COUNCIL ON GRADUATE MEDICAL EDUCATION

Eighth Report

Patient Care
Physician Supply and Requirements:
Testing COGME Recommendations

U.S. Department of Health & Human Services
HRSA
Health Resources & Services Administration

Council on Graduate Medical Education

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Revised November 1996

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Health Resources and Services Administration
Bureau of Health Professions
Division of Medicine

HRSA-P-DM 95-3

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The Council on Graduate Medical Education

The Council on Graduate Medical Education (COGME) was authorized by Congress in 1986 to provide an ongoing assessment of physician workforce trends and to recommend appropriate federal and private sector efforts to address identified needs. The legislation calls for COGME to serve in an advisory capacity to the Secretary of the Department of Health and Human Services (DHHS), the Senate Committees on Labor and Human Resources, and the House of Representatives Committee on Commerce. While by statute, the Council terminated on September 30, 1995, it has been extended through appropriation legislation.

The legislation specifies that the Council is to comprise 17 members. Appointed individuals are to include representatives of practicing primary care physicians, national and specialty physician organizations, international medical graduates, medical student and house staff associations, schools of medicine and osteopathy, public and private teaching hospitals, health insurers, business, and labor. Federal representation includes the Assistant Secretary for Health, DHHS; the Administrator of the Health Care Financing Administration, DHHS; and the Chief Medical Director of the Veterans Administration.

Charge to the Council

The charge to COGME is much broader than the name would imply. Title VII of the Public Health Service Act, as amended by Public Law 99-272 as amended by Title III of the Health Professions Extension Amendments of 1992, required COGME to provide advice and make recommendations to the Secretary and Congress on a wide variety of issues:

1. The supply and distribution of physicians in the United States
2. Current and future shortages or excesses of physicians in medical and surgical specialties and subspecialties
3. Issues relating to international medical school graduates
4. Appropriate federal policies with respect to the matters specified in items 1-3, including policies concerning changes in the financing of undergraduate and graduate medical education (GME) programs and changes in the types of medical education training in GME programs
5. Appropriate efforts to be carried out by hospitals, schools of medicine, schools of osteopathy, and accrediting bodies with respect to the matters specified in items 1-3, including efforts for changes in undergraduate and GME programs
6. Deficiencies and needs for improvements in existing data bases concerning the supply and distribution of, and postgraduate training programs for, physicians in the United States and steps that should be taken to eliminate those deficiencies

The Council is to encourage entities providing graduate medical education to conduct activities to voluntarily achieve the recommendations of this Council specified in item 5.

COGME Reports

Since its establishment, COGME has submitted or is in the process of completing the following reports to the DHHS Secretary and Congress:

- First Report of the Council, Volume I and Volume II (1988)
- Second Report: The Financial Status of Teaching Hospitals and the Underrepresentation of Minorities in Medicine (1990)
- Scholar in Residence Report: Reform in Medical Education and Medical Education in the Ambulatory Setting (1991)
- Third Report: Improving Access to Health Care Through Physician Workforce Reform: Directions for the 21st Century (1992)
- Fourth Report: Recommendations to Improve Access to Health Care Through Physician Workforce Reform (1994)
- Fifth Report: Women and Medicine (1995)
- Sixth Report: Managed Health Care: Implications for the Physician Workforce and Medical Education (1995)
- Seventh Report: Physician Workforce Funding Recommendations for Department of Health and Human Services' Programs (1995)
- Eighth Report: Patient Care Physician Supply and Requirements: Testing COGME Recommendations (1996)

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Acknowledgments

The Council wishes to acknowledge its indebtedness to Jack Colwill, M.D., for taking the lead on thoroughly refining and ultimately finalizing the Eighth Report of COGME. The Council further warmly acknowledges Marc L. Rivo, M.D., M.P.H., previous Executive Secretary and Director of the Division of Medicine, Bureau of Health Professions (BHPr), for his staff leadership in the formulation of the report, and Enrique S. Fernandez, M.D., M.S.Ed., now COGME Executive Secretary and Director of the Division of Medicine. Acknowledgement is also made of the leadership of Fitzhugh Mullan, M.D., retired Director of BHPr, and Ciro V. Sumaya, M.D., M.P.H.T.M, Administrator, Health Resources and Services Administration of the U.S. Public Health Service, DHHS. COGME also gratefully acknowledges the primary staff roles in developing the Eighth Report of Robert M. Politzer, M.S., Sc.D., Office of Research and Planning, Sandra R. Gamliel, Division of Medicine, and James M. Cultice, Office of Research and Planning, BHPr. Key liaison support was provided by F. Lawrence Clare, M.D., M.P.H., COGME Deputy Executive Secretary, Jerald M. Katzoff, COGME Staff Liaison for Physician Workforce Issues, and P. Hannah Davis, Statistician, in the Division of Medicine. Graphics were produced by Evelyn Christian and Ceal Neally of the Office of Research and Planning.

Executive Summary

BACKGROUND

In its Third Report, Improving Access to Health Care Through Physician Workforce Reform: Directions for the 21st Century, COGME made recommendations to address the problems of physician oversupply, increasing specialization, geographic maldistribution, and minority underrepresentation. Recognizing a progressive oversupply of specialists as well as a shortage of generalist physicians, COGME set forth goals for the number and type of physicians entering residency. It was recommended that the number of physicians entering residency be reduced from 140% to 110% of the number of graduates of allopathic and osteopathic medical schools in the United States in 1993 and that the percentage of those graduates who complete training and enter practice as generalists should be increased from the current level of 30% to 50% (ie, the so-called "110:50/50 recommendation"). The Fourth Report issued by COGME provided an update of the Third Report and recommended legislation to achieve these workforce goals through allocation of reduced numbers of residency positions to consortia of medical schools and teaching hospitals. The Sixth Report, Managed Health Care, documented fundamental changes occurring in the United States health care system and outlined implications for medical education and the physician workforce based on a reassessment of physician supply and requirements. In response to a changing congressional environment, COGME's Seventh Report, Physician Workforce Funding Recommendations for Department of Health and Human Services' Programs, recommended that planned reductions in Medicare funding of graduate medical education (GME) be targeted specifically to reducing the number of first-year residents by reducing GME payments for international medical graduates (IMGs).

The implications of implementing the 110:50/50 recommendation of COGME's Third Report are great. First-year residency positions in the United States would be reduced from 25,000 to approximately 19,600—a 22% decrease. The number of physicians entering specialties would drop 44%, while the number of generalist physicians would increase by one-third.

Since publication of the Third Report in 1992, the health care delivery system has been changing rapidly as a result of progressive implementation of managed systems of care and competitive medical practice. Consequently, in this report physician supply and requirements are reassessed in the context of a health care system increasingly dominated by managed care. Methodologies and available analyses for forecasting patterns of physician utilization (ie, requirements) are compared under various assumptions, and the appropriateness of the 110:50/50 recommendations for GME are reassessed. In addition, COGME's position regarding the specialty composition of the workforce and the output of training programs is clarified.

PHYSICIAN SUPPLY

In the 1960s and 1970s, in response to a physician shortage, the number of graduates of medical schools in the United States doubled and the United States government fostered immigration of physicians trained in foreign medical schools. When the shortage eased, the number was not adjusted subsequently. While the output of medical schools in the United States has remained stable for over a decade, the number of IMGs who entered residency training each year almost doubled between 1988 and 1994—from 3,600 to 6,700. As a result, the number of first-year residency positions filled has increased to 140% of the number of United States medical graduates (USMGs), and the nation's physician-to-population ratio has increased rapidly.

Between 1965 and 1992, the patient care physician-to-population ratio (excluding resident physicians) increased by 65%, from 115 to 190 physicians per 100,000 population, almost entirely in the medical specialties. The specialist physician-to-population ratio increased by 121%, from 56 to 123 specialists per 100,000 population, while the generalist ratio increased only 13%, from 59 to 67 generalists per 100,000 population.

If numbers of those entering GME remain at current levels, the patient care physician-to-population ratio will continue to increase until 2010—an additional 15% over the 1992 level—from 190 to 219 physicians per 100,000 population. Assuming that 70% will continue to enter specialty practice, the specialist-to-population ratio will increase another 23%, from 123 to 152 specialists per 100,000 population, while the generalist physician-to-population ratio will remain stable at 67 per 100,000.

These projections may actually understate the future total patient care physician supply. Entry into GME in this country is a pathway to entering practice in the United States for both domestic and international medical school graduates. The increases in IMGs could continue. Several new schools of osteopathy are under development, adding to the medical supply. Furthermore, anecdotal reports suggest that the unprecedented demand by United States citizens for medical education is leading to increases in their enrollment in schools outside the United States that are not accredited by the Liaison Committee for Medical Education.

The estimates of future numbers of generalists may also be understated, inasmuch as these projections are based on past patterns of specialty choice. As perceptions of a surplus of specialists become prevalent, graduates of medical schools in the United States appear to be exhibiting increased interest in generalist specialties. According to information derived from the Association of American Medical Colleges Graduation Questionnaire, medical students' interest in generalist careers has increased from its nadir of 14.6% in 1992 to 27.6% in 1995. At the same time, students' interest in the medical subspecialties and hospital-based specialties appears to be declining.

It is unclear what long-term impact this increasing interest in generalist specialties will have on total numbers of physicians entering specialty medicine. In the past, patterns of reimbursement for GME have provided incentives for hospitals to maintain and expand their training programs. Residents provide valued service and are a source of revenue through GME reimbursement. These incentives may result in increasing numbers of IMGs being recruited to fill vacant subspecialty positions, in which case the surplus of specialists would not be moderated.

Congress now is contemplating reductions in the funding of GME. It is COGME's belief that across-the-board reductions may have little impact on the total number of residents entering GME. Targeted reductions that decrease funding in the subspecialties may result in more physicians entering generalist specialties but may not reduce total numbers entering GME. However, targeted reductions in GME reimbursement for IMGs—such as those recommended in COGME's Seventh Report—are most likely to reduce total numbers of physicians.

PHYSICIAN REQUIREMENTS

Five studies have been undertaken to determine projections for physician requirements for the next century. Four of these studies are demand-based methodologies, and one large-scale effort—the Graduate Medical Education National Advisory Council (GMENAC) Study—utilized a needs-based methodology to estimate requirements for practicing physicians. The GMENAC model projected physician need based on the prevalence of illness and estimates by provider panels of physician services required to manage these illnesses. Conversely, the demand-based models establish their assumptions on the manner in which medical services are paid (eg, the percentage of capitated managed care versus fee-for-service) and current patterns of utilization. COGME places special emphasis on those demand models that assume increasing domination of the health care system by managed care arrangements. These systems use fewer patient care physicians per 100,000 population and a higher proportion of generalists than do the fee-for-service arrangements that have dominated health care delivery in this nation.

