Practice Variation:
Location, Location, Location

Joseph A. Hill, MD, PhD

[May 27, 2011]

Departments of [1]Internal Medicine (Cardiology) and [2]Molecular Biology,
University of Texas Southwestern Medical Center, Dallas, Texas 75390-8573

This is to acknowledge that Joseph A. Hill, M.D., Ph.D. has not disclosed any financial interests or other relationships with commercial concerns related directly or indirectly to this program. Dr. Hill will not be discussing off-label uses in his presentation.

Learning Objectives

- To become aware of the extent of regional variation in healthcare delivery in the United States.
- To explore the body of research that has sought to unravel mechanisms contributing to spatial variation in healthcare delivery.
- To explore the workings of "best practices", where efficient, highly integrated healthcare is provided and consequently, healthcare costs are relatively low.

Introduction

The amount of care Americans receive depends on where they live and on the physicians and hospitals they use. Indeed, healthcare delivery in the United States is marked by substantial regional variation. Importantly, this variation cannot be explained entirely on the basis of prevalence of illness, medical evidence, or patient preference. The last 4 decades has seen the emergence of a large body of research designed to explain this phenomenon which contributes importantly to spiraling healthcare costs.

McAllen, Texas

McAllen, Texas is a town of approximately 700,000 inhabitants. Its demographics, racial and ethnic mix, education levels, socioeconomic factors, numbers of illegal immigrants, etc, are similar to many other cities in the United States. Public health statistics in McAllen are median. One feature of this city, however, sets it apart. Healthcare costs in McAllen are among the highest in the nation. Indeed, apart from Miami, where the cost of living is substantially greater, expenditures for healthcare in McAllen are the very highest in the US. This is particularly noteworthy in that, on average, healthcare expenses in the US are the highest in the world (1 in 6 dollars we earn goes to healthcare...$2.7 trillion per year). In terms of healthcare, McAllen is the most expensive city in the most expensive nation in the world! In comparison with El Paso, a city remarkably similar to McAllen, healthcare expenditures in McAllen are fully 2-fold higher. Why?

Perhaps the people of McAllen are sicker than most of the rest of the US. If true, that might explain why healthcare costs are higher...sicker people require more medical care. In fact, this explanation does not hold. Cardiovascular disease rates in McAllen are lower than national

average. Smoking rates are lower than average. Asthma, HIV, infant mortality are lower than average. Cancer and injury rates are lower than average.

Perhaps healthcare is delivered in a superior manner in McAllen, leading to higher costs. In other words, could it be that McAllen's expenses are not too high, but rather expenses elsewhere are too low? In fact, McAllen has fewer specialists than average. Disease-related morality in McAllen is no different than El Paso's. And in terms of Medicare rankings based on metrics of care, McAllen's 5 largest hospitals performed worse, on average, than El Paso's.

In the end, there's no escaping the conclusion that healthcare expenditure in McAllen is excessive, and the citizens of the Square Dance Capital of the World are not benefiting from these expenditures. They're not sicker, and they do not seek out care more frequently. Rather, they receive 50% more specialist visits; 60% more stress-echos; 30% more bone density scans; 50% more cholecystectomies, knee replacements, breast biopsies, and bladder scopes; 200% more nerve conduction studies for carpal tunnel; 550% more urine flow studies for BPH; 2-3-fold more pacemakers, ICDs, CABGs, CEAs, PCIs; and 5-fold more home-nurse visits.

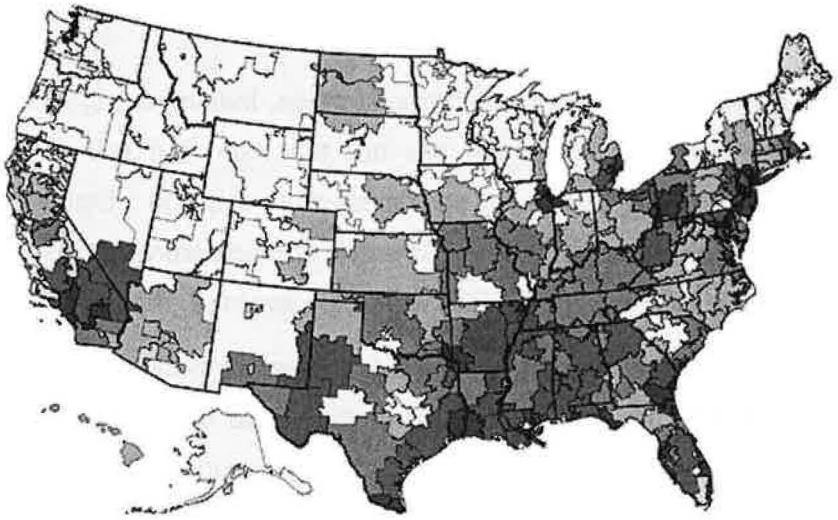
As a result, Medicare expenditure in McAllen is $15,000 per enrollee, a remarkable statistic in light of the fact that per capita income is only $12,000!

Sadly, McAllen is not unique. Indeed, Medicare expenditures in the US vary a full 2.7-fold from the most expensive to the least expensive regions (**Figure 1**). Now, a substantial literature, based on "healthcare delivery epidemiology" has emerged to unravel mechanisms underlying regional variations in healthcare expenditure in the US. Much of this work has emerged from the Dartmouth Atlas Project. In fact, a fascinating overview of 40 years of research in this field was published recently in a book[1] by Dr. John Wennberg (from which many of the figures reproduced here derive), a pioneer in the science of healthcare delivery.

Practice Variation

In order to understand this literature, it is important to define a few terms. Among them are categories into which different types of healthcare are divided:

Necessary care: this is healthcare whose benefits far exceed side effects or unintended consequences. In necessary care, there is widespread agreement that a certain diagnostic test or therapeutic intervention is appropriate and worthwhile. Examples include surgery for hip fracture or colectomy for colon cancer. This type of care accounts for approximately 15% of Medicare spending.



Attributes of U.S. HRRs in Different Quintiles of the EOL-EI*

Variable	Quintile of EOL-EI					Ratio (Highest to Lowest)
	1 (Lowest)	2	3	4	5 (Highest)	
EOL-EI, $†	9074	10 636	11 559	12 598	14 644	1.61
Per capita Medicare spending, $‡	3922	4439	4940	5444	6304	1.61
Hospital characteristics§						
Overall supply (beds per 1000), *n*	2.4	2.6	2.9	2.9	3.2	1.32
Beds in teaching hospitals, %	10.2	18.1	13.8	20.8	28.1	2.76
Beds in hospitals with > 300 beds, %	31.6	37.4	38.7	43.8	57.2	1.81
Physician supply (per 10 000), *n*§	184.8	189.4	184.4	204.6	242.4	1.31
Medical specialists	26.9	28.8	28.6	34.8	44.4	1.65
General internists	21.3	23.4	22.6	28.5	37.3	1.75
Family practitioner/GP	35.9	31.3	29.6	25.9	26.5	0.74
Surgeons	43.8	45.6	46	50.3	56.4	1.29
All other specialties	56.8	60.3	57.5	65.1	77.7	1.37
Medicare enrollees in HMOs, %	12.1	6.8	7.3	7.7	15.3	1.26
Residents in metropolitan areas, %	77.5	81.9	82.3	79.2	97.4	1.26

*EOL-EI = End-of-Life Expenditure Index; GP = general practitioner; HMO = health maintenance organization; HRR = hospital referral region.

