II. SPECIAL REPORT

Forecasting Physician Supply: Recent Developments

by Jonathan P. Weiner

Human resources are central to any system of health care, and none more so than physicians. While the appropriate role of these providers is the subject of some contention, most accept the value to society of an adequate supply of doctors of medicine (MDs) and osteopathy (DOs). The key question debated in this journal and elsewhere continues to be: What is the line of demarcation between “too many” and “too few” physicians?

Questions surrounding this dialectic include: (1) Conceptually, what constitutes an “adequate” supply of physicians, where supply is in balance with requirement? (2) Philosophy aside, what modeling methodologies should be used to determine whether the nation’s supply meets the criterion of adequacy? (3) What are the economic, clinical, and social implications of a surplus or deficit of physicians? (4) In our free-market economy, what approaches could or should policymakers use to influence the size and composition of a physician population that is out of balance?

I do not address the intricacies of these difficult issues here; rather, I refer readers to several comprehensive works.1 My intent here is more straightforward: to review and comment on several recent developments of relevance to those interested in physician labor planning in the United States. In this review, I identify and discuss areas of current policy debate that are fueled or quelled by the findings of these new forecasts.

Federal Government Activities

Although considerably more laissez-faire than other nations, the U.S. federal government dominates physician planning. I discuss three major federal efforts here: one elapsed, the others ongoing.

Graduate Medical Education National Advisory Committee. The Graduate Medical Education National Advisory Committee’s (GMENAC’s) report of a decade ago presented an “adjusted needs-based” model that predicted an overall “surplus” of about 60,000 physicians by 1990, with the surplus increasing to more than 135,000 by the year 2000. 2 A summary of GMENAC’s forecasts is presented in Exhibit 1. Many have vigorously contested the findings of this multi-million-dollar modeling effort. In spite of—perhaps because of—such criticism, this report still stands as the nation’s most influential document related to physician supply planning. GMENAC’s predictions for 1990 usually serve as the point of reference around which related debate revolves.

Bureau of Health Professions. The so-called Bureau of Health Professions (BHPr) model first became widely known as a demand-based alternative to GMENAC’s epidemiologic need-based model of physician supply.3 Today, the BHPr’s model represents the federal government’s major forecasting methodology for health professions planning and is considered the state of the art. It is updated regularly and provides estimates of the supply and the expected overall demand for US. physicians (and other health professionals). It does not, however, estimate forecasts of demand on a detailed specialty specific basis. The most recent predictions of this model were published in 1988.4 The BHPr estimates for the years 1990 and 2000 (Exhibit 1) show a “surplus” of 27,000 and 72,000, respectively—about half as large as the GMENAC estimates.

Council on Graduate Medical Education (COGME). Most of the current congressional debate on physician supply has focused on Medicare’s three-billion-dollar annual price tag for graduate medical education (residency and fellowship training).5
### Exhibit 1

<table>
<thead>
<tr>
<th>Source</th>
<th>Assumptions</th>
<th>1990 Supply</th>
<th>Requirement</th>
<th>“Surplus” Supply</th>
<th>Requirement</th>
<th>“Surplus”</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMENAC</td>
<td>Supply calculations assume?</td>
<td>536</td>
<td>473</td>
<td>63</td>
<td>643</td>
<td>506</td>
</tr>
<tr>
<td></td>
<td>Residents = .35 FTE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residents = 1.00 FTE</td>
<td>593</td>
<td>-</td>
<td>-</td>
<td>680</td>
<td>-</td>
</tr>
<tr>
<td>Bureau of Health Professionals (BHPr) physicians</td>
<td>Supply represents all active physicians</td>
<td>597</td>
<td>571</td>
<td>27</td>
<td>709</td>
<td>637</td>
</tr>
<tr>
<td>American Medical Association</td>
<td>Current training patterns</td>
<td>592</td>
<td>-</td>
<td>-</td>
<td>693</td>
<td>-</td>
</tr>
<tr>
<td>Association</td>
<td>Decrease in training programs</td>
<td>590</td>
<td>-</td>
<td>-</td>
<td>673</td>
<td>-</td>
</tr>
</tbody>
</table>


Specifically, Congress has targeted mechanisms for calculating direct and indirect support for hospital residency programs, the role of such support in the training of foreign medical graduates (FMGs), and the apportionment of support between primary care and specialist positions. These issues were addressed in the Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1985. As a response to these controversies, an amendment to COBRA mandated the creation of the Council on Graduate Medical Education (COGME).