For all five models, requirements for patient care generalist physicians in year 2000 lie within a range of 60-80 generalists per 100,000 population. Specialist requirements in the five models varied from 82-138 specialists per 100,000 population. The differences in the five models lie in the degree to which historic increases in the demand for specialists are assumed to continue in the increasingly competitive managed care setting. Given the widespread consensus that the future health care system will be dominated by managed care (ie, capitated financing with strong utilization controls), COGME believes that ranges of patient care generalists between 60-80 per 100,000 population and specialists between 85-105 per 100,000 population are reasonable estimates of physician utilization in the early 21st century. COGME believes that market forces will at least balance increasing demand for specialty services resulting from new technology. Consequently, increasing demand for specialists is not anticipated.

If physician staffing patterns were at the midpoint of the requirement ranges (165 patient care physicians with 70 generalists and 95 specialists per 100,000 population) the workforce would consist of approximately 42% generalists and 58% specialists. In comparison, in the year 2000, COGME projects 203 patient care physicians with 63 generalists and 140 specialists per 100,000 population—a specialty mix of 31% generalists and 69% specialists.

COMPARISON OF ALTERNATIVE SUPPLY SCENARIOS WITH REQUIREMENTS

In its Third and Fourth Reports, COGME recommended that the nation reduce the number of physicians entering GME to the number of United States allopathic (MD) and osteopathic (DO) medical school

graduates plus 10%, and that at least 50% of these residency graduates enter practice as generalists. This recommendation and various alternative scenarios of numbers of first-year residents and alternative specialty mixes were compared with the aforementioned patient care physician requirement ranges.

If recent patterns of residency education continue with first-year residency positions at a level of 140% of U.S. medical graduates and an output of 30% generalists and 70% specialists, imbalances between supply and requirements will worsen. Generalist supply will remain in the lower portion of the requirement range of 60-80 generalists per 100,000 population. At the same time, the patient care specialist supply will increase to 152 physicians per 100,000 population in 2010, far above COGME's estimated requirement range of 85-105 specialists per 100,000 population. The number of specialists will be 100,000 above the upper level of the range in the year 2000 and will grow to 140,000 above the range by the year 2010. At the same time, the supply of generalists will be 48,000 below the top of the requirement range in the year 2000 and will be approximately 39,000 below the upper end of the range in 2010 (see appendix Table 3).

Neither reducing the number of first-year residents nor increasing the generalist output to as high as 60% would alone bring both generalist and specialist supplies within the requirement ranges of a managed care-dominated system by the year 2010. If the number of first-year residency positions is not reduced and the proportion of generalist trainees grows to 50% with the increasing attractiveness of generalist careers and reduction in GME funding of subspecialty training, the number of generalists will exceed 80/100,000 before 2010 and the ratio of specialists will markedly exceed the requirement range. However, a reduction of first-year residents to the number of USMGs plus 10%, in combination with an increase in the proportion of generalists to at least 50% of those educated annually, will minimize the projected specialty surplus while maintaining generalist supply. Under this scenario, in 2010, the specialist physician-to-population ratio will be 134 per 100,000—87,000 specialist physicians above the requirement range. At the same time, the generalist physician-to-population ratio will be 77 per 100,000—8,000 generalist physicians below the upper level of the requirement range.

The ultimate requirements for generalists and specialists will obviously depend on the configuration of future health care systems. In a competitive environment, that system will be structured through an interaction of factors including cost efficiency mechanisms, consumer desires, and workforce availability. The Council anticipates that nurse practitioners and physician assistants will be utilized increasingly, both in specialty care and in primary care. It also believes that specialists will provide a portion of primary care services for chronically ill patients in managed care systems. At the same time, COGME anticipates that generalists will assume increased roles in coordinating care and providing primary care as managed systems of care proliferate, thus reducing demand for specialists.

It has been suggested that the current generalist supply will be adequate in a system dominated by managed care. Evidence to support this conclusion is drawn from data demonstrating that generalist-to-population ratios in the United States already approximate current generalist staffing levels in many health maintenance organizations (HMOs). However, these conclusions, as well as the studies utilized in establishing COGME's estimations of requirements, are derived by projecting physician staffing patterns in local systems of managed care to the nation as a whole. They do not consider the inevitable geographic variation in physician supply. While variation in physician supply across states and regions may be reduced as managed care progressively dominates the health care delivery system, it is not realistic to expect that physicians in the future will be distributed evenly. The ranges of requirements are intended to be broad enough to take into consideration geographic and other local variations.

Current levels of generalist supply have been achieved through public support of generalist training. If generalist training is to be expanded by one-third, as would be the case with implementation of the 110:50/50 recommendation, the educational infrastructure must be maintained and enhanced. Training programs, particularly those serving rural and inner-city areas, should continue to receive training grant support at least for a decade or until managed care efforts have clearly replaced these needs.

In the final analysis, COGME recognizes that the nation's most significant workforce problem is an increasing surplus of physicians, primarily of specialists. In a setting of overall surplus, the issue of optimal requirement ranges becomes moot. The real issue becomes identifying where the system has the capacity to productively employ additional physicians. At present, this country has very limited capacity to absorb additional specialists while still being able to employ many additional generalists productively.

The health care system is in a state of dynamic change. Patterns of delivery may change with time, and current data are incomplete. Ongoing studies of workforce supply and requirements are needed.

CONCLUSIONS

Despite the aforementioned uncertainties, current data support a goal that total first-year residency positions be reduced to 110% of 1993 USMGs and that 50% of this reduced number enter practice as generalists. Implementing this recommendation will require fundamental changes in current patterns of GME which should be instituted as rapidly as possible. If this goal is achieved, the nation's physician workforce will more closely correspond to physician requirements early in the next century.

Patient Care Physician Supply and Requirements: Testing COGME Recommendations

BACKGROUND

In its Third Report, *Improving Access to Health Care Through Physician Workforce Reform: Directions for the 21st Century*, COGME made recommendations to address the problems of physician oversupply, increasing specialization, geographic maldistribution, and minority underrepresentation. Among its recommendations, COGME set forth goals for the number and type of physicians entering residency. It was recommended that the number of physicians entering residency be reduced from 140% to 110% of the number of graduates from allopathic and osteopathic medical schools in the United States in 1993 and that the percentage of those graduates who complete training and enter practice as generalists should be increased from the current level of 30% to at least 50% (ie, the so-called "110:50/50" recommendation).[1] The Fourth Report issued by COGME provided an update of the Third Report and recommended legislation to achieve these workforce goals through allocation of reduced numbers of residency positions to consortia of medical schools and teaching hospitals. The Fourth Report also presented early analyses of the impact of changing health care delivery systems on projected physician staffing patterns compared with projected physician supply.[2] The Sixth Report, *Managed Health Care*, documented fundamental changes occurring in the United States health care system and outlined implications for medical education and the physician workforce based on a reassessment of physician supply and requirements.[3] In recognition of the changing congressional environment, COGME recommended in its Seventh Report, published in 1995, that planned reductions in Medicare funding of graduate medical education (GME) be targeted specifically to reducing the number of first-year residents by reducing GME payments for international medical graduates (IMGs).[4]

The implications of implementing the 110:50/50 recommendation are great. First-year residency positions in the United States would be reduced from 25,000 to approximately 19,600—a 22% decrease. The number of physicians entering specialties would fall 44% while the number of generalist physicians would increase by one-third. Understandably, COGME's recommendation has drawn a great deal of attention from policy makers, medical educators, and the public. The 50/50 goal has also generated confusion as to whether it refers to resident output or to the supply of practicing physicians.

Since publication of the Third Report in 1992, the health care delivery system has been changing rapidly, with the progressive implementation of managed systems of care and competitive medical practice. These delivery systems utilize fewer physicians than fee-for-service systems.[5,6,7] Consequently, in this report underlying assumptions, methodologies, and data used in previous supply and requirement analyses are reevaluated. Methodologies and available analyses for forecasting physician supply and projected utilization patterns (ie, requirements) are compared under various assumptions, and the appropriateness of the 110:50/50 recommendations for GME are reassessed. In addition, COGME's position is clarified with regard to the specialty composition of the workforce.

PHYSICIAN SUPPLY

The Bureau of Health Professions (BHPr) of the Health Resources and Services Administration (HRSA) maintains the only aggregate physician supply model that includes both allopathic and osteopathic physicians.[8] This model utilizes a 1986 base-year count of active physicians abstracted from information provided by the American Medical Association (AMA) and the American Osteopathic Association (AOA). Data for allopathic physicians are drawn from the AMA Masterfile and that of osteopathic physicians from AOA data files. These files provide information such as age, sex, self-designated specialty, and type of practice.

The AMA Masterfile contains current and historical data on all allopathic physicians, including United States medical graduates (USMGs) and IMGs. Data are derived from a number of sources including the record of Physician Professional Activities questionnaire, which is sent annually to approximately one-third of all allopathic physicians and to additional physicians for whom address or practice changes are known. In answering this questionnaire, physicians

may indicate that they practice in more than one specialty. The Masterfile designates the physician as a generalist or specialist based on which specialty consumes the largest proportion of the physician's effort.[9] Data are also obtained from medical schools, hospitals, medical societies, the National Board of Medical Examiners, state licensing agencies, the Educational Commission for Foreign Medical Graduates, the U.S. government (for those under governmental employ), and the American Board of Medical Specialties.[10]

The AOA conducts a census of all doctors of osteopathy (DOs) every 3 years to identify characteristics of DOs and their practice. Data on matriculating medical students are added to the Masterfile every year, and the AOA continually tracks them through medical school, residency, and into practice. Data regarding matriculating students are provided by the American Association of Colleges of Osteopathic Medicine. Dropouts from the Masterfile are updated on an ongoing basis as the AOA is notified of events such as retirements and deaths. Dropout data are obtained from various sources such as medical schools, alumni associations, state societies, and state centers for health statistics. Because of the relatively small number of osteopathic physicians and the lack of IMGs, AOA file data can be based on a complete census, total tracking of incoming students, and recording of the relatively small numbers of retirements and deaths.[11]

In projecting physician supply, the BHPr utilizes 1986 base-year counts of physicians by specialty and by level of activity as provided by the AMA and the AOA. These counts are projected forward in time by adding new entrants, both USMGs and IMGs. Those leaving the workforce through death or retirement are subtracted each year. Adjustments are made to account for shifts in specialty or activity. In estimating the future physician supply, the projection model assumed no increase above the current level of USMGs. It also assumed that the number of IMGs finishing their GME in the United States and ultimately practicing here will continue at the current rate of 4,800 per year.

COGME's previous reports on physician supply have focused on numbers of active physicians—all physicians devoting 20 hours or more weekly to their professional activities. Active physicians can then be subdivided into patient care physicians; physicians in teaching, research, and administration; resident physicians; and those who are unclassified. Currently, approximately 74% of active physicians are classified as patient care physicians—those who identify their prime activity as the practice of medicine. An additional 6% are involved in teaching, research, and administration and 16% are resident physicians and fellows enrolled in various educational programs. Only 4% are unclassified because of lack of available data.[12]

This report will focus on the supply of and requirements for physicians in patient care. Utilizing patient care physicians and excluding resident physicians for projections of physician supply will tend to understate the actual patient care workforce because significant amounts of patient care are provided by residents and by many of those physicians who participate in teaching, research, and administration. When making projections of patient care physicians for future years, the assumption is made that the relative proportion of patient care to total active physicians will remain at 74% of total active physicians.