†Average age-sex-race–adjusted per capita fee-for-service spending on hospital and physician services in the HRRs within each quintile for Medicare enrollees age 65–99 years who were in their last 6 months of life. For details, see Methods.

‡Average age-sex-race–adjusted 1996 annual per capita fee-for-service spending in the HRRs within each quintile on all Medicare services among enrollees age 65–99 years (9).

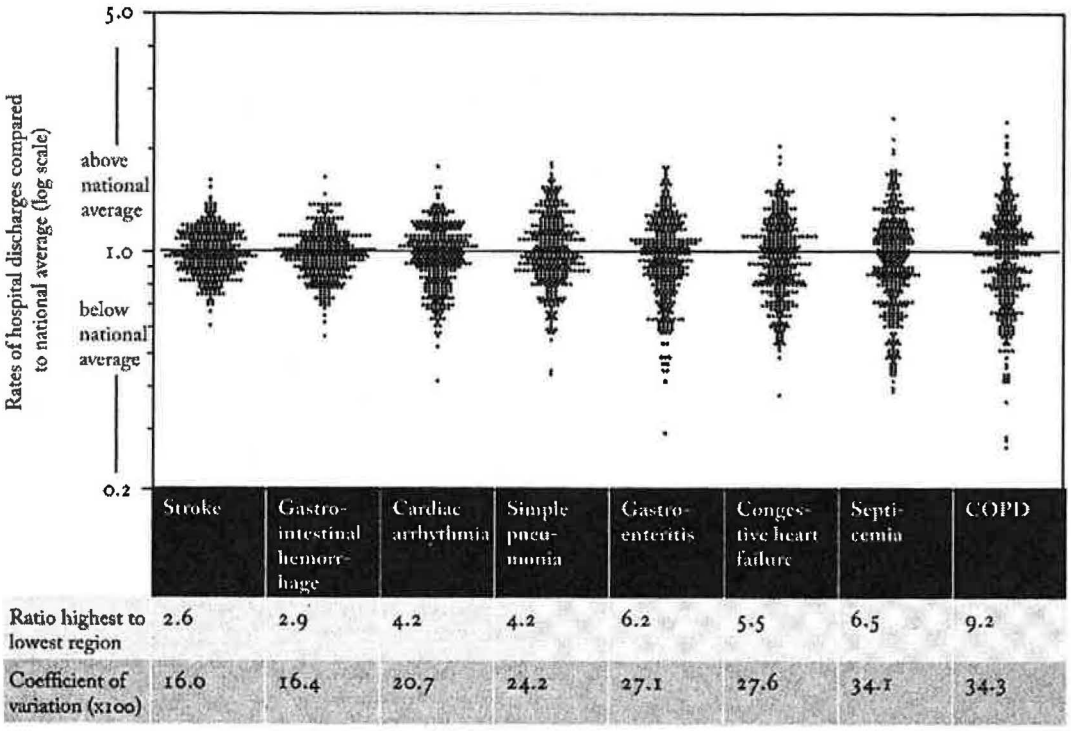
§Key attributes and average per capita supply of the specified medical resource in the HRRs within that quintile. Per capita supply is calculated per 1000 or per 10 000 residents of the general population within the HRRs (9).

Figure 1

The great majority of regulatory oversight has focused on necessary care, including science-based performance measures and publication of quality reports on the internet. (Indeed, the very reason this type of care is deemed necessary stems from its important scientific underpinnings.)

Again, in the context of necessary care, there is little regional variation in practice patterns (**Figure 2**). A hip fracture in Tuscaloosa is treated largely the same was as one in Tacoma.

Same for stroke and gastrointestinal bleeding. This care stands on a robust foundation of rigorous science, and practice patterns line up behind the science.



	Stroke	Gastro-intestinal hemorr-hage	Cardiac arrhythmia	Simple pneu-monia	Gastro-enteritis	Conges-tive heart failure	Septi-cemia	COPD
Ratio highest to lowest region	2.6	2.9	4.2	4.2	6.2	5.5	6.5	9.2
Coefficient of variation (x100)	16.0	16.4	20.7	24.2	27.1	27.6	34.1	34.3

Figure 2

Preference-sensitive care: this is where two or more treatment options are available and neither is established to be superior. Hence, a decision regarding which to pursue is based on preference, either that of the physician or that of the patient. Examples include elective surgery; lumpectomy versus mastectomy; prostate cancer screening by PSA testing. This type of care accounts for approximately 25% of Medicare spending.

Supply-sensitive care: this type of care is not about a specific treatment per se, but rather the frequency with which everyday medical care is used in treating patients with acute or chronic illnesses. Examples include physician visits; specialist consultations; imaging exams; hospital admissions; and ICU admissions. Here, medical science is virtually silent; there are no science-based guidelines regarding how often a patient with chronic illness should be seen by his/her physician; when a specialist should be consulted; how aggressive to be with diagnostic studies; when to admit a chronically ill patient, etc. As a result of its sheer volume, this type of care amounts to a full 60% of Medicare spending…hundreds of billions of dollars!

A large body of evidence has established that the volume of supply-sensitive care is strongly influenced by the capacity of the local medical market:

- Number of primary care physicians;
- Number of specialists;
- Availability of diagnostic equipment, such as CT and MRI scanners;
- Number of hospital beds;
- Number of ICU beds;

The greater the capacity of the medical marketplace, the more expenditures there are in the realm of supply-sensitive care. And this is not to suggest that venal concerns drive physician behavior (although, sadly, it clearly does in some instances). Rather, the relationship between capacity and utilization is driven by the assumption – shared by provider and patient – that more care is better. As a consequence, available resources are used until their exhaustion. Interestingly, most physicians are unaware the effect capacity has on their behavior, including until recently this author...and perhaps until now, you, dear reader.

Necessary Care

As noted above, this is care that is widely accepted to be appropriate, necessary, and beneficial. This is little discussion regarding the appropriateness of resecting colon carcinoma, except in instances where the tumor has already spread widely. A hip fracture virtually always leads to a surgical intervention. Heart attack or stroke triggers a hospital admission nearly uniformly. There is considerable science around these types of medical expenses, and, as a result, there is little regional variation in their use.

To the extent that regional variance in practice exists around necessary care, it is arguably a problem of underuse. Are all patients benefiting from medical care grounded in science and established to afford benefit? Indeed, many of us have assumed that lack of availability and consequent underuse of care are significant factors in the variation in healthcare delivery. As we'll see later, however, evidence does not support this contention; underuse does not contribute substantially to practice variation in the vast majority of care which falls outside the realm of necessary care.

Preference-Sensitive Care

Here, there are options regarding the path to take and no established science to drive the decision between those options. As such, it is appropriate to defer the choice to the appropriately informed patient. However, in many – even most – instances, the patient defers the treatment choice decision to the physician. "I'll go with surgery, if that's what you recommend, doc." Most physicians truly seek to provide optimal care to their patients, but studies find that physician's preferences on behalf of the patient often do not coincide with the patient's preferences for him/herself.

First, both doctor and patient are often driven by the bias that "more care is better." When one choice is "watchful waiting", many physicians and patients prefer to pursue a more active path. When an MRI "to check things out" costs only $30 in copayment, then why not?...better safe than sorry. Again, issues around incentives or compensation may not pertain at all; rather, both parties agree that additional knowledge (or check-in with the MD) is beneficial, especially when the costs are hidden.

