



# Tracking the Care of Patients with Severe Chronic Illness

## The Dartmouth Atlas of Health Care 2008

Lead Author **John E. Wennberg** Co-Authors **Elliott S. Fisher, David C. Goodman, Jonathan S. Skinner**

*“In health care,  
it matters  
where you get  
your care.”*

**More than 90 million Americans** live with at least one chronic illness, and seven out of ten Americans die from chronic disease. The quality of care for Americans with chronic disease is remarkably uneven.<sup>1</sup> Most patients receive episodic care from multiple different physicians who rarely coordinate the care they deliver. And the growing costs of chronic disease care present a threat not only to patients and their families but also to the nation.<sup>2</sup>

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: the frequency of primary care visits per Medicare enrollee varies 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. Spending on patients with serious chronic illness varies by a factor of nearly three.<sup>3</sup>

Most Americans would assume that these variations are due primarily to differences in how sick people are. And most would assume that those living in the regions getting more care would be getting better care and achieving better health outcomes. But neither of these assumptions holds true. Analyses of variations in practice and spending thus provide insights into the underlying causes of poor quality and rising costs and point to important opportunities to reform the U.S. health care system.

This edition of *The Dartmouth Atlas of Health Care* describes how care for Medicare beneficiaries with serious chronic illness varies across U.S. states, regions, and hospitals. As in the 2006 edition, the focus is on Medicare beneficiaries who have serious chronic illness and are in their last two years of life. This edition both updates the earlier analyses to encompass more recent data (now through 2005) and expands the scope to include all sectors of care covered by the Medicare program, including acute inpatient hospital care, outpatient services, skilled nursing and long-term hospital care, home health care and hospice services. This Executive Summary provides a brief overview of the major findings, conclusions, insights, and recommendations that are presented in the current edition.

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## Unwarranted Variation and the Categories of Care

Some variations in practice are clearly justified. Unwarranted variations refer to variations in practice or spending that cannot be explained on the basis of illness, strong scientific evidence, or well-informed patient preferences.<sup>4</sup> The Dartmouth Atlas Project distinguishes three categories of care (see box).

The focus of this Atlas is on the use of just one category, supply-sensitive care, among Medicare patients with severe chronic illness who are in their last two years of life. One reason for this focus is because of the growing concern about the way chronic illness is managed in the United States, and about the increasing recognition that some chronically ill and dying Americans are 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 health system 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 is identical: all were dead after the interval of observation. By further adjusting for differences in age, sex, race, and primary chronic diagnosis, 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.

### Categories of Clinical Services

**Effective care** consists of evidence-based interventions where the benefits so substantially exceed the harms that eligible patients should receive the care. The provision of life-saving drugs following a heart attack is an example. Variation in the use of such treatments among eligible patients reflects a failure to deliver needed care—or underuse.

**Preference-sensitive care** encompasses treatment decisions where different choices carry quite 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 that patients are making fully informed choices.

**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 differences in local capacity and a payment system that ensures current capacity remains fully deployed.

Chapter One summarizes the now extensive research on the underlying causes of variations in practice and spending across regions and hospitals for patients with chronic illness and the implications of these variations for the quality and outcomes of care.

## Chronic Illness and the Problem of Supply-Sensitive Care (Chapter One)

**Variations in spending are not due to differences in the prevalence of serious illness.** Although there are differences in the prevalence of severe chronic illness across U.S. regions, these differences explain only a small proportion—about 4%—of the variations in Medicare spending across the 306 hospital referral regions (HRRs) defined by the Dartmouth Atlas Project.

**Variations in spending are largely due to differences in supply-sensitive care.** Extensive research, dating back to early work by Milton Roemer, has confirmed the strong association between per capita supply of hospital beds and hospitalization rates for common medical conditions. For conditions where hospitalization is required—as with hip fractures—variations in utilization are unrelated to the local supply of beds. But where medical decisions are more discretionary—as is the case for patients with heart failure and most other medical conditions—admission rates are strongly correlated with the local supply of hospital beds. And in regions with more physicians, the frequency of visits to physicians is higher. The degree of variation is remarkable: 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.

**Is more better?** Over the past ten years, a growing body of research has asked whether greater use of supply-sensitive care results in better quality of care or better health outcomes. And the answer is increasingly clear. Whether from patients' 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) or whether one looks only at patients with serious illnesses cared for at the major academic medical centers within the United States.<sup>5</sup>

