VARIATIONS IN MEDICAL PRACTICE: IMPLICATIONS FOR HEALTH POLICY

By Philip Caper

Prologue: There is no service to which Americans attach greater importance than medical care. And there is no profession that enjoys higher standing with the populace than that held by physicians. These two facts, plus the mystique of medicine, have left the consumer and third-party purchaser of care largely unconcerned about the cost and quantity of the health care product, at least until recently. Now, more attention is being paid not only to its cost, but also its quantity. One of the forces driving this closer examination is the question of quantity. Philip Caper is well equipped as a physician and policy analyst to draw some implications from the phenomenon of variations in medical practice. He was a professional staff member of the Senate Labor and Human Resources Subcommittee on Health and Scientific Affairs from 1971 to 1976 and vice chancellor for health affairs at the University of Massachusetts and chief of the medical staff at the institutions teaching hospital in Worcester from 1976 to 1980. Since then, he has been a research fellow at Harvard University's Kennedy School of Government and, since last year, a visiting professor of medicine at Dartmouth College. In the health policy world, Caper says, medical care has most often been considered an undifferentiated good, with need defined by levels of disease in the population. Thus, policy mechanisms have focused on moderating the unit price of the medical good, leaving untrammeled the quantity of service. The inadequate attention paid to the volume issue may be “the most important single factor in explaining the ineffectiveness of regulatory strategies attempted to date in controlling the per capita costs of medical care,” Caper argues. Under the new incentives of Medicare’s diagnosis-related group payment mechanism, volume will remain an illusive dimension unless specific policies are designed to address it.
John Wennberg's work concerning variations in medical practice among hospital service areas, described elsewhere in this issue, represents a breakthrough in the application of rigorous methods to issues of importance to health policy. His approach to describing patterns of clinical practice is a significant contribution to our understanding of the relationship between clinical medicine and the politics, economics, and regulation of medical care.

Some Background

Even though we do not have a unitary and explicitly articulated health policy in the United States, such a policy can be inferred by retrospective examination of public and private actions during the past fifty years. American health policy has been directed toward increasing our national supply of medical care resources and improving access to those resources. During the period 1930-1965, we greatly expanded the role of private, employment-related hospital and medical insurance. These private insurance programs were designed to pay the costs of hospital care, whatever they might be. Hospital insurance coverage gradually expanded during that period until, by 1965, over 70 percent of hospital services were reimbursed through insurance programs of some type.

Concurrently, a combination of state and federal actions was increasing the capacity of our health care system. The federal Hill-Burton program was building hospital beds, state and federal programs of subsidization of health professions’ education were enlarging our pool of physicians and other health professionals, and our technologic armamentarium was being increased dramatically through funding by the National Institutes of Health. Finally, Medicare and Medicaid were enacted in 1965, creating a massive federal program to fill in the gaps left by the rapid expansion of predominantly work-related private health insurance.

This policy of expanding our capacity to finance and deliver medical care has worked extremely well, and has accomplished many of its goals. But it has created other problems. Because all of the emphasis has been on expansion, and little or none on restraint of costs or on the measurement or assurance of cost-effectiveness, a set of incentives have been created which say to everybody—doctors, patients, and administrators—that the sky's the limit and that effectiveness, not cost, is the only important goal. These incentives are dominant and are overwhelmingly important in determining the behavior of virtually all of the participants in the system.

The implementation of Medicare and Medicaid had a number of effects, some intended and others not. The intended effects included improving access to care for the elderly and the poor. One of the unintended results, however, was to pour hundreds of billions of federal dollars into a system
with virtually no cost controls. The presence of Medicare and Medicaid as an explicit item in the federal budget also made the inevitably resulting inflation highly visible.

Understanding Small-Area Analysis

An understanding of the discretionary nature of most medical decisions is essential to understanding the causes of the rapid rise in expenditures for health care we are now experiencing.

In order to understand the implications of small-area analysis of clinical practice patterns for health policy, it is first necessary to understand its principal methods and findings. Wennberg's studies in northern New England during the past decade have gone a long way toward shedding additional light on the highly discretionary nature of medical care, and have served to emphasize the key role played by physician practice patterns in determining the nature and quantity of the per capita consumption of medical services. His demonstration that such a large proportion of decisions to hospitalize patients are discretionary represents a big step toward explaining why changes in the volume of services occur so readily in response to economic and professional incentives acting on physicians.

Wennberg and his colleagues have adapted the methods of epidemiology to the study of the distribution and rates of consumption of medical care, and in so doing have greatly added to the level of rigor possible in discussions of health policy. Epidemiology (Epi–upon; demos–the people) is the study of the rates and distribution of disease in populations. Unlike the clinician, who is concerned with diseases in individual patients, the epidemiologist studies diseases in populations of individuals. The most important tools of the epidemiologist's trade are statistical ones, which allow him to compare populations which may differ from one another in size and demographic composition, and to determine whether differences which are observed between populations are due to systematic factors or to random variation.

