EMJ Online First, published on August 18, 2017 as 10.1136/emermed-2017-207042

Is less more, or is it less? The growing evidence on high-intensity hospital care

Ziad Obermeyer[1,2]

[1]Department of Emergency Medicine, Brigham and Women's Hospital, Boston, Massachusetts, USA
[2]Department of Emergency Medicine, Harvard Medical School, Boston, MA, USA

Correspondence to
Dr Ziad Obermeyer, Department of Emergency Medicine, Brigham and Women's Hospital, 75 Francis St, Neville House, Boston, MA 02115, USA; zobermeyer@bwh.harvard.edu

Received 14 July 2017
Accepted 15 July 2017

The evidence seems clear: we spend so much on healthcare, and get so little in return. Despite wide variation in the amount we spend on care, patients' outcomes are often the same.[1] So clearly, we should just do less. Indeed, given the growing problems of overdiagnosis and overtreatment, less is more.

As emergency physicians, we deliver a fair amount of high-intensity care. Yes, good care can sometimes be as simple as an astute diagnosis or a kind word. But it can also involve cross-sectional imaging, invasive procedures and hospital admission. At the right time and for the right patient, we believe, this care can be the difference between life and death.

And yet this care is coming under increasing scrutiny from payers and policy makers.

While emergency care accounts for a small fraction of direct health system costs,[2] the decision to admit a patient to the hospital is an expensive one indeed. There are many good reasons to send patients home—reducing crowding, avoiding hospital-acquired infections and more. But the driving force behind efforts to reduce admissions today is simple: to reduce costs. As a result, physicians everywhere face increasing pressure to discharge patients to home.

This poses a particular dilemma for emergency physicians. On one hand, the rest of the world seems very certain we should be sending more patients home. On the other, our experience suggests that failures of risk stratification and mistriage to home can have terrible consequences.

SO WHERE IS THE EVIDENCE?

Early death after discharge from the ED

Recently my colleagues and I published a study investigating how often generally healthy people sent home from US EDs died in the week after discharge.[3] Two of our key findings are relevant to current debates about the value of hospital care.

First, death in the week after discharge happens more often than we thought, about 10 000 times per year nationally, or 0.12% of all discharges home. This number is all the more striking because it is the 'tip of the iceberg': for each patient who experiences the catastrophic chain of events leading to death, many more likely experience harm or disability because of missed opportunities to diagnose or treat serious illnesses. Many of those who die are sent home with syndromic, non-pathological discharge 'diagnoses'—for example, altered mental status, dyspnoea and malaise/fatigue—that speak to the difficulties of emergency diagnosis.

Second, the risk of death depends strongly on the intensity of emergency care in a given hospital: EDs with higher admission rates and higher costs have far fewer early deaths after discharge. These EDs are far more likely to be housed in academic medical centres. Low-admission rate, low-spending EDs have 3.4 times the rate of early death after discharge. While these EDs are more likely to be located in outlying areas, the majority are housed in garden-variety, non-academic hospitals in urban or suburban areas.

> *'Emergency departments with higher admission rates and higher costs have far fewer early deaths after discharge'.*

An obvious concern here is bias from case mix differences: if sicker patients come in through the front door, they might well die at higher rates after being sent out, irrespective of the care that was or was not delivered in the ED. But strikingly, overall mortality rates (ie, for admitted and discharged patients together) in low-spending hospitals are far *lower* than high-spending hospitals. In other words, low-spending hospitals have the healthiest patient populations walking in through the front door—but despite this, have the highest rates of early death after discharge on the way out. These findings are all the more notable since all patients in our sample had reasonably good insurance (from the national US Medicare programme, the source of our data).

The bottom line: patient outcomes vary widely and systematically in the week after emergency visits. These disparities seem to have everything to do with the clinical care patients get in the ED, and not with baseline population differences, insurance or other factors that typically preoccupy health services researchers. And this clinical care costs money: every 20% increase in spending was linked to a statistically significant 5% decrease in risk of death after discharge.

> *'Every 20% increase in spending was linked to a statistically significant 5% decrease in risk of death after discharge'.*

Does this mean that we need to admit everyone from the ED, or spend more on every patient? Of course we can't, and we shouldn't. But well-intentioned policy efforts to reduce spending in the emergency setting, or reduce 'unnecessary' hospital admissions, may put patients at risk. Sometimes, more is more.

Other evidence on costs and outcomes

Why haven't we seen similar results in other literature? As with our own study, the major challenge of

To cite: Obermeyer Z. *Emerg Med J* Published Online First: [*please include* Day Month Year]. doi:10.1136/emermed-2017-207042

studying healthcare is causal inference: the fundamental difficulty of showing causal relationships between x and y. This problem is at the root of a growing crisis of credibility in health research more broadly: 1-week kale is a superfood, and benzodiazepines and proton pump inhibitors are safe; the next week they are carcinogens and killers.

Going back to our study, let's say we had found no relationship between spending and outcomes. One explanation is that spending does not affect outcomes. This would certainly fit a common belief that high-cost (often academic) hospitals provide a lot of unnecessary care, and 'lean' hospitals (which, in the USA, are often for-profit) deliver better value.

Another explanation is the exact opposite. If urban academic hospitals draw sicker patient populations, even high spending might not get these patients up to the same level of health: poor outcomes, high spending. If non-academic hospitals serve healthier patient populations drawn from their neighbourhoods, they do not need to spend much money to keep their patients in good health. Good outcomes, low spending.