Chartered in 1986 for ten years, COGME published its first report in July 1988. Its next report is due in 1991. Unlike GMENAC, its better-funded predecessor, COGME has not initiated any large-scale modeling activities. Its 1988 report does, however, make a plea for financial support for this purpose. Although its power appears limited, COGME is arguably the most influential standing body in the country with national purview over medical education and physician supply.

To date, COGME has chosen a fairly conservative course. Its July 1988 report concluded that “...there is now or soon will be an aggregate oversupply of physicians in the United States. The Council notes, however, that there are significant uncertainties which could change this assessment.” With regard to these conclusions, COGME suggests that: (1) the federal government should “not attempt to influence physician manpower supply in the aggregate;” (2) first-year residency slots should not be eliminated as a means of controlling supply, but “if steps are taken to reduce physician supply” (by unnamed parties), medical school class size should be reduced; and (3) the public and private sectors should target such problems as geographic maldistribution, the inadequate supply of minority practitioners, shortages within specialties, and “quality of care.”

Of relevance to Congress’s most pressing concern—Medicare’s role in financing graduate medical education—COGME recommended that no drastic changes in hospital-based support be made and that aggregate spending be maintained. Perhaps in recognizing that Congress may not fully embrace its lead recommendations, COGME further suggests that priority training positions (those educating geriatricians and preventive medicine specialists, filled by minorities, in underserved communities, or in ambulatory care, for example) “should be sheltered” from cuts.
Several years ago, the American Medical Association (AMA) initiated an ambitious program of physician supply research and planning. In 1987, the Department of Manpower and Demographic Studies, of the AMA’s Center for Health Policy Research published its first annual report, which gave projections of future physician supply. In 1988, a second volume was published, which I examine here. This volume is a significant technical achievement, representing what can be considered the most sophisticated physician supply and demand forecasting model ever developed within the private sector.

The report, *Physician supply and Utilization by Specialty*, updates and augments earlier AMA supply projections by expanding the specialty groups modeled and adding estimates for DOs. (This may be the first time that DOs have been included in any AMA publication, an event here noted with approval.) The study also makes specialty-specific forecasts of the expected demand for physician services for the year 2000. Estimates of the rate of economic return of medical training are also presented.

The report provides forecasts of supply for most (though not all) specialties through the year 2010. The models are driven to a great extent by data extracted from the AMA’s own large-scale data systems: the Physician Masterfile (a database describing all U.S. physicians) and the Physicians’ Professional Activity questionnaire (sent to each physician every four years). These extensive forecasts complement and augment those developed by the BHPr.

**Assumptions.** The AMA’s supply estimates are provided under several sets of assumptions, some of which differ from the government’s. Their “best” estimate is a model that assumes a gradual 10 percent decrease below 1986 medical school class size and an abrupt one-third decrease in the number of U.S. (citizen) foreign medical graduates (USFMGs) entering practice. The AMA’s forecasts (Exhibit 1) are devised under the assumption of current (1986) patterns of training and the anticipated changes. The AMA’s best supply estimates are closer to GMENAC’s predictions (where one resident is considered equal to one full-time equivalent) than those developed more recently by the BHPr.

For all practical purposes, the three sets of supply estimates presented in Exhibit 1 are convergent; the two most dissimilar forecasts—the AMA’s year 2000 “best” estimate and the BHPr’s—differ by only 5 percent. It should be noted, however, that for later years and for individual specialties, the discrepancies between the AMA and BHPr forecasts are more substantial—for some specialties, as large as 17 percent.