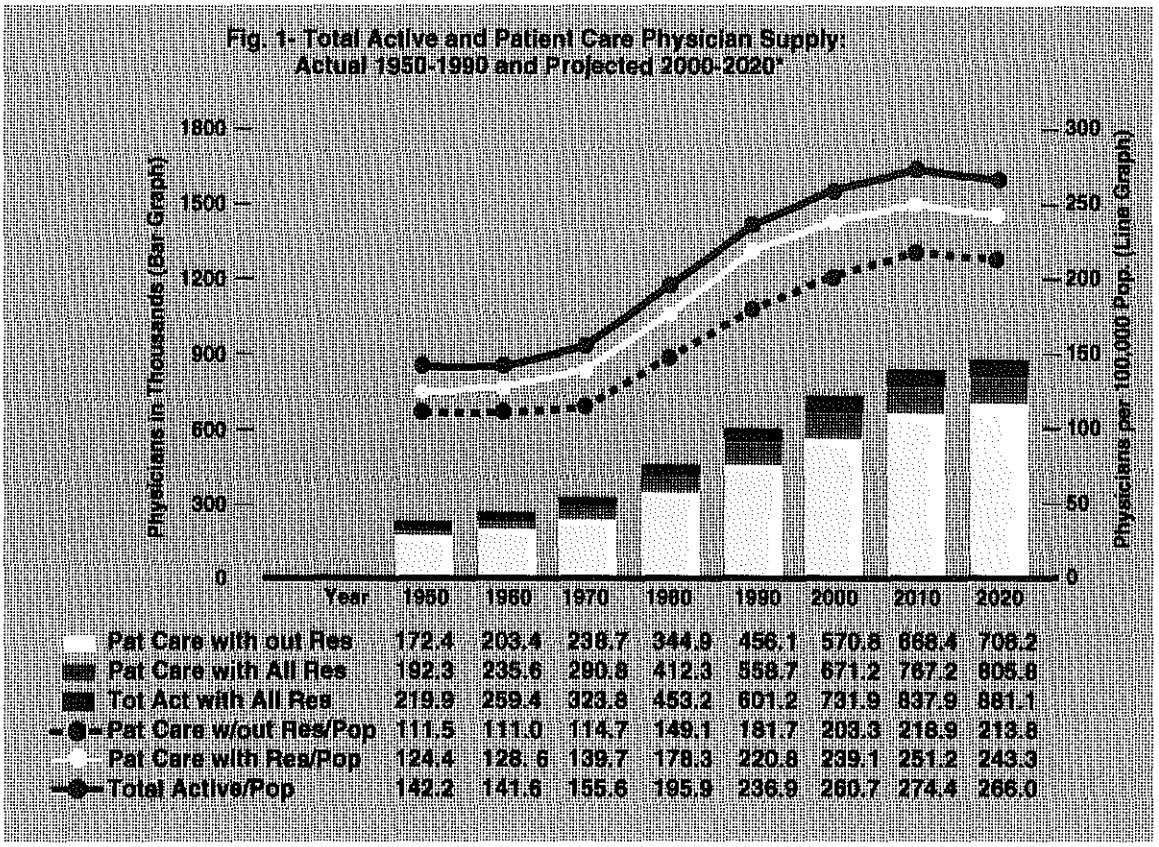
Physician-to-population ratios reported in this paper are lower than those projected in COGME's Third and Fourth Reports. These earlier projections were based on population estimates from the 1989 Mid-series Census Bureau P-25 Report. Based on updated population projections issued in November 1993 (P25-1104), the anticipated population in the year 2020 increased from 294.4 million to 325.9 million. Even when correcting for these projected increases in the U.S. population, the ratio of physicians to population continues to increase substantially above current levels. (COGME has recommended that physician-to-population ratios be maintained at the 1993 level given current market requirements for physicians.)

PHYSICIAN SUPPLY TRENDS AND PROJECTIONS

In Figure 1, trends in physician supply are revealed and physician supply is projected to the year 2020. Numbers of physicians as well as physician-to-population ratios for patient care physicians, patient care physicians including residents and fellows, and total active physicians are provided.

In the period between 1950 and 1990, the patient care physician-to-population ratio increased 63%, from about 112 to 182 per 100,000. When resident physicians are included in the supply of patient care physicians, the patient care physician-to-population ratio increased 77%, from about 124 in 1950 to 221 per 100,000 in 1990. At the same time, the total active physician-to-population ratio increased 67%, from 142 to 237 per 100,000.

If numbers entering GME remain at current levels, the patient care physician-to-population ratio will continue to increase to 219 physicians per 100,000 in 2010—a 20% increase above 1990 levels. At the same time, the total active physician-to-population ratio will increase to 274 per 100,000—an additional 16%. These projections are based on an



*Projections assume output of physicians at 140% of USMGs with 30% generalists and 70% specialists

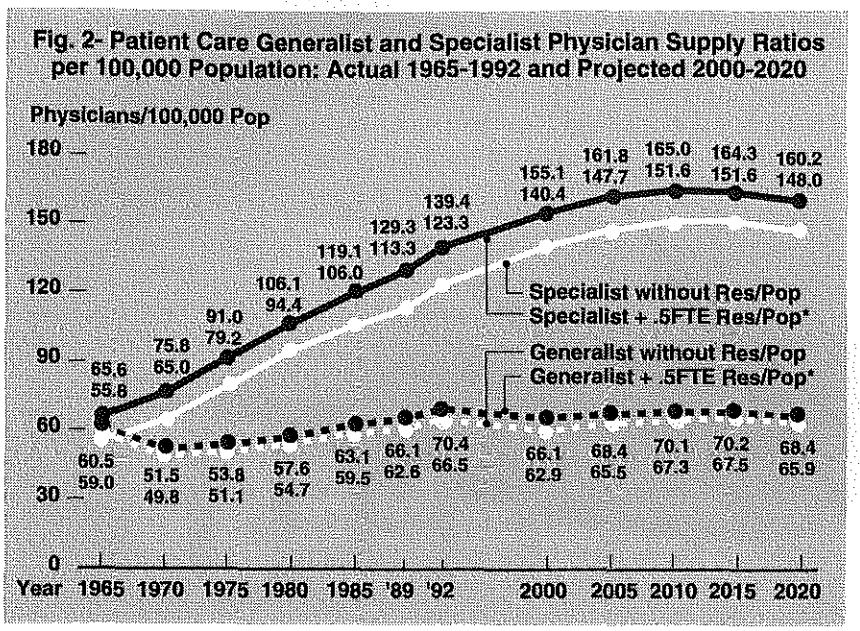
Source: 1950-1990 data adjusted by BHPr from AMA Physician Masterfile and unpublished AOA data. Projections from BHPr physician supply model.

assumption that USMGs will not increase and that numbers of IMGs entering the workforce will remain stable at 4,800 per year.

The aforementioned projections of physician supply may actually understate total supply. While the output of medical schools in the United States has been stable for over a decade, the number of physicians entering GME has been increasing because of increasing numbers of IMGs. Between 1988 and 1994, the number of IMGs who entered residency training almost doubled, increasing from 3,600 to 6,700.[13] Numbers of IMGs may continue to increase. Furthermore, several new schools of osteopathy are in developmental stages, and an unprecedented demand for medical education may be leading to a resurgence in United States citizens enrolling in foreign medical schools. Thus, the projections may understate total future physician supply.

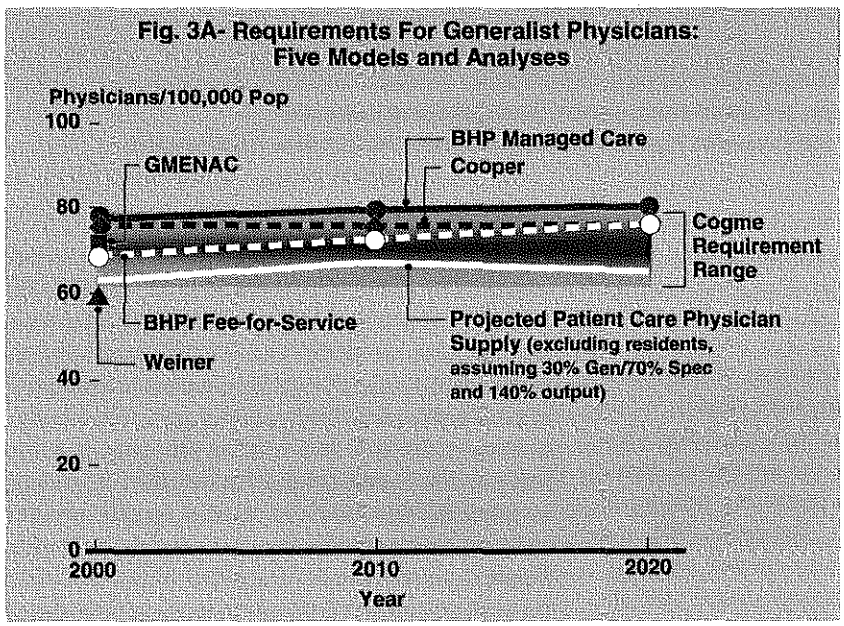
In Figure 2, patient care physicians are subdivided into the categories of generalists (family physicians, general practitioners, general internists, and general pediatricians) and specialists (all other patient care physicians). Between 1965 and 1992, generalist physicians in patient care increased only 13%, from about 59 to 67 per 100,000, while specialist physicians increased by 121%, from about 56 to 123 per 100,000. Recognizing that resident physicians involved in training programs are less productive than practicing patient care physicians, corrections are made to approximate effective resident physician supply. The assumption was made that each resident physician is a one-half full-time equivalent and that the effort of residents in generalist specialties is divided equally between specialty and generalist services. As can be seen in Figure 2, the net impact of resident physicians under these assumptions is primarily to increase provision of specialty services.

Assuming that historical patterns of specialty choice continue, in which 70% of trainees enter specialties, projections for the year 2010 indicate that the patient care physician-to-population ratio for generalists will remain stable at about 67 per 100,000, whereas the specialist ratio will increase an additional 23% over the 1992 figure, to about 152 per 100,000 population. Thus, the proportion of physicians who are generalists will drop from current levels of 35% to 31% in 2010.



* Projections assume output of physicians at 140% of USMGs with 30% generalists and 70% specialists. Resident numbers adjusted as described in the text.

Source: 1965-1992 data adjusted by BHPr from AMA Physician Masterfile and unpublished AOA data. Projections from BHPr physician supply model.



