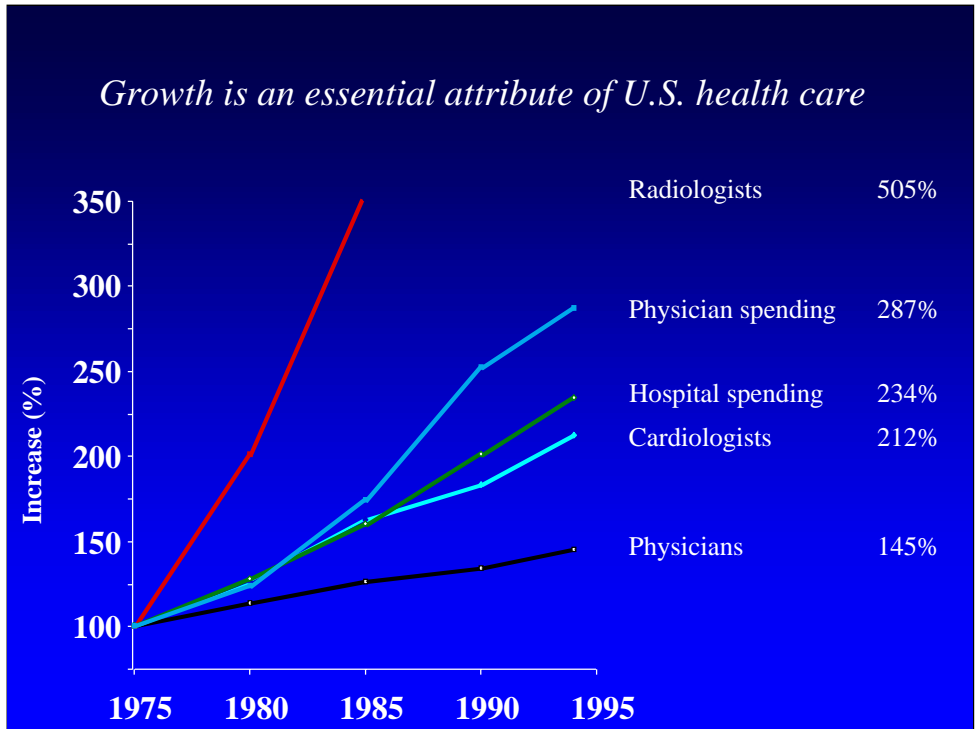


Is More Better?

Elliott S. Fisher, MD, MPH

Health Care in America: Is More Better?

Growth is an essential attribute of U.S. health care



Growth is an essential attribute of health care in the United States. Since 1975, inflation adjusted spending on hospital and physician services has more than doubled. The physician supply has also grown, with the numbers of cardiologists doubling and the number of radiologists per capita increasing by a factor of 5.

There is no question that greater access to improved technology has led to dramatic gains in the treatment of many conditions

As is concern about growth

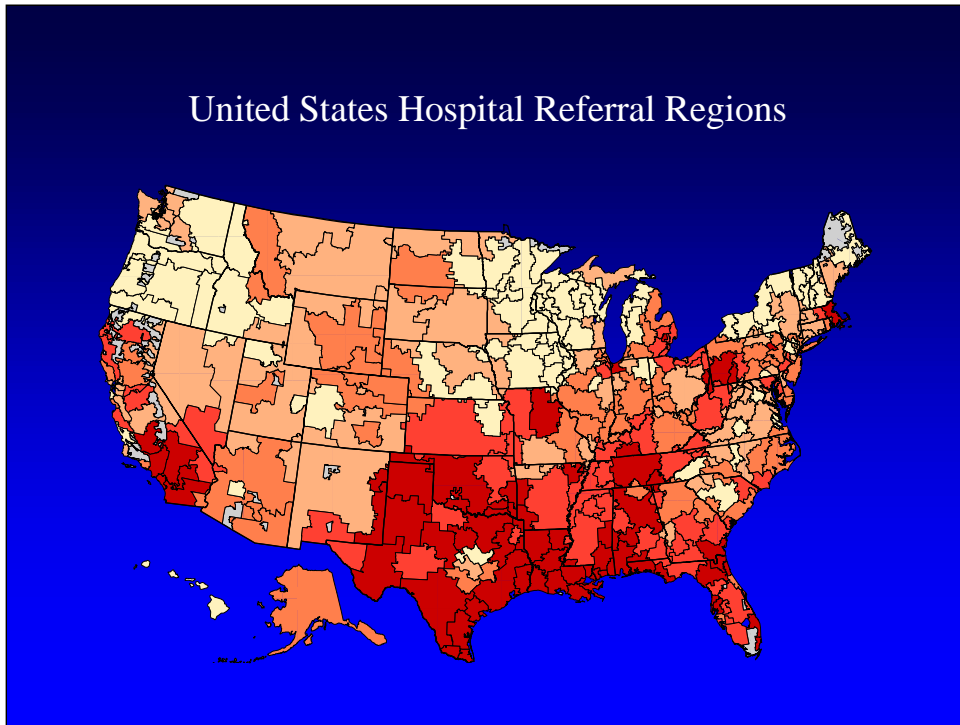
Illich	Medical Nemesis and the Expropriation of Health	1976
Preston	The Clay Pedestal	1981
Mold	The Cascade Effect in the Clinical Care of Patients	1986
Meador	The Last Well Person	1994
Goodwin	Geriatrics and the Limits of Modern Medicine	1999