**Table 1. Regional Differences in Spending and the Content, Quality, and Outcomes of Care**

	Higher spending regions compared to lower spending*
<b>Health care resources<sup>6</sup></b>	<ul style="list-style-type: none"> <li>■ Per capita supply of hospital beds 32% higher.</li> <li>■ Per capita supply of physicians 31% higher overall: 65% more medical specialists, 75% more general internists, 29% more surgeons, and 26% fewer family practitioners.</li> </ul>
<b>Content and quality of care<sup>4,6,7</sup></b>	<ul style="list-style-type: none"> <li>■ Adherence to process-based measures of quality lower (quality worse).</li> <li>■ Little difference in rates of major elective surgery.</li> <li>■ More hospital stays, physician visits, specialist referrals, imaging, and minor tests and procedures.</li> </ul>
<b>Health outcomes<sup>8,9</sup></b>	<ul style="list-style-type: none"> <li>■ Mortality over a period of up to five years slightly higher following acute myocardial infarction, hip fracture, and colorectal cancer diagnosis.</li> <li>■ No difference in functional status.</li> </ul>
<b>Physician perceptions of quality<sup>10</sup></b>	<ul style="list-style-type: none"> <li>■ More likely to report poor communication among physicians.</li> <li>■ More likely to report inadequate continuity of patient care.</li> <li>■ Greater difficulty obtaining inpatient admissions or high quality specialist referrals.</li> </ul>
<b>Patient-reported quality of care<sup>8</sup></b>	<ul style="list-style-type: none"> <li>■ Worse access to care and greater waiting times.</li> <li>■ No difference in patient-reported satisfaction with care.</li> </ul>
<b>Trends over time<sup>9</sup></b>	<ul style="list-style-type: none"> <li>■ 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.</li> </ul>

\* 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.<sup>6</sup>

**What is going on?** The likely explanation for both the dramatic differences in spending and the strong correlations with supply lies in the lack of firm scientific evidence available to guide most clinical decisions; the general assumption among both physicians and patients that more medical care means better care; the marked variations in supply that emerge in an unplanned marketplace; and a fee-for-service payment system that rewards providers for staying busy. Physicians adapt their practice subliminally to the available resources. From the primary care physician’s perspective, for example, it will often seem more efficient to refer to a specialist or admit to the hospital if those resources are available and payments for office-based primary care have been constrained. The key element of the theory is that because so many clinical decisions are in the “gray areas” of medicine where evidence is now lacking (how often to see a patient, when to refer to a specialist, when to admit), any expansion of capacity will result in subtle shifts of clinical judgment toward greater intensity of care.

**Implications for patient preferences.** Concern about overly aggressive care for patients at the end of life has sparked increasing interest both in palliative care and in aligning the kinds of services provided to dying patients with their well-informed preferences. Because care for seriously ill patients varies so substantially across regions and hospitals, patients and their families can benefit from the insights about their own systems provided in this edition of the Atlas. In some communities, they may be able to choose hospitals or other sites where the intensity of care is most in keeping with their personal preferences, especially at the end of life.

**Implications for evaluating efficiency in managing chronic illness.** The dramatic differences in costs and the absence of any evidence of benefit from higher spending points to important opportunities and challenges for U.S. policy makers. The opportunity lies in the potential gains in efficiency that could be



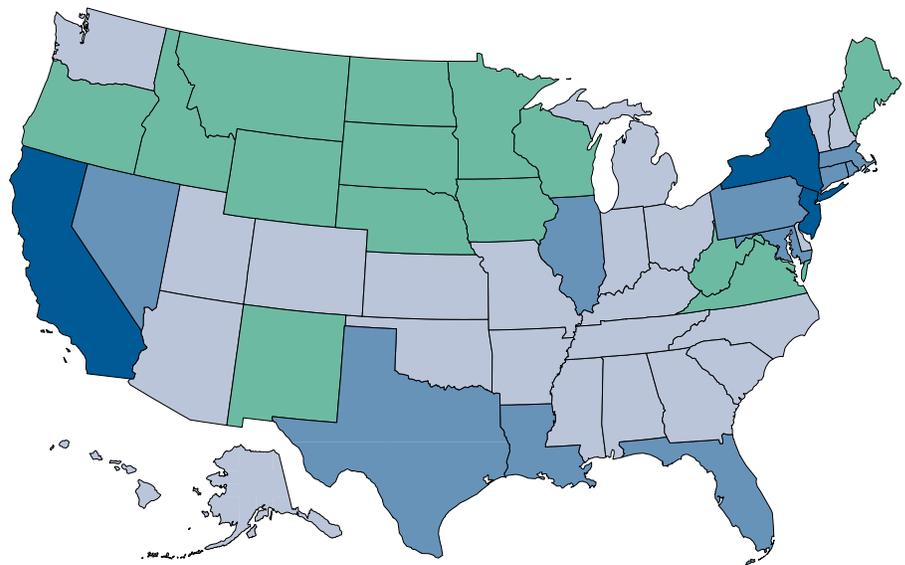
achieved if higher spending regions or hospitals adopted the practice patterns of the most efficient U.S. regions. For example, if all U.S. regions could safely adopt the practice patterns observed for the most efficient regions (such as Madison, Wisconsin; Sioux Falls, South Dakota; or Des Moines, Iowa), spending during 2005 for patients with severe chronic illness would have declined by over 25%.

This edition of the Atlas presents measures of spending and utilization at both the state and regional levels, and for the first time includes data on all sectors of care that are reimbursed through the Medicare program, including acute care hospitals; doctors' offices and outpatient clinics; skilled nursing facilities; long-term care hospitals and rehabilitation facilities; hospices; and care delivered at patients' homes by home health agencies.

Two important insights emerge from these data. First, the volume of services provided is a more important determinant of spending than is the price paid for each service. Second, the availability of lower cost sectors does not appear to reduce the utilization in higher cost sectors. In other words, there is no evidence of substitution of services across sectors.

