 19.5 | 18.7 | 25.5 |
| Beverly Hospital | 80.2 | 19.5 | 18.4 | 42.3 |
| Northridge Hospital Medical Center | 80.8 | 18.3 | 21.8 | 40.7 |
| Mission Community Hospital | 79.6 | 25.8 | 11.3 | 42.5 |
| Huntington Memorial Hospital | 76.9 | 11.2 | 22.2 | 43.5 |
| Pomona Valley Hospital Medical Center | 62.7 | 13.4 | 20.3 | 29.1 |
| San Gabriel Valley Medical Center | 98.4 | 33.6 | 16.4 | 48.4 |
| San Pedro Peninsula Hospital | 66.0 | 12.9 | 19.6 | 33.5 |
| Santa Monica UCLA Medical Center | 77.1 | 19.4 | 23.5 | 34.2 |
| St. John's Health Center | 83.3 | 19.2 | 19.8 | 44.3 |
| Sherman Oaks Hospital & Health Center | 75.4 | 19.6 | 16.3 | 39.5 |
| Encino-Tarzana Regional Medical Center | 85.8 | 14.3 | 29.8 | 41.8 |

**Appendix Table 3e. Estimated RN labor requirements under proposed federal standard per 1,000 decedents during the last two years of life (deaths 2001-05)**

| Hospital name | Total RN labor requirements | High-intensity ICU/CCU | Intermediate-intensity | Medical/ surgical |
|---|---|---|---|---|
| Providence-Little Company of Mary | 66.3 | 14.6 | 24.9 | 26.8 |
| Torrance Memorial Medical Center | 63.3 | 18.4 | 16.0 | 28.9 |
| Henry Mayo Newhall Memorial Hospital | 81.3 | 34.4 | 2.4 | 44.5 |
| Valley Presbyterian Hospital | 76.6 | 16.3 | 24.1 | 36.2 |
| Citrus Valley Medical Center-QV Campus | 76.7 | 15.9 | 20.2 | 40.6 |
| Presbyterian Intercommunity Hospital | 58.2 | 15.1 | 13.1 | 30.0 |
| **Los Angeles hospitals** | **81.1** | **19.3** | **19.4** | **42.4** |
| **Sutter Health (Sacramento)** | **44.6** | **10.0** | **11.3** | **23.3** |
| **Mayo Foundation (Rochester)** | **53.5** | **21.7** | **2.0** | **29.8** |
| **Intermountain Health Care (SLC/Ogden)** | **42.1** | **18.9** | **0.8** | **22.3** |