But concern about medical care and the medical care system has kept pace with the growth of medical care.

These authors have each highlighted different limitations of U.S. medical care, but all express concern that too many Americans simply assume that more medical care can only be good for us.

With support from the Robert Wood Johnson Foundation, Dr. Elliott Fisher and his colleagues have begun a careful look at this question, motivated in part by the remarkable differences in practice patterns observed across the U.S. and highlighted in the Dartmouth Atlas of Health Care.

United States Hospital Referral Regions



The Dartmouth Atlas divides the country into 306 discrete medical markets called hospital referral regions, each with an average population size of just under one million people. They include multiple hospitals and at least one major referral hospital. The Atlas studies show that almost all people receive their care within the region. The Atlas then describes the performance of each of those distinct health care systems.

The findings of the Atlas are discussed fully in Dr. Wennberg's lecture. The striking and nearly consistent finding is variability.

Variations in resources and spending

Differences across Hospital Referral Regions

	Lowest	Highest	Ratio
Hospital Beds	1.4	5.1	3.6
Primary Care Physicians	33.8	105.1	3.1
Specialist Physicians	53.3	227.0	4.3
Medicare Spending	\$3,074	\$9,033	2.9

Wennberg. 1999. The Dartmouth Atlas of Health Care.

Dr. Fisher's research has focused on variability in resources and spending. Although the resident populations of hospital referral regions are relatively similar in terms of their need for care, the levels of resources and the amounts of care provided differ dramatically -- as shown above. Some regions have 3.6 times as many hospital beds per capita as others, 3.1 times as many primary care physicians as others, and 4.3 times as many specialists as other regions. Medicare spending differs by a factor of nearly three.

Dr. Wennberg's lecture "Unwarranted Variations" also summarizes what has been learned about the patterns of practice in high and low cost communities.

Why such dramatic differences in spending? Key findings from the Atlas

Not explained by differences in need.

Are influenced by local capacity.

What high spending / high resource communities get...

More care of proven benefit? *No*

More discretionary surgery? *No*

More supply-sensitive services? *Yes*

The differences in spending are not due to differences in need across regions
The differences are powerfully influenced by local capacity.

High spending regions do not get more care of proven benefit, such as flu shots, pneumonia vaccination, or high quality care for heart attacks. Residents of high spending regions are no more likely to receive potentially valuable discretionary procedures such as bypass surgery or cholecystectomy.

High spending regions do receive more supply sensitive services.

Supply-sensitive services

Weak or absent scientific evidence for providing the service.

Care provided under the assumption that more is better.

Use of the service is strongly associated with local supply.

Since the increased utilization in high spending regions is due to “supply sensitive” services, it is important to understand what we mean.

Supply-sensitive care has the following attributes:

- Weak or absent scientific evidence for providing the service -- scientists have very rarely bothered to ask how frequently patients should see physicians or whether they should receive care for pneumonia in the hospital or at home.
- Rather, care is provided under the assumption that more is better -- or can't hurt.
- Use of the service is strongly associated with local supply.

Why such dramatic differences in spending? Key findings from the Atlas

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Are influenced by local capacity.