**Projections.** To help assess the demand for physician services in the year 2000, the AMA projected “current” utilization patterns forward by adjusting for expected demographic changes within the U.S. population. Two parallel models, relying on distinct federal data sources, were used to make these projections: the consumer-based 1980 National Medical Care Utilization and Expenditure Survey (NMCUES) and the physician-based 1985 National Ambulatory Medical Care Survey (NAMCS).

The NMCUES model is applied under two scenarios: scenario one, in which rates are forecast on the basis of age/sex/race/income groups; and scenario two, in which the use rates of nonwhites are adjusted upward (by age/sex category) to equal those of whites. (This adjustment leads to a 10 percent increase in the predicted utilization of nonwhites.) This second scenario is meant to control, at least in part, for access barriers believed to impede the care of minorities. Based on the NMCUES-derived scenario two, the AMA forecasts that the average American will have 4.86 contacts with a physician in the year 2000. Contacts are defined as including direct, nontelephone patient/physician contacts in all settings, to all specialties except hospital-based radiologists, anesthesiologists, and pathologists.

The last section of the AMA report compares the forecast growth in physician supply with consumer utilization (Exhibit 2). This represents the report’s only attempt at integrating the supply- and demand-side forecasts. Between 1985 and 2000, the
### Exhibit 2
Comparison Of The AMA’s Predicted Growth In Physician Utilization And Supply, By Selected Specialties, 1985–2000

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Supply</th>
<th>Difference in growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>All physicians</td>
<td>14.5% 25.8%</td>
<td>-11.3%</td>
</tr>
<tr>
<td>Physician (MD) specialties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General/family practice</td>
<td>13.0 9.9</td>
<td>3.1</td>
</tr>
<tr>
<td>All internal medicine</td>
<td>24.0 36.6</td>
<td>-12.6</td>
</tr>
<tr>
<td>General internal medicine</td>
<td>24.6 27.0</td>
<td>-2.4</td>
</tr>
<tr>
<td>Medical subspecialties</td>
<td>23.4 51.8</td>
<td>-28.4</td>
</tr>
<tr>
<td>All surgical specialties</td>
<td>17.0 13.1</td>
<td>3.9</td>
</tr>
<tr>
<td>General surgery</td>
<td>16.5 0.5</td>
<td>16.0</td>
</tr>
<tr>
<td>Surgical subspecialties</td>
<td>17.1 19.9</td>
<td>-2.8</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>7.0 38.8</td>
<td>-31.8</td>
</tr>
<tr>
<td>Obstetrics/gynecology</td>
<td>2.8 24.3</td>
<td>-21.5</td>
</tr>
</tbody>
</table>


a These utilization forecasts are based on the NMCUES survey. Minority use rates have been adjusted to equal those of whites.
b This column represents the sum of the second column (supply) subtracted from the first (utilization).
c Includes both MDs and DOs. Based on all active physicians.

AMA predicts that the overall supply of physicians (including DOs) will increase by almost 26 percent, while the demand of the population is expected to increase by only 14.5 percent. The difference between these two growth figures is about 11 percent. Exhibit 2 also presents similar comparisons for major MD specialties. Growth in consumer demand is expected to outstrip the growth in supply for family practitioners and general surgeons, the exhibit shows. For the other specialties, supply is expected to grow faster than demand, with the largest disparity for medical subspecialists and pediatricians.

Exhibit 2 is not meant to identify directly the extent of a “surplus” or “shortage” in a given specialty; for one thing, the balance between supply and demand in the base year (1985) may not represent equilibrium. More appropriately, as the authors state, by comparing these two sets of projections, “we can identify... which specialties are likely to have to adjust to changes in patient loads or other aspects of their practices.”

**Shortcomings.** The AMA study’s greatest shortcoming is that it does not go further in suggesting future imbalances. Although all components of the model are provided, the report does not synthesize them to assess the adequacy of supply in meeting the population’s expected demand. The authors did not view this action as appropriate: “We must emphasize that this analysis does not project specialty surpluses or shortage... Our analysis uses current utilization patterns as a base of comparison. These patterns do not represent a normative standard because not all segments of society utilize health services ‘appropriately’.”