Second, physician and patient, faced with the same menu of risks and benefits, may order them very differently; what's important to the physician may not be important to the patient and *vice versa*. Take the example of prostatectomy: often, a surgeon's decision to operate is driven by indirect markers of disease, such as measures of urine flow or post-void residuals. Indeed, most investigators prefer to track "hard", quantifiable endpoints, rather than rely on softer measures, such as symptoms. However, some individuals may be bothered to a greater or lesser degree by their symptoms; a man's intolerance for rising repeatedly from bed during the night can vary widely. Same for frequency and urgency. In fact, studies reveal that patient symptoms correlate poorly with urine flow or PVR. Thus, a patient may be much more concerned about the "soft" endpoints of symptoms and rank them very differently than the physician.

Third, physicians may assume that surgical complications (which in the case of prostatectomy include incontinence, decreased sexual function, retrograde ejaculation, and more) are an inevitable risk -- the price one has to pay to obtain benefit. However, research has shown that patients often evaluate the risk: benefit equation differently than physicians. Again, in the case of prostatectomy, many men would prefer to live with symptoms – getting up more than once in the night – to avoid the potential downsides of prostate resection. Patients care little about the strength of the urinary stream, a hard endpoint tracked regularly in the urological

literature; rather, they may be very unhappy about incontinence, a regrettable consequence of surgery, but a soft endpoint deemed as an inevitable risk of otherwise-beneficial surgery.

Fourth, patients often make incorrect assumptions regarding the efficacy of an intervention, and physicians may not be aware of the assumptions they're making. For example, many men believe that prostatectomy for BPH and elevated PSA will eliminate the risk of prostate cancer. A number of studies have found that when patients are provided a clear description of the risk and benefits, and assumptions they make are entertained and discussed, the likelihood that they will pursue an aggressive, for example surgical, treatment strategy is dramatically diminished. Some men prefer to endure symptoms of frequency and urgency – and avoid the potential downsides of surgery – if their risk of cancer and death are not enhanced by surgery. Some women will elect lumpectomy over mastectomy (and endure x-ray therapy, if needed), if they recognize that their risk of dying of recurrent breast cancer is similar either way.

Historically, patients look to their physicians as the decision-making proxy who will selflessly act in the patient's best interest. In other words, a medical decision is delegated to the provider. (It is my bias that the vast majority of physicians do just that...make decisions based primarily on the patient's best interest.) However, it is becoming increasingly apparent that the physician – while thinking he/she is doing what is best for the patient – is not acting in a manner in concert with what the patient actually wants.

To address this, there is a movement away from the now-standard protocol of informed consent (i.e. delegated decision making) where the patient is informed of an intervention's risks and benefits and consents to accept the risk in hopes of attaining benefit. Increasingly, a movement toward informed patient choice is gaining traction; here, the patient's preferences are given paramount importance. He/she is presented with a clear understanding of risks and benefits and the choice between two clearly particular paths is left to the patient. Indeed, a whole new field of medical research is emerging that deals with the communication of risk and the balanced description of treatment choices. Also, a number of states are presently entertaining legislation that shifts the emphasis from informed consent to informed patient choice: from authority which is delegated to the physician to a patient-driven decision process. This democratization of healthcare is emerging and is welcome.

Supply-Sensitive Care

Much of medical care is not driven by scientific evidence. Far from being just a problem, the "art of medicine" is one of the most beautiful aspects of our profession. That being said, in the

context of chronic illness, physicians have little in the way of scientific basis for many of the decisions we make. Should I consult a specialist now? Does a symptom warrant a costly imaging, even invasive, examination? Does my patient need to be admitted to the hospital today? Is ICU care warranted? How long should he/she remain hospitalized? Together, these everyday decisions sum to approximately 60% of Medicare expenditures (again, hundreds of billions of dollars). As has been quipped, the physician's pen is the most expensive medical instrument.

A large body of research has been amassed demonstrating a clear relationship between the volume of these types of care and the availability of medical resources.

First, it is important to emphasize that a decision by a patient to seek out medical attention is very largely driven by illness. Sick patients go to the doctor. What we're talking about here is the volume of care provided *after* the patient sees a physician; this is where remarkable variance exists across the nation.

To summarize a large literature, a variety of measures of healthcare use and expenditure track closely with the availability of healthcare resources (**Figures 2-10**).