These tools have been applied by Wennberg to study the ways medical care is used by doctors and patients in different locations, and to compare the observed differences. This approach has been made possible by two relatively recent developments in the health care field—the widespread existence of hospital claims data, and the availability of computer.

Wennberg's work, then, is concerned with the epidemiology of the consumption of medical care resources. Medical care resources can be measured in a number of ways. For instance, they can be measured in terms of dollars spent, surgical procedures performed, patients admitted to the hospital, or resources allocated to a particular geographic area. Statistical techniques can then measure differences in resource consumption and distribution among hospital areas, and determine whether observed dif-
ferences are due to random variation or to systematic differences between the observed populations.

The great power of his work in helping us to understand the dynamics of the medical marketplace lies in its examination of the degree to which the rates and distribution of medical services adhere to the guiding principle of epidemiology. The assumption underlying all epidemiologic monitoring is that levels of illness present in similar populations are similar. Systematic differences in rates of illness must be due to systematic differences between the populations. Thus, differences in observed levels of tuberculosis, for example, between two populations which otherwise seem similar must be due to differences in susceptibility or exposure to the tubercle bacillus. The job of the epidemiologist is to identify and explain those differences. In studying the distribution of medical care, a corollary to that principle is that the amount of care provided to a population is roughly proportional to the quantity of illness present in that population. Wennberg’s work convincingly shows that this corollary does not hold true. Rates of medical care seem to correlate more strongly with differences among physicians (“practice style variations”) than with differences among patients.

Another common supposition is that the existence of specialty centers in some areas account for the observed variations. The practice variations which Wennberg describes are not due to referrals to specialty centers. Medical care consumed by individuals is counted against their place of residence, not the area in which the service is provided. This technique corrects for the “border crossing” among geographic areas seen as a result of the existence of a referral center distant from the patient’s place of residence.

A hospital service area has been defined as including any geographic subunit in which more of the people living there use that particular hospital than any other one (a “plurality rule”). Therefore, the patterns of clinical practice observed among residents of that area reflect the practices of that hospital’s medical staff. The migration of patients out of area to receive care elsewhere serves, if anything, to produce an understatement of the actual variations in practice. Out-of-area care provided to residents of a hospital service area will appear as the weighted average of the combined practices of those out-of-area hospital staffs, and will almost certainly reduce the variation from the mean observed in any given area.

Wennberg’s work has resulted in a much clearer understanding of how medicine is practiced than has existed before. First, it makes clear that there are sizable and persistent differences in the per capita rates of hospital admission for surgical and other procedures among hospital service areas. For example, a child living in Rumford, Maine, has fifteen times the probability of being hospitalized with a diagnosis of pediatric pneum-
monia as does a child living in Portland.

Second, the per capita rates of procedures or discharge diagnoses for a particular hospital service area tend to be quite stable over time and are characteristic for a given community. Services which are performed frequently tend to be done year in and year out. The same is true for services performed infrequently, or somewhere in between. Therefore, for a particular hospital service area, a "medical care signature" can be identified which is relatively invariate over time and is characteristic of that hospital service area. The things which seem to affect a medical care signature in the short run are the building of hospital beds, the movement of physicians into or out of the area, or the feedback of information that directly informs physicians of their comparative rates of service. Per capita numbers of hospital beds and doctors, and doctors' practice styles—i.e., whether a particular doctor is aggressive or conservative regarding surgery or admitting patients to the hospital for other reasons—seem to be the most important factors affecting a particular area's per capita rate of hospital admission. Attempts to explain these differences by correlating them with demographic differences among the residents of various service areas have failed. Variations in the occurrence of diseases cannot adequately explain these differences either.

Finally, some causes of hospitalization show consistently greater variation than others. For example, the per capita rate of inguinal hernia repair shows little variation among hospital service areas when compared with hysterectomy, prostatectomy, or tonsillectomy. The same is true of hospitalizations for hip fractures, surgery for cancer of the bowel, and appendectomies. Studies in Norway, England, Canada, and various parts of the United States show that these procedures are always low-variation procedures. Conversely, hysterectomy, prostatectomy, and certain other surgical procedures are always high-variation procedures no matter where one looks. This variation phenomenon, then, seems to be independent of the social or organizational system for providing care, since it has been observed in the socialist systems of Norway and England as well as the capitalist system of the United States.