**Variation in Medicare Spending Among States and Regions (Chapter Two)**

**Variation in Medicare spending among the states and regions:** As was well documented in previous Atlases, the amount of money the Medicare program spends per patient with severe chronic illness in the last two years of life varies substantially among states. During the period 2001–05, thirteen states had spending levels above the national average; 37 states had spending levels below the national average, and in fourteen 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, California, and New York—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 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)**

**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)

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. And the degree of variation among HRRs located within a single state, New York, was nearly as great as that found among all hospital referral regions: more than \$75,000 per chronically ill decedent in the Bronx and Manhattan hospital referral regions compared to \$36,824 in Rochester and \$33,271 in Binghamton.

**The majority of spending occurs in the acute care hospital setting.**

Almost 55% of the total amount spent on Medicare beneficiaries during their last two years of life was in the acute care hospital setting. This includes not only hospital inpatient facility charges, but also payments for inpatient physician visits, procedures, and diagnostic tests. Spending in outpatient settings comprised the next largest fraction of spending—15.6%—whereas other sectors received smaller shares of payments.

**The volume of services provided is a major determinant of differences in spending.**

Medicare and other payers have focused much of their attention on controlling the prices paid to providers for clinical services. Analyses presented in the current Atlas show that differences in the volume of services are more strongly related to state and regional differences in spending than price. State-level variations in inpatient hospital spending, for example, are more strongly correlated with the volume of services (measured as the number of hospital days per beneficiary,  $R^2 = 0.59$ ) than was price (reimbursements per day,  $R^2 = 0.07$ ). Similar patterns are seen for other services. Addressing variation in spending will require attention not only to price, but also to volume.

**Tradeoffs among sectors of care: no evidence of substitution.** Many believe that expanding access to non-acute care sectors, such as skilled nursing or rehabilitation facilities, home health services, or hospices, will reduce the utilization of expensive acute care hospital services. The data in this Dartmouth Atlas suggest that making other kinds of care more readily available does not necessarily lead to a decline in either hospitalizations or 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. The association between higher spending and utilization of ambulatory care, particularly physician visits, with greater numbers of inpatient visits was particularly strong.

**Likely explanation: a system that rewards volume and reinforces fragmentation.**

What can account for the paradoxical finding that higher inpatient care utilization is associated with greater ambulatory and skilled nursing care? First, traditional Medicare pays for utilization in each sector without regard to the level of spending in the others. Second, as we have argued above, both the current fee-for-service payment system and the culture of medicine itself ensures 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. 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. 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. 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.

**Implications: training more primary care physicians alone won't solve the problem.** 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 address the lack of 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. The findings in this chapter underscore the need for care coordination, reform of the payment system, and focus on capacity.

Academic medical centers are responsible not only for the education of current and future physicians, but also for establishing the scientific basis of medical care. This edition of the Atlas examines variations among America's top academic medical centers (AMCs), focusing on three measures: Medicare spending, resource availability, and utilization. Data are provided for the primary teaching hospitals associated with all U.S. medical schools, but special attention is focused on the five AMCs that *U.S. News & World Report* placed at the top of its 2007 Honor Roll for America's Best Hospitals.

## How America's Best Hospitals Manage Chronic Illness (Chapter Three)

**Table 2. Spending, Resource Use, and Utilization of Services Among Medicare Beneficiaries with Chronic Illness Cared For at Five “Honor Roll” Academic Medical Centers (Deaths Occurring 2001–05)**

	UCLA Medical Center	Johns Hopkins Hospital	Massachusetts General Hospital	Cleveland Clinic Foundation	Mayo Clinic (St. Mary's Hospital)
<b>Medicare spending per patient during last two years of life</b>					
Total Medicare spending	\$93,842	\$85,729	\$78,666	\$55,333	\$53,432
Inpatient site of care	\$63,900	\$63,079	\$43,058	\$34,437	\$34,372
Outpatient site of care	\$14,125	\$13,404	\$11,509	\$8,906	\$7,557
Skilled nursing/long-term care facility	\$6,891	\$3,287	\$15,149	\$5,101	\$7,114
Other sectors of care	\$8,926	\$5,959	\$8,951	\$6,889	\$4,389
<b>Resource inputs per 1,000 patients during last two years of life</b>					
Hospital beds	85.8	78.2	79.2	65.5	58.2
Intensive care (ICU) beds	38.1	20.0	16.0	19.2	18.4
FTE physician labor					
<i>All physicians</i>	38.5	25.7	29.5	26.1	20.3
<i>Primary care physicians</i>	9.6	10.0	11.5	8.8	6.8
<i>Medical specialists</i>	21.2	8.9	11.7	10.6	8.9
<b>Care during last six months of life</b>					
Hospital days per patient	18.5	16.5	17.3	14.8	12.0
Physician visits per patient	52.8	28.9	39.5	33.1	23.9
<b>Terminal care</b>					
Percent of deaths associated with ICU admission	37.9	23.2	22.5	23.1	21.8
Percent admitted to hospice	28.8	35.2	23.8	36.6	29.1
<b>Average estimated co-payments per patient for physician services and durable medical equipment during the last two years of life</b>	\$4,835	\$3,390	\$3,409	\$3,045	\$2,439

The remarkable differences among these hospitals highlight both the challenges and the opportunities that emerge from a critical evaluation of their practices.

**Spending:** Medicare spent more than \$93,000 per patient for those loyal to UCLA over the last two years of life. By contrast, for those who received most of their care at the Mayo Clinic, spending came to a little more than half that amount.

**Utilization:** Chronically ill patients loyal to UCLA had more than twice as many physician visits compared to Mayo, and they spent about 50% more days in the hospital.