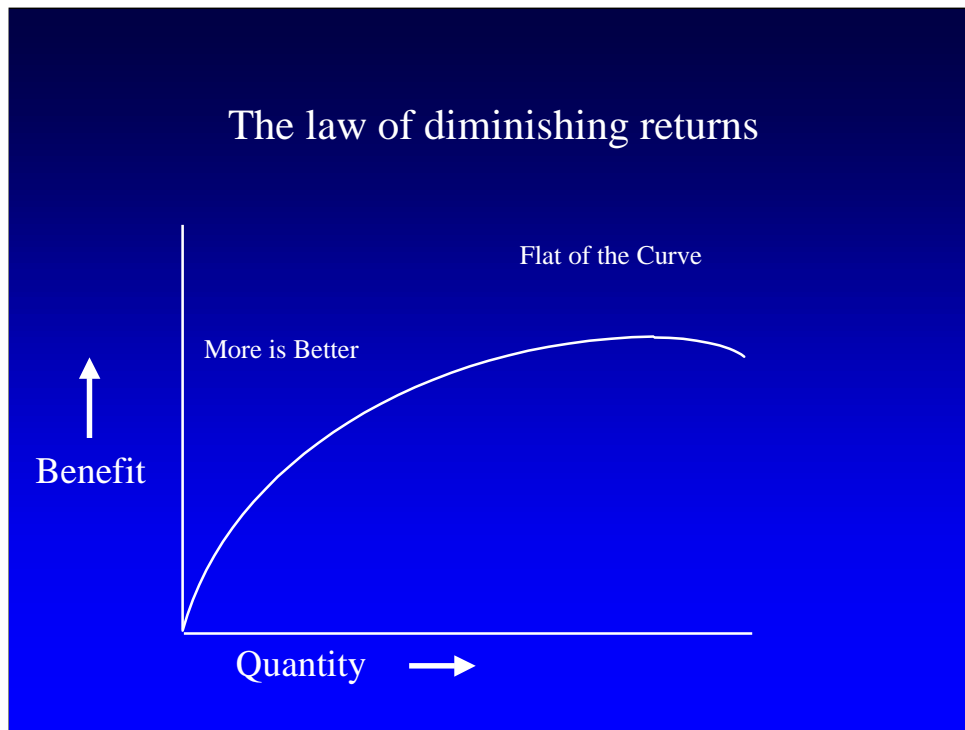
What high spending / high resource communities get...

<i>More care of proven benefit?</i>	<i>No</i>
<i>More elective surgery?</i>	<i>No</i>
<i>More supply-sensitive care?</i>	<i>Yes</i>
More visits, more tests, More minor procedures Greater use of the hospital Greater use of specialists	

What kinds of additional services are provided in high-spending regions?

Residents receive:

- More physician visits, more tests
- More minor procedures
- Much greater use of the hospital as a site of care for medical conditions.
- More frequent use of specialists.



But is more better? There are certainly theoretical reasons to be concerned that more medical care -- especially more of the supply-sensitive services delivered in high cost regions -- might not offer significant benefits. The law of diminishing returns holds that each additional input brings a slightly smaller benefit. Consider the difference between the first few physicians in a community and adding additional physicians to a community that already has all specialties represented.

Dr. Fisher and his colleagues have completed an extensive literature search and carried out several of their own research projects to address the question of where the U.S. sits on this curve. The evidence is consistent and is increasingly convincing.

Let's first look at the studies examining whether regions with greater hospital use -- the major component of increased spending in high cost regions -- is associated with improved survival.

Associations between hospital capacity and mortality

Study	Association	Magnitude	Statistical significance
Krakauer 1996	Positive	0.5% / bed	p = 0.10
Kessler, 2000	Positive	1.3% / 1 sd change	p < 0.05

In addition to their own work, they have found only two studies that specifically examined associations between hospital capacity and mortality in the United States. Both studies focused on the Medicare population.

Krakauer and his colleague, in a national study examining associations between health care capacity and Medicare mortality, found a small positive association between the supply of hospital beds within a region and mortality. An increase of 1 bed per 1000 population was associated with a 0.5% relative increase in mortality.

Kessler studied mortality among Medicare enrollees in the year after acute myocardial infarction, that is heart attacks, in the 1980s and 1990s. They also found a consistent and strong effect of local bed supply on mortality.