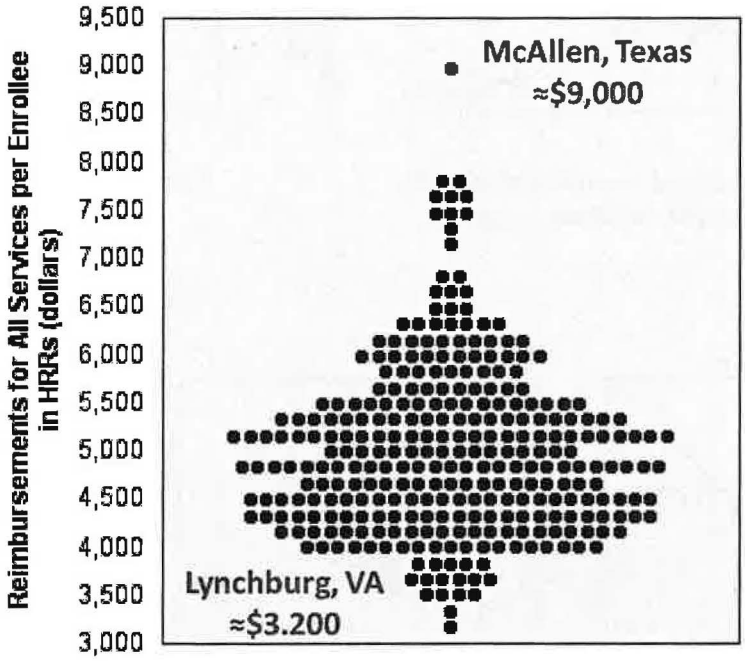


Figure 3

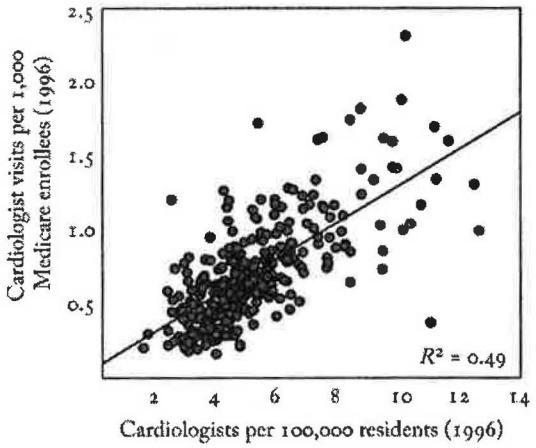


Figure 4

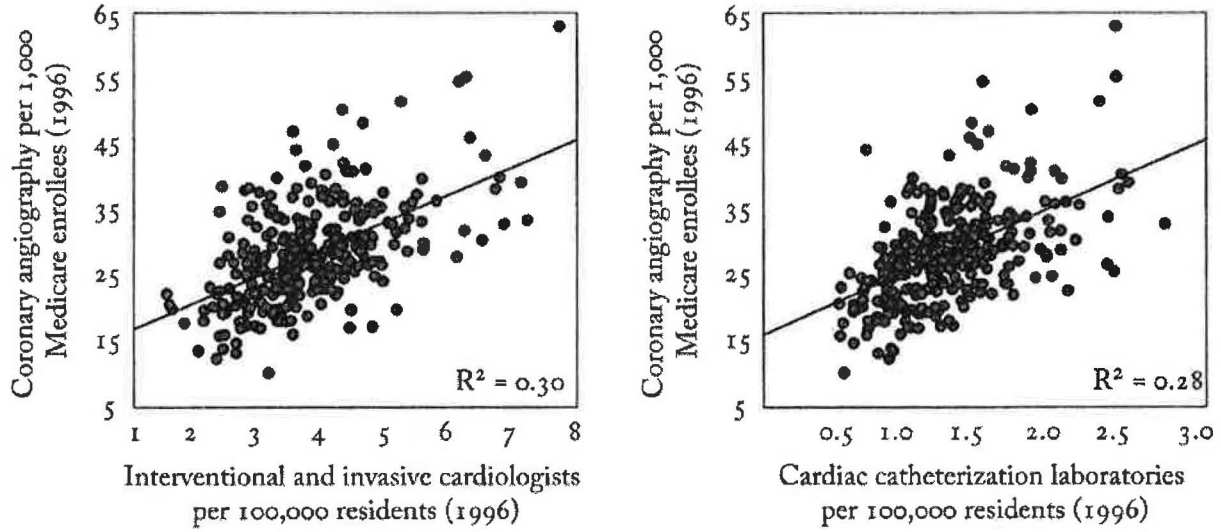


Figure 5

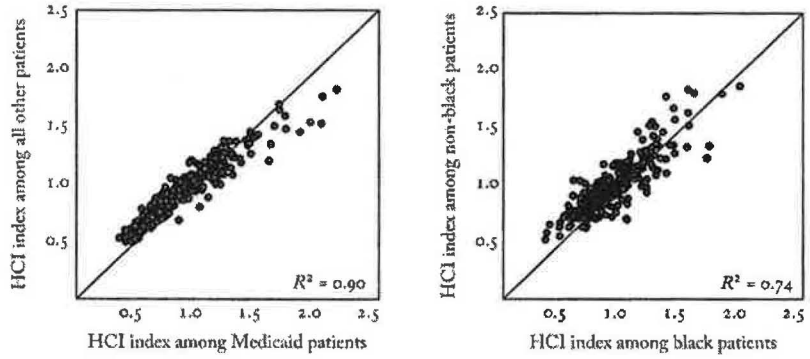


Figure 6

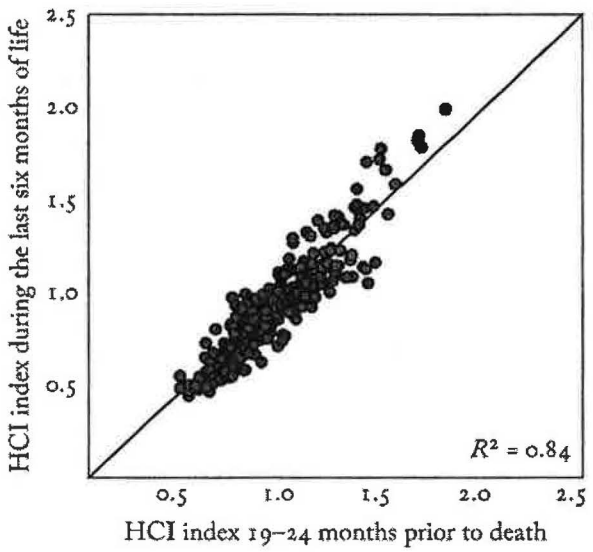
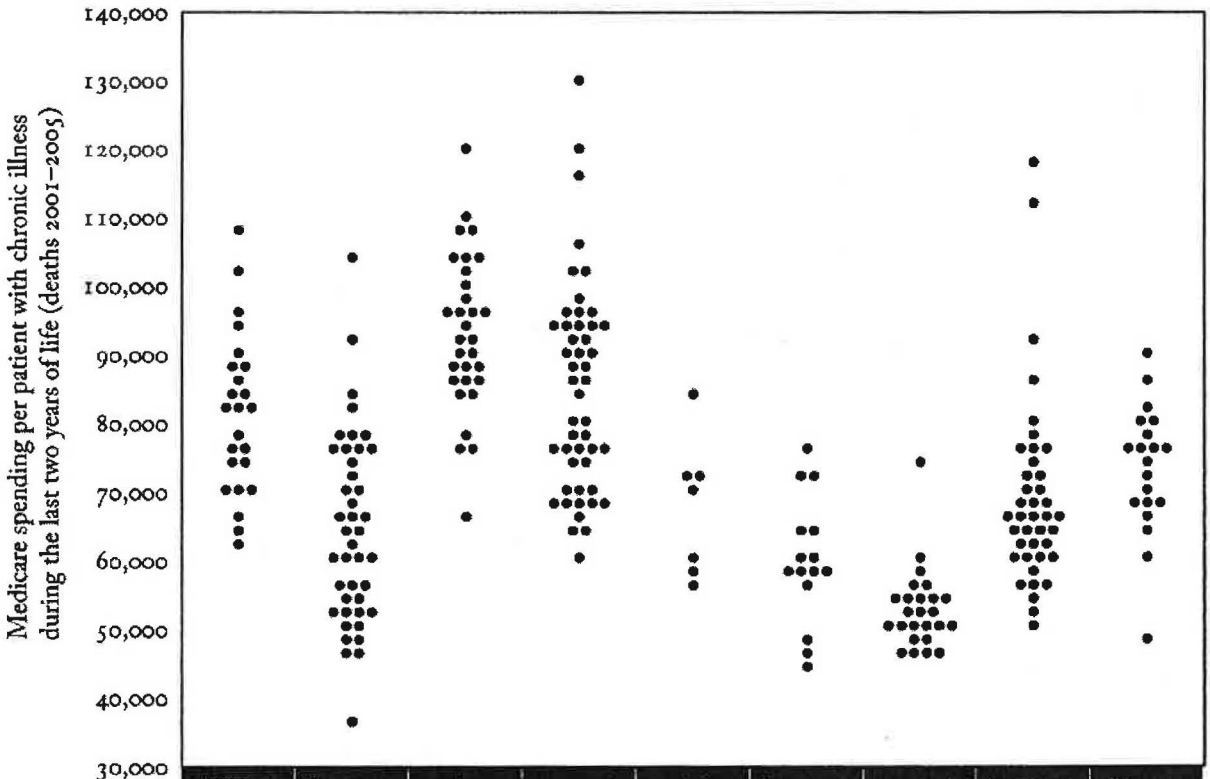


Figure 7



	Miami	Houston	Manhattan	Los Angeles	New Orleans	Detroit	Cleveland	Philadelphia	Chicago
Most costly hospital	$107,860	$103,630	$121,010	$130,990	$84,860	$75,630	$73,600	$118,000	$91,130
HRR average	$80,920	$67,550	$94,680	$84,320	$68,660	$60,970	$52,230	$66,910	$72,030
Least costly hospital	$62,270	$35,620	$66,440	$61,240	$56,560	$44,750	$46,140	$49,940	$49,190