**Resource Use:** Compared to the Mayo Clinic, UCLA used about one and a half times the number of beds and almost twice as many physician FTEs in managing similar patients

**Benchmarks of efficiency.** The current edition of the Atlas draws on these data to propose an approach to measuring and improving the efficiency of U.S. hospitals' chronic disease care using the principles of benchmarking and the concept of relative efficiency. 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. 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.

### Understanding the Role of Volume and Price: The Medical Care Cost Equation

As was discussed above, both volume and price contribute to the differences in spending that are observed across states and regions. The same is true for the chronic disease populations cared for by individual hospitals. To understand the relative contribution of each and to estimate potential savings from reducing the volume of services, it is useful to consider “the medical care cost equation,” which makes these contributions transparent. The equation can be expressed in terms of actual dollars, as well as ratios to a benchmark. Table 3, below, illustrates both, using the Mayo Clinic in Rochester, MN as the benchmark.

**Table 3. The Medical Care Cost Equation**

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
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

The relative contributions of volume and price to the differences in inpatient spending are clearly shown in the table. UCLA's inpatient spending was 1.84 times that of the Mayo Clinic because its patients spent 47% more days in the hospital and reimbursements per day were 25% higher. Using the Cleveland Clinic as the benchmark would show that spending at UCLA was 87% higher, because UCLA patients spent 31% more days in the hospital, and reimbursements per day were 43% higher.

The current Atlas provides numerous examples of how this approach to benchmarking may be used to compare efficiency, estimate labor inputs, and calculate the potential savings that could be achieved by reducing overuse of supply-sensitive services at high-cost institutions. An example based upon data from UCLA and the Mayo Clinic is provided in the box.

**Estimating potential savings.** Data from the Atlas can therefore be used to estimate the savings that could be achieved if, for example, UCLA met the *utilization* benchmark provided by the Mayo Clinic. Because reimbursement rates reflect local and federal factors that are beyond the control of hospital administrators (such as local labor costs and variable subsidies for graduate medical education), the volume standard of St. Mary's (21.3 days per decedent) can be applied to the UCLA reimbursement rate per day (\$1,871) to estimate what per decedent spending would have been had the Mayo utilization benchmark applied (\$39,772 per decedent). The savings in hospital reimbursements from meeting the utilization benchmark provided by Mayo would thus be \$18,785 per patient. A similar approach can be used to estimate savings for physician evaluation and management services (\$2,974 per decedent loyal to UCLA). This results in an estimate of almost \$22,000 in potential savings per decedent, a 34% reduction in payments for these two sectors of care alone.

**Rethinking the physician shortage.** The varying patterns of use of physician labor 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 meaningful estimates of how many the nation now needs, much less what will be needed in the future? The debate over the projected need for physicians cannot be resolved without understanding the effect that the physician workforce supply has on utilization patterns. In light of the evidence that regions and academic medical centers with greater use of physician labor in managing chronic illness incur higher costs and have slightly worse outcomes (Table 1), the assertion that the nation faces a physician shortage warrants critical examination.<sup>11</sup>

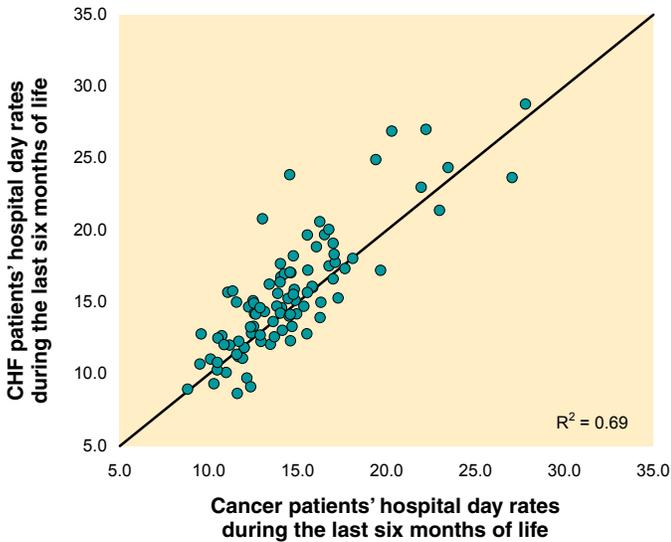
**Rethinking the nursing shortage.** Finally, the variation among academic medical centers in the number of hospital beds used in managing their patient populations implies variation in the number of registered nurses required to treat patients in the hospital. The method is described in detail in Chapter Three. The variation in staffing requirements for the top five academic medical centers is shown in Table 4.