**Appendix Table 3f. Utilization per decedent during the last six months of life (deaths 2001-05))**

| Hospital name | Hospital days | Intensive and intermediate care days | High-intensity ICU/CCU days | Intermediate-intensity days | Medical/ surgical days | Total physician visits | Medical specialist visits | Primary care physician visits | Ratio of MS/ PC visits | Percent seeing 10 or more physicians |
|---|---|---|---|---|---|---|---|---|---|---|
| Alhambra Hospital Medical Center | 30.0 | 13.9 | 7.1 | 6.9 | 16.1 | 123.7 | 77.5 | 41.3 | 1.88 | 57.9 |
| Methodist Hospital of Southern California | 16.7 | 9.3 | 2.2 | 7.2 | 7.3 | 58.7 | 35.5 | 20.5 | 1.73 | 45.5 |
| Providence St. Joseph Center | 17.9 | 7.3 | 3.2 | 4.1 | 10.6 | 61.5 | 40.5 | 18.2 | 2.22 | 51.2 |
| West Hills Hospital & Medical Center | 17.6 | 9.9 | 3.3 | 6.7 | 7.6 | 53.6 | 29.7 | 21.5 | 1.38 | 44.2 |
| Citrus Valley Medical Center-IC Campus | 15.5 | 8.0 | 3.2 | 4.8 | 7.5 | 66.7 | 43.9 | 19.3 | 2.27 | 39.8 |
| Brotman Medical Center | 24.9 | 8.3 | 4.7 | 3.6 | 16.6 | 92.3 | 65.1 | 24.0 | 2.72 | 57.9 |
| Downey Regional Medical Center | 15.1 | 8.5 | 3.1 | 5.4 | 6.6 | 77.3 | 48.7 | 25.2 | 1.94 | 45.1 |
| City of Hope National Medical Center | 18.5 | 5.3 | 4.2 | 1.1 | 13.2 | 35.9 | 19.3 | 12.6 | 1.53 | 49.9 |
| Encino-Tarzana Regional Medical Center | 20.3 | 7.8 | 3.7 | 4.1 | 12.5 | 60.1 | 38.0 | 19.5 | 1.95 | 51.4 |
| Memorial Hospital of Gardena | 19.2 | 6.9 | 4.4 | 2.4 | 12.4 | 67.9 | 36.7 | 27.3 | 1.35 | 31.2 |
| Glendale Adventist Medical Center | 20.3 | 9.5 | 3.5 | 6.1 | 10.8 | 79.0 | 54.6 | 19.9 | 2.74 | 54.3 |
| Glendale Memorial Hospital | 17.7 | 8.5 | 3.9 | 4.6 | 9.2 | 65.6 | 43.9 | 18.5 | 2.37 | 51.1 |
| Verdugo Hills Hospital | 15.1 | 4.8 | 1.8 | 2.9 | 10.4 | 51.0 | 27.1 | 18.4 | 1.48 | 46.7 |
| Foothill Presbyterian Hospital | 12.3 | 4.5 | 3.8 | 0.7 | 7.9 | 42.7 | 23.5 | 16.6 | 1.42 | 30.8 |
| Lakewood Regional Medical Center | 15.5 | 8.3 | 2.9 | 5.4 | 7.2 | 61.8 | 38.1 | 17.3 | 2.20 | 50.4 |
| Antelope Valley Hospital | 16.8 | 4.4 | 2.2 | 2.2 | 12.4 | 49.0 | 29.0 | 16.8 | 1.73 | 34.5 |
| Lancaster Community Hospital | 15.6 | 7.2 | 2.6 | 4.6 | 8.4 | 46.1 | 26.1 | 16.6 | 1.57 | 36.9 |
| Long Beach Memorial Medical Center | 15.9 | 7.8 | 3.6 | 4.2 | 8.1 | 61.0 | 38.3 | 18.9 | 2.02 | 46.8 |
| Pacific Hospital of Long Beach | 18.5 | 10.2 | 3.8 | 6.4 | 8.3 | 58.0 | 31.9 | 22.8 | 1.40 | 39.1 |
| St. Mary Medical Center | 23.1 | 9.0 | 3.2 | 5.7 | 14.1 | 82.1 | 52.2 | 25.8 | 2.02 | 49.6 |
| California Hospital Medical Center | 18.6 | 10.2 | 4.7 | 5.5 | 8.4 | 60.1 | 33.2 | 22.6 | 1.47 | 54.0 |
| Cedars-Sinai Medical Center | 24.4 | 9.2 | 4.4 | 4.8 | 15.2 | 79.3 | 55.8 | 18.8 | 2.97 | 59.3 |
| Good Samaritan Hospital | 21.7 | 11.2 | 8.7 | 2.5 | 10.5 | 68.4 | 42.0 | 22.5 | 1.87 | 42.5 |
| Hollywood Presbyterian Medical Center | 26.7 | 14.5 | 8.1 | 6.4 | 12.2 | 80.9 | 54.9 | 20.5 | 2.68 | 51.3 |
| Pacific Alliance Medical Center | 25.6 | 7.2 | 6.1 | 1.1 | 18.4 | 110.6 | 69.0 | 36.1 | 1.91 | 38.1 |
| St. Vincent Medical Center | 20.0 | 10.5 | 4.5 | 6.0 | 9.6 | 75.9 | 49.5 | 21.8 | 2.27 | 46.7 |
| UCLA Medical Center | 18.5 | 11.6 | 4.8 | 6.8 | 6.9 | 52.8 | 35.3 | 13.7 | 2.57 | 52.9 |
| White Memorial Medical Center | 22.4 | 10.0 | 4.2 | 5.8 | 12.4 | 69.4 | 38.0 | 28.6 | 1.33 | 61.7 |
| St. Francis Medical Center | 17.6 | 7.7 | 3.9 | 3.8 | 9.9 | 82.6 | 55.2 | 22.3 | 2.48 | 54.4 |
| Providence Holy Cross Medical Center | 18.1 | 8.1 | 2.8 | 5.3 | 10.0 | 58.9 | 36.1 | 18.6 | 1.94 | 50.5 |
| Doctors Hospital Medical Center | 13.2 | 7.8 | 3.6 | 4.2 | 5.3 | 76.5 | 36.6 | 38.0 | 0.96 | 41.7 |
| Beverly Hospital | 18.3 | 8.2 | 3.9 | 4.3 | 10.1 | 69.0 | 40.3 | 25.6 | 1.58 | 47.6 |
| Northridge Hospital Medical Center | 19.1 | 8.7 | 3.7 | 5.0 | 10.4 | 65.0 | 39.0 | 22.9 | 1.70 | 48.1 |
| Mission Community Hospital | 18.1 | 7.3 | 4.4 | 2.9 | 10.8 | 69.8 | 39.7 | 26.8 | 1.48 | 37.9 |
| Huntington Memorial Hospital | 18.9 | 7.6 | 2.2 | 5.4 | 11.3 | 61.2 | 36.1 | 22.2 | 1.63 | 49.4 |
| Pomona Valley Hospital Medical Center | 14.5 | 7.8 | 2.6 | 5.2 | 6.7 | 58.2 | 28.9 | 26.9 | 1.08 | 42.1 |
| San Gabriel Valley Medical Center | 21.6 | 10.6 | 6.8 | 3.8 | 11.0 | 87.8 | 54.4 | 29.4 | 1.85 | 50.8 |
| San Pedro Peninsula Hospital | 15.1 | 8.1 | 2.9 | 5.2 | 7.1 | 41.7 | 27.6 | 11.4 | 2.43 | 35.6 |
| Santa Monica UCLA Medical Center | 17.8 | 10.4 | 4.0 | 6.3 | 7.5 | 55.3 | 32.1 | 21.4 | 1.50 | 52.7 |
| St. John's Health Center | 18.7 | 7.7 | 3.6 | 4.1 | 11.0 | 68.3 | 41.8 | 23.2 | 1.81 | 53.4 |
| Sherman Oaks Hospital & Health Center | 17.3 | 8.5 | 4.2 | 4.3 | 8.8 | 58.2 | 33.5 | 22.2 | 1.51 | 49.3 |
| Encino-Tarzana Regional Medical Center | 20.4 | 10.8 | 3.1 | 7.7 | 9.6 | 64.5 | 39.5 | 21.6 | 1.83 | 56.9 |