Figure 8

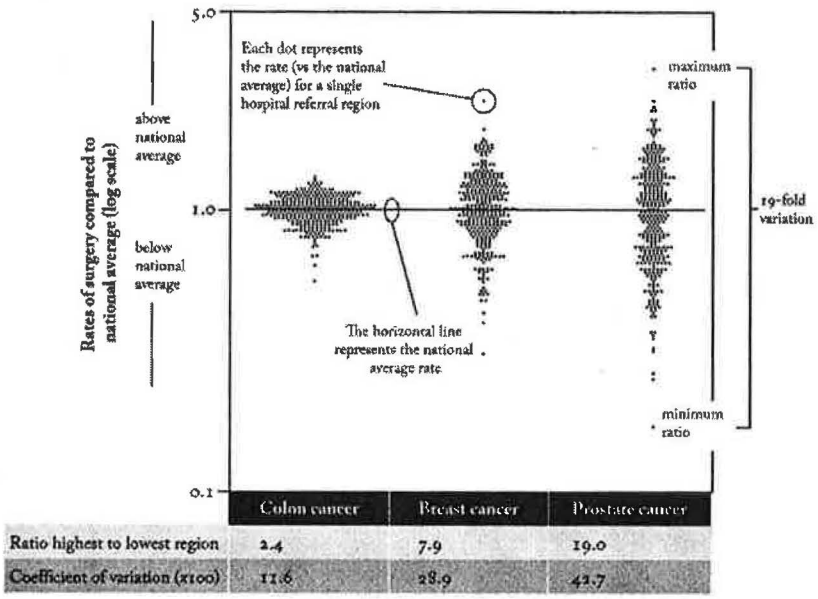


Figure 9

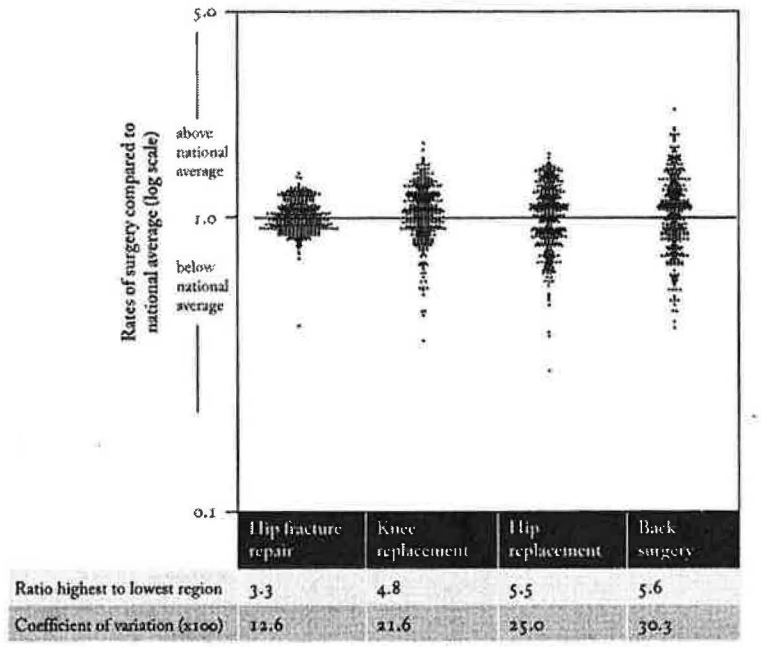
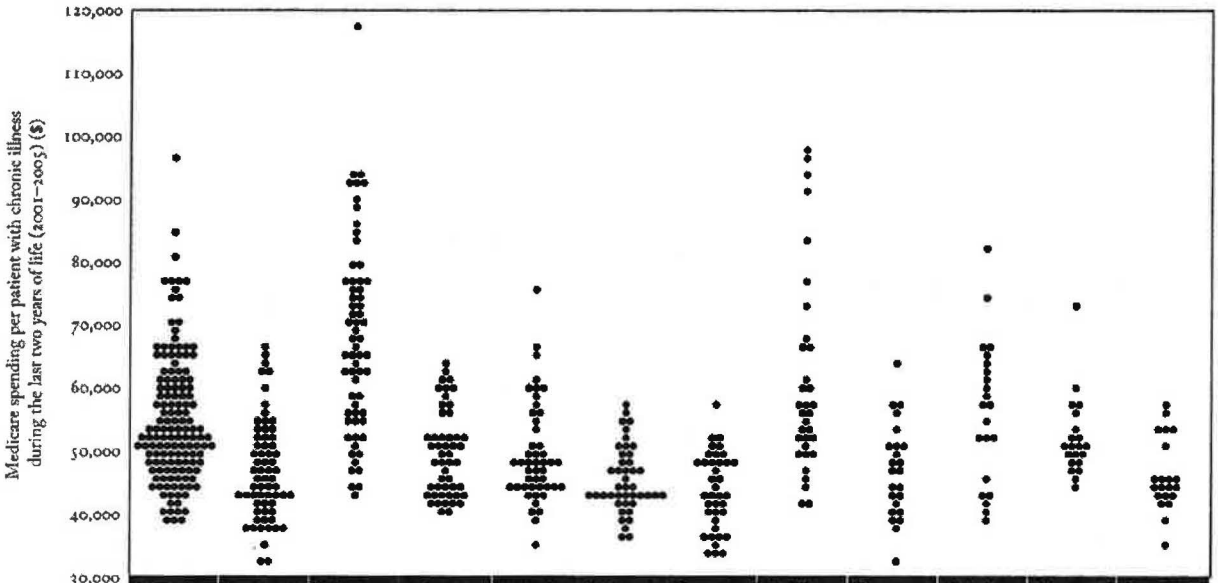


Figure 10

In an effort to control for possible confounding influences of patient morbidity, researchers have evaluated rates of Medicare expenditure in the last 2 years of life (as well as in the final 6 months of life). Here, we can infer that the patients are similarly ill, and we can be certain that the outcomes are the same; they're all dead! These studies have revealed similar degrees of variation in the expenditures of Medicare funds, days hospitalized, days spent in ICU, etc

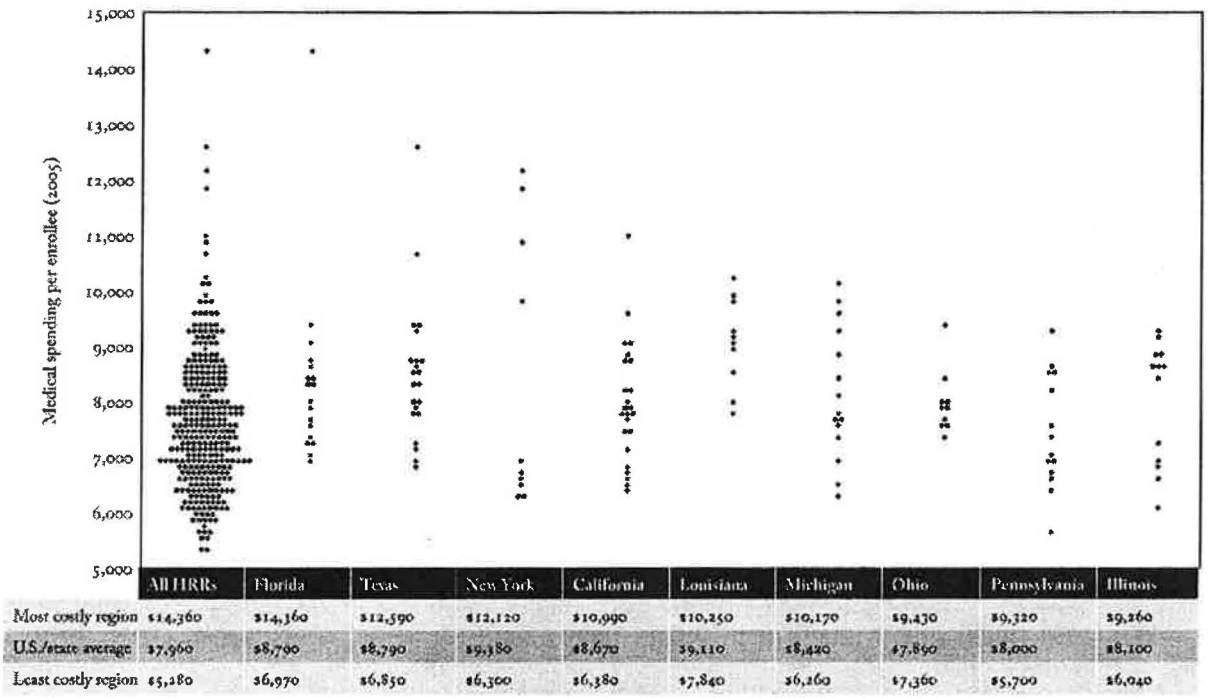
(**Figure 8**). Together, these studies lend additional credence to the notion that differences in rates or severity of illness are not a major contributor to the wide variations seen in the volume and cost of healthcare nationwide.

