HOW MANY DOCTORS ARE ENOUGH?

by Jeffrey E. Harris

Prologue: *If money were no object, we might all enjoy what has been described as "presidential medicine"—a one-to-one relationship with our physician. But since the allocation of scarce resources is an ever present reality, the question increasingly arises: How many doctors are enough? For the last decade, a growing chorus of interests have asserted that the United States faces an era when it has more physicians than it can accommodate, or at least is prepared to finance in the manner to which they have been traditionally accustomed. The newest voices in the chorus, as reported in the DataWatch on trends in health personnel in this issue, are the American Medical Association and the Association of American Medical Colleges. While these interests assert that a surplus looms or is already present in some medical specialties and in some locales, their positions are often based on different assumptions and different economic perspectives. In this essay, Jeffrey Harris asks, Is it really obvious that we have too many physicians? Harris, a physician and economist, thinks not. And, he wonders, if the physician supply projections of the Graduate Medical Education National Advisory Committee were right or—more importantly, if they were wrong—what will be the cost to society? Harris received both doctorates in medicine and economics from the University of Pennsylvania. He is an internist at Massachusetts General Hospital and a professor of economics at Massachusetts Institute of Technology. Harris has served on the National Academy of Sciences' (NAS') Committee for National Strategy on AIDS, as well as several other NAS committees. In addition, he has been a contributor, consulting editor, and senior reviewer for several of the Surgeon General's reports on smoking and health, and has written extensively on the economics of hospitals and public health. Harris served for several years on the Massachusetts Board of Registration and Discipline for Medicine, the state's licensing board, from which he derived a portion of his knowledge on physician supply issues. Harris delivered the original version of this paper at a Vanderbilt University Health Policy Symposium on graduate medical education.*

From 1967 to 1980, the ratio of actively practicing doctors to population rose by over 50 percent. Whatever its consequences for public health, the growth in physician supply had a clear effect on public policy: it cured the policymaking establishment of its chronic, persistent fear of doctor deficiency. While the Surgeon General in 1966 lamented, "We shall never have all the physician manpower we need," the Graduate Medical Education National Advisory Committee concluded in 1980 that "There will be too many physicians in 1990."[1] In a major reversal, the U.S. government halted its expansionary policies toward the physician sector. Preferential visas and federal capitation grants to medical schools were abandoned. Now, in the mid-1980s, Medicare's prospective payment rates to teaching hospitals and federal grants for biomedical research are the targets of the new contraction.

The purpose of this article is to reopen the question: How many doctors do we really need? To many analysts and policymakers, the question is purely one of methodology. There are economic models of market demand, engineering-style analyses of clinical need, yardstick comparisons with idealized populations, and various mixtures of the above. Despite the massive effort to refine such models over the past two decades, the problem has not been correctly framed. Any assessment of the optimal number of doctors, regardless of the specific forecasting method, is bound to have a large range of uncertainty. Hence, any federal policy to place physician supply on the correct trajectory could miss the target widely in either direction. The key question is this: Which is more costly to the public welfare—undershooting or overshooting?

Once the main question is properly stated, the answer becomes transparent: A doctor shortage entails greater social costs than a doctor excess. Accordingly, even if there were unanimous agreement on a future oversupply of doctors, currently proposed efforts to restrict physician supply would still need to be pursued with moderation.

The "Need" Criterion

Public decisionmakers would like to see the U.S. market economy produce the right quantity of physicians, but they have only a limited number of imperfect policy instruments to influence market outcomes. Two main obstacles stand in the way: first, the benefit or "need" criterion is not clearly defined; and second, there are substantial time lags between the date of an intervention and the realization of its effects.

Market-oriented solutions. A neoclassical economist might argue that the problem of defining need is really no problem at all; the market will automatically define social preferences. However, the market for physicians' services, as currently configured, has so many imperfections and distortions that the realized demand for doctors may not even approximate the optimum quantity.

