On The Appropriateness Of Small-Area Analysis For Cost Containment

Researchers should abandon their microscopic inspection of medical practice and refocus their gaze on what patients want, what works, and how much is enough.

by John E. Wennberg

The paper by Joseph Restuccia and colleagues comes as no surprise to the student of small-area variations. Variations studies have shown that for most causes of admission, the average severity of illness among hospitalized patients is not closely associated with the discharge rate. Therefore, one would not expect to see a higher proportion of hospital beds used by less ill patients (“inappropriate admissions”) in hospitals serving areas with higher hospitalization rates. The key to understanding the dynamics of this paradox is understanding the effect that capacity has on clinical judgment. For most medical causes of admission, the effect of increasing the number of staffed hospital beds per capita is to reduce the threshold for admission at all levels of patient severity; among populations living in regions with greater capacity, the very sick are admitted more often (and treated more intensely); the less sick also are more likely to be admitted.

Hospital capacity. This fundamental effect of capacity occurs for a wide range of medical conditions because there is no well-established evidence about the value of hospitalization. In contrast to surgical interventions, where theory on the relationship between need and outcomes is strong (although supporting scientific evidence may be weak), for medical conditions the theoretical basis for recommending hospital care (rather than care in another setting) is poorly articulated. Moreover, outcomes studies that test whether the benefits of hospital care exceed the risks for specific conditions and levels of illness have not been done. For example, for patients with congestive heart failure, chronic obstructive pulmonary disease, pneumonia, and gastroenteritis, which are among the most common medical causes of hospitalization, one cannot find discussions in medical texts or journals concerning the criteria for hospitalization, nor can one find studies of the risks and benefits to hospitalized patients, compared with patients treated elsewhere. Yet physicians (and, no doubt, patients) are schooled to believe that sick patients with complex medical problems are more likely to do better in settings with more resources and more opportunities for high-tech interventions—that is, in hospitals. Since there are always more sick persons than beds, strategies based on these beliefs inevitably lead to the use of available beds and technologies.

As a result, the discharge rate for most medical conditions among hospital service areas or regions is closely correlated with the per capita number of staffed hospital beds. The exceptions are a few “low-variation” conditions, such as hip fracture, for which the hospitalization rate closely reflects the under-
lying incidence of the condition.

The broad influence that the number of staffed beds has on practice style ("the threshold effect") has been characterized in several studies comparing Boston (high rate per capita) with New Haven (low rate per capita).³ The influence of capacity on hospitalization at the low end of the severity scale is illustrated by the greater proportion of Medicare enrollees living in Boston who are admitted within a year (in 1985, 21.3 percent compared with 15.6 percent in New Haven) and the lower case-fatality rates for residents of Boston compared with those in New Haven.⁴ At the high end of the severity scale, the influence of supply is seen in shorter intervals between readmissions for chronically ill patients; in more admissions, patient days, and inpatient expenditures in the last six months of life; and in the greater proportion of Medicare enrollees living in Boston who die under active treatment in a hospital, rather than at home, in a hospice, or in a nursing home.⁵ A recent study illustrates that the threshold effect that has been so well documented in Boston and New Haven prevails nationwide.⁶

Given the broad influence of capacity on the rate of hospitalization for patients located at both ends of the illness severity spectrum, it is not surprising that a study of "appropriateness" that uses an instrument designed to assess the need for hospitalization on the basis of acuity of illness will fail to detect an increase in the proportion of inappropriate (low-acuity) admissions in high-rate areas. What is surprising is the authors' claim that "to the extent that areas with high and low hospital use have similar rates of inappropriateness, the usefulness of small-area analyses in targeting cost containment interventions is in doubt." On the contrary, small-area analysis has demonstrated that looking at population-based rates of admissions for high-variation medical conditions makes it possible to identify areas where capacity exercises its effects on the whole population, resulting in higher population rates of hospitalization. This identification of populations with higher rates of admission for high-variation conditions allows us to address the issue at the level of aggregate supply, rather than at the level of individual admissions, a strategy that has consistently failed to solve the problem of variation for medical admissions. When addressing variations in hospitalization rates for medical conditions, I prefer a strategy that deals with aggregate resource allocation (that is, capacity or budgets), rather than strategies that micro-manage the doctor/patient relationship through practice guidelines or appropriateness criteria applied case by case.

**Correcting the equation.** How can we know the correct population-based rate? By using benchmarking. Hospitals with national reputations for quality and commitment to scientific medicine, and that serve demographically similar populations, can be compared with regard to economic efficiency and mortality rates. When these parameters are used, New Haven and Boston differ only in economic efficiency. A recent study using the New Haven actuarial experience as the benchmark illustrates that if the practice patterns of New Haven were adopted by Boston clinicians, Medicare outlays for enrollees living in Boston for inpatient care in 1992–1993 would have been $317.5 million rather than $460.5 million—a savings of $143.0 million.⁷

An alternative strategy for addressing unnecessary hospitalizations could, in theory, be similar to that applied to surgical interventions and would require extensive outcomes research on a condition-by-condition basis, paying close attention to the myriad numbers of patient subgroups based on severity of illness and comorbidity. This strategy would require reform of the doctor/patient relation, ship to determine on a case-by-case basis whether admission was necessary. However, I
do not believe that this strategy will work, primarily because it does not address the fundamental problem: When presented with a sick patient and an available bed, our society strongly believes that more is better. For every problem that may temporarily yield to an investigation that accurately specifies the risks and benefits of outpatient versus inpatient care, a hundred will remain unexamined and therefore susceptible to the threshold effect of hospital capacity on utilization. It is not only the number of problems that would overwhelm an effort to achieve comprehensive end-results rationality. The game is constantly changing: The inventive nature of the medical mind and the ever-increasing availability of more sophisticated technologies for discovering and treating medical disease make yesterday’s outcomes study susceptible to continuous reinterpretation and revision.

Subtle differences. So, what are we to do? In designing a cost containment strategy, it is important to keep in mind that the effect of capacity on practice style is subliminal. It occurs without awareness by clinicians and, presumably, patients. Prior to the publication of the first Boston/New Haven study, clinicians at the Yale-New Haven Hospital were unaware of the differences between the communities. These doctors included clinicians who had practiced in both communities and had made the transition to the New Haven environment without awareness that their own practice styles had probably changed. In a more recent cohort study comparing Bostonians to New Havenites, we examined the readmission patterns over a three-year period for patients whose initial admissions were for stroke, heart attack, hip fracture, and a few other low-variation conditions. All subsequent admissions were counted, and most of these were for high-variation medical conditions. Because most rehospitalizations were at the same hospital, the cohort design was useful for discovering differences in practice style between the teaching hospital staffs. When I asked clinicians at different Boston teaching hospitals where their own hospital stood in comparison to others, none knew, even though the differences were substantial and statistically significant.

The differences in readmission are attributable to differences in the effective per capita supply of staffed beds: The population loyal to Yale-New Haven is larger, relative to its staffed beds, than the population loyal to the Boston teaching hospitals. In Boston the size of the population loyal to the New England Medical Center and Boston University Hospital relative to staffed beds is smaller than that for Massachusetts General, Beth Israel, Brigham and Women’s, and Boston City Hospitals. The result is more frequent readmissions generally and more frequent admissions for conditions that, were the patient in the Yale-New Haven patient pool, would be treated outside the hospital.

The Boston City/Boston University Hospital comparison is notable because the effect of capacity can be observed within what is essentially one institution with a shared medical staff. The probability of readmission for patients initially hospitalized at Boston University is 28 percent higher than for those hospitalized at Boston City Hospital, even though the population served by the latter is poor and likely to be sicker. The subtle, adaptive nature of the relationship between supply, practice style, and medical theory is revealed in these differences: The same physicians who serve as the house staff for Boston City Hospital also serve Boston University Hospital. When practicing in the Boston City Hospital context, they adopt one practice style; in the Boston University setting, another.

Reducing capacity. The U.S. health care market is already moving in the direction of reducing excess capacity, implicitly operating under the assumption that if more is not demonstrably better, then less will suffice. In more regulated health care systems such as Canada's, governments are seeking objective ways of reducing excess hospital capacity. The measures of capacity provided by small-area analysis, and related readmission ratios generated by cohort studies, provide benchmarks that should be useful in a variety of cost
containment strategies targeted to reducing acute care hospitalizations.

The ultimate issue is whether a reduction in capacity will harm patients. Within the range of variation in cities such as New Haven, Minneapolis, and San Francisco, it appears that it will not. First, clinicians in low-rate areas do not recognize that they are rationing care. Second, the available data comparing mortality in high- and low-rate hospitalization areas do not support the hypothesis that greater use of acute hospital care for medical conditions results in increased life expectancy. Third, recent studies of the preferences of seriously ill patients for intensive care show that many preferred less intervention than what they actually received. The amount of care these patients received was directly related to the capacity of their local health care systems; those living in high-capacity regions who preferred less care than they received were more likely to have their preferences overridden than were those who preferred less care and resided in low-rate areas.

Searching for inappropriate admissions will not solve the most fundamental of the health care system’s problems, and it is time that we turn our attention away from the microscopic inspection of individual medical decisions and focus instead on the problem of learning how much care patients want, what works, and how much is enough. In the case of medical conditions, this means focusing on the patterns of variation and their association with supply and population-based outcomes, particularly mortality. When more is not better for patients and the health care economy, it also means taking appropriate steps to reduce acute hospital capacity.

NOTES

4. Fisher et al., “Hospital Readmission Rates for Cohorts of Medicare Beneficiaries in Boston and New Haven.”
5. Regarding readmissions, see Wennberg and Cooper, The Dartmouth Atlas of Health Care in the United States. Regarding location of care, see Fisher et al., “Hospital Readmission Rates for Cohorts of Medicare Beneficiaries in Boston and New Haven.”
6. Wennberg et al., “Are Hospital Services Rationed in New Haven or Over-Utilized in Boston?”
8. Wennberg et al., “Hospital Use and Mortality among Medicare Beneficiaries in Boston and New Haven.”
10. Wennberg et al., “Hospital Use and Mortality among Medicare Beneficiaries in Boston and New Haven.”