Associations between hospital capacity and mortality

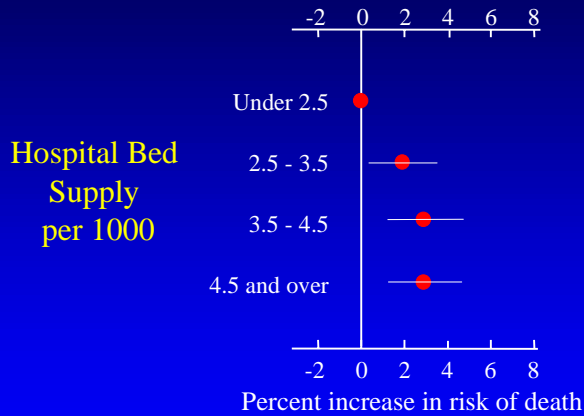
Population: 20% sample of all Medicare enrollees

Method: Cross sectional analysis
Individual and census data as controls

Turning to their own analyses, Dr. Fisher examined mortality in a 20% national sample of Medicare enrollees. They carried out a cross-sectional analysis in which they used Medicare data about the individuals (such as age, race and sex) and data about the zipcode where they lived (such as income and average levels of disability) to control for possible differences across regions in the underlying health status of the populations. Medicare enrollees in regions with greater per-capita supplies of hospital beds used much more hospital care -- after adjusting for any differences in illness.

They then looked at mortality rates.

Associations between hospital capacity and mortality



The results for the study are displayed above. Medicare beneficiaries residing in regions with 4.5 beds or more per 1000 had a two percent increased risk of death compared to those living in regions with less than 2.5 beds per 1000.

They also looked at different subgroups of the population -- such as those who were older, or black or poor. For all of the subgroups the findings were essentially the same. There were no population subgroups in whom greater hospital use was associated with improved survival.

Is More Better? Other studies, other resources

Study	Findings
Krakauer 1996:	Regions with a greater per-capita supply of medical specialists have increased mortality ($p = 0.09$)
Skinner 2000:	Regions with more aggressive use of end-of-life services have mortality rates that are no lower than other regions.
Chau, 2001	Survival following hip fracture is no better (and may be worse) in regions with greater propensity to use medical specialists at the end of life.

Several studies have looked at differences in mortality associated with the large differences in use of supply sensitive services.

Krakauer found that regions with a greater per capita supply of medical specialists have increased mortality.

Skinner found that regions with more aggressive use of end-of-life services have mortality rates that are no lower than other regions.

Chau found that survival following hip fracture is no better (and may be worse) in regions with a greater propensity to use medical specialists at the end of life.

Other studies: Randomized Trials

Study	Findings
Wasson 1992	<p>Patients were randomized to receive regular office visits or to receive telephone calls.</p> <p>Those randomized to more frequent office visits had more frequent hospitalizations. Those most at risk (poor health initially) had higher mortality.</p>
Weinberger 1997	<p>Chronic disease patients were randomized to “intensive” primary care (more frequent visits and other monitoring)</p> <p>Those under more intensive follow-up had higher hospitalization rates and a trend toward higher mortality.</p>

Two recent randomized trials have also examined whether greater use of supply sensitive services leads to improved outcomes.

Wasson compared patients followed with frequent clinic visits to those who instead received telephone calls at their homes. There was no improvement in health among those who had the more frequent office visits. In fact, they were more likely to be hospitalized and experienced a small increased risk of death.

Weinberger randomized patients to “intensive” primary care or routine care. Those who received the more frequent follow-up visits, associated with primary care treatment, had higher hospitalization rates and slightly - but not significantly -- higher mortality.

Both of these studies found that more intensive use of supply-sensitive services offered no significant benefit. They also raised the possibility of harm.

What could be going on?

Adverse events from unnecessary care counterbalance any benefit from increased treatment.

Theoretical mechanisms (JAMA article)

Predicted impact of adverse events.

What could be going on? At best, the United States appears to be on the flat of the curve. How could this happen? Could it be that for supply-sensitive services the risks exceed the benefits for residents of high rate areas?

We've looked at this in two ways:

First, we've considered the clinical mechanisms whereby more medical care could lead to harm. The means and evidence are summarized in an article that we published in the Journal of the American Medical Association in 1999.

Second, we've used available data to predict the impact of hospital-associated adverse events across the range of hospital utilization rates observed in the U.S. A summary of this work can be downloaded after you finish the lecture.

Estimating the population impact of adverse events

$$\text{Population death rate for adverse events} = \text{Hospitalization Rate} \times \text{Fatal adverse event rate}$$

The basic idea behind the estimate of the impact is illustrated in this slide.