These baseline population differences can be hard to see: so many aspects of health and sickness are not recorded in our datasets, and cannot be controlled for or adjusted away. Randomised trials are specifically designed to deal with these unobserved differences—but without a trial comparing more or less costly care, how can we distinguish between these two explanations?

One option is simply reasoning through what the biases are, and what implications they have for the observed results, as we did in our study. This 'hypothetico-deductive' approach is valuable, and underappreciated in health research and elsewhere.[4]

Another option is to take advantage of 'natural experiments': circumstances that introduce random variations in care, which allow rigorous identification of the effect of care on outcomes. A growing number of careful studies do this, and I will highlight three.

A study by Doyle and colleagues[5] shows that a 10% increase in hospital costs reduces patient mortality by 4% in the first year after emergency admissions. The methodological starting point of the study is the observation that (under specific conditions) the particular ambulance that happens to be closest to your home at any given time is essentially random. Since the crew of this ambulance often has measurable preferences for certain EDs, this effectively creates random assignment to the preferred hospital of the particular ambulance crew closest to your house when you call for help. When patient outcomes are analysed through the lens of this natural randomisation—rather than a naive comparison of outcomes—sizeable differences in outcomes between high-cost and low-cost hospitals become crystal clear.

Another study[6] finds that patients cared for by teams from a highly ranked academic medical centre are 10%–25%*less expensive* than those cared for by their lower ranked colleagues. Here, researchers use data from a hospital where patients, based on the last digit of their social security number, are assigned to one of two admitting teams: a team of physicians from one of the top medical schools in the USA, or a team from a medical school ranked near the median. This quirk of the hospital's admission protocol simulates a randomised trial of top-ranked versus median inpatient care. Importantly, costs at the two teams' parent hospitals did not differ, suggesting that unobserved case mix differences in patients were obscuring real differences in care. But in randomly assigned patients, the care provided by the country's top academic doctors—generally thought to involve needlessly high costs—is far higher value than previously believed.

Finally, frequent ED closures in the USA means that, overnight, patients with myocardial infarction can face dramatic increases in the time needed to drive to the nearest catheterisation facility. Shen and Hsia[7] use the timing and geographical distribution of closures to identify the effect of timely emergency care. They find a 28% increase in 90-day mortality for a 30 min increase in driving time, clearly showing the value of prompt catheterisation. By comparison, clopidogrel reduces 28-day mortality by 7%.[8]

CONCLUSIONS

If timely, high-quality hospital care were a drug, it would be a blockbuster. Health systems around the world would be lining up to buy it from the lucky pharmaceutical company that developed it.

Instead, misguided policy efforts risk indiscriminately cutting high-value and low-value care alike. The longer term costs of this strategy—untreated infarctions, non-healing fractures, ruptured appendicitides—will eventually become apparent.

> *'The challenge for national health systems is to identify areas where high-intensity care makes a difference, and where it does not'.*

The challenge for national health systems today is to identify areas where high-intensity care makes a difference, and where it does not. Surely there are opportunities throughout the medical system to reduce costs without doing harm. Patients at the end of life in all countries receive care that is highly aggressive, invasive and largely against their wishes, as well as expensive.[9] More broadly, there is growing potential for advances in predictive analytics to identify patients who will, and will not, benefit from high-intensity diagnostic testing and intervention.[10] But all this will require careful evaluation of the evidence, using rigorous methods from econometrics and statistics. Widely held beliefs and a desire to cut costs are a poor substitute for science.

Contributors ZO wrote the article.

Competing interests None declared.

Provenance and peer review Not commissioned; internally peer reviewed.

REFERENCES

1 Fisher ES, Wennberg DE, Stukel TA, *et al*. The implications of regional variations in Medicare spending. part 2: health outcomes and satisfaction with care. *Ann Intern Med* 2003;138:288.
2 Lee MH, Schuur JD, Zink BJ. Owning the cost of emergency medicine: beyond 2%. *Ann Emerg Med* 2013;62:498–505.
3 Obermeyer Z, Cohn B, Wilson M, *et al*. Early death after discharge from emergency departments: analysis of National US insurance claims data. *BMJ* 2017;356:j239.
4 Deaton A, Cartwright N. Understanding and misunderstanding randomized controlled trials. *National Bureau of Economic Research Working Paper* 2016;w22595.
5 Doyle J, Graves J, Gruber J, *et al*. Measuring returns to hospital care: evidence from ambulance referral patterns. *J Polit Econ* 2015;123:170–214.
6 Doyle JJ, Ewer SM, Wagner TH. Returns to physician human capital: evidence from patients randomized to physician teams. *J Health Econ* 2010;29:866–82.
7 Shen Y-C, Hsia RY. Geographical Distribution of Emergency Department Closures and Consequences on Heart Attack Patients. *National Bureau of Economic Research Working Paper* 2016;w22861 http://www.nber.org/papers/w22861.
8 Chen ZM, Jiang LX, Chen YP, *et al*. Addition of clopidogrel to aspirin in 45,852 patients with acute myocardial infarction: randomised placebo-controlled trial. *Lancet* 2005;366:1607–21.
9 Bekelman JE, Halpern SD, Blankart CR, *et al*. Comparison of Site of Death, Health Care Utilization, and Hospital Expenditures for Patients Dying With Cancer in 7 Developed Countries. *JAMA* 2016;315:272–355.
10 Obermeyer Z, Emanuel EJ. Predicting the future-big data, machine learning, and clinical medicine. *N Engl J Med* 2016;375:1216–9.

Is less more, or is it less? The growing evidence on high-intensity hospital care

Ziad Obermeyer

Emerg Med J published online August 18, 2017

Notes