Recent evidence suggests an increasing interest in generalist careers among USMGs. Information from the Association of American Medical College's Graduation Questionnaire, which is completed by senior medical students, indicates that student interest in the generalist specialties has risen from a low of 14.6% in 1992 to 27.6% in 1995. At the same time, interest in medical specialties and hospital-based specialties has been falling. Matching rates in anesthesia have fallen precipitously, and first-year trainees in family medicine have increased by 29% between 1992 and 1995.[14] It is not clear whether this changing interest in specialty preference by USMGs will result in reduced numbers of specialty trainees. Current incentives in the funding of GME, as well as the service needs of teaching hospitals, provide incentives for these hospitals to fill open specialty positions with IMGs. Alternatively, possible changes in funding of GME and the recognition of a specialist surplus may lead hospitals to reduce the number of specialty positions, thus increasing the proportion of graduates entering generalist practice.

PHYSICIAN REQUIREMENTS

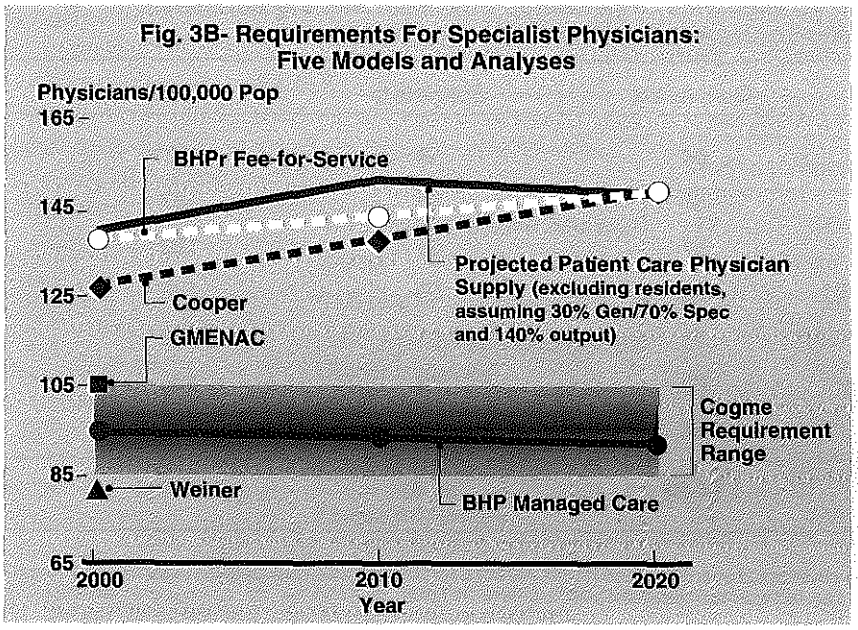
Five approaches have been utilized to project future physician requirements. The studies utilized two basically different methodologies. The Graduate Medical Education National Advisory Council (GMENAC) study of 1980, an adjusted needs-based methodology, defined physicians needed to provide adequate care to the entire population based on the prevalence of disease and necessary health maintenance services. The other four studies are demand-based models. These demand-based models make assumptions about patterns of health delivery and individuals' ability to pay for services. They then project future demand based on current utilization rates, projected increases in population size, and specific assumptions about the delivery system. The five approaches are outlined as follows and findings are summarized in Figures 3A and 3B.

1. The GMENAC Study

The federally mandated GMENAC study of physician supply and requirements was published in 1980. It developed models of projected physician supply, GME, and physician requirements.[15,16]

The GMENAC model projected ideal or adequate levels of care for the United States population. For the study, data were obtained on the incidence or prevalence of each disease within the population, the percentage of individuals with a disease requiring care, and the number of visits required per episode per year. The results of the study summed up all morbidities for the entire United States population, defined the percentage of individuals requiring treatment from each specialty, and designated the percentage of each specialty's visits that should be delegated to nonphysician providers. The total national requirement for physicians was determined by dividing the visits needed by the number of visits estimated to be provided by physicians in each specialty.

Thus, this model was based primarily on epidemiologically defined need. Parameters of the model were estimated normatively for specific morbidities. The approach is described as an "adjusted" needs-based model because biological need was adjusted for



nonbiological factors in order to make the forecast as achievable and realistic as possible. It was designed to provide ideal or adequate levels of care. It was goal oriented where the future system was tight and efficient and the generalist was the gatekeeper, without explicitly referring to organization of the system.

2. The BHPr Fee-for-Service Demographic Utilization Model

The BHPr demographic utilization model is based on current patterns of utilization of physician services stratified by individuals' age, gender, race, and ethnic groupings.[17] Forecasts of future size and composition of the population are obtained and used to base projections. Past physician utilization patterns by specialty are applied for each forecasted population group to define total services required. These service requirements are translated into specialty-specific full-time equivalent physician estimates using standard measures of physician productivity.

Projections are based on the assumption that demand will increase in patterns similar to those in fee-for-service dominated systems. Under these assumptions, the model apportions 72% of the population to fee-for-service insurance plans, 14% to managed care plans, and 14% to uninsured individuals in the base year 1989. In this minimal-change scenario, the proportion covered under fee-for-service plans drops only slightly to 69% in the year 2000 and to 63% in 2020. The percentage enrolled in managed care programs increases modestly, from 14% in 1989 to 20% in 2000 and 30% in 2020. The percentage of uninsured individuals falls from 14% in 1989 to 11% in 2000 and to 7% uninsured in 2020.

3. The Cooper Analysis

The Cooper analysis uses information on HMO staffing patterns, technologic advancements, and recent Bureau of Census projections of population. Requirements for generalists and specialists are separately analyzed and estimates are based on projections of future HMO generalist utilization and past growth of specialists.[18,19]

Recognizing that current HMO staffing patterns for generalists are similar to the current generalist physician-to-population ratio, the nation's current level of generalists is accepted as adequate. The assumption is made that increasing financial access to care and increasing needs for generalist care by the elderly will be offset by increasing participation of nonphysician providers and by use of specialists to provide primary care. Thus, 70-80 generalist physicians per 100,000 population are projected to be sufficient.

The starting point in Cooper's analysis for specialist requirements is the current range of ratios of 85-95 specialists per 100,000 in staff and group model HMOs. The estimate is then compared with the current specialty estimate of 117 and inflated to 138 to account for residents. The managed care estimate is then adjusted up to 120 to generalize the HMO experience to other practice modes and settings. Specialist requirements are then projected to increase by 1 specialist per 100,000 per year based on continued technologic advances and expanded capabilities to effectively care for patients with chronic diseases. (The author points out that the number of specialists per 100,000 population has been increasing at a rate of 3 physicians per 100,000 per year under fee-for-service arrangements and assumes that managed care will reduce this increase to 1 per 100,000 per year.)

4. The BHPr Managed Care Dominated System Requirements Scenario

This scenario recognizes that the number of United States citizens enrolled in capitated managed care plans has increased rapidly while traditional indemnity plans have been declining equally rapidly. As managed care plans assume an increasing share of the market, competition stimulates parsimonious utilization of resources and increasing cost efficiency.[6,7,20,21,22] Consequently, whereas fee-for-service dominated models predict future physician requirements by projecting past utilization patterns to future increases in population and increases in financial access, managed care scenarios must take into account increasing efficiencies in the system.

Demand-based projections under managed care scenarios require information on physician staffing patterns within various types of managed care sys-

Table 1. Health Maintenance Organization Physician Staffing Estimates: Full-time Equivalent Physicians per 100,000 Population

Source	*Generalists*	*Specialists*	*Total*
Seven Kaiser Plans[1*]	54	58	112*
Kaiser Portland[2]	56	81	137
GHA Seattle[3]	57	65	122
GHAA Fax Survey (4/1/93)[4]	88	50	138
GHAA Industry Profile (1993)[5]	71	61	132
Kindig/Rentmeester Study[6]	62	73	135
Tarlov[7]	66	54	120
Range	**54-88**	**50-81**	**112-138**

* Mulhausen and McGee forecast the physician-to-population ratio in 2000 to be 129/100,000 but do not forecast the generalist/specialist mix.

Specialist ratios may not reflect all full-time equivalent counts. As a result, GHAA reports a total full-time equivalent physician ratio of 120/100,000.

Includes ob/gyn.

1. Mulhausen R, McGee J. Physician need: an alternative projection from a study of large, prepaid group practices. *JAMA* 1989;26(13):1930-1934.
2. Hooker R. The role of physician assistants and nurse practitioners in a managed care organization. In: Clawson DK, Osterweis M (eds). The role of physician assistants and nurse practitioners in primary care. Washington, DC: The Association of Academic Health Centers, 1993.
3. Kronick R, Goodman DC, Wennberg J, Wagner E. The marketplace in health care reform: the demographic limitations of managed competition. *N Engl J Med* 1993;328(2):148-152.
4. GHAA survey conducted 3/31/93 on behalf of the Bureau of Health Professions and the Clinton Health Care Task Force (unpublished data).
5. Group Health Association of America, Inc. Patterns of enrollment. Washington, DC: GHAA, 1993.
6. Rentmeester K, Kindig D. Physician supply by specialty in managed care organizations. Testimony before PPRC, December 9, 1993.
7. Tarlov A. HMO enrollment growth and physicians: the third compartment. *Health Affairs*, Spring 1986.

tems. Current information is derived primarily from literature on staff and group model HMOs (eg, Kaiser Permanente, Group Health Cooperative). Within staff and group model HMOs, reported staffing levels vary widely, as shown in Table 1. In recent years, most of the increase in managed care has occurred through independent practice association (IPA) types of models. Unfortunately, little information is available concerning IPA staffing arrangements.

The BHPr's managed care dominated scenario utilizes the following assumptions:[7]

- Two-thirds of the United States population will be enrolled in a managed care plan by 2000. This percentage will rise to 80% in 2020.
- The entire population will have health insurance.
- HMO staffing patterns will be at the upper end of the reported range of 112 to 138 physicians per 100,000.
- The HMO staffing ratio is increased by 25% to 172.5 per 100,000 population to adjust for the older age of the total population, greater utilization of services by elderly and sicker populations than previously required by HMO enrollees, and use of out-of-plan services.
- Fifty percent of physicians in managed care systems are projected to be generalists. While current plans are reported to utilize 45% generalists, this projection assumes that greater availability of generalists, coupled with greater competition among plans, will stimulate increased utilization of generalists.
- One-third of the population in the year 2000 and one-fifth in 2020 will remain in fee-for-service systems with patient care physician-to-population ratios (excluding residents) equal to the weighted average of metropolitan areas (225) and nonmetropolitan areas (104). This projection results in an overall estimate of 174 patient care physicians per 100,000 in the fee-for-service sector. It anticipates that the nonmanaged care population may consist of the most affluent residents of metropolitan areas along with residents of nonmetropolitan areas for whom managed care arrangements are inaccessible.
- Within the fee-for-service sector, the generalist/specialist ratio will reflect the current specialty distribution of 34% generalists and 66% specialists. (Currently, each cohort of physicians entering practice has a 30% generalist/70% specialist distribution.)