The population death rate due to adverse events in a region is the product of two independent rates. One is the hospitalization rate -- that is, the number of hospitalizations per 1000 people living in that region. The second is the rate of fatal adverse events among hospitalized people. In a specific region, the population death rate from adverse events due to hospitalization is the product of these two rates. The case-fatality rate from adverse events is likely to be unrelated to the underlying hospitalization rate. The more time people spend in hospitals, the more likely they are to have an adverse event due to hospitalization.

We now have good data on both hospitalization rates and adverse event rates.

Predicted impact of adverse events

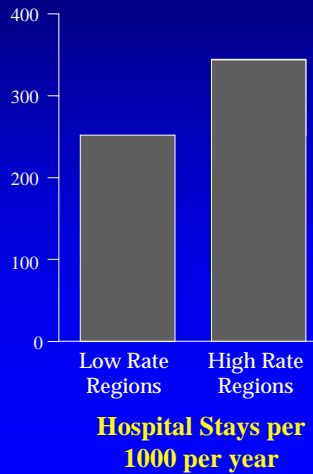
1. How many excess hospitalizations?
(Fisher, 2000)
2. How many fatal adverse events expected?
(Brennan 1991, Andrews 1997)

Our data on the number of excess hospitalizations in high capacity communities was derived from our recently published article in Health Services Research.

Rates of fatal adverse events were derived from two studies. Brennan reported the findings of the Harvard Medical Practice Study, which used chart review to determine event rates. Andrews had trained observers monitor all physician and nurse work rounds to identify adverse events that might not have appeared in the medical record. These two studies provide a range of potential adverse event rates associated with hospitalization.

These data can be used jointly to estimate the impact of higher hospitalization rates on population mortality rates from adverse events.

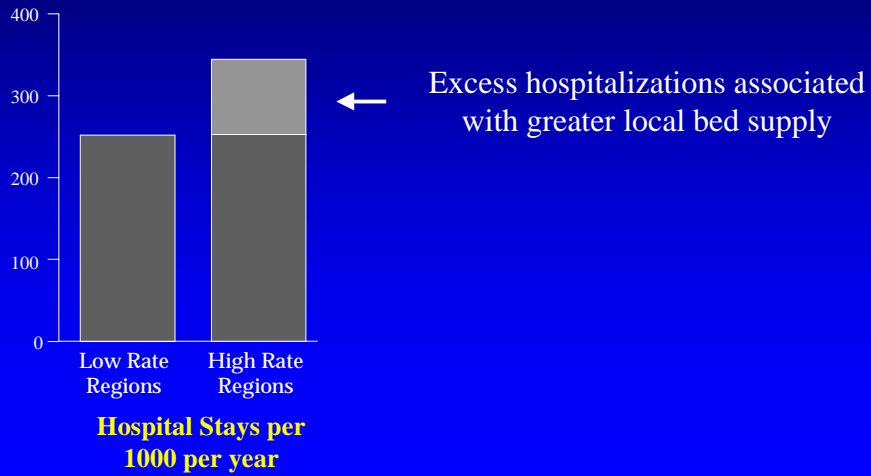
Predicted impact on mortality of excess supply-sensitive hospitalizations



As already pointed out, hospitalization rates differ dramatically according to the local hospital bed supply. In regions with a low bed supply, Medicare beneficiaries are hospitalized at an average annual rate of 258 per 1000 -- we call these “low rate regions” in the slide.

In contrast, residents of regions with a high bed supply are hospitalized at the rate of 341 per 1000 -- we call these “high rate regions”. As we’ve pointed out before, the excess hospitalizations in high rate regions are not due to greater illness levels or to differences in incomes across these regions. Rather, they represent a decision to treat similar patients in the hospital as opposed to the outpatient setting.