For low-variation procedures there is, by definition, good agreement among doctors about when the condition exists and when it needs surgery. On the other hand, procedures which show great variation are variable because there is little agreement among doctors about the best thing to do. In a sense, the amount of variation is a measure of the amount of disagreement among doctors.

These variations exist, are real, and are persistent no matter how one measures medical care. Measured in per capita rates, surgical procedures, dollars spent, beds or hospital employees, or hospital admissions, variations exist in every part of this country and in those foreign countries which have been studied.
The variations phenomenon does not apply only to a few outlier procedures. We recently grouped all of the hospital discharges in the state of Maine for the years 1980 through 1982 into diagnosis-related group (DRG) categories, and measured the amount of variation in each procedure among the state’s hospital service areas (J.E. Wennberg, K. MacPherson, and S.P. Caper, “Will Payment Based on Diagnosis-Related Groups Control Hospital Costs?” The New England Journal of Medicine, in press). We discovered that over 85 percent of all, hospital discharges fell into DRG categories that varied even more than did hysterectomy rates, which had heretofore been considered to be a high-variation procedure (about fourfold). It seems, then, that most reasons for hospitalization vary in per capita rate by fourfold or more among hospital service areas. Substantial variation in the per capita rates of medical care consumption seems to be the dominant rule for most causes of hospitalization.

Provider-Induced Demand: Implications For Health Policy

Those of us who have been concerned with medical care, its quality, cost, and access, have always tended to think of it as an undifferentiated good, with a need defined by levels of disease in the population. We have tended to downplay the importance of what economists call induced demand, because we have thought of the need for medical care as being determined by factors beyond the immediate control of doctors and patients. Because of that, health policy analysts have often assumed that the demand for medical services is relatively fixed. Wennberg’s work calls those important assumptions into question.

During the past fifteen years or so, since shortly after the enactment of Medicare and Medicaid, the rapidly rising costs of health care have been of increasing concern to many participants in the health policy debate. A variety of programs, most implemented by state and federal governments, have attempted to control those costs. Many of those regulatory initiatives were paper tigers, establishing agencies that did not have the teeth to accomplish their mandates, such as the Health Systems Agencies (HSAs). Others constructed regulatory programs intended to control the unit price of services, as in state rate-setting programs or federal regulations controlling the per diem cost of hospital services. Still others relied heavily on community consensus to define the “need” for medical care.

But overall expenditures are the product of unit cost (or price) and unit volume. Setting unit prices for specific services will succeed in controlling overall costs only if the volume of those services doesn’t change, or such changes are small.

Studies of the epidemiology of medical care have now made it clear that consensus within the medical profession about the need for specific...
services is the exception rather than the rule. Insufficient attention has been paid to the effects of changes in the volume of services (which have, in part, occurred in response to past regulatory programs) on overall medical care expenditures. These changes have not been limited to government-supported programs, but have occurred systemwide.

Those programs that did take changes in the volume of services into account, did so by attempting to control the capacity of the system without any clear criteria or adequate information (such as state certificate of need laws), or by relying on community standards to establish criteria for volume control [such as the Professional Standards Review Organization (PSRO) program], without enough attention to variation in those standards among communities. As Wennberg’s paper shows, variation among communities in criteria for most reasons for hospital admission is so great as to make standards based upon community-specific criteria virtually meaningless. None of those programs have been shown to reduce the rate of inflation in health care costs to an acceptable level.

Another important goal implicit in most public regulatory programs has been the achievement of a reasonable level of equity among varying geographic areas and among different populations. It is clear from this work that such a goal has little meaning without a better consensus among physicians with respect to the appropriate use of medical services.

In my opinion, the failure of these regulatory programs can be attributed to a number of factors including poor regulatory design, inadequate authority to enforce regulatory decisions due to mixed political support, and insufficient information concerning the true nature of clinical decision making. In particular, if the volumes of particular services (including hospital admissions) are as variable as this work seems to indicate, then the decision to hospitalize a patient or perform a procedure, not the price that hospitalization or procedure, is the single most important factor determining the overall per capita cost of medical care. Inadequate appreciation of this factor may explain the ineffectiveness of regulatory strategies attempted to date in controlling the per capita costs of medical care.

Indeed, when hospital service areas are compared, the factors most strongly correlated with the per capita costs of hospital services are the per capita rates of admission to the hospital experienced by the residents of that area, the number of hospital beds per capita, and the number of hospital employees per capita. There is very poor correlation between per capita costs and those contributors to per admission costs which have traditionally been measured, such as length-of-stay, hospital occupancy level, and ancillary service utilization.