**Appendix Table 3f. Utilization per decedent during the last six months of life (deaths 2001-05))**

| Hospital name | Hospital days | Intensive and intermediate care days | High-intensity ICU/CCU days | Intermediate-intensity days | Medical/ surgical days | Total physician visits | Medical specialist visits | Primary care physician visits | Ratio of MS/ PC visits | Percent seeing 10 or more physicians |
|---|---|---|---|---|---|---|---|---|---|---|
| Providence-Little Company of Mary | 15.5 | 9.8 | 3.4 | 6.4 | 5.7 | 44.2 | 27.6 | 14.2 | 1.95 | 36.7 |
| Torrance Memorial Medical Center | 14.2 | 7.6 | 3.8 | 3.8 | 6.6 | 40.8 | 25.2 | 13.1 | 1.92 | 33.0 |
| Henry Mayo Newhall Memorial Hospital | 18.1 | 6.9 | 6.3 | 0.5 | 11.2 | 51.6 | 33.8 | 15.4 | 2.19 | 42.0 |
| Valley Presbyterian Hospital | 18.0 | 9.6 | 3.6 | 6.1 | 8.4 | 59.4 | 35.5 | 21.3 | 1.67 | 42.9 |
| Citrus Valley Medical Center-QV Campus | 18.3 | 8.6 | 3.6 | 5.0 | 9.7 | 75.8 | 50.2 | 22.5 | 2.23 | 48.7 |
| Presbyterian Intercommunity Hospital | 13.6 | 5.3 | 2.5 | 2.9 | 8.3 | 44.1 | 24.4 | 17.1 | 1.42 | 35.0 |
| **Los Angeles hospitals** | **18.8** | **8.7** | **3.9** | **4.8** | **10.1** | **65.1** | **40.8** | **20.8** | **1.96** | **47.7** |
| **Sutter Health (Sacramento)** | **10.3** | **4.1** | **1.6** | **2.5** | **6.3** | **27.0** | **12.3** | **13.4** | **0.92** | **30.2** |
| **Mayo Foundation (Rochester)** | **11.6** | **3.5** | **3.1** | **0.3** | **8.1** | **23.0** | **10.1** | **11.0** | **0.92** | **37.5** |
| **Intermountain Health Care (SLC/Ogden)** | **8.8** | **2.3** | **2.2** | **0.1** | **6.5** | **20.1** | **9.0** | **9.8** | **0.92** | **20.6** |