While the authors’ position has validity, this concern is germane to most every health personnel modeling effort ever published. Most readers of the report will be left wanting more. Moreover, if analysts wish to apply the AMA’s sophisticated forecasts to a particular health policy concern (for example, identifying residency programs to protect from Medicare budget cuts), they will, of necessity, be forced to manipulate these data on their own.

The authors’ rationale for proceeding no
further can be accepted at face value. However, a critical reader will wonder whether their affiliation was a factor in their decision. While the AMA’s sponsorship was crucial to the success of the study, it may also have placed certain constraints upon the authors. Had their report, published under the AMA’s imprint, offered explicit quantification of future “surpluses” or “shortages,” it is quite likely that the association would have been assailed from a variety of directions (for example, the Federal Trade Commission, the Association of American Medical Colleges, or the societies of “surplus” specialties).

The philosophical and political issues are complex, but using the AMA’s calculations to assess the balance between supply and demand is not technically difficult. The results of such an assessment suggest that the number of physicians available in the year 2000 will significantly outstrip the number required. Based on the AMA forecasts of consumer use, provider supply, and current productivity patterns (that is, patient contacts per physician per year), a “surplus” of 189,000 full-time-equivalent physicians is estimated.

My analysis seems to suggest that BHPr’s physician “surplus” predictions of 72,000 may be conservative.” Moreover, the AMA-derived forecasts do not appear to support the assertions of those who have criticized GMENAC’s estimate of “over-supply” (137,000) as being far too high. These observations are further buttressed by the fact that my comparison of supply and demand conservatively excludes almost 40 percent of the available physician supply from the analysis (residents and fellows, nonpatient care physicians, and all radiologists, anesthesiologists, and pathologists). The federal forecasts are stated with reference to the entire physician population.

### Updating The GMENAC Model

To support COGME’s deliberations, a study was commissioned by the Federated Council for Internal Medicine (FCIM), a group formed by the American College of Physicians and the medical subspecialty societies.” By updating GMENAC’s original physician supply model, the effort intended to forecast supply and requirements for general internal medicine and its nine subspecialties.” The study represents the most extensive application of GMENAC’s need-based model since that committee disbanded.

The FCIM model addresses the fact that many of GMENAC’s decade-old assumptions are viewed as out-of-date. In revising estimates, the FCIM relied on GMENAC’s original model parameters, with several important exceptions. Modifications were made based on clinical, social, and financial changes occurring over the last decade.

The FCIM model’s revisions attempted to take into account the following factors: (1) the changing incidence of disease for eleven conditions of special relevance to elderly populations (for example, ischemic heart disease and arthritis); (2) the addition of acquired immunodeficiency syndrome (AIDS) to physicians’ caseloads; (3) decreases in average physician productivity due to an increase in “employee status” and the number of part-time practitioners; and (4) updated information on physician supply, based primarily on BHPr forecasts.

The FCIM recalculated the GMENAC model after modifying the original equations. Their new parameters were based on available empirical evidence. The numbers were not “adjusted” by expert panels as was done during the initial GMENAC process. Using this approach, the FCIM developed projections of requirement and supply for 1990 through 2020. The revised model predicts a significantly higher requirement for general internal medicine and a slight decrease for the subspecialties.

The FCIM model suggests that by 1990 the overall “surplus” of medical physicians will be significantly smaller (by about 12,000) than first predicted by GMENAC, and it forecasts a modest shortage of general internists. By the year 2000 however, the FCIM predicts that the overall surplus in internal medicine will expand to about 21,000, but that the shortage of general internists will swell to 5,000.

These findings are valuable for at least...
two reasons. First, the results add another set of well-conceived forecasts to the physician supply debate. Some will question the FCIM's assumptions and their continued reliance on a model that many consider insensitive to the health care system's changing market structure. However, the factors that FCIM considered are among those cited as the most striking reasons to reject GMENAC's original predictions. FCIM's results imply that these criticisms may be valid, but, all in all, the revised forecasts support GMENAC's key finding of too many specialists and too few generalists.