Integrated hospital and healthcare systems fare no better (**Figure 11**). State-by-state and intra-state variance is marked (**Figure 12**). And unfortunately, the problem is getting worse (**Table 1**).



	Hospital Corporation of America	Community Health Systems, Inc.	Tenet Healthcare Corporation	Health Management Associates	Ascension Health	Triad Hospitals, Inc.	Catholic Health Initiatives	Catholic Healthcare West	Trinity Health	Catholic Health East	Adventist Health System Sunbelt	Catholic Healthcare Partners
Most costly hospital	$95,900	$66,600	$118,000	$64,200	$75,600	$56,800	$56,700	$98,300	$64,200	$82,500	$73,400	$57,800
System average	$55,000	$48,200	$65,400	$49,750	$51,100	$46,000	$45,700	$59,850	$49,250	$57,000	$53,800	$47,400
Least costly hospital	$38,500	$31,850	$43,100	$40,100	$35,600	$36,100	$33,800	$41,500	$32,400	$39,400	$44,650	$35,700

Figure 11



	All HRRs	Florida	Texas	New York	California	Louisiana	Michigan	Ohio	Pennsylvania	Illinois
Most costly region	$14,360	$14,360	$12,590	$12,120	$10,990	$10,250	$10,170	$9,430	$9,320	$9,260
U.S./state average	$7,900	$8,790	$8,790	$9,380	$8,670	$9,110	$8,420	$7,890	$8,000	$8,100
Least costly region	$5,280	$6,970	$6,850	$6,300	$6,380	$7,840	$6,260	$7,360	$5,700	$6,040

Figure 12

Quintile	*Patient Days in Intensive Care*			*Medical Specialist Visits*			*Primary Care Visits*		
	% Increase in 5 Years	*Ratio to Q5*		*% Increase in 5 Years*	*Ratio to Q5*		*% Increase in 5 Years*	*Ratio to Q5*	
		2001	*2005*		*2001*	*2005*		*2001*	*2005*
1 ($55,873)	18.0	2.16	2.29	11.3	2.79	2.84	6.2	1.43	1.49
2 ($43,058)	16.0	1.72	1.80	7.0	1.97	1.92	6.6	1.21	1.26
3 ($37,179)	7.9	1.47	1.43	5.7	1.61	1.55	3.1	1.11	1.12
4 ($34,365)	11.6	1.27	1.27	5.1	1.35	1.30	4.3	1.09	1.11
5 ($30,709)	11.3	1.00	1.00	9.7	1.00	1.00	2.2	1.00	1.00

Q, Quintile.
Spending is for the last 2 years of life.
Source: Dartmouth Atlas Project database.

Table 1

Academic Medical Centers

Academic healthcare institutions drive much of the innovation and change in healthcare. They are the sites where all physicians are trained, where much of the research that drives new therapies occurs. They pride themselves in being evidence-based and science-grounded. Given this, one might infer that the variation in medical practice across academic institutions would be less than elsewhere.

Such is not the case. Studies have uncovered substantial variation in many markers of healthcare delivery – numbers of beds, ICU beds, ratios of specialist-to-PCP, lengths of stay, and, last but not least, cost – across academic institutions, even very prestigious ones. Within the University of California system, for example, there is 3-fold variance in HCI (Hospital Care Intensity[1], a summary measure of the intensity of inpatient care, **Table 2**). Among the top 5 academic institutions, so named by US News and World Report in 2008, we see substantial variation in Medical expenditures, use of ICU beds, etc (**Table 3**). And these top 5 institutions are not even at the limits of variance; examination of the highest and lowest cost academic medical centers reveals 10-fold variance in HCI (**Table 4**), easily comparable with private practice! Clearly, the vanguards of science within many of our academic centers have not focused their energies on standardizing the ways in which healthcare is delivered.

Hospital	HCI Percentile	Percent Black	Percent in Medicaid	Days in Hospital per Patient		
				Blacks	Nonblack	Medicaid
Cedars-Sinai	99th	8.8	31.8	29.8	23.8	28.5
UC- Los Angeles	90th	8.1	20.6	20.6	18.2	21.6
UC-San Diego	44th	5.1	27.6	15.0	13.6	14.3
UC- San Francisco	39th	10.1	41.5	14.1	13.4	14.2
UC- Dallas	27th	14.1	46.1	13.9	11.7	11.2

Table 2

[1] HCI is based on two supply-sensitive utilization measures: the average number of days patients spent in the hospital and the average number of physician visits patients experienced.

The examples of Boston and New Haven are informative. Both cities house prestigious schools of medicine and highly regarded university hospitals. Yet, individuals living in Boston spend nearly twice as many days in the hospital as compared with those living in New Haven (**Figure 13**).

	Johns Hopkins Hospital	*Mayo Clinic (St. Mary's Hospital)*	*UCLA Medical Center*	*Cleveland Clinic Foundation*	*Massachusetts General Hospital*
Rank among best hospitals	1	2	3	4	5
Medicare spending per patient, last two years of life					
Total Medicare spending	$85,729	$53,432	$93,842	$55,333	$78,666
Inpatient site of care	$63,079	$34,372	$63,900	$34,437	$43,058
Outpatient site of care	$13,404	$7,557	$14,125	$8,906	$11,509
Skilled nursing/long-term care	$3,287	$7,114	$6,891	$5,101	$15,149
Home health care	$1,813	$662	$3,994	$2,194	$4,718
Hospice care	$2,217	$2,054	$1,649	$2,485	$1,503
All other care	$1,929	$1,673	$3,283	$2,210	$2,729
Resource inputs per 1,000 patients, last two years of life					
Physician labor					
All physician FTE labor	25.7	20.3	38.5	26.1	29.5
Medical specialist FTE	8.9	8.9	21.2	10.6	11.7
Primary care physician FTE	10.0	6.8	9.6	8.8	11.5
Ratio of medical specialist to primary care labor inputs	0.89	1.30	2.20	1.20	1.02
Hospital beds					
All beds	78.2	58.2	85.8	65.5	79.2
High-intensity ICU/CCUs	11.8	16.4	13.8	14.3	15.0
Intermediate-intensity ICUs	8.2	2.0	24.3	4.8	1.0
Medical and surgical beds	58.2	39.8	47.7	46.4	63.2
Patient experience, last six months of life					
Hospital days per patient	16.5	12.0	18.5	14.8	17.3
Physician visits per patient	28.9	23.9	52.8	33.1	39.5
Percent seeing 10 or more physicians	44.6	41.0	52.9	48.2	53.5
Terminal care					
Percent of deaths in hospital	36.5	30.2	43.2	38.6	44.5
Percent of deaths with ICU admission	23.2	21.8	37.9	23.1	22.5
Percent enrolled in hospice	35.2	29.1	28.8	36.6	23.8
Average co-payment per patient last two years of life	$3,390	$2,439	$4,835	$3,045	$3,409

CCUs, coronary care units; FTE, full-time equivalent; ICU, intensive care unit.
Source: Dartmouth Atlas Project database. Ranking of hospitals is by *U.S. News & World Report* "Best Hospitals" for 2007.