**Appendix Table 3g. Intensity of terminal care and average co-payments during the last two years of life (deaths 2001-05)**

| Hospital name | Intensity of terminal care (deaths 2001-05) | | Average co-payments for physician services and durable medical equipment per decedent | | |
|---|---|---|---|---|---|
| | Percent of deaths associated with admission to ICU/IMCU | Percent admitted to hospice during the last six months of life | Total co-payments | Part B (physician) co-payment | Durable medical equipment |
| Alhambra Hospital Medical Center | 49.6 | 10.5 | $5,890 | $5,248 | $642 |
| Methodist Hospital of Southern California | 30.8 | 24.9 | $4,089 | $3,583 | $506 |
| Providence St. Joseph Center | 32.1 | 22.3 | $4,811 | $4,337 | $474 |
| West Hills Hospital & Medical Center | 26.5 | 32.7 | $4,104 | $3,624 | $480 |
| Citrus Valley Medical Center-IC Campus | 27.6 | 29.9 | $4,432 | $3,978 | $454 |
| Brotman Medical Center | 34.5 | 14.4 | $5,692 | $5,059 | $633 |
| Downey Regional Medical Center | 29.1 | 21.4 | $4,440 | $4,001 | $439 |
| City of Hope National Medical Center | 19.8 | 29.1 | $4,163 | $3,841 | $323 |
| Encino-Tarzana Regional Medical Center | 31.4 | 27.5 | $4,206 | $3,821 | $385 |
| Memorial Hospital of Gardena | 35.1 | 12.0 | $4,776 | $4,098 | $679 |
| Glendale Adventist Medical Center | 36.4 | 17.9 | $5,208 | $4,757 | $451 |
| Glendale Memorial Hospital | 34.4 | 23.3 | $5,208 | $4,685 | $523 |
| Verdugo Hills Hospital | 26.7 | 23.1 | $3,707 | $3,356 | $351 |
| Foothill Presbyterian Hospital | 22.2 | 33.3 | $3,230 | $2,807 | $422 |
| Lakewood Regional Medical Center | 29.7 | 23.2 | $4,259 | $3,781 | $478 |
| Antelope Valley Hospital | 26.0 | 21.7 | $4,552 | $3,965 | $587 |
| Lancaster Community Hospital | 28.0 | 23.7 | $4,760 | $4,095 | $665 |
| Long Beach Memorial Medical Center | 33.2 | 26.0 | $4,735 | $4,327 | $408 |
| Pacific Hospital of Long Beach | 30.6 | 18.8 | $3,996 | $3,428 | $568 |
| St. Mary Medical Center | 30.5 | 20.9 | $6,099 | $5,581 | $517 |
| California Hospital Medical Center | 39.1 | 11.7 | $5,387 | $4,804 | $583 |
| Cedars-Sinai Medical Center | 40.0 | 19.6 | $6,524 | $5,920 | $603 |
| Good Samaritan Hospital | 39.6 | 15.7 | $5,157 | $4,733 | $423 |
| Hollywood Presbyterian Medical Center | 45.8 | 6.2 | $5,341 | $4,688 | $652 |
| Pacific Alliance Medical Center | 39.9 | 5.5 | $4,838 | $4,281 | $557 |
| St. Vincent Medical Center | 35.2 | 11.9 | $5,664 | $5,154 | $510 |
| UCLA Medical Center | 37.9 | 28.8 | $4,835 | $4,298 | $537 |
| White Memorial Medical Center | 36.5 | 12.5 | $6,252 | $5,604 | $648 |
| St. Francis Medical Center | 37.5 | 13.7 | $5,163 | $4,530 | $634 |
| Providence Holy Cross Medical Center | 31.5 | 21.9 | $4,658 | $4,055 | $603 |
| Doctors Hospital Medical Center | 24.1 | 23.3 | $4,297 | $3,708 | $589 |
| Beverly Hospital | 32.9 | 20.6 | $5,556 | $5,080 | $477 |
| Northridge Hospital Medical Center | 31.5 | 22.5 | $4,665 | $4,189 | $476 |
| Mission Community Hospital | 27.8 | 20.0 | $4,655 | $4,011 | $644 |
| Huntington Memorial Hospital | 29.4 | 25.0 | $4,043 | $3,628 | $415 |
| Pomona Valley Hospital Medical Center | 30.8 | 28.7 | $4,425 | $3,915 | $510 |
| San Gabriel Valley Medical Center | 36.5 | 18.5 | $4,576 | $4,093 | $483 |
| San Pedro Peninsula Hospital | 34.1 | 25.7 | $3,391 | $3,022 | $369 |
| Santa Monica UCLA Medical Center | 32.9 | 27.9 | $4,322 | $3,794 | $529 |
| St. John's Health Center | 30.3 | 28.2 | $5,883 | $5,372 | $512 |