Predicted impact on mortality of excess supply-sensitive hospitalizations



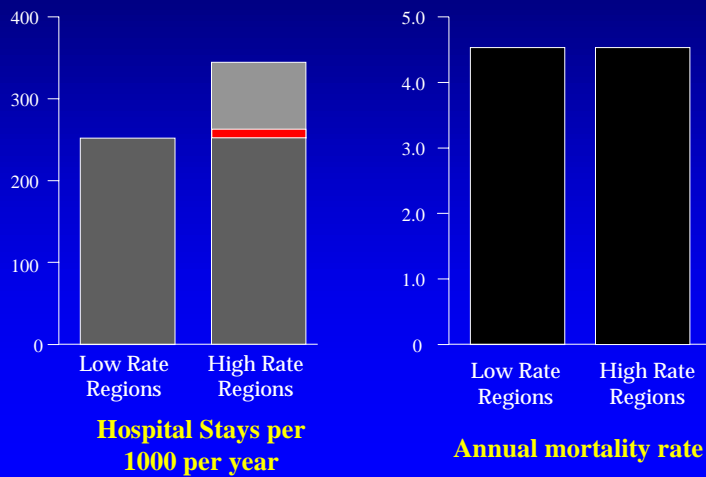
The excess hospitalizations in high rate regions are shown in gray.

Predicted impact on mortality of excess supply-sensitive hospitalizations

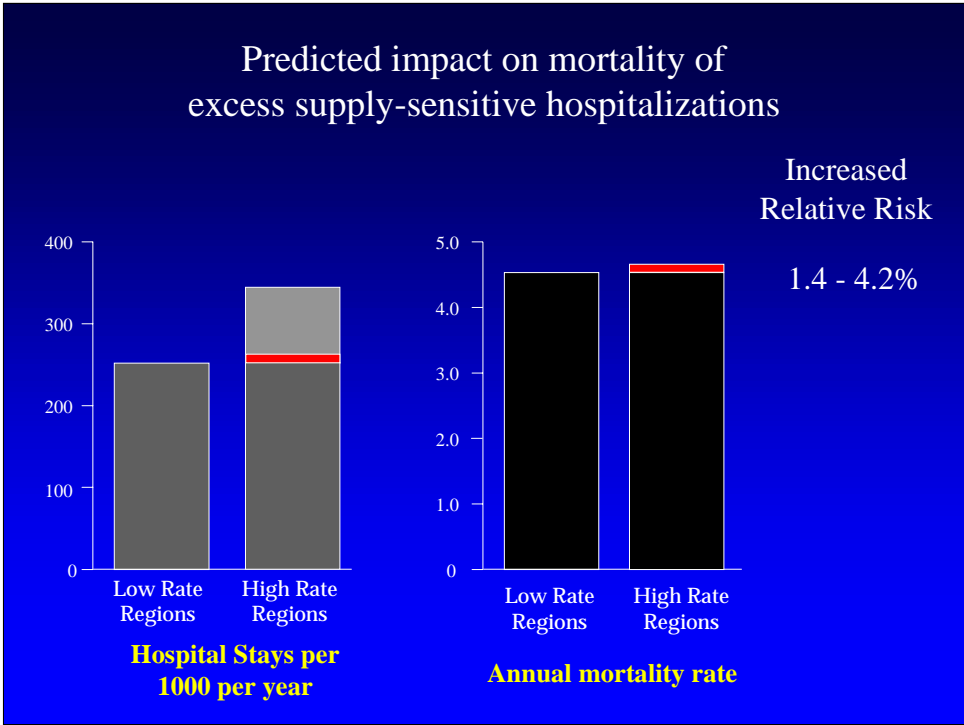


We then use the fatal adverse event rate from the Brennan and Andrews studies to estimate that these excess hospitalization in high rate regions would be expected to cause between 8 and 23 deaths per 1000 extra hospitalizations.