**Table 4. Inpatient Nurse Staffing Requirements per 1,000 Decedents to Meet Proposed Federal Standards of Care During the Last Two Years of Life among Medicare Beneficiaries with Chronic Illness Cared For at Five “Honor Roll” Academic Medical Centers (Deaths Occurring 2001-05)**

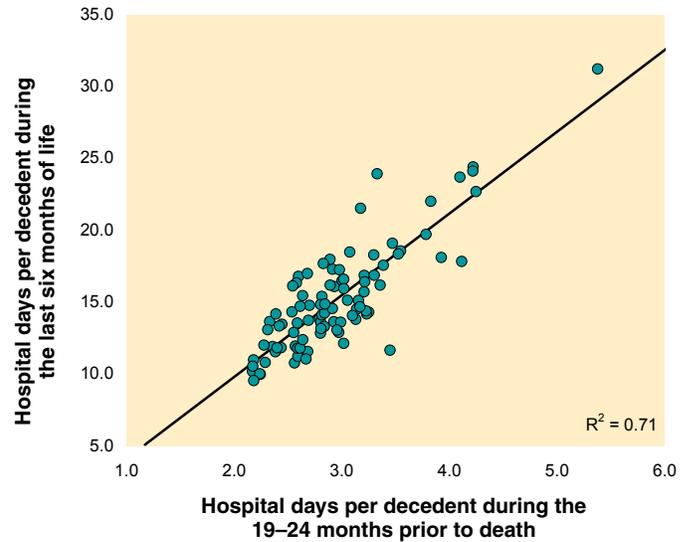
Academic Medical Center	Nurse requirements according to level of bed intensity			
	Total	High-intensity ICU/CCU beds	Intermediate-intensity ICU beds	Medical & surgical unit beds
UCLA Medical Center	80.7	20.7	24.3	35.8
Massachusetts General Hospital	70.9	22.6	1.0	47.4
Johns Hopkins Hospital	69.6	17.7	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

These data suggest that reducing the overuse of acute care hospitals would not only save money, it could also help resolve the national shortage in the registered nurse workforce.

**The hospital capacity effect on chronic disease care: a medical signature.** The data presented in the Atlas demonstrate how dramatically academic medical centers vary in the per capita number of physicians, beds, and nurses they use relative to the size of the patient populations they serve. 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. Hospitals with low utilization rates for patients with one chronic condition tend to have low utilization rates for patients with other conditions, and vice versa. Figure 1 provides just one example: the relationship between hospital day rates for patients with cancer and with congestive heart failure (CHF). Similar correlations are observed when one looks at patients with other chronic illnesses, when one studies patients from different socioeconomic backgrounds, or when one compares older and younger, male and female, and black and non-black patients.



**Figure 1. Association Between Hospital Day Rates per Decedent for Patients with Cancer and Congestive Heart Failure During the Last Six Months of Life Among Patients Receiving Most of their Care at Selected Academic Medical Centers (Deaths Occurring 2001–05)**



**Figure 2. 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)**

Finally, this hospital effect, or medical signature, is highly consistent over time (in the absence of major changes in hospital capacity). Figure 2 shows the close relationship between hospital day rates during the last six months of life and during the 19–24 months prior to death. That patients grew increasingly ill over time is reflected in the fact that per capita hospital days were roughly three to four times greater during the last six months of life as compared with months 19–24 preceding death. But the variation in rates among hospitals was striking during both periods, and the amount of care given to patients early in the two year period preceding death was highly correlated with care intensity during the last six months of life for each individual hospital. A similar association exists for physician visit rates. 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.

**Care intensity and patient choice.** Many Americans are concerned about the care they will likely receive at the end of life and express their wishes for the care they would prefer through advance directives. Yet the differences across hospitals (and substantial research) suggests that the patient’s wishes may have less influence on the intensity of care he or she receives than the practice patterns at the hospital where care is delivered.<sup>12,13</sup>

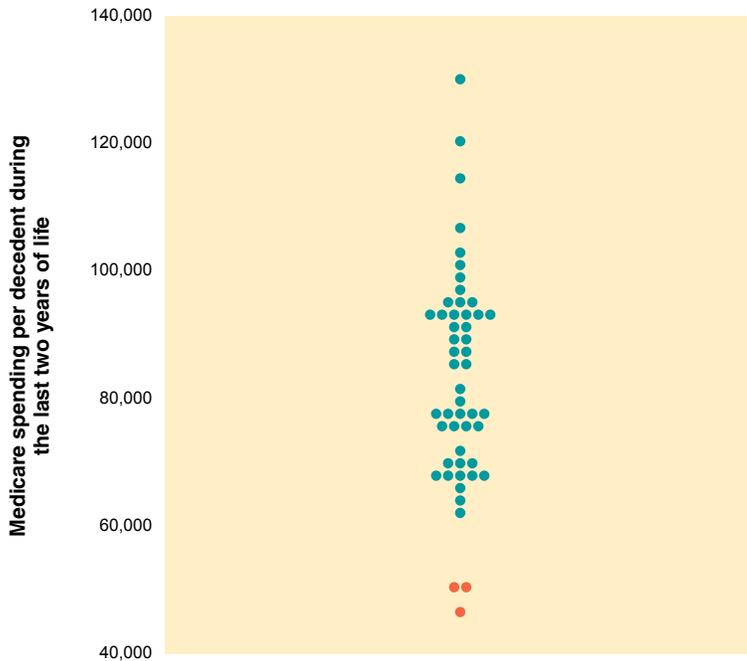
Hospital-specific data that make end-of-life practice patterns transparent could help patients and families identify providers whose care patterns correspond more closely to their preferences. For those who seek more conservative, less aggressive care, the Dartmouth Atlas can point to those hospitals 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. We discuss these ideas further below.

### **Evaluating Local Health Systems: The Case of Los Angeles (Chapter Four)**

This edition of the Dartmouth Atlas provides several case studies of how hospital-specific performance measures can be used to support local reform initiatives and improve patient choice. Using the spending, resource input, and utilization profiles of relatively efficient providers to evaluate hospital efficiency provides a means to rank hospitals and gives less efficient providers potential models for how to allocate resources more rationally.