Although the FCIM results appear to indict GMENAC and other need-based models, they also highlight this approach's main advantage over demand-based approaches. Because the former are clinical/epidemiologic in orientation, the effects of changes in disease incidence and the care-giving process can be readily assessed. The relative ease with which the FCIM was able to incorporate a new disease-AIDS into the pre-existing modeling framework is a case in point. Accomplishing this would have been considerably more difficult had the model been economic.

A Shortage Of Certainty Or A Surplus Of Assumptions?

Under contract to COGME in 1987, Louis I? Garrison, Jr. and his colleagues at Project HOPE's Center for Health Affairs carried out a comprehensive review of the physician supply modeling literature. They concluded that if the council wished to quantify whether the country's physician stock was in balance with requirement, there were four courses of action: (1) to develop a unique modeling framework; (2) to augment the existing BHP demand-based model; (3) to build on GMENAC's original need-based model; or (4) to rely on private-sector research organizations—notably the AMA—to provide forecasts.

The studies I have reviewed here are suggestive of the findings that could be expected, if COGME adopted one of these options over another. It appears that forecasts based on the methodologies of the BHP, AMA, or a revision of GMENAC would lead to divergent findings. This variation would be evident across all predictions, but especially for those related to requirement or to individual specialties. This divergence is directly tied to the assumptions inherent in each model: assumptions that are overt (at proclaimed decision points) and covert (hidden deep within the model’s technical infrastructure).

Physician supply forecasting will always be shrouded by statistical, economic, and clinical minutiae; yet, at its heart, it is not a purely technical enterprise. Its purpose is to provide policymakers and managers with information and perspectives that allow them to select more rationally among alternative decision options. When forecasting is meant to predict needs, assumptions used in the model represent a set of ideals or principles. When the goal is to predict supply or demand, assumptions usually are intended to portray a market's behavior or its response to a particular policy action. In either case, the purpose of the entire process is to take these suppositions and make them visible: to forecast their expected effects on the health care system. Once assumptions have been selected, either tacitly or actively, the results of a model are sealed.

To help unravel the intricacies of physician supply modeling, Congress asked its Office of Technology Assessment in 1980 to develop an extensive critique of the state of the art. This report summed up the situation as follows: “Greater awareness of the limits of forecasting and less preoccupation with a particular set of numbers would be possible if the assumptions underlying the projections are made more explicit; alternative forecasts are projected, based on different sets of assumptions; and participation in the forecasting process is expanded to include policy makers as well as technicians.” A decade later, the members of COGME, Congress, and others in the policy arena, as well as those preparing the forecasts, would do well to heed this exhortation.

The supply of physicians and other health professionals has a profound effect on our health care delivery system, in terms that are both monetary and human. The
system is changing dramatically. Economic, social, and even biological assumptions operative yesterday are inoperative today. Now more than ever, monitoring and forecasting physician supply are essential to our nation’s health. The costs of doing otherwise, and risking a physician population grossly out of balance with society’s needs or demands, are far too great.

NOTES


9. Ibid., 117.

10. Ibid., 3.

11. For a detailed analysis of this assessment, contact the author at The Johns Hopkins University, School of Hygiene and Public Health, Department of Health Policy and Management, Room 605,624 North Broadway, Baltimore, Maryland 21205.


14. The subspecialties included allergy/immunology, cardiology, endocrinology, gastroenterology, hematology/oncology, infectious diseases, nephrology, pulmonary diseases, and rheumatology.

15. L.P. Garrison, Jr., P.J. Neumann, and J.A. Schoenmari, Assessing Physician Specialty Imbalances: Background and Short-Term Options for the Council on Graduate Medical Education, discussion paper, prepared by Project HOPE, Center for Health Affairs, under DHHS HRSA Order no. 87-3128 (P) (Chevy Chase, Md.: Project HOPE, June 1987).