Predicted impact on mortality of excess supply-sensitive hospitalizations

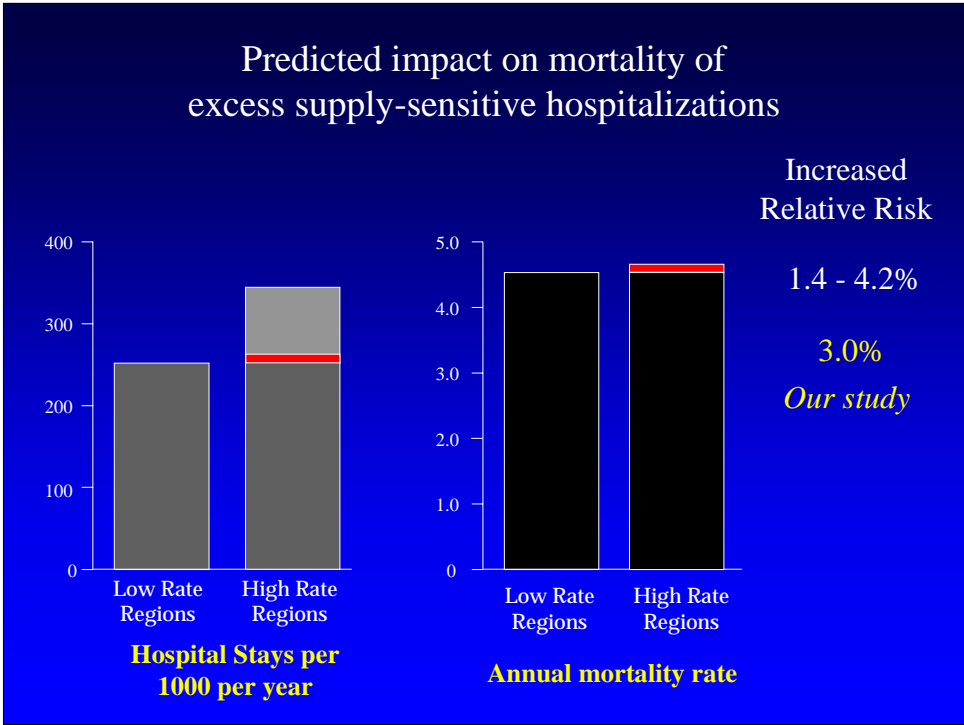


The average Medicare mortality rate is 4.7%. Given the similar levels of illness and socioeconomic status in high and low rate regions, we would expect both regions to have the same underlying mortality rate of 4.7%.



But we haven't yet accounted for the additional deaths due to adverse events in the high rate regions.

Once we add this in, we would expect to see a small increase in the mortality rate in regions with higher hospitalization rates. Compared to the baseline risk in the low rate region, the increased relative risk of death in high rate regions would be between 1.4% and 4.2%. And that is exactly what we found.



This predicted impact of excess supply sensitive hospitalizations on Medicare mortality brackets the findings from our recent study -- a three percent increase in mortality.

Is More Better?

Benefit in terms of mortality?	No.
Other benefits?	Unlikely.

All of these studies provide consistent and reasonably strong evidence that there is no significant mortality benefit from the increased supply-sensitive care provided in high cost regions. Might there be other benefits?

The patterns of clinical practice in high and low cost regions suggest that this is unlikely to be the case. As mentioned earlier and discussed in more detail in Dr. Wennberg's lecture, we see the following: Residents of high cost regions:

Are no more likely to receive needed care -- such as flu shots.

Are no more likely to receive discretionary surgery -- such as heart bypass.

The differences are in "supply sensitive services".

Supply-sensitive care -- what's provided?

Specific physician service	Ratio: high to low regions
Office visits	1.5
Inpatient specialist consultation	4.9
Feeding tube placement	5.4
Emergency intubation	3.3
Continuous ventilator management	7.7

Outpatient office visits differ only slightly. But inpatient services -- especially those used for the care of critically ill patients near the end-of-life -- differ dramatically across high and low cost regions.

These services would not appear to offer substantial benefits in terms of survival -- and that is the only rationale for such aggressive care. These services are certainly not associated with improved quality of life during a terminal illness.

Summary

The two-fold differences in spending observed across US regions are largely due to greater use of the hospital and other “supply-sensitive” care.

Greater use of hospital and physician services in high-capacity regions doesn't offer a detectable benefit in terms of survival.

The types of services provided -- predominantly aggressive end-of-life care -- are also unlikely to offer a benefit in terms of quality of life.

What have we learned?

First, the two-fold differences in spending observed across U.S. regions are largely due to greater use of the hospital and other “supply-sensitive” services.

Second, greater use of hospital and physician services in high-capacity regions doesn't offer a detectable benefit in terms of survival.

Third, the types of services provided -- predominantly aggressive end-of-life care -- are also unlikely to offer a benefit in terms of quality of life.

Conclusions

There are good reasons to be cautious about more medical care.

We see that increased capacity is generally devoted to care of uncertain benefit.

Finally, we have no evidence of improved outcomes from greater use of supply sensitive services -- and there is some research that suggests that residents of the highest intensity regions are at risk of harm.

In conclusion, there are good reasons to be cautious about more medical care. In the absence of strong scientific evidence of benefit, there are real risks of harm that should be taken into consideration.

Second, we see that increased capacity is generally devoted to care of uncertain benefit.

Finally, we have no evidence of improved outcomes from greater use of supply sensitive care -- and there is some research that suggests that residents of the highest intensity regions may be at risk of harm.