**A high-cost region.** Los Angeles, a hospital referral region that epitomizes high-cost, high-intensity health care, provides an important and telling example. The region as a whole ranked third among the 306 Atlas HRRs 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 inputs 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 in the national distribution in “high-tech” deaths: 30.2% 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.

**Variation among providers within Los Angeles.** The health care providers serving any given region are not all alike, including the providers in Los Angeles (Figure 3). Medicare spending during the last two years of life varied from \$131,000 per beneficiary at the most costly Los Angeles hospital to \$61,000 at the least expensive hospital. The current edition provides data to support benchmarking against integrated delivery systems, such as the Mayo Clinic in Rochester, Minnesota, Intermountain Healthcare (IHC) in Utah, and the Sutter system hospitals in Sacramento. While the Mayo Clinic originated as a physician group practice in Rochester, Minnesota, both Sutter and Intermountain Healthcare evolved from the consolidation of several hospitals into integrated systems where the organization of the physician staff into group practices remains an ongoing process. Regardless of which benchmark is chosen, however, the data point to a substantial—and variable—degree of overuse of supply-sensitive services at Los Angeles hospitals. These differences in spending, as has been discussed before, reflect real differences in utilization and resource inputs, with a relatively small contribution due to price differences.

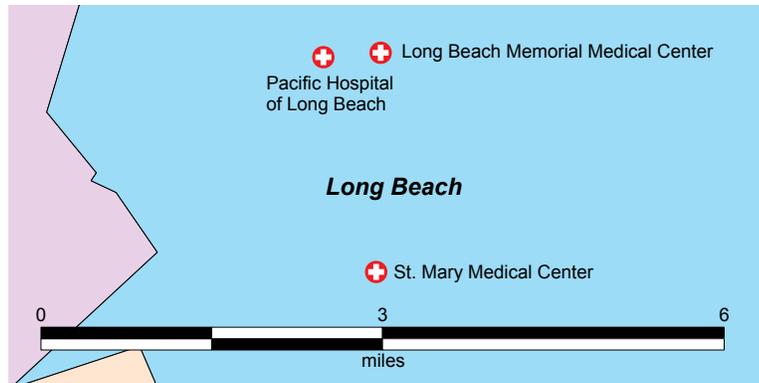


	Rate	Ratio to IHC
Highest	\$130,992	2.82
2nd highest	\$120,756	2.60
75th percentile	\$93,862	2.02
L.A. hospitals average	\$84,317	1.82
25th percentile	\$74,120	1.60
2nd lowest	\$63,661	1.37
Lowest	\$61,239	1.32
<b>Benchmark Systems</b>		
Sutter (Sacramento)	\$50,718	1.09
Mayo (Rochester)	\$50,273	1.08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

**Figure 3. 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)**

**Opportunities for savings.** 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 would have required 75% more registered nurses under proposed federal standards. That amounts to a lot of wasted effort and unnecessary care.

**Hospitals are nonetheless expanding acute care capacity.** 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.



**Map 2. Long Beach**

**A practical example: What might happen in Long Beach?** The current edition of the Atlas works through examples of how hospitals in Los Angeles that are within a single hospital system in Los Angeles (Catholic Healthcare West), or within the same neighborhood (Long Beach) can be compared. The Long Beach community is served by three acute care hospitals located within three miles of each other (Map 2). Averaged over the five-year period from 2001–05, patients loyal to St. Mary Medical Center cost the Medicare program more than \$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 5. 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
<b>Medicare spending in last two years of life</b>				
Total Medicare spending per decedent	\$98,315	\$89,937	\$80,710	1.22
<b>Resource use during last two years of life</b>				
Hospital beds	118.1	84.7	78.3	1.51
FTE physician labor	47.8	32.3	40.8	1.48
<b>Care intensity during last six months of life</b>				
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

These differences highlight both the opportunities and the challenges facing both Los Angeles and the country.

**How could hospitals improve their efficiency? Expand their population base.** 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. 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 the number of beds required to care for its population. 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.

**Where would the patients come from? Why might they shift their loyalty?** Patients with severe chronic illness are not highly mobile, so 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 for inpatient and physician services 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. As more patients move 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: if the Mayo Clinic benchmark were reached at Long Beach Memorial, the estimated per decedent spending for inpatient and physician spending would drop from \$80,710 to \$57,912.

**Who wins and why?** One group of winners in this scenario would be payers—insurance companies, Medicare Advantage plans, and Long Beach employers with large numbers of older workers and retirees, such as Boeing. They would all see their costs fall. The Long Beach Memorial Hospital could also become a winner if it were willing and able to take risks, based on the knowledge that its costs are 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<sup>i</sup> and would be exposed to less physical and financial risk from acute care hospitalization and high-intensity care at the end of life.

**But the situation is not “win-win”.** 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 for its loyal patient population would go up. St. Mary patients would experience more physician visits, hospitalizations, and stays in intensive care, 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

<sup>i</sup> According to CMS measures, the quality of care for Long Beach Memorial already ranks higher than for St. Mary.

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.