Medical care markets are, for good or bad, heavily regulated. State medical boards regulate physician licensure. Federal and state agencies regulate the business of private health insurance. Governments regulate public coverage for the poor and aged. Federal laws regulate physician immigration. Government intervention has created cross-subsidies among medical education, medical research, and the provision of medical services. To assert that market demand correctly reveals society's preferences is to conclude that the current regulatory policy toward the medical care sector either is already optimal or, for whatever reason, just cannot be changed. There is no way to escape the circularity without some exogenously defined notion of physician need.

Policy analysts have devised market-based models to project the future demand and supply of physicians' services.[2] Future demand is projected from trends in disease incidence, consumers' income, health insurance coverage, physicians' fees, and population demographics. Future supply is projected from trends in medical school enrollment, physician specialty choice, productivity, immigration, retirement, and mortality. Such market-based models may indeed be valuable for describing the future consequences of current policies. But they do not show whether such policies were the right ones. Merely to predict, for example, that physicians' fees will fall or that the average duration of a doctor visit will rise is not equivalent to predicting an oversupply of doctors. Perhaps fees should decline even further; perhaps the average time per visit should even be higher. These are normative, not descriptive, matters.

One way to turn market-based descriptions into normative judgments is to argue that existing market imperfections have consistently pushed the quantity of physician services above (or below) the optimum. Thus, according to such writers as Kessel and Friedman, educational and legal restrictions on entry into the medical profession, high private returns to doctoring, and rising applications to medical schools are all evidence that the market has undersupplied doctors.[3] But licensure restrictions surely have some salutary effect on the quality of physician services.[4] Moreover, government subsidies to medical care, medical education, health insurance, and biomedical research have surely stimulated physician supply. Could the combined, net effect of such distortions be the right number of doctors at the wrong price?[5] The answer requires a cost-benefit analysis quite apart from market-based projections of demand and supply.

The GMENAC approach. From the start, medical manpower analysts in the U.S. have attempted to come up with some nonmarket criteria to assess market outcomes. The classic Lee-Jones study devised a need criterion based upon a consensus of expert opinions concerning the amount of care required for an exhaustively enumerated list of diseases

and health conditions.[6] The Bane Committee employed the prevailing ratio of physicians to population as the normative benchmark for assessing future physician requirements.[7] The most recent and influential attempt is that of the Graduate Medical Education National Advisory Committee (GMENAC) in 1980, which, like the Lee-Jones study, sought to define norms for physician supply on the basis of expert opinion. The GMENAC report predicted that, under current policies and projected market trends, there would be an oversupply of 70,000 doctors (about 15 percent more than needed) by the year 1990, and an oversupply of 145,000 doctors (about 30 percent more than needed) by the year 2000.

One has merely to count up the published criticisms of the GMENAC report to assess its influence on current policy.[8] Many of the more recent criticisms of the GMENAC findings dwell upon the report's faulty predictions of specialty mix and its failure to consider fully the rising proportion of female practitioners. Rather than offering a detailed critique of GMENAC here, I wish to use the GMENAC report to bring out critical uncertainties inherent in any externally defined need criterion.

The GMENAC methodology essentially entailed two sequential steps. First, following the Lee-Jones idea, GMENAC asked panels of experts in various branches of medicine to reach a consensus on norms of care for each health condition and each medical procedure. Second, a "modeling panel" attempted to reconcile the resulting need estimates of the expert panels. The modeling panel further "adjusted" the expert estimates to take account of "economic, social, and behavioral constraints."[9] Hence, the methodology was termed "adjusted needs-based."

To some extent, the modeling panel merely resolved conflicts of overlapping specialty jurisdiction. In other instances, the modeling panel imposed productivity constraints on the specialists. Thus, the modeling panel reduced the first-stage estimate of the number of required surgeons from 24,500 to 23,100. About one-quarter of the reduction reflected the panel's judgment that a gall bladder operation should take only two hours—not three as first suggested by the experts.[10]

In a number of cases, however, the modeling panel made some key decisions about the desired health of the American population. The main vehicle was revision of a critical parameter in the development of expert norms—the "percent requiring care in 1990." Thus, for general pediatrics, the modeling panel let stand the expert view that absolutely every case of otitis media (ear infection) required medical attention.[11] For ophthalmology, however, the modeling panel rejected the expert panel's view that 50 percent of refractive errors and 16 percent of strabismus (squint) and amblyopia (dimmed vision) required a physician's attention. These judgments dropped the required number of ophthalmologists from 14,700 to 11,400, and led directly to the overall conclusion that we would ultimately have too many eye specialists.[12] Likewise, the modeling panel deemed that only half of the estimated 1.3 million persons with significant psoriasis needed care—not 90 percent as recommended by the expert panel.[13] For persons with acne, the number designated as in need of care was reduced by threefold.[14] Absent such corrections by the modeling panel, GMENAC would have found a severe shortage of dermatologists in 1990.[15]

In even more critical instances, the modeling panel apparently passed judgment on the effects of future technological advances in medicine. Thus, GMENAC concluded that there would be almost twice as many cardiologists as needed by 1990.[16] In reaching such a judgment, the modeling panel decided that cardiologists would continue to favor noninvasive procedures (such as radioisotope scans) over invasive procedures (such as cardiac catheterization). Acknowledging the fast pace of technical change in cardiology, the modeling panel noted that "whether this newer technology will require more cardiologists by 1990 is not clear."[17]

The GMENAC report makes plain an important conclusion. In any normative assessment of the need for doctors, the microdetails of production efficiency will be swamped by two macroissues: the overall desired level of public health and the predicted path of technological change in the medical sector.

Six years later. It is hardly novel merely to invoke public expectations about the health care system or to cite technological progress as a factor in planning physician supply. The point is that these two factors make the benefit criterion for doctors especially elusive. Consider what has changed in the six years since the GMENAC report.

In 1978, cesarean sections accounted for about 14 percent of all deliveries. The GMENAC modeling panel deemed the appropriate rate for 1990 to be 15 percent.[18] Yet by 1982, cesarean operations had already exceeded 19 percent of live births.[19] The rapid rise in cesarean sections reflects important, unanticipated changes in obstetrical knowledge—about the risks of using forceps in certain cases, about the delivery of breech babies, about the care of more fragile, premature infants. It would be plainly unrealistic to claim that the rising cesarean rate merely reflects unnecessary medical care.

When the GMENAC panel issued its report in 1980, the existence of acquired immunodeficiency syndrome (AIDS) had not been recognized. By the year 1990—GMENAC's benchmark for prediction—the Public Health Service currently projects that there will be a total of 270,000 cases, requiring $8 to $16 billion worth of medical care.[20]

GMENAC properly noted that a number of new procedures might be used by gastroenterologists to examine internal organs.[21] But it could not have predicted that by 1983, over 500 liver transplants would be per-

formed. In 1978, during GMENAC's initial deliberations, the first successful use of test-tube fertilization was reported. By 1984, over 200 babies had been conceived by such means. GMENAC could not have predicted cardiologists' use of a new enzyme (streptokinase) to dissolve the blood clots that cause heart attacks; it could not have predicted the widespread use of a tiny balloon that can be threaded directly into the coronary artery to remove a blockage.

To be sure, any single change in medical science or technology may have a small impact on the aggregate need for physicians' services. The issue here, however, is the combined effect of literally hundreds of relatively small, unanticipated changes. Some might argue that in the aggregate these technological advances will be "labor-saving;" hence, failure to anticipate them will result in an overestimate of physical need. Compelling evidence for such a claim is lacking.

Lags In Implementing Policy

An uncertain target does not automatically bar effective public policy. What also matters is the speed with which policymakers can recognize and react to new information. In fact, the GMENAC recommended that an immediate successor committee be constituted to monitor new data and, as appropriate, revise its recommendations.[22]

Such a recommendation has considerable merit. Even in ideal circumstances, however, policy intervention in the physician sector will be quite rigid. It takes time to acquire reliable, new information; more frequent data revisions are costly and may merely lead to deterioration in data quality. With each significant new datum, we may need a new consensus on the appropriate policy adjustment. What is more, the effects of new policies are not realized instantaneously. College undergraduates, medical students, residents, medical school deans, researchers, and clinicians make investments in particular education and practice strategies. Organizations move inertially. Trainees take years to move through the medical education pipeline. Long implementation lags could mean extra time for the private sector to anticipate and hedge against future policy moves.

Long-term investment in educational capacity. Federal and state legislation implemented in the 1960s and early 1970s encouraged the growth of medical school facilities and the number of physicians trained there. The number of medical schools increased from eighty-seven to 126 during 1963-80, while average enrollment per school increased from 368 to 520. Even without direct subsidy, 127 U.S. medical schools are still expected to graduate about 17,000 new MDs annually through 1989.[23] If past government policies have indeed overshot their target, as GMENAC and others suggest, then it will clearly take some time to get back on course.

Exactly how much time would be required? The answer requires a model of the effects of alternative policy interventions on the future quantity of physicians' services. Here the descriptive analyses of market supply and demand have a critical role. Some modeling efforts by the Bureau of Health Manpower have addressed the potential effects of alternative government policies.[24] Such a task, however, is even more difficult than predicting the future quantity of doctors under an unchanging policy regime. One has merely to ask whether policies that successfully curb the growth in physician supply might in turn restrict the growth of alternative health care delivery systems.

The uncertainties in policy toward medical employment are not greater than in many other planning problems. After all, central banks here and abroad still manage to conduct monetary policy in the midst of widespread confusion over the measurement of monetary aggregates, the degree of control over various rates and targets, and even the banks' underlying macroeconomic goals. Health policy planners might indeed profit from a study of such nonhealth planning problems. But there is a crucial distinction: the "loss function" in the physician manpower problem is highly asymmetric. That is, the downside risk of an undersupply of doctors is quite different from the upside risk of too many doctors.

Overshooting And Undershooting The Target

At any point in time, the optimal future trajectory for the stock of physicians is extremely difficult to predict. Unless one adopts the default position that current policy is already optimal, predictions of market demand and supply are unreliable guides. Although there is a need for richer sources of nonmarket data, two problems elude policymakers' control: (1) the specification of public expectations about health; and (2) the future state of the art of clinical practice. Accordingly, the desired policy is to continue to feel out the market, reassessing objectives as new information becomes available. Unfortunately, intervention and response lags are so substantial that we can find ourselves far off the optimal trajectory for some time.

But if a particular public policy indeed missed the mark, and in fact it could miss by a lot, then which is more costly—too many or too few doctors? A shortage of doctors entails significantly greater social costs than does an excess. In effect, having more doctors is a form of insurance against the worst policy mistakes.

Equity. An excess of doctors is more equitable than a shortage. Although there is no unique method to gauge physicians' welfare, the accumulated evidence suggests that the recent burgeoning in physician supply has reduced, rather than enhanced, the economic returns to doctoring.[25] To be sure, some analyses suggest only a small decline or even

no change in real net incomes of physicians over the past two decades. However, when proper adjustments are made for age, specialty mix, and survey artifacts, according to my calculations, real net income of successive cohorts of practitioners has been declining substantially.

This should be no surprise. Any policy intervention that increases both the quantity and price-responsiveness of physician supply will reduce the excess economic returns from doctoring; in turn, wealth will be transferred from doctors to patients. Thus, in planning physician supply, a downside error accrues to doctors, while an upside error goes to consumers. The contractionary policy that the federal government is about to pursue, after all, is going to make existing doctors richer.

One might argue that higher economic returns attract higher quality students into the medical profession. I know of no evidence to document such an hypothesis.

Rationing disasters. Very large underestimates of need can lead to rationing disasters. This is not to say that 800,000 physicians need to be placed on standby for a thermonuclear catastrophe. But the advent of new technology (the totally implantable artificial heart) or a new disease (AIDS) rapidly imposes unforeseen demands on the current physician stock.

Innovations in delivery. A growing physician supply is conducive to innovations in health care delivery. More doctors have been the central stimulus to the growth of HMOs and other prepayment schemes since the late 1970s. More doctors have been the force behind the trend toward tighter links between physicians and other providers of medical care. More doctors have resulted in more salaried (rather than fee-for-service) remuneration; more formal employment relationships between physicians and hospitals; and more pressure for hospitals to compete with nonhospital forms of care, such as ambulatory surgical centers, walk-in emergency centers, and diagnostic centers.

More medical education. An expansion in physician supply means an expansion in medical education. More medical education means more faculty members and more scientific research. It means more doctors choosing scientific careers as the differential returns between practice and research are narrowed.

Better geographic distribution. The expansion in physician supply may reduce the problem of geographic maldistribution. Traditionally, doctors did not locate in small communities with relatively low demand because the set-up costs of practice were too high, and because the returns (both monetary and nonmonetary) to practice in large cities were so much higher. An expansion in physician supply reduces the relative attractiveness of big-city practice, pushing the doctors to the periphery and alleviating the market failure.

Physician-induced demand. One possible rejoinder to the claim that a doctor shortage is more costly than a doctor excess is the familiar theory that physicians can create their own demand. There is some disagreement about the precise articulation of this hypothesis.[26] However, the main ingredients of the argument are as follows. The physician acts as both an agent for the patient and a supplier of medical care. Accordingly, the physician's decisions concerning medical care are influenced by the physician's economic gain as well as the patient's welfare. For any particular medical decision, the relative importance of patient welfare and physician income will depend on the doctor's income and the fee to be received. Through market competition, an increase in physician supply tends to depress physician income and to reduce fees. Hence, an increase in physician supply, by threatening the doctor's economic position, results in medical recommendations and decisions that are more in the doctor's economic interest and less for the patient's welfare.

Such an argument is plausible but incomplete. Patients monitor their physicians' decisions, however imperfectly. As the number of potential competitors increases, the patient's ability to monitor may be enhanced. Thus, increased competitive pressure on general practitioners and internists might steer them to advise less surgery for their patients. The argument, moreover, is purely qualitative. The questions are not whether doctors can drum up more business, but exactly how much; not whether economic pressures might induce doctors to supply unnecessary care, but exactly how unnecessary. Proponents of demand inducement have not shown that the large, genuine benefits and costs of changes in aggregate physician supply are more than trivially counterbalanced by the speculative benefits and costs of unnecessary surgery, too many tests, and the like.

The theory of physician-induced demand is, however, not the only rejoinder. An alternative argument is that the quality of a physician's medical care depends on the volume of care supplied. Thus, an increase in the supply of surgeons may result in fewer operations per surgeon. As the surgeon's operative rate declines, the complication rate rises. There are indeed well-documented examples of a positive relation between volume and quality (mostly in the case of hospital care). On the other hand, lower patient volumes can translate into more time per patient, and thus higher quality. Again, the arguments are at best qualitative.

Toward Moderation In Policy

The current policy establishment had decided that there is and will be a huge oversupply of doctors. Rather than fencing with such opposition, I shall adopt a position of moderation. If indeed the supply of doctors is expected to exceed the optimum number, then the goal of current policy should be to remove only a fraction of the perceived excess.

Accordingly, instead of an active policy to reduce the size of medical school classes, one might seek only to restrict enrollments to current levels. Instead of complete elimination of the Medicare subsidy to teaching hospitals, it might be advisable merely to contain the growth of the subsidy. Rather than abandoning support for building and operating medical schools, state governments might seek only to freeze their support at current levels.

How might policymakers gauge the effectiveness of such strategies? Periodic reconvening of blue-ribbon commissions will not work, nor will the continued, narrow focus on physician needs versus supply. Instead, it seems much more promising to find policy rules based on intermediate targets. Many such targets are, of course, already under consideration, including the aggregate size of the medical school entering class. Others might be less obvious: a national time series on real physician net incomes, standardized perhaps for age, sex, and other factors; a continuing index of geographic maldistribution; an index of the rate of entry of medical graduates into research careers; a time series on the fraction of physician incomes received through employment or contractual arrangements; a standardized series on incidence rates of surgical and other procedures.

Whatever course is taken, the proposition that there are too many doctors should continually receive careful scrutiny, and not be accepted as conventional wisdom. Maybe the health care sector cannot absorb 17,000 new medical graduates each year. Maybe it can.

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NOTES

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