The Implications Of These Findings For DRGs

The recently enacted DRG system of paying for hospital care under
Medicare will have a number of effects. First of all, because it replaces our traditional cost-based retrospective reimbursement system with a price-fixed retrospective system, it will encourage hospital administrators to be very concerned about their per admission costs of providing care. This is a major and desirable change in incentives. But those same incentives could produce unanticipated and undesirable changes in behavior as well.

If the DRG system succeeds in encouraging hospitals to reduce their costs of caring for a spell of illness by reducing diagnosis-specific average lengths-of-stay, beds that would otherwise be occupied will become empty. The incentives under such circumstances will be to encourage increases in the volume of admissions in order to fill those beds. Such a response is particularly likely as the per capita number of physicians continues to increase. The existence of today's robust entrepreneurial spirit in the hospital industry will serve to fan this fire.

A similar incentive will be created by the shift in revenues among hospitals induced by the DRG system. To put it quite simply, some hospitals will gain and some will lose revenues relative to cost-based reimbursement under the DRG system. Those hospitals that stand to lose will have strong incentives to maintain revenue levels by increasing their admission volumes as an alternative to reducing employment levels and reducing plant capacity. Those that gain will not be expected to return their excess revenues. As the per capita rate of admission for the Medicare population increases, so will the total cost to the system unless there is a compensatory decrease in the price per admission. But if DRG prices were to fall in response to increasing per capita admission rates, incentives to economize would disappear.

Hospital admissions decisions are made by local physicians. If local decision making is to be affected, local information concerning DRG-specific per capita admission rates must be generated and made available to physicians, hospital boards and administration, insurance carriers, and other purchasers and consumers of health care. That is precisely what Wennberg proposes.

If the DRG system is to succeed in controlling overall expenditures under Medicare, according to this hypothesis, it will do so only if it is supplemented with effective controls on the capacity of hospitals and on the overall volume of admissions. The same can be said for any system that depends upon control of unit prices for overall cost control.

**Toward A Rational Information Policy**

There is one more important lesson to be learned from this work. It demonstrates the usefulness of routinely collected hospital discharge and claims data in helping us to better understand the workings of the medical care system and the importance of public accessibility to such data for
research and policy development purposes. The use of epidemiologic techniques to compare medical practices among geographic areas clearly presents great opportunities for learning more about patterns of medical care, and does so in a way that is very useful for policy development.

The availability of such information could also be of great help to local peer review organizations (PROS). The existence of such data, on a statewide basis by hospital-market area, would also be helpful to PROS in establishing criteria for utilization review based upon actual observed practice.

One significant obstacle at present to the extension of this work is the availability of and access to data. Studies such as those advocated here can be conducted without unacceptable threats to the confidentiality of patient information since aggregate, not individual, data would be generated.

Opportunities for such research exist because of the skill of Wennberg and others in making use of data to compare differences among hospital service areas which exist at any given point in time—so called cross-sectional analysis. But even greater opportunities exist if the results of such differences are followed over time through a technique called longitudinal analysis. Hospital claims data can help us investigate questions such as whether the women of Lewiston or Rockland, where per capita hysterectomy rates vary by more than twofold, are better off with respect to uterine disease and its sequelae. Analysis over time could help us find out which physician practices have the most desirable effects on patients. We cannot automatically assume that either high- or low-use practice styles are correct.

Summary

The structural characteristics and incentives inherent in our current health care system have served us well to stabilize and expand our capacity to develop, finance, and deliver health services. But we have, at the same time, built a sophisticated race car without brakes, which is accelerating at a rate that threatens all of the thought and ingenuity responsible for its existence. The rate of cost inflation in the health care sector will continue to exceed that in other sectors unless some important additional changes are made in its structure and incentives. It is reasonable to expect that an increasing number of practicing physicians, the continued development and dissemination of new medical technologies, and the aging of the American population will continue to fuel the rise in the demand for hospital and other medical services we have seen in the recent past.

Analytic tools such as the ones described here can provide us with valuable information that will enable us to modify the system with a scalpel instead of a meat axe. The challenge of the remainder of the
eighties and into the last decade of this century will be one of coping equitably with increased demand for medical services of all types, and of eliminating less important services in order to make room for those of greater proven efficacy. Continued unbridled expansion of our health care system to accommodate both is no longer an acceptable option.

The future of research such as that described here depends heavily upon the support it receives, not only in monetary terms, but also in terms of cooperation on the part of all of the participants in the health care policy debate. Whether the health care system of the future evolves along competitive or regulatory lines, access to timely, accurate data is essential and can be accomplished without compromising confidentiality.

We are at a crossroads in our national health policy. Constraining costs has been added to maintaining quality as a major factor for consideration. Tools that will help us begin to contain costs without compromising access to quality care are clearly becoming available. Whether we take advantage of them or not is up to us.