Table 2. Generalist and Specialist Patient Care Requirements and Forecasted Supply Under Current Trends: Physicians per 100,000 Population

	Year 2000			*Year 2020*		
Source	*Gen.*	*Spec.*	*Total*	*Gen.*	*Spec.*	*Total*
BHPr Managed Care Scenario[1]	77	96	173	81	92	173
Weiner[2]	59	82	141	-	-	-
GMENAC[3,4]	72	106	178	-	-	-
BHPr Fee-for-Service Scenario, Utilization-based[5]	69	138	207	76	149	225
Cooper[6]	75	128	203	75	148	223
Requirements Range	**59-77**	**82-138**	**141-207**	**75-81**	**92-149**	**173-225**
Projected Supply	**63**	**140**	**203**	**66**	**148**	**214**

1. Gamliel S, Politzer R, Rivo M, Mullan F. Managed care on the march. Will the physician workforce meet the challenge? Health Affairs, Summer 1995.
2. Weiner JP. Forecasting the effects of health care reform on U.S. physician workforce requirements: evidence from HMO staffing patterns. JAMA 1994;272(3):222-230.
3. Bowman MA, Katzoff JM, Garrison LP, Wills J. Estimates of physician requirements for 1990 for the specialties of neurology, anesthesiology, nuclear medicine, pathology, physical medicine and rehabilitation, and radiology: a further application of the GMENAC methodology. JAMA 250;1983.
4. Summary Report of the Graduate Medical Education National Advisory Committee, September 1980, Vol 1, US DHHS pub no. (HRA) 81-651. Rockville, MD: Office of Graduate Medical Education, HRSA, April 1981.
5. Refinements to BHPr requirements forecasting model, Vol II: data and methodology. Rockville, MD: BHPr, HRSA, April 1993.
6. Cooper R. Seeking a balanced physician workforce for the 21st century. JAMA 1994; 272(9):680-687.

- The assumption is made that specialist staffing patterns in managed care will not change from those projected in the year 2000. Implicit in this decision is the assumption that increasing demand for services resulting from an aging population and from new technology will be balanced by decreasing utilization of discretionary services.

5. The Weiner Managed Care Projections

Weiner uses methodologies similar to the BHPr's managed care analysis with somewhat different assumptions.[6] The Weiner managed care dominated systems model utilizes the following assumptions to estimate physician requirements for the year 2000:

- Two scenarios are presented: 1) 10% are in staff and group model HMOs and 30% in integrated networks such as IPAs, and 2) 15% of the population are in staff and group model HMOs and 40% in integrated networks.
- The entire population will have health insurance.
- Unadjusted HMO staffing levels are 120 physicians per 100,000 enrollees.
- HMO staffing ratios are increased 22% to adjust for changes in age, gender, and socioeconomic status of newly enrolled populations as well as out-of-plan use by HMO enrollees.
- Forty-five percent of physicians in HMOs are generalists.
- Physician requirements in IPAs are assumed to be 15% less than their staff and group counterparts because of reported higher productivity of IPA physicians.
- Staffing patterns for the fee-for-service sector are based on 1992 levels of United States supply.
- Staffing levels in managed fee-for-service are based on a 5% percent downward adjustment of the fee-for-service sector.
- Staffing requirements for nonmetropolitan areas are based on those of IPA networks.

Projected Physician Staffing Requirements

Physician requirements in the year 2000 and in the year 2020 derived from each of the five requirement models as well as the projected supply of generalists and specialists are shown in Table 2. Requirement ranges are shaded in the figures to demonstrate the uncertainty of the boundaries. The GMENAC and Weiner studies did not project requirements beyond the year 2000.

Generalist Requirements Projections

All models projecting generalist requirements early in the 21st century are in the same general range (Figure 3A). Consequently, COGME believes that the recommended range for generalist

physicians should be approximately 60-80 patient care generalist physicians per 100,000 population. As illustrated in Figure 3A, the projected supply lies in the lower portion of COGME's requirement band.

Specialist Requirements Projections

Projections of specialists requirements varied markedly (Figure 3B). The Cooper scenario as well as the BHPr's utilization-based fee-for-service scenario anticipate increasing demand for specialists as a result of changes in the composition of the population and the utilization of new technology. The BHPr's managed care scenario and the Weiner model project much lower requirements in the year 2000 as a result of greater reliance on generalists and less use of specialists inherent in cost-containing managed care systems. The GMENAC model, utilizing a totally different methodology, projects year 2000 specialist requirements only slightly higher than the Weiner and BHP managed care models.

COGME anticipates that increasing competition among delivery systems will reduce discretionary services and at least balance increased demand for specialists resulting from new technology.

Consequently, COGME concludes that specialist physician requirements in the early 21st century will be approximately 85-105 specialist physicians per 100,000 population. The projected supply of patient care specialist physicians, excluding residents, will be approximately 40% above the upper levels of this requirement range and about 54% above the requirement range if residents were included (Figure 3B).

Variables

Projecting physician requirements beyond the first decade of the 21st century is imprecise because of uncertainties about the configuration of the health care delivery system, the impact of increasing numbers of nurse practitioners and physician assistants upon physician utilization, and the changing demographics of the population. The assumptions of the Cooper model drive up requirements for specialists in 2020. On the other hand, in the BHPr managed care model, requirements for generalists modestly increased in 2020 based on assumptions of higher generalist utilization as a result of an increasing proportion of the population in managed care. COGME anticipates that increasing efficiencies in the delivery system will tend to limit increasing physician utilization. Consequently, recognizing the uncertainties, COGME has not increased the requirement bands for either generalists or specialists in the second decade of the 21st century.

Issues of geographic distribution must also be considered in establishing requirement bands. The COGME requirement bands were derived from studies that project physician staffing patterns in local systems of managed care to the nation as a whole. Consequently, these studies assume a uniform geographic distribution of physicians. In 1990, the ratio of active generalist physicians per 100,000 population in reality varied 2-fold and that of specialists varied 2.7-fold across the 50 states.[23] This degree of variation demonstrates the delivery system's great elasticity in absorbing additional physicians. As capitated systems of care increasingly dominate health care delivery, COGME anticipates that the ability to absorb additional physicians in oversupplied areas will be reduced. Consequently, some redistribution of physicians from areas of high physician density seems likely to occur. Nevertheless, it is not realistic to expect that physicians in the future will be distributed evenly. The ranges of requirements that the bands represent are intended to be broad enough to allow for geographic and other local variations on a national basis.

SCENARIOS FOR PROJECTING PATIENT CARE PHYSICIAN SUPPLY

In its Third and Fourth Reports, COGME proposed two major national goals for the total supply and specialty mix of new physicians entering the workforce. Given health care requirements, COGME recommended limiting the total number of entry residency positions to the number of allopathic (MD) and osteopathic (DO) medical school graduates in the United States plus 10% (USMG plus 10% or 110% of USMGs). COGME also recommended a redistribution of residency positions so that 50% of residents enter generalist careers.

Different scenarios were tested to assess the effect of varying numbers of filled first-year residency training positions and alternative mixes of generalists and specialists on the projected patient care physician supply (Figures 4A & B, 5A & B, and 6A & B). The scenarios presented assume that policies affecting the number and distribution of positions will begin in academic year 1997-98 and continue through 2020. Results are presented as physician-to-population ratios of patient care physicians, excluding resident physicians and academic physicians. The scenarios provide supply projections based on reducing the number of first-year residents from the current level of 140% of 1993 medical school graduates to 110% of 1993 graduates. They also show results of a sequential increase in the proportion of residency graduates entering generalist careers, from the current 30% to a high of 60%, and a reduction in the proportion of specialists, from a high of 70% to a low of 40%.

To model these events, total numbers of MD residents according to training specialty were projected for each year between 1997 and 2020 for each of the possible scenarios—four different specialty mixes and four different downsizing alternatives.

Specialty Mix

The scenario testing utilized a simplified form of the BHPr aggregate physician supply forecasting model. The supply of allopathic generalist physicians and specialists who graduated in 1986 or before was projected to the year 2020 using the BHPr's projection model. To these base numbers were added graduates from 1987 to 1997 who are assumed to maintain the same specialty distribution (29% generalists, 71% specialists) as the those who graduated before 1987. Graduates after 1997 were allocated according to these specialty and generalist scenarios. Among osteopathic physicians, the share of generalists, including those graduating after 1997, is assumed to remain at about 60%, consistent with their current specialty distribution. The 60% generalist assumption for osteopathic physicians was applied to all alternative specialty mix results.

In the alternative scenarios modifying the specialty mix of graduates, the percentage of DO graduates becoming generalists held steady at 60%. For example, in the 40% generalist physician scenario, 38.9% of new allopathic and 60% of osteopathic physicians are estimated to enter practice as generalists.

In calculating patient care physicians, resident physicians and those assumed to practice in nonpatient care activities are excluded. The percentage of allopathic physicians by specialty who are in patient care was calculated from data in the AMA Physician Characteristics and Distribution (PCD), 1993 edition.[10]

A higher proportion of generalist than specialist physicians enter patient care. Consequently, as the fraction of post-1997 graduates in generalist specialties increases, the fraction of physicians in patient care also increases (beginning in 2001 when the 1998 graduates begin to enter practice). The numbers of residents in a future year were subtracted from the projected total number of estimated MDs in that year and an adjustment was made for the fraction of total MDs in nonpatient care practice (7.4% based on figures in the 1993 PCD). The assumption was made that 4.2% of primary care MDs will be in nonpatient care practice based on the 1993 PCD. The share of osteopathic physicians in patient care is assumed to remain at 77.3% in all scenarios.

Resident Output

Four scenarios examined the impact of changing the size of the first-year residency from 140% to 110% of USMGs. The scenario assumed 15,942 MD and 1,911 DO medical school graduates in 1998. The total number of USMGs (17,853) was held constant over the 1998-2020 projection period. Applying the four scenarios generated the following findings:

USMG (%)	*Total First-Year Resident Positions*
140%	24,994
130%	23,209
120%	21,424
110%	19,638

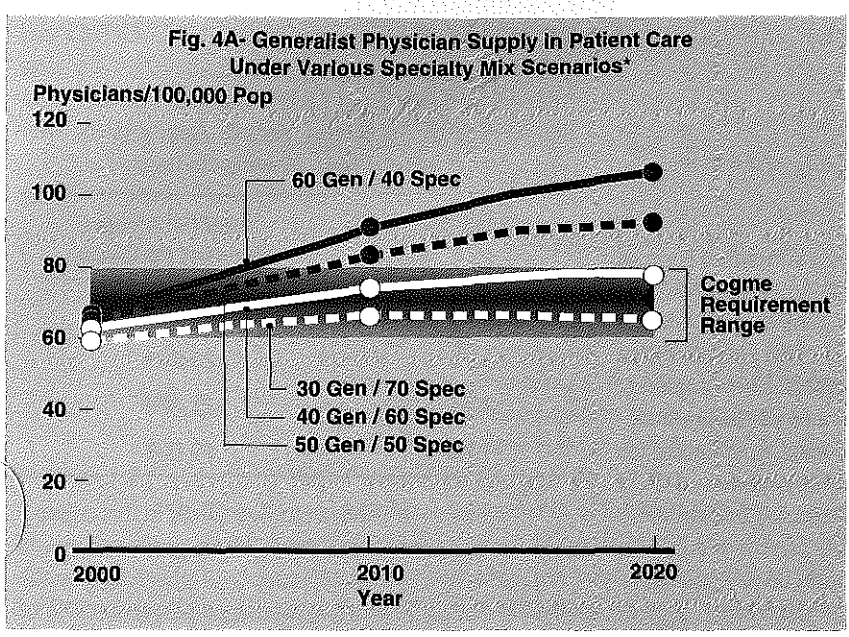
A portion of IMGs complete GME in this country and return to practice abroad. These graduates would not add to the permanent supply of physicians in the United States. In recent years, approximately 60% of IMGs in residency training have permanent resident status, or have become naturalized citizens, and are therefore expected to remain and practice in the United States. An additional 35% complete GME on exchange visitor visas. Exchange visitors are required to return home for a minimum of two years, except for a small (but growing) number who receive waivers. Past data suggest that one-third of exchange visitors ultimately return to the United States as permanent members of the physician work force. In all, 70 to 75% of IMGs in first-year residency positions are assumed ultimately to practice in the United States.[24]

COMPARING SUPPLY PROPOSALS

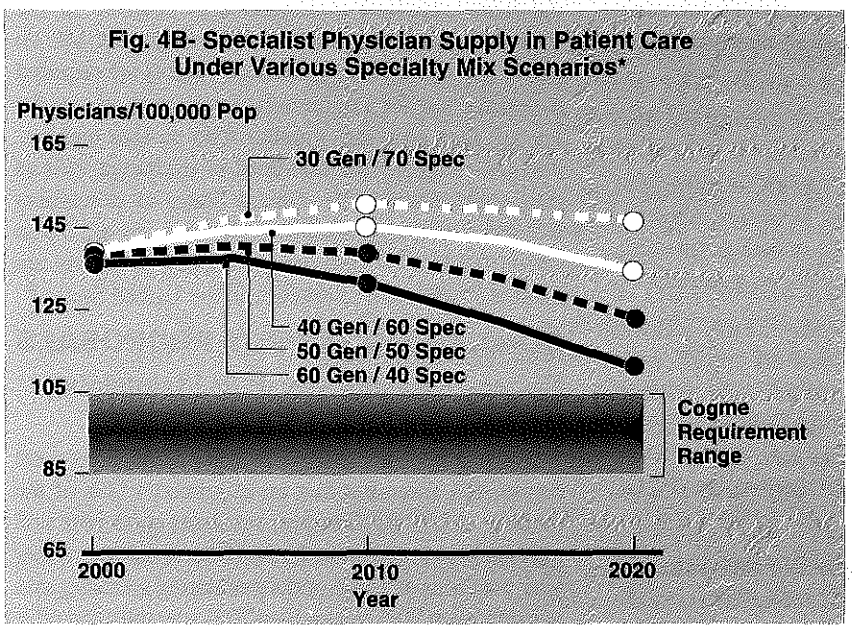
Varying Specialty Mix while Maintaining Current Resident Output

Generalist and specialist supply projections were formulated assuming that an estimated 132% of the number of USMG first-year residents each year will ultimately practice in the United States, based on first-year positions of 140% and a graduating specialty mix varying from 30% generalists/70% specialists to 60% generalists/40% specialists. If no change occurs (ie, 30% generalists/70% specialists), the generalist supply will remain below the midpoint of the requirement range for generalists throughout the period (Figure 4A). In the year 2000, an additional 20,000 generalists would be required to achieve the midpoint of the range. This figure would drop to 8,000 in 2010. Increases in the percentage of generalists to 50% or above without reduction in total numbers of residents would result in rapid increases in the generalist physician-to-population ratio, exceeding the requirement range by the year 2010.

In comparison, the specialist ratio well exceeds the upper limit of the requirement range under all scenarios (Figure 4B). Under the current mix of 70%



* Assuming current physician output at 140% of United States Medical Graduates.



* Assuming current physician output at 140% of United States Medical Graduates.

specialists, the number of specialists will exceed the requirement range by almost 100,000 in the year 2000 and by more than 140,000 in 2010. If no reduction in first-year residents occurs, only a reduction of specialists to 40% of current graduates would result in reductions approximating the specialist requirement range by 2020. Such a reduction in the proportion of specialists would result in a major surplus of generalists.

Impact of Varying Resident Output and Maintaining Current Specialty Mix

Projections of generalist and specialist supply in which resident output is varied from 140% to 110% of USMGs while maintaining the current specialty mix are modeled in Figures 5A & B. Although aggregate numbers of trainees are reduced, the overall generalist/specialist imbalance is modified only slightly. Generalist supply remains at the low end of the requirement range throughout the period (Figure 5A).

Conversely, specialist supply continues to remain well above the upper limit of the requirement range under all scenarios (Figure 5B). Surpluses above the requirement range would vary from about 120,000 to 140,000 in the year 2010.

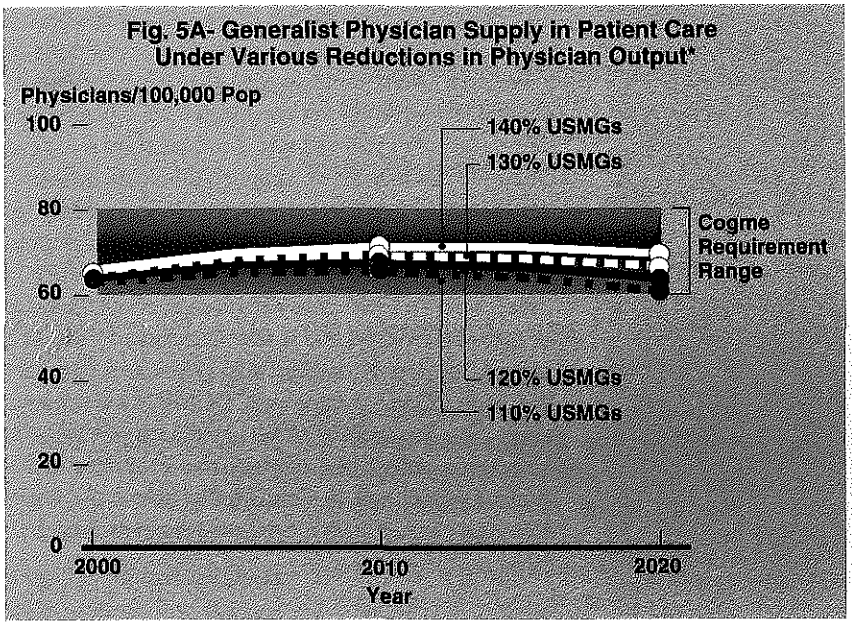
Impact of Implementing COGME's 110:50-50 Recommendation

Figures 6A & B provide a comparison of the various specialty mix alternatives when the supply of total residents is reduced to 110% of USMGs. As noted earlier, a reduction to 110% of USMGs in first-year positions without modification in the generalist/specialist mix provides only modest reductions in the specialist-to-population ratio while the ratio of generalist positions lies below the midpoint of the requirement range. If total number of residents is reduced to 110% of USMGs and the percentage of generalists is increased to 50%, the ratio of generalists-to-population will be 77 per 100,000—8,000 below the upper end of the requirement range in the year 2010 (see appendix Table 4). At the same time, the specialist ratio falls by 2010 to a level of 134—87,000 specialists above the range. Were the mix to increase to 60% generalists, the ratio of generalists-to-population would exceed the requirement range while that of specialists would drop within the requirement range by 2020.

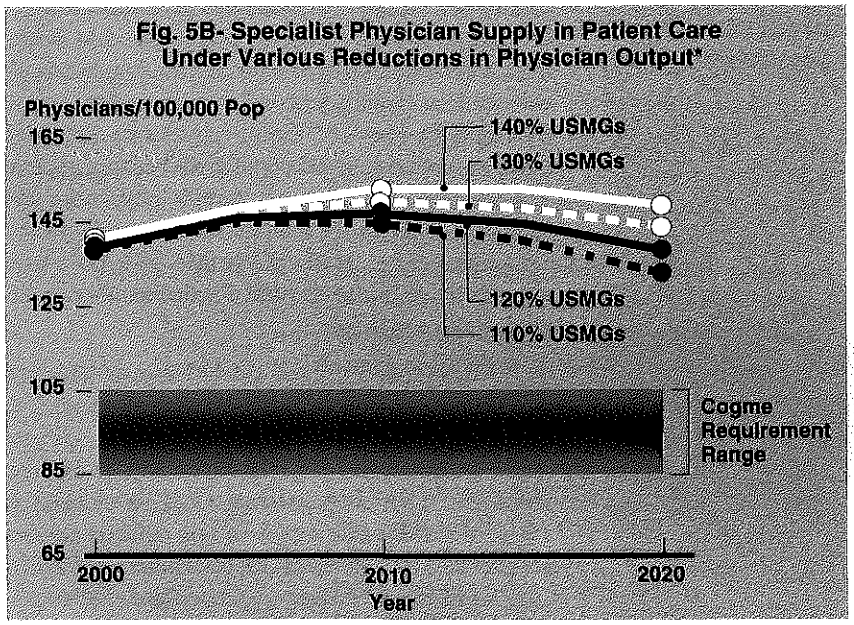
This model suggests that both a reduction in trainees to at least 110% of USMGs as well as an increase in proportion of generalists to 50% will best bring generalist and specialist population ratios toward the upper limits of their respective requirement ranges.

DISCUSSION

This report clearly demonstrates that remarkable increases have occurred both in the total physicians and in the physician-to-population ratio during the past 30 years. Furthermore, the physician-to-population ratio will continue to increase at least to the year 2010. These supply projections are conservative. They assume a continuation of current numbers of USMGS and IMGs entering GME annually. In 1994 numbers of IMG's entering GME had risen to 6,700. In addition, several new schools of osteopathy are in developmental stages and unprecedented demand by college graduates for medical education may be leading to major increases in enrollment of United States students in foreign medical schools.



* Assuming current specialty mix of 30% generalists and 70% specialists.



* Assuming current specialty mix of 30% generalists and 70% specialists.

Projections of patient care physician supply are further understated because resident physicians are not included in supply calculations. Were they included, their impact would primarily increase the delivery of specialty services. The entire effort of specialist residents is contributed to specialty care and, even in the generalist specialties, the majority of effort of residents is directed to delivery of specialty services inasmuch as specialty rotations predominate (Figure 2).

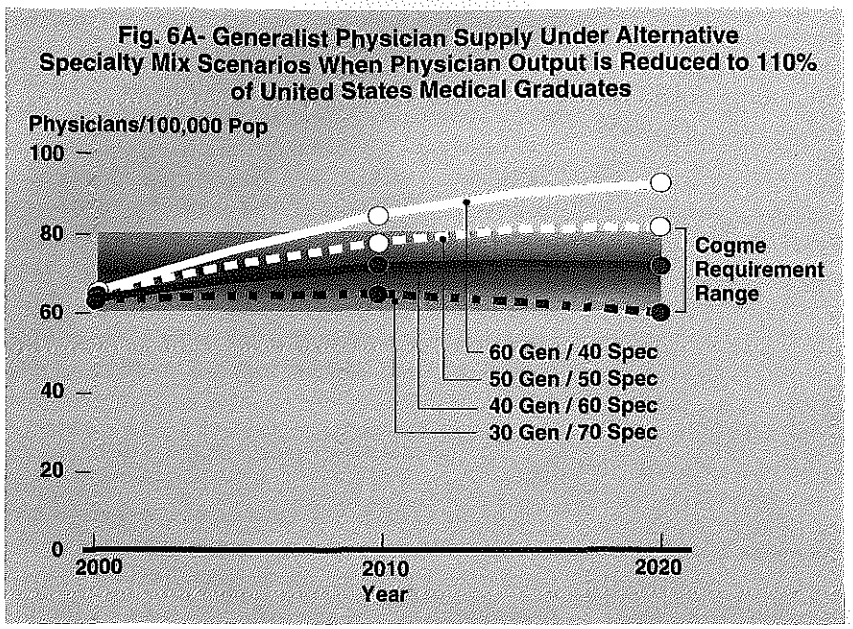
Physician supply is reported in numbers of patient care physicians working more than 20 hours per week, whereas physician requirements are stated in terms of full-time equivalent physicians. Some might perceive that these two measures are not equable. However, HRSA estimates that supply figures of patient care physicians as reported by the AMA are approximately equivalent to measurements of full-time equivalent physicians on the requirements side of the equation. These data demonstrate that active patient care physicians worked on average 58.9 hours per week in 1992.[10] This high number of hours suggests that most active physicians are working full-time. Further, many in the category of inactive physicians, who work less than 20 hours per week, provide patient care and are not included in these supply figures.

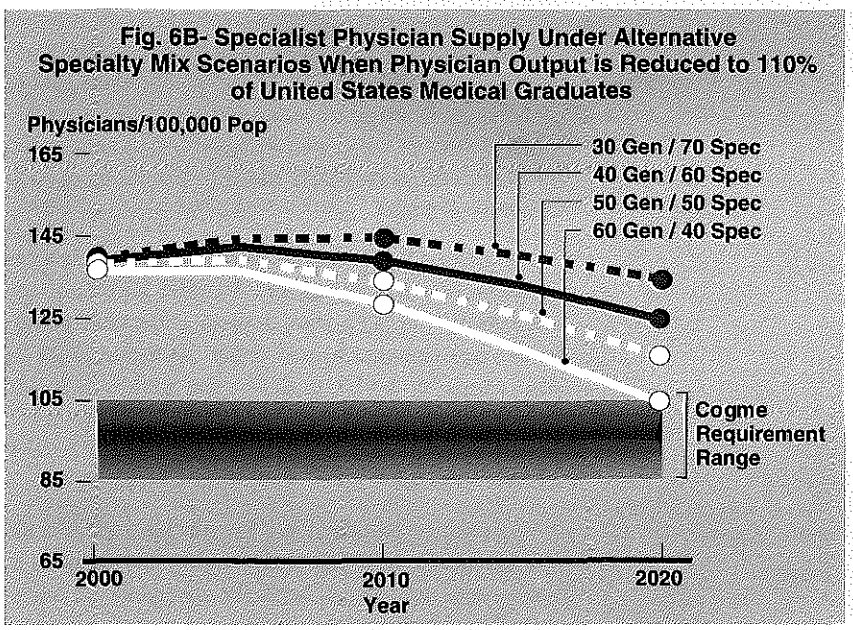
The physician-to-population ratio is highly sensitive to changes in population projections by the Bureau of the Census. For that reason, conclusions and recommendations regarding supply and requirements emphasize projections for the year 2010—a 15-year rather than a 25-year forecast—thus reducing the impact of changes in population projections on the physician-to-population ratio.

In this report the term requirements reflects anticipated utilization levels. These requirements should not be construed as absolute numbers necessary for quality care but rather should be viewed as anticipated levels of utilization based on the assumptions of each analysis or model.

Various methods for projecting physician requirements are described. Despite differing assumptions, all scenarios project generalist physician requirements in the years 2000 and 2020 in the range of 60-80 patient care generalists per 100,000 population. Projected supply will lie in the lower levels of that range if past patterns of specialty choice continue.

Projected requirements for specialist physicians varied significantly depending on key assumptions in the various scenarios. The BHPr managed care dominated model as well as the Weiner model anticipate that managed care will progressively reshape the overall health care delivery system and that competitive bidding will force economies in the overall delivery system. These economies will help maintain overall physician requirements at levels similar to those of today. Conversely, the earlier BHPr's fee-for-service dominated delivery model anticipated an increasing demand for specialists associated with increasing technology and patient demand for its utilization. Cooper, likewise, assumes that there will be a higher baseline requirement for specialists when the HMO experience is adjusted to national requirements and that new technology will increase overall specialist utilization in the next 30 years.





COGME recognizes that managed care is reshaping health care delivery and concludes that the assumptions in the BHPr managed care dominated model and in the Weiner model are most likely to prove correct. It also notes how similar these requirement projections are to those of the GMENAC needs-based model of 1980. **Consequently, COGME concludes that specialist requirements will be somewhere in the range of 85-105 specialists per 100,000 early in the next century.** Like the BHPr's managed care dominated scenario, COGME anticipates that increasing efficiencies in the delivery system will at least balance demand for utilization of new technology.

During the past quarter century, there has been a national consensus that the nation has a shortage of generalists. Now some suggest that current ratios of generalists to population are adequate in a health care delivery system increasingly dominated by managed care.[17,18,25] Evidence to support this conclusion is drawn from data on current generalist staffing of HMOs and on the recognition that the generalist physician-to-population ratio in the United States already exceeds that of the United Kingdom, is about the same as that of Germany, and is less than that of Canada.[23] Indeed, the supply of generalist physicians currently lies in the lower portion of COGME's requirement range. The lower level of 60 physicians per 100,000 population reflects the conservative estimates of the Weiner model and is significantly below the BHPr managed care and GMENAC requirements models.

If the 110:50/50 recommendation is implemented, the numbers of generalists will increase to the upper portions of the requirement range. These increases may facilitate dispersion of generalists to areas of need. However, COGME recognizes that incentives will be necessary to assist in meeting the physician staffing requirements of areas in greatest need. Increased numbers of family physicians are most likely to serve more rural populations because populations necessary to support family physicians are smaller than those for internal medicine and pediatrics. Historically, family physicians have been over twice as likely to choose rural practice as other generalists and specialists.

Federal training grants funded through Title VII of the Public Health Service Act have assisted in providing the educational infrastructure that has produced current levels of generalist supply. If the total number of physicians entering GME is reduced to 110% of USMG and if 50% of this reduced number are educated as generalists, the total number of generalist trainees will increase by one-third. An educational infrastructure is necessary to provide this increase. Furthermore, that educational infrastructure must recognize the changing educational needs imposed by a changing health care delivery system as well as the persistent problems of geographic distribution. **These requirements, both to expand and to enhance the quality of generalist education, make it essential that training grant support through Title VII be maintained and even expanded. Such support is particularly important for programs serving rural and inner-city areas, for at least a decade or until managed care efforts have clearly replaced these needs.**

Assuming past levels of generalist and specialist output, imbalances between supply and requirements will worsen with an increasing surplus of specialists

and little change in generalists. Neither reducing the number of first-year residents alone, nor increasing the proportion of generalists alone, will bring both generalist and specialist supply within COGME's requirement ranges. **The only scenario that will minimize the specialty surplus while maintaining generalist supply above the midpoint of the requirement range is a combination of both reducing the number of first-year residents from 140% of USMGs to 110% while increasing the proportion of generalists to at least 50% annually.**

Baseline projections of physician supply in the next century have assumed that numbers of first-year resident physicians will remain stable and that 70% will enter specialty practice, as has been the case in recent years. However, multiple factors may modify actual supply and specialty mix. A progressive surplus of specialists may induce more USMGs to select generalist careers. Such a scenario would progressively increase the generalist-to-population ratio and could produce a generalist surplus, as reflected in Figure 4A. At the same time, more IMGs will be recruited into unfilled specialty programs unless total positions are reduced.

Congress is considering various approaches to reducing the funding of GME. COGME recognizes that these reductions may have differing impacts on GME depending on approaches taken. Residents provide valued services. At the same time, hospitals receive direct and indirect reimbursement through Medicare for their training programs. **Across-the-board reductions in GME reimbursement may have only modest impact on GME because residents would still provide relatively inexpensive labor. Targeted reductions such as elimination of funding for training after initial board certification may markedly reduce subspecialty training but have little impact on total numbers of residents. Under such a scenario, reductions in fellowship positions would result in many more graduates of residencies in internal medicine and pediatrics entering generalist careers—potentially producing a generalist surplus. Alternatively, targeted reductions in the funding of GME for IMGs has significant potential for reducing total numbers of trainees while market forces increase the proportion entering generalist careers.**[4]

Recognizing the impending physician surplus, an argument can be made that the number of USMGs should be reduced. COGME has not yet considered alternative approaches of both reducing both USMGs and IMGs. Any reduction in students in the United States would need to be accompanied by reductions in total numbers entering residency positions; otherwise, unfilled positions would likely be filled by additional IMGs. The first step in reducing the physician surplus must be to reduce numbers entering GME. This is an appropriate issue for COGME and other policy bodies to consider carefully in the future.

Studies of physician supply and physician requirements are based on current data and what appear to be rational assumptions for future demand and utilization of physician services. These projections and assumptions may need to be altered in future analyses. The delivery system is in a state of dynamic change, as is the market for health professionals. Changing delivery systems may modify physician requirements. Modifications in the rate of population growth, changing prevalence of disease, technologic advances, changes in physician productivity, and increased roles for nurse practitioners and physician assistants—to mention only a few factors—may modify future projections. Consequently, continuing reanalysis and modification of projections and recommendations is essential in the years ahead. An especially important area for reconsideration is an assessment of the increasing role of nurse practitioners and physician assistants in the provision of generalist as well as specialist services. Projections are based on current staffing patterns of these providers in managed care. These programs are rapidly increasing in size and, because of the short duration of training, will have more rapid impact on the workforce than changes in medical education.

Data limitations in multiple areas handicap more precise definitions of supply and requirements. Information on physician staffing in managed care comes primarily from literature on staff and group model HMOs, (eg, Kaiser Permanente, Group Health Cooperative of Puget Sound). Today, the typical staff and group model HMO no longer dominates the managed care scene as network and IPA arrangements have proportionately increased. Unfortunately, little information is available concerning physician utilization in these systems. Even within staff and group model HMOs, reported staffing varies widely, as shown in Table 1. Such data typically are obtained through survey instruments. Incomplete information is available on out-of-plan use by enrollees as well as on contractual arrangements by HMOs with specialists practicing outside the HMO. Thus, specialty services currently utilized by HMO enrollees may be underestimated. Further, HMO enrollees may not be representative of the United States population in that they tend to be younger and perhaps healthier than the population at large. Consequently, adjustments must be made to staffing patterns in managed care plans to estimate national requirements. Such adjustments are imprecise.

The impact of an increasing proportion of women in the workforce also must be addressed. In 1993-94, 42% of allopathic medical students and 36% of osteopathic medical students were women. In 2010, 40% of all physicians will be women. Women currently appear to work approximately 5 fewer hours per week than their male counterparts and may practice approximately 1 less year. If women continue to show a preference for primary care specialties, the effective reduction in workforce will be disproportionately greater in the generalist disciplines. While women spend more time with individual patients and, consequently, see fewer patients, the impact of the pattern on productivity is unclear. Productivity in a system dominated by managed care may be better defined in terms of meeting the needs of a given population rather than in numbers of patient visits.[26]

The goal of this report has been to develop a reasonable framework for supply and requirement analyses under various policy scenarios and to weigh the appropriateness of each. Despite limitations of the data, it appears inescapable that the nation faces a significant surplus of specialists and is capable of absorbing many additional generalists. The suggested requirement ranges for optimal physician utilization in the early 21st century are 60-80 generalists and 85-105 specialists per 100,000 population. The supply of generalists falls in the lower portions of these ranges while that of specialists markedly exceeds these ranges.

In the setting of an overall physician surplus, the issue of accuracy of "requirement ranges" may be less relevant than identifying where the system has adequate elasticity to absorb additional physicians productively. At present, the system has the capacity to absorb many additional generalists whereas the capacity for gainful employment of additional specialists is declining.

Despite uncertainties noted in this report, current data overwhelmingly support a goal that total first-year residency positions be reduced to 110% of 1993 medical school graduates and that 50% of this reduced number enter practice as generalists. This goal requires fundamental changes in current patterns of GME, which should be rapidly implemented. If this goal is achieved, the nation's physician workforce will more closely match requirements early in the next century.

References

1. Council on Graduate Medical Education. *Third Report: Improving Access to Health Care through Physician Workforce Reform: Directions for the 21st Century.* Rockville, Maryland: DHHS, October 1992.

2. Council on Graduate Medical Education. *Fourth Report : Recommendations to Improve Access to Health Care through Physician Workforce Reform.* Rockville, Maryland: DHHS, January 1994.

3. Council on Graduate Medical Education. *Sixth Report: Managed Health Care: Implications for the Physician Workforce and Medical Education.* Rockville, Maryland: DHHS, June 1995.

4. Council on Graduate Medical Education. *Seventh Report: Physician Workforce Funding Recommendations for Department of Health and Human Services' Programs (1995).* Rockville, Maryland: DHHS, June 1995.

5. Rentmeester K, Kindig D. Physician supply by specialty in managed care organizations. Testimony before the Physician Payment Review Commission, December 9, 1993.

6. Weiner JP. Forecasting the effects of health reform on US physician workforce requirement: evidence from HMO staffing. *JAMA* 1994;272(3):222-230.

7. Gamliel S, Politzer RM, Rivo ML, Mullan F. Managed care on the march: will the physician workforce meet the challenge? *Health Affairs* 1995;14(2):131-42.

8. Traxler H. Physician supply modelling in the United States of America and its uses in assisting policy making. *World Health Statistics* Quarterly 1994;47(3/4):118-125.

9. Grumbach K, Becker SH, Osborn EHS, Bindman AB. The challenge of defining and counting generalist physicians: an analysis of Physician Masterfile data. *Am J Public Health* 1995; 85(10):1402-07.

10. American Medical Association. *Physician Characteristics and Distribution in the US.* Chicago: American Medical Association, 1993.

11. American Osteopathic Association. Special communication, June 1995.

12. Kindig DA. Counting generalist physicians. *JAMA* 1994;271(19):1505-07.

13. Association of American Medical Colleges. Graduate medical education tracking census, Student Application Information Management System data base. Washington, DC: AAMC, 1995.

14. Kahn NB Jr, Schmittling GT, Graham R. Entry of US medical school graduates into family practice residencies: 1994-1995 and three year summary. *Fam Med* 1995;27(8):492-500.

15. McNutt DR. GMENAC: Its manpower forecasting framework. *Am J Public Health* 1981;1116-24.

16. GMENAC Staff Papers. No. 3: Physician requirements forecasting: needs-based versus demand-based methodologies. Hyattsville, MD: Bureau of Health Manpower, March 1978. DHEW Pub. No. (HRA) 78-12, 1978.

17. Greenberg L, Cultice J. *The Bureau of Health Professions Physicians Requirements Model.* Rockville, MD: Bureau of Health Professions, February 1995.

18. Cooper RA. Seeking a balanced physician workforce for the 21st century. *JAMA* 1994; 272(9):680-87.

19. Cooper RA. Perspectives on the physician workforce to the year 2020. *JAMA* 1995; 15;274(19):1534-43.

20. Miller RH, Luft HS. Estimating health expenditure growth under managed competition: science, simulations, and scenarios. *JAMA* 1995;273(8):656-62.

21. Enthoven A. Competition of alternative delivery systems. In: Greenberg W (ed). Competition in the health sector: past, present and future. Germantown, MD: Aspen Systems Corporation, 1978.

22. Wholey D. The effect of market structure on HMO financial performance. Final Report. Rockville, MD: Health Care Financing Administration (Contract No. 17-C-90055/3-02), April 1995.

23. Libby DL. Data analysis by Wisconsin Network for Health Policy Research. Personal communication, December, 1995.

24. Mullan F, Politzer RM, Davis CH. Medical migration and the physician workforce: international medical graduates and American medicine. *JAMA* 1995; 273(19):1521-27.

25. Whitcomb ME. A cross-national comparison of generalist physician workforce data: evidence for US supply adequacy. *JAMA* 1995;274(9):692-5.

26. Council on Graduate Medical Education. *Fifth Report: Women and Medicine: Physician Education in Women's Health and Women in the Physician Workforce*. Rockville, Maryland: DHHS July 1995.

APPENDICES

TABLE 3— Requirement Bands for Projected Numbers of Generalists and Specialists: Current First Year Residency PGY1 Scenario of 140% of USMGs and Alternative Specialty Output Mix

Year/ Scenario	*Physicians*	*Requirement Bands Lower Bound*	*Upper Bound*	*Supply - Requirement Upper Bound Surplus/Shortage (-)*
GENERALISTS				
2000				
30/70	176705	168440	224586	-47881
40/60	179007	168440	224586	-45579
50/50	181308	168440	224586	-43278
2005				
30/70	191790	175370	233827	-42037
40/60	205073	175370	233827	-28754
50/50	218354	175370	233827	-15473
2010				
30/70	205508	183211	244281	-38773
40/60	229602	183211	244281	-14679
50/50	253695	183211	244281	9414
2015				
30/70	214824	190946	254594	-39770
40/60	249317	190946	254594	-5277
50/50	283810	190946	254594	29216
2020				
30/70	218159	198737	264982	-46823
40/60	262313	198737	264982	-2669
50/50	306465	198737	264982	41483
SPECIALISTS				
2000				
30/70	394102	238623	294770	99332
40/60	391800	238623	294770	97030
50/50	389499	238623	294770	94729
2005				
30/70	432814	248441	306898	125916
40/60	423967	248441	306898	117069
50/50	415121	248441	306898	108223
2010				
30/70	462910	259548	320619	142291
40/60	443253	259548	320619	122634
50/50	423597	259548	320619	102978
2015				
30/70	482299	270507	334155	148144
40/60	452244	270507	334155	118089
50/50	422188	270507	334155	88033
2020				
30/70	490082	281544	347789	142293
40/60	450366	281544	347789	102577
50/50	410650	281544	347789	62861

TABLE 4- Requirement Bands for Projected Numbers of Generalists and Specialists: Current Specialty Output of 30% Generalists & 70% Specialists and Alternative First Year Residency PGY1 Scenarios

Year/ Scenario	*Physicians*	*Requirement Bands Lower Bound*	*Upper Bound*	*Supply - Requirement Upper Bound Surplus/Shortage (-)*
GENERALISTS				
2000				
110% PGY1	180010	68440	224586	-44576
120% PGY1	178904	168440	224586	-45682
130% PGY1	177803	168440	224586	-46783
140% PGY1	176705	168440	224586	-47881
2005				
110% PGY1	189095	175370	233827	-44732
120% PGY1	189994	175370	233827	-43833
130% PGY1	190892	175370	233827	-42935
140% PGY1	191790	175370	233827	-42037
2010				
110% PGY1	196893	183211	244281	-47388
120% PGY1	199769	183211	244281	-44512
130% PGY1	202638	183211	244281	-41643
140% PGY1	205508	183211	244281	-38773
2015				
110% PGY1	200517	190946	254594	-54077
120% PGY1	205294	190946	254594	-49300
130% PGY1	210060	190946	254594	-44534
140% PGY1	214824	190946	254594	-39770
2020				
110% PGY1	198562	198737	264982	-66420
120% PGY1	205106	198737	264982	-59876
130% PGY1	211634	198737	264982	-53348
140% PGY1	218159	198737	264982	-46823
SPECIALISTS				
2000				
110% PGY1	391012	238623	294770	96242
120% PGY1	392045	238623	294770	97275
130% PGY1	393074	238623	294770	98304
140% PGY1	394102	238623	294770	99332
2005				
110% PGY1	423062	248441	306898	116164
120% PGY1	426313	248441	306898	119415
130% PGY1	429560	248441	306898	122662
140% PGY1	432814	248441	306898	125916
2010				
110% PGY1	440197	259548	320619	119578
120% PGY1	447766	259548	320619	127147
130% PGY1	455331	259548	320619	134712
140% PGY1	462910	259548	320619	142291
2015				
110% PGY1	447118	270507	334155	112963
120% PGY1	458839	270507	334155	124684
130% PGY1	470560	270507	334155	136405
140% PGY1	482299	270507	334155	148144
2020				
110% PGY1	443316	281544	347789	95527
120% PGY1	458897	281544	347789	111108
130% PGY1	474478	281544	347789	126689
140% PGY1	490082	281544	347789	142293

TABLE 5- Requirement Bands for Projected Numbers of Generalists and Specialists: First Year Residency PGY1 Scenario of 110% of USMGs and Alternative Specialty Output Mix

Year/ Scenario	*Physicians*	*Requirement Bands Lower Bound*	*Upper Bound*	*Generalist Supply - Requirement Upper Bound Surