

## **The Productivity of Physician Specialization: Evidence from the Medicare Program**

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## **The Productivity of Physician Specialization: Evidence from the Medicare Program\***

Amitabh Chandra and Katherine Baicker

There is increasing concern in the U.S. with the growth of health care expenditures. The rapid rise in expenditures is particularly troubling given that different areas seem to produce the same amount of health care at very different costs. In fact, a large body of literature documents both wide variation across the country in the quality and quantity of health care produced and the complete absence of a positive relationship between expenditures and the quality of care (*The Dartmouth Atlas of Health Care*, John Wennberg and Meagan Cooper, Eds., 1996; Jonathan Skinner, Elliott Fisher, and John Wennberg, 2001; John Wennberg et al., 2002; Elliott Fisher et al., 2003a and 2003b; Katherine Baicker and Amitabh Chandra, 2003). Understanding the factors that drive these differences in use of inputs and productivity in health care is fundamental to designing efficient health care policy. Potential efficiency gains are particularly important in the context of the aging U.S. population and the Medicare program's mounting fiscal crisis.

Many different inputs contribute to the production of health care, including medical personnel, technology, and patient characteristics. One dimension in which the production of health care in different parts of the country varies widely is the use of physician "specialists" (for example, cardiologists and gastroenterologists) – those doctors who are not pediatricians or general practitioners. For example, the hospitals serving the population around Louisville, KY have 30 percent more medical specialists per capita than those serving Lexington, KY, but 5.5 percent fewer family practitioners per capita – even though the cities have similar geography and demographics and each has a teaching hospital.

These differences are driven by supply and demand factors in the market both for specialists and for health care more generally. Gary Becker and Kevin Murphy (1992) develop a

general model of specialization which suggests that the degree of specialization in a market should be driven by an equalization of the positive marginal return to specialized knowledge and the growing marginal cost of coordinating specialists. This model has testable predictions: all else equal, areas with the advantage of low costs of coordination (such as dense cities) should have a higher degree of specialization, produce more health care, and consequently, better health.

There are a number of factors that may interfere with the socially efficient use of specialization in the production of health care. Medicare, a major purchaser of health services, reimburses physicians using administrative pricing that is often criticized for being out of line with market valuation of the services they provide. More directly, several federal policies aim to increase the fraction of medical students going into primary care, including the specialty of Internal Medicine: the Council on Graduate Medical Education has guidelines on the number and distribution of residencies by specialty, and the federal government subsidizes areas with a “shortage” of primary care physicians through Medicare and the National Health Service Corps. These policies may introduce distortions that increase the number of specialists. Furthermore, each individual specialist may not take into account the externality that coordination failure imposes – by adding congestion to the provision of health care, each specialist may compromise the quality of care provided by other physicians, a negative spillover that may also lead to too much specialization. By contrast, if a social planner were making a decision for the entire hospital market, that planner would choose a lower level of specialization that took the congestion externality into account.

In this study we examine the empirical relationship between the mix of specialists in the physician workforce and the costs and benefits of the health care provided across health care markets. We focus on evidence from the Medicare program for several reasons. First, the

current program represents 17 percent of all health care expenditures and 13 percent of the federal budget. The projected doubling of the Medicare population between 2000 and 2025 will lead to an increasing strain on national resources. Second, we have particularly rich data on Medicare the treatment of beneficiaries – a group that uses specialist services intensively.

Our results demonstrate that areas with relatively more medical specialists have much higher spending per Medicare beneficiary, but do not produce higher quality care, higher patient satisfaction, or lower mortality – even when the underlying risk and demographics of the populations they serve are taken into account.

## I. Empirical Framework

We examine the degree of physician specialization in health care markets, and answer two questions. First, is a higher density of physicians of particular specialties associated with higher quality health care? Second, what is the relationship between the composition of the physician workforce and differences in spending across hospital markets? The *Dartmouth Atlas of Health Care* (1996) divides the country into 306 Hospital Referral Regions (HRRs), each representing the geographic area served by a major referral hospital (or major health care market). We perform analysis at the HRR level (weighted by the Medicare population) using data from the *Atlas* derived from Medicare Claims Data for 1995-96. We estimate:

$$\text{Outcome}_i = \beta_0 + \beta_1 \text{Family Practitioners}_i + \beta_2 \text{Internists}_i \\ + \beta_3 \text{Medical Specialists}_i + \beta_4 \text{Surgical Specialists}_i + X_i \Gamma + \varepsilon_i$$

The right-hand side variables of interest are the number of physicians per 100,000 people in 1995 falling into four different categories: family practitioners (including general practitioners and family medicine physicians), internists, medical specialists (such as cardiologists), and surgical

specialists (such as thoracic surgeons and other non-medical specialists). The average number of family practitioners per 100,000 people is 29, medical specialists is 28, non-medical specialists is 92, and internists is 23. We also include covariates that capture the underlying risk of the population, including discharges for heart attacks, hip fractures, stroke, gastro-intestinal bleeding, and other conditions, and adjust for the age, sex, and race of the population.

We begin by examining a number of health treatment outcomes, including an “effective care” index that is the sum of the use of 11 different procedures that serve as markers of high quality care (Baicker and Chandra, 2003; Wennberg et al., 2002). These procedures, such as the administration of aspirin and beta-blockers after heart attacks, mammograms for older women, influenza vaccination, and eye exams and the evaluation of lipid profiles for diabetics, are relatively inexpensive, are known to have desirable screening and medical benefits, and are rarely contraindicated. Their use should thus be relatively insensitive to the characteristics of the population and relatively uniform across areas – most beneficiaries should be receiving this care. The average value of this effective care index is 47.7, with a standard deviation of 3.5.

Specialists may also produce other kinds of care. We include analysis of the care Medicare beneficiaries receive in the last six months of life. Prior research has shown that end-of-life care is extraordinarily expensive but not correlated with the underlying sickness of the population, patient outcomes, or patient satisfaction (Fisher et al., 2003a and 2003b; Wennberg et al., 2002). We also test the effect of increased access to specialists on patients’ overall satisfaction with their care (gathered from the *Medicare Current Beneficiary Survey*) and on mortality from all causes.

Finally, we use average spending on Medicare beneficiaries as an outcome that may be affected by the extent of specialization. The average spending per Medicare beneficiary was just under \$5,000 in 1995.

## **II. Physician Specialization and the Quality of Care**

Increasing specialization of the physician workforce means that each patient will see more doctors, and will presumably receive better care (albeit with higher coordination costs). We begin by analyzing the effect of specialization on the fraction of patients who see more than 10 doctors in their last six months of life. Table 1 shows the change in spending and other outcomes associated with moving from areas with less specialization to areas with more. As shown in the first row, increased specialization indeed increases the number of doctors patients see: areas with 8 more medical specialists per 100,000 (and 8 fewer family practitioners, which would represent a roughly one standard deviation change in each) have 50 percent more beneficiaries seeing more than 10 doctors in the last six months of life (which represents a 1.2 standard deviation increase).

This increased specialization should bring with it better health care and better health outcomes, but also the potential for increased coordination failures. If specialists do not adequately internalize the coordination cost they impose on other physicians, or if subsidies lead to overuse of specialists, then areas with increased specialization may not have better care. While previous research has shown that patients treated by specialists may have better outcomes for diseases within that area of specialty, such as for heart attack treatments (John Ayanian et al., 2002) or depression (Kenneth Wells and Roland Sturm, 1995), one area where coordination costs may interfere with better care is in the provision of the “effective care” described above. Our analysis suggests that the provision of effective care is not improved by specialization.

Coefficients across different components of effective care and the composite index are all very small, and mostly insignificant. Areas with 8 per thousand fewer family practitioners (and 8 more medical specialists) have very similar use of effective care.

The use of expensive end-of-life care, however, increases significantly as the rate of medical specialization increases. Focusing on patients in their last six months of life allows us to further abstract from potential variations in the illness of the population that are not captured by the risk adjusters. Areas with one more medical specialist per 100,000 residents have Medicare beneficiaries who spend 0.07 (with a standard error of 0.01) more days in the ICU in their last six months of life (or 3 percent more), while beneficiaries in areas with more family practice doctor spend 0.02 (s.e. 0.01) fewer days.

Areas with a greater degree of physician specialization have neither higher patient satisfaction nor lower mortality. Areas with 8 more family practitioners per thousand (and 8 fewer medical specialists) have 3.7 percent higher overall patient satisfaction, as shown in the fourth row, and no significant difference in mortality, as shown in the last row. Specialization does not seem to be associated with better care along any of these dimensions.

### **III. Physician Specialization and Medicare Spending**

If increased specialization is not associated with better care, is it associated with more cost-effective care? Our regressions show that there are significant differences in the amount of Medicare spending associated with the composition of the physician workforce. Figure 1 demonstrates that, holding the other types of physicians constant (and adjusting for risk, which does not affect the results we present here), areas with one more medical specialist per 100,000 population have \$90 *higher* Medicare spending per beneficiary (s.e. 18), while areas with one more family practitioner have spending that is \$30 *lower* (s.e. 10). The density of surgical

specialists and internists has little effect on costs. (The regression results are not sensitive to the inclusion of Rochester, MN (the Mayo Clinic HRR), which is an outlier with 50 medical specialists per 100,000 residents.) This means areas with 8 fewer medical specialists per 100,000 people (and 8 more family practitioners) have \$1,000 less spending per beneficiary (or almost 20 percent, which is more than a one standard deviation decrease in spending).

#### **IV. Discussion**

Areas with more specialists spend more on health care for Medicare beneficiaries but see no improvement in the quality of care, mortality, or patient satisfaction. Do these results imply that having a more specialized physician workforce in an area *causes* higher spending and less efficient care, that we need more family practitioners and fewer specialists? We cannot draw those conclusions from this analysis. Areas with more specialization in health care may be different from other areas along many dimensions. While our evidence suggests that it is not the demographics, preferences, or illness of patients that drive the differences in specialization, it may be other characteristics about the area's institutions, hospitals, historical practice patterns, and insurance markets that distort both the specialist mix and the provision of care.

That said, market distortions or coordination externalities may both increase the number of specialists and drive up health care costs. Only by understanding the factors that drive the use of very different inputs into the production of health care and by better measuring the productivity of the medical care purchased (both in terms of health benefits and patient utility) can we evaluate policies aimed at changing the size and composition of the physician workforce.

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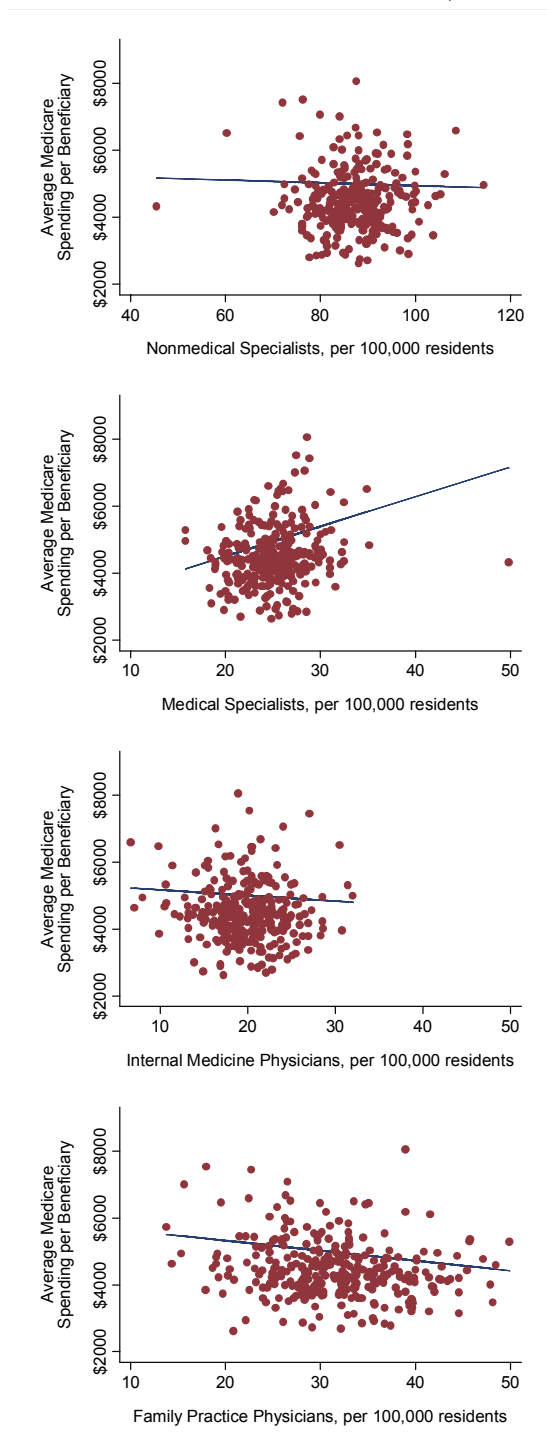
**TABLE 1- SPENDING AND HEALTH CARE ACROSS AREAS WITH DIFFERENT DEGREES OF PHYSICIAN SPECIALIZATION**

Comparing areas with different levels of specialization: 8 more medical specialists per 100,000 and 8 fewer family practitioners per 100,000			
	Family Practitioner Component	Medical Specialist Component	Total
Patients Seeing > 10 MDs in Last 6 Months of Life (Mean = 16%)	+6.0%	+45.9%	+51.9% (1.2 sd) [p=.000]
“Effective” Care Index (Mean = 47.7 %)	-0.3%	+2.0%	+1.7% (0.2 sd) [p=.184]
Patient’s Overall Satisfaction with Provider (Mean = 74%)	-2.0%	-1.7%	-3.7% (0.4 sd) [p=.047]
All Cause Mortality (Mean = 5.2/1,000 beneficiaries)	+0.1%	+0.5%	+0.6% (0.1 sd) [p=.567]
Medicare Spending (Mean = \$4,998)	+4.8%	+14.2%	+19.0% (1.0 sd) [p=.000]

Notes:

These results are based on estimates of equation (1). The regressions control for the density of other specialists in a given hospital referral region and discharge rates for heart attacks, hip-fractures, strokes, and GI bleeding, and age, sex, and race of the population. 8 medical specialists and 8 family practitioners per 100,000 are approximately one standard deviation.

**FIGURE 1 – MEDICARE SPENDING AND PHYSICIAN SPECIALIZATION (CONTROLLING FOR ILLNESS AND DEMOGRAPHICS)**



Note: Each graph controls for demographics, underlying illness, and the density of other specialists in each HRR. Illness is measured through the discharge rates for heart attacks, strokes, and GI bleeding.

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