Table 3

	Top Three Hospitals Ranked on HCI Index			*Bottom Three Hospitals Ranked on HCI Index*		
	NYU Medical Center	*Cedars-Sinai Medical Center*	*Robert Wood Johnson University Hospital*	*University of Wisconsin Hospital*	*University of New Mexico Hospital*	*Scott & White Memorial Hospital*
HCI index percentile rank among U.S. hospitals	99.8	99.2	98.0	11.9	11.5	9.1
Patient experience, last six months of life						
Hospital days per patient	31.2	24.4	23.7	11.1	10.0	9.6
Physician visits per patient	76.9	79.3	66.1	18.4	19.5	20.6
Percent seeing 10 or more physicians	64.8	59.3	62.7	24.9	31.9	30.8
Terminal care						
Percent of deaths in hospital	50.5	52.9	50.3	27.4	32.6	29.3
Percent of deaths with ICU admission	35.1	40.0	37.2	16.1	25.3	13.0
Percent enrolled in hospice	20.1	19.6	27.0	40.5	43.1	45.3
Average co-payment for physician care per patient during last two years of life	$5,550	$6,500	$4,800	$2,050	$2,150	$2,200

HCI, hospital care intensity; ICU, intensive care unit.
Source: Dartmouth Atlas Project database; data are for deaths from 2001 to 2005.

Table 4

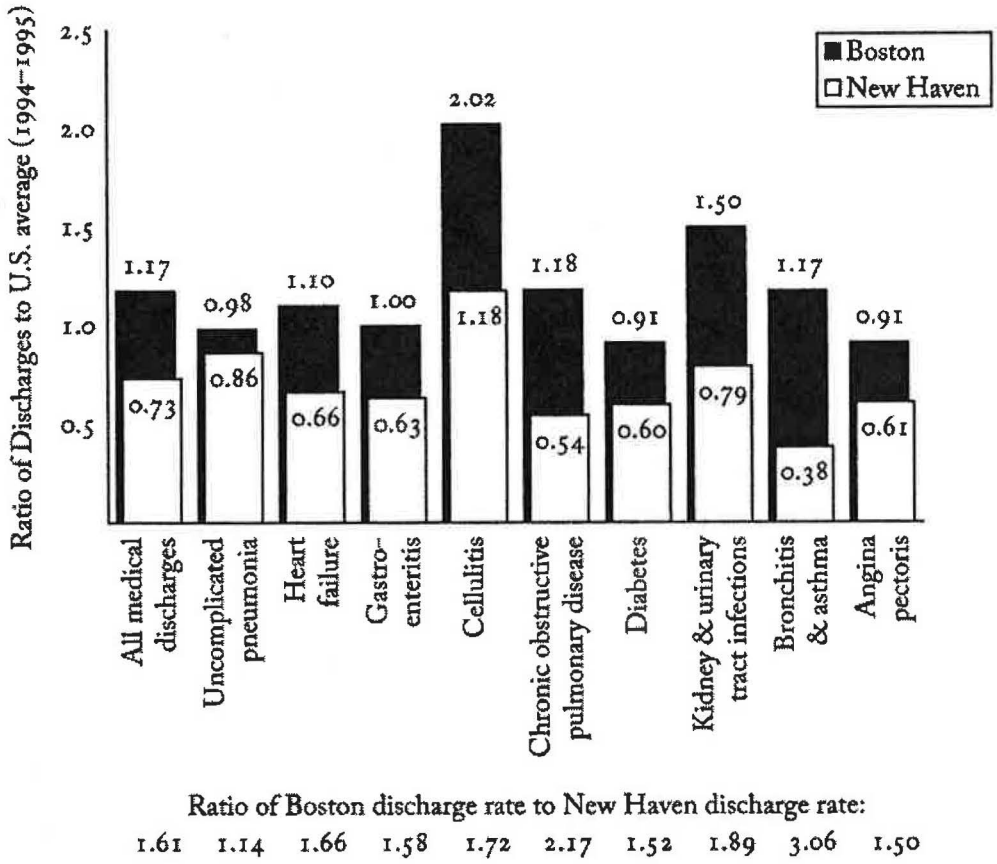


Figure 13

Factors Underlying Variation in Supply-Sensitive Care

Perhaps the explanation for regional variation in the volume (and cost) of supply-sensitive care relates to poverty? Low-income individuals are often poorly educated, often less willing to comply with medical directives, and therefore emerge as high-cost users of healthcare resources. Whereas there is no doubt some truth to this, studies have revealed a close correlation between medical expenditures in high-income regions with those in low-income regions (**Figure 14**). Based on this, we can infer that differences in income level are insufficient to explain practice variation.

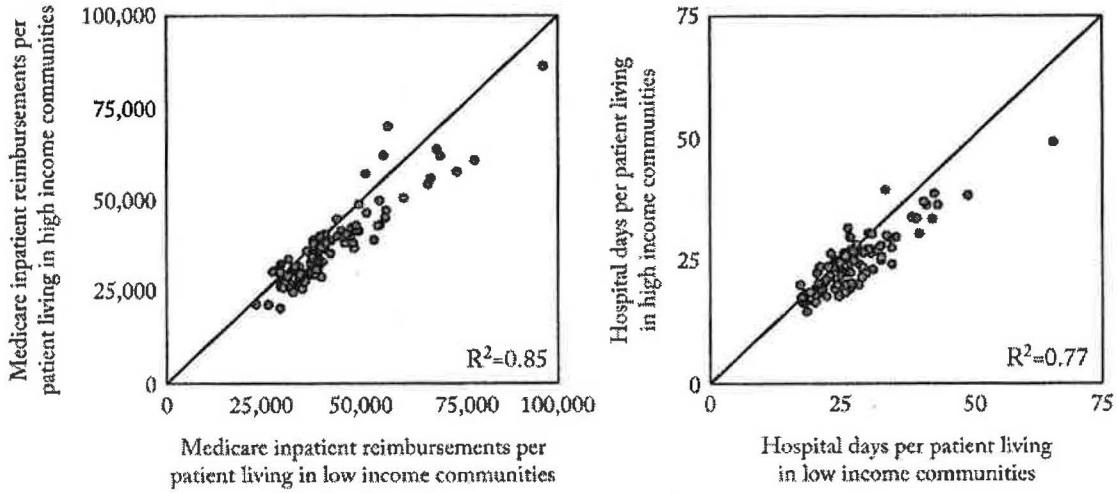


Figure 14

Consequences of Variation in Supply-Sensitive Care

A major point to emphasize is that individuals living in regions of high medical expenditure do not benefit with longer, happier lives. Indeed, many economists view expenditures in American healthcare as "flat of the curve" medicine. As noted, a number of studies demonstrate equal demand for care, and equal access to care, but strikingly unequal rates of "post-access" consumption of healthcare by demographically similar populations; yet, these increased expenditures provide only marginal benefit at a cost of adverse events. As a result, incremental health gains for spending more on healthcare are essentially zero.