**Appendix Table 3g. Intensity of terminal care and average co-payments during the last two years of life (deaths 2001-05)**

| Hospital name | Intensity of terminal care (deaths 2001-05) | | Average co-payments for physician services and durable medical equipment per decedent | | |
|---|---|---|---|---|---|
| | Percent of deaths associated with admission to ICU/IMCU | Percent admitted to hospice during the last six months of life | Total co-payments | Part B (physician) co-payment | Durable medical equipment |
| Sherman Oaks Hospital & Health Center | 31.7 | 22.2 | $3,784 | $3,395 | $389 |
| Encino-Tarzana Regional Medical Center | 34.6 | 25.8 | $5,355 | $4,865 | $490 |
| Providence-Little Company of Mary | 33.8 | 28.9 | $3,826 | $3,363 | $464 |
| Torrance Memorial Medical Center | 32.3 | 30.7 | $3,745 | $3,286 | $459 |
| Henry Mayo Newhall Memorial Hospital | 31.1 | 30.7 | $4,472 | $4,027 | $445 |
| Valley Presbyterian Hospital | 35.0 | 20.9 | $4,253 | $3,808 | $445 |
| Citrus Valley Medical Center-QV Campus | 38.6 | 18.9 | $4,665 | $3,996 | $669 |
| Presbyterian Intercommunity Hospital | 21.7 | 35.7 | $3,774 | $3,325 | $448 |
| **Los Angeles hospitals** | **33.1** | **22.7** | **$4,810** | **$4,305** | **$505** |
| **Sutter Health (Sacramento)** | **21.2** | **24.8** | **$3,051** | **$2,622** | **$429** |
| **Mayo Foundation (Rochester)** | **19.4** | **26.9** | **$2,360** | **$2,099** | **$261** |
| **Intermountain Health Care (SLC/Ogden)** | **14.2** | **45.1** | **$2,422** | **$1,973** | **$450** |