**The problem: supply-sensitive care and Roemer's law in action.**

Because reduction in capacity means reduction in utilization, and reduction in utilization means lowered revenue, reducing capacity leads to lower revenue. As patients move to more efficient hospitals like Long Beach Memorial, less efficient hospitals like St. Mary would lose not just the cash flow to pay for current capacity; many would also find it difficult to pay off their debt to the bond market. Failure to meet these obligations could mean bankruptcy. Managers of for-profit hospitals are accountable to investors. It is hard for hospitals to reduce excess capacity, no matter how such measures might improve the quality of the care they deliver to their patients.

**Implications: information will not be enough.**

As our Dartmouth colleague Paul Batalden is fond of saying, "Every system is perfectly designed to get the results it gets." Because the payment system continues to reward the expansion of acute care facilities, there is little incentive for providers to pay attention to the volume of care they provide or to develop systems for managing and coordinating the care of patients with chronic illness. And hospitals are accountable—either to their stockholders or to those who hold their bonds—for their financial performance, which under the current payment system depends upon revenue derived from utilization. Addressing the problem of excess acute care capacity will thus require reform of the payment system.

**Dealing with Unwarranted Variation: Strategies for Reform (Chapter Five)**

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 emerging clinical strategies designed to improve care: the hospice and palliative care movements, the growing chronic disease management industry, and population-based chronic care models that emphasize continuous and coordinated management of patients over time and among sectors of care. The assumption that more is better is also under scientific assault, as was discussed above (Table 1).

The single most important factor determining whether a community or a given care system and its associated physicians 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 and health systems, providers have overbuilt their acute care sectors; lower cost systems and regions have been more frugal, using fewer hospital beds, less physician labor, and less of such expensive technologies as intensive care beds and 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.

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 variation we have documented. These problems include (1) inadequate science; (2) poor coordination of care and overuse of acute care hospitals; and (3) a flawed payment system that rewards overuse. The current edition of the Atlas and several recent articles outline key elements of strategies to address these problems.<sup>4,14,15</sup>

**Improving the scientific basis of care delivery.** 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 for public policy should be obvious.

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. 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. And the research needs to be conducted in real time at the institutions where patients are receiving care. Because of the importance of following patients over time and across settings, 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. Participating organizations should be fairly compensated for conducting the research and should be further rewarded through a proposed shared savings program with the Centers for Medicare & Medicaid Services (CMS) designed to encourage the coordination of care and reduction of overuse.

**Promoting the growth of organized, accountable care.** Achieving better care coordination and reducing overuse of acute care hospital services will require new clinical policies and new ways of thinking about how to organize and finance care. As is evident from the data presented above and elsewhere, Medicare beneficiaries with chronic illness are highly loyal to the hospitals and physicians who are already providing their care. In other words, most care for patients with chronic illness is already provided by defined groups of physicians associated with specific hospitals. Physician groups and hospitals should be encouraged to become real or virtual integrated systems that are willing to be accountable for the coordination, overall costs, and quality of care provided to their chronic disease patients. Steps could include requiring the adoption of either a single shared electronic health record or communication standards that ensure complete and reliable sharing of information among physicians and institutional providers within the defined network;

the implementation of care management systems such as disease registries and disease management protocols; and public reporting of performance measures on care coordination, informed patient choice, and costs.

The primary care “medical home” could provide a model for such coordination of care, especially if implemented as an element of a virtual or real organized delivery system where the other component parts (hospitals, specialists) had incentives to collaborate. The major limitation of the medical home models currently promoted by primary care specialties is their narrow focus: without collaboration from specialists to ensure both communication and collaborative decision making, and without financial incentives that encourage both hospitals and specialists to reduce overuse, primary care coordination is likely to fail.

**Shared savings: an incentive for all sectors to improve coordination and reduce overuse.** Few providers will willingly see their incomes fall. Prospective payment systems that reward providers for cost-effective care may yet emerge, but even with substantial investments, fundamental reform of the payment system could take ten or more years. In the meantime, shared savings approaches could provide the third leg of a successful approach to reform of chronic disease care.<sup>ii</sup> Under a shared savings approach, providers who are willing to be accountable for chronic disease care and meet the key standards discussed above would be eligible for shared savings payments. Payments could be based on per beneficiary costs relative to appropriate spending targets. The targets could be based on the relative efficiency standards discussed above, and could be adjusted to ensure that even lower cost systems would also have an opportunity to receive payments. The key notion would be to provide a sufficient financial incentive for low-cost systems to avoid future growth and higher cost systems to be rewarded for reducing overuse of acute care settings and specialty services. The shared savings payments should allow both physicians and hospitals to preserve their margins (net income) while reducing their total revenues. Such an approach would offer the win-win incentives required to reduce unnecessary care and the overuse of acute care hospitals.

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<sup>ii</sup>CMS has been conducting a demonstration project (the Physician Group Practice—PGP demo) in which large multi-specialty physician group practices that meet specific quality benchmarks are eligible for shared savings if they also reduce their spending growth below a specified target. Initial results of this program are promising, underscoring the potential benefit of a shared savings approach.

Trisolini M, Aggarwal J, Leung M, et al. The Medicare Physician Group Practice Demonstration: Lessons Learned on Improving Quality and Efficiency in Health Care. The Commonwealth Fund. February 2008.