In fact, some evidence suggests that patients actually do worse in regions of high medical expenditure. A potential explanation lies in the observation that high-cost regions are marked by disorganized and highly inefficient medical infrastructures. Care is duplicated needlessly. Communication between providers and across systems is inadequate. In light of this, it is perhaps not at all surprising that more care is not necessarily better care.

Apart from problems associated with disorganized and chaotic care, an additional hazard of over-use of medical care is over-diagnosis...where a patient is diagnosed and treated for a disease (e.g. cancer) that was never going to bother him/her. Again, let's turn to the example of prostate cancer. Studies suggest that if you screen 1,000 men for 10 years, you avoid approximately 1 prostate cancer death. However, around 4 of the men will die of prostate cancer anyway. And, approximately 50 men will be over-diagnosed, i.e. needlessly treated. The attendant costs and psychological stress can be substantial. Even more, 5 of these men will experience significant side effects, such as incontinence and diminished sexual function...again, needlessly.

Grateful patients whose screening exam identified a tumor feel they "owe their lives" to screening and early detection. In some instances, they do! However, many times, and as noted above in the example of prostate cancer, they do not. Rather, they have been harmed by the screening process. And ironically, the perception of lifesaving benefits from cancer detection tends to promote additional screening with risk of additional over-diagnosis.

Financial Implications

Numerous studies have demonstrated that the amount of care Americans receive depends on where they live and on the physicians and hospitals they use. Given this, it is not surprising to infer that the financial implications are great. As noted earlier, preference-sensitive and supply-sensitive care together account for over 80% of Medicare expenditures. In this day of spiraling healthcare costs – which without hyperbole threaten to bankrupt our society – addressing these costs is urgent. Only with combined efforts of regulatory bodies, lawmakers, and our profession, can success be envisioned.

All agree that society can no longer afford the inefficiencies and overuse uncovered by these studies. Above and beyond this, however, the variance in practice patterns is profoundly unfair. We've seen already that some regions spend more on healthcare without deriving benefit. Perhaps less apparent at first glance is the fact that these variances lead to substantial cross-market subsidies; regions where healthcare is relatively cheap subsidize regions where healthcare delivery is less frugal. In other words, taxpayers in regions where healthcare is efficient and relatively economical contribute more than they receive; people in high-cost regions receive more care than they pay for (although, again, the additional care does not buy them longer, healthier lives).

Lest we think people living in expensive healthcare zones are reaping financial bounty from these cross-market subsidies, we must recognize that individuals living in high-use regions pay substantially more in co-payments for their healthcare. In many instances, these increments in healthcare payments sum hundreds – even thousands – of dollars per year.

Path to Efficiency

Examples abound where physicians – afforded feedback regarding their practice patterns – self-regulate, leading to substantial improvements in healthcare delivery. One striking example occurred in the 1970's when a small town in Maine was confronted with the fact that tonsillectomy rates in that city were substantially elevated relative to the rest of the state and relative to the nation. This feedback triggered an evaluation of the criteria used determine eligibility for tonsillectomy, and surgery rates prompted declined (point F in **Figure 15**). [As noted, many other similar examples could be cited. And lest our heads swell, we might contemplate the care and procedures we routinely provide at this time and at which our children will scoff as the "tonsillectomy of the 2010's."]

In several locales across the country, healthcare delivery is relatively efficient and economical. Rochester (Minnesota), Salt Lake City (Utah), Temple (Texas), to name a few, are regions where healthcare expenditures are modest in comparison with other regions. In each case, these locales host a large integrated healthcare system: Mayo Clinic, Intermountain Healthcare, Scott & White. A challenge for the future will be to emulate the "best practices" in our midst for the sake of our patients and efficiency.

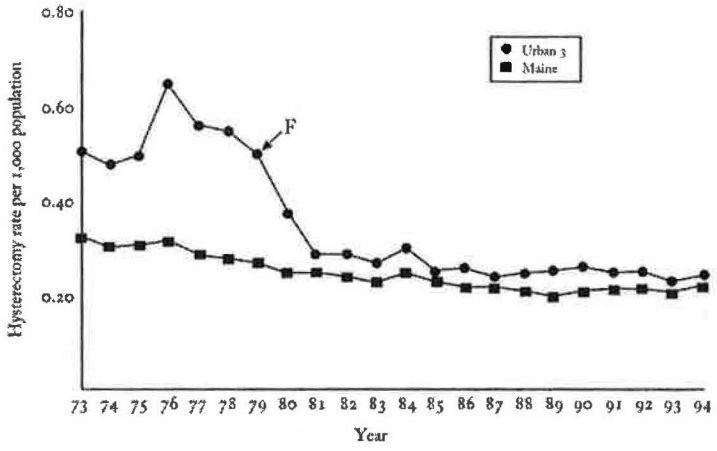


Figure 15

There is a silver lining in this cloud of inefficiency and overuse. As we've seen, feedback and altered incentives can lead to rapid and robust changes in behavior. If we are able to effect system-wide changes, such that efficient practice patterns in existence already are replicated, evidence suggests that the looming doctor shortage may never emerge. Indeed, studies suggest that we already have sufficient numbers of physicians to care for aging baby boomers (**Table 5**). [That is not to suggest that the relative proportions of these physicians do not need to change; on the contrary, success in the arena almost certainly hinges on the training of additional primary care physicians with consequent increases in their relative proportions in American medicine.]

Region	*Estimated Percentage of Reduction in Resources in Managing Chronic Illness*				
	Hospital Beds	*ICU Beds*	*Total Physician Labor*	*Primary Care Labor*	*Medical Specialist Labor*
Temple, Texas	23%	55%	27%	15%	43%
Sacramento, California	24	16	18	13	26
Rochester, Michigan	25	29	32	28	41
Madison, Wisconsin	29	53	34	25	48
Portland, Oregon	38	55	31	27	40
Salt Lake City/ Ogden, Utah	41	43	33	35	39

Most of the care in Temple, Texas, Rochester, Michigan, and Madison, Wisconsin, is provided by group practices; integrated hospital systems dominate care in Sacramento, California, Portland, Oregon, and Salt Lake City/Ogden, Utah.

Table 5

Concluding Remarks

Healthcare delivery in the United States is marked by a remarkable degree of regional variation. Numerous studies have demonstrated that supply within the medical community – numbers of doctors, specialists, hospital beds, ICU beds, etc – contributes importantly to this variance. And no parts of the medical spectrum are spared; rather, it is seen at robust levels in the small-practice environment, in integrated healthcare systems, and within academic medical

centers. Happily, examples exist where efficient, relatively cost-effective delivery of healthcare exists. A challenge facing our profession is the implementation of changes that integrate and streamline healthcare delivery for the benefit of our patients and society.

Disclosures

None

Addendum

Many of the figures reproduced here are taken from the recent book Tracking Medicine[1] by John E. Wennberg. As such, their use is intended exclusively for a local audience. They are not to be reproduced in any form without the author's and publisher's permission.

References

1. Wennberg JE. *Tracking medicine*. Oxford: Oxford University Press, Inc.; 2010.