**Appendix Table 3h. CMS Hospital Compare quality scores (2005) (all patients)**

| Hospital name | Composite score | AMI score | CHF score | Pneumonia score |
|---|---|---|---|---|
| Alhambra Hospital Medical Center | n/a | n/a | n/a | n/a |
| Methodist Hospital of Southern California | 79.0 | 85.8 | 81.5 | 69.3 |
| Providence St. Joseph Center | 91.0 | 97.8 | 96.5 | 79.8 |
| West Hills Hospital & Medical Center | 81.2 | 93.3 | 84.0 | 67.8 |
| Citrus Valley Medical Center-IC Campus | 77.9 | 94.8 | 70.0 | 65.0 |
| Brotman Medical Center | n/a | n/a | n/a | n/a |
| Downey Regional Medical Center | 85.5 | 88.6 | 82.0 | 83.5 |
| City of Hope National Medical Center | n/a | n/a | n/a | n/a |
| Encino-Tarzana Regional Medical Center | n/a | n/a | n/a | n/a |
| Memorial Hospital of Gardena | 66.9 | 73.3 | 88.5 | 49.8 |
| Glendale Adventist Medical Center | 79.7 | 89.6 | 75.5 | 69.5 |
| Glendale Memorial Hospital | 91.1 | 98.6 | 95.5 | 79.5 |
| Verdugo Hills Hospital | 76.4 | 84.5 | 71.0 | 71.0 |
| Foothill Presbyterian Hospital | 75.8 | 87.0 | 66.5 | 69.3 |
| Lakewood Regional Medical Center | 88.5 | 94.2 | 89.0 | 81.0 |
| Antelope Valley Hospital | 79.5 | 86.6 | 72.0 | 74.5 |
| Lancaster Community Hospital | 74.6 | 80.0 | 71.0 | 69.8 |
| Long Beach Memorial Medical Center | 85.9 | 97.8 | 90.0 | 69.0 |
| Pacific Hospital of Long Beach | n/a | n/a | n/a | n/a |
| St. Mary Medical Center | 85.5 | 96.2 | 88.0 | 70.8 |
| California Hospital Medical Center | 88.4 | 96.8 | 94.5 | 77.0 |
| Cedars-Sinai Medical Center | 96.5 | 100.0 | 100.0 | 90.3 |
| Good Samaritan Hospital | 79.7 | 88.6 | 83.5 | 66.8 |
| Hollywood Presbyterian Medical Center | 76.4 | 92.0 | 81.0 | 58.5 |
| Pacific Alliance Medical Center | 45.2 | 43.5 | 44.0 | 48.3 |
| St. Vincent Medical Center | 72.2 | 73.8 | 70.0 | 71.3 |
| UCLA Medical Center | 83.9 | 95.0 | 92.0 | 66.0 |
| White Memorial Medical Center | 80.8 | 93.8 | 82.5 | 67.0 |
| St. Francis Medical Center | 79.9 | 86.4 | 89.5 | 67.0 |
| Providence Holy Cross Medical Center | 92.4 | 95.8 | 91.5 | 88.5 |
| Doctors Hospital Medical Center | 82.4 | 80.5 | 90.5 | 79.7 |
| Beverly Hospital | 85.2 | 95.8 | 87.5 | 70.8 |
| Northridge Hospital Medical Center | 92.7 | 99.8 | 95.5 | 82.5 |
| Mission Community Hospital | 74.2 | 81.5 | 82.0 | 59.3 |
| Huntington Memorial Hospital | 76.7 | 90.2 | 79.5 | 58.5 |
| Pomona Valley Hospital Medical Center | 82.9 | 89.0 | 88.5 | 72.5 |
| San Gabriel Valley Medical Center | 79.9 | 83.8 | 79.0 | 76.5 |
| San Pedro Peninsula Hospital | n/a | n/a | n/a | n/a |
| Santa Monica UCLA Medical Center | 86.2 | 96.8 | 90.5 | 70.8 |
| St. John's Health Center | 83.1 | 96.8 | 83.0 | 66.0 |
| Sherman Oaks Hospital & Health Center | n/a | n/a | n/a | n/a |
| Encino-Tarzana Regional Medical Center | 84.1 | 90.4 | 84.5 | 76.0 |

| Appendix Table 3h. CMS Hospital Compare quality scores (2005) (all patients) | | | | |
|---|---|---|---|---|
| **Hospital name** | **Composite score** | **AMI score** | **CHF score** | **Pneumonia score** |
| Providence-Little Company of Mary | 86.3 | 95.0 | 87.0 | 75.0 |
| Torrance Memorial Medical Center | 80.7 | 87.2 | 82.5 | 71.8 |
| Henry Mayo Newhall Memorial Hospital | 82.2 | 94.0 | 83.5 | 69.8 |
| Valley Presbyterian Hospital | 80.1 | 91.6 | 85.5 | 57.3 |
| Citrus Valley Medical Center-QV Campus | n/a | n/a | n/a | n/a |
| Presbyterian Intercommunity Hospital | 84.1 | 96.4 | 89.5 | 66.0 |
| **Los Angeles hospitals** | **81.4** | **89.6** | **83.5** | **70.6** |
| **Sutter Health (Sacramento)** | **88.1** | **95.1** | **92.0** | **77.4** |
| **Mayo Foundation (Rochester)** | **94.1** | **97.8** | **95.5** | **88.8** |
| **Intermountain Health Care (SLC/Ogden)** | **87.6** | **92.6** | **91.9** | **79.8** |

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