Information on the care provided to chronically ill Medicare beneficiaries at most U.S. acute care hospitals is available on the Dartmouth Atlas website, [www.dartmouthatlas.org](http://www.dartmouthatlas.org). The information may be useful to a variety of stakeholders, from policy makers to patients and their families (see table, page 18).

## Accessing Information on the Dartmouth Atlas Website (Afterword)

To help users access the reports, 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. The “hospital care intensity index,” or HCI, reflects the amount of time spent in the hospital and the intensity of physician services delivered in the hospital. Users can navigate through the states and regions to find hospitals and generate reports. The tables present performance measures grouped into distinct categories: Medicare Spending, Resource Allocation, and Patient Experience. How these reports might be used by various stakeholders is discussed in the Afterword.

Stakeholders	How they might use Atlas data
Policy makers & government officials	Understand importance of variations to national and local health care reform initiatives
Payers & employers	Compare provider efficiency as foundation for negotiation of alternative payment approaches
Hospital boards & administrators	Use information to guide construction, recruitment and care management planning.
Journalists & bloggers	Prepare local or national stories discussing practice variation—and “name names.”
Patients & families	Identify and choose caregivers with practice patterns that fit their preferences.
Physicians & care managers	Help patients receive care they want by using data to stimulate discussion and advanced care planning.

Over 30 years ago Wennberg and Gittelsohn published their article describing variations in spending, resource allocation, and utilization within Vermont. One could look at the current data in the Dartmouth Atlas as evidence of how *little* has changed: marked variations in practice and spending remain across U.S. states, regions, and hospitals.

## Conclusion: Is Change Really Possible?

But we may be nearing a tipping point. Rapidly rising health care costs and their profound impact on the future financial health of the U.S. government have brought the variations phenomenon—and the potential for savings that it implies—to the attention of leading government officials.<sup>2</sup> Concern about the possible collapse of primary care and the growing recognition of the adverse impact of fragmented chronic disease care has motivated increasing interest in payment reform to support improved care coordination by fostering the development of effective “medical homes” for patients with chronic illness and others.<sup>16</sup> And policy makers—from the Medicare Payment Advisory Commission (MedPAC) to the Centers for Medicare & Medicaid Services (CMS)—are supporting policy development and demonstration programs that include a focus on fostering accountable care organizations and shared savings models. Any major reform, however, will depend upon Congressional action.

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 of the perils of overtreatment. But translating personal experience into effective public policy will require a debate over the quality of care, and the quality of death, that results from the widely varying practices of health care providers. It is our hope that the Dartmouth Atlas will stimulate a wider public discourse on these matters.

## Endnotes

- <sup>1</sup> McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, Kerr EA. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003 Jun 26;348(26):2635-45.
- <sup>2</sup> Orszag PR, Ellis P. The challenge of rising health care costs—a view from the Congressional Budget Office. *N Engl J Med*. 2007 Nov 1;357(18):1793-5.
- <sup>3</sup> 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.
- <sup>4</sup> Wennberg JE, Fisher ES, Skinner JS. Geography and the debate over Medicare reform. *Health Affairs* web exclusive, 13 February 2002.
- <sup>5</sup> Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ. Variations in the longitudinal efficiency of academic medical centers. *Health Affairs* web exclusive, 7 Oct 2004.
- <sup>6</sup> 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.
- <sup>7</sup> Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Affairs* web exclusive, 7 April 2004.
- <sup>8</sup> 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.
- <sup>9</sup> 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 February 2006.
- <sup>10</sup> Sirovich BE, Gottlieb DJ, Welch HG, and Fisher ES. Regional variations in health care intensity and physician perceptions of quality of care. *Ann Intern Med* 2006;144:641-649.
- <sup>11</sup> Goodman DC, Grumbach K. Does having more physicians lead to better health system performance? *JAMA*. 2008 Jan 23;299(3):335-7.
- <sup>12</sup> Barnato AE, Herndon MB, Anthony DL, Gallagher PM, Skinner JS, Bynum JP, Fisher ES. Are regional variations in end-of-life care intensity explained by patient preferences? A study of the US Medicare population. *Med Care*. 2007 May;45(5):386-93.
- <sup>13</sup> Pritchard RS, Fisher ES, Teno JM, Sharp SM, Reding DJ, Knaus WA, Wennberg JE, Lynn J. Influence of patient preferences and local health system characteristics on the place of death. SUPPORT Investigators. Study to Understand Prognoses and Preferences for Risks and Outcomes of Treatment. *J Am Geriatr Soc*. 1998 Oct;46(10):1242-50.
- <sup>14</sup> Fisher ES, Staiger DO, Bynum JP, Gottlieb DJ. Creating accountable care organizations: The extended hospital medical staff. *Health Affairs*. 2007 Jan-Feb;26(1):w44-57.
- <sup>15</sup> Wennberg JE, Fisher ES, Skinner JS, Bronner KK. Extending the P4P agenda, part 2: How Medicare can reduce waste and improve the care of the chronically ill. *Health Affairs*. 2007 Nov-Dec;26(6):1575-85.
- <sup>16</sup> Bodenheimer T. Primary care—will it survive? *N Engl J Med*. 2006 Aug 31;355(9):861-4.

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### The Dartmouth Atlas

The Dartmouth Institute for Health Policy and Clinical Practice  
Center for Health Policy Research

Contact: Hae Jin Shin  
Tel: (202) 261-2888  
Fax: (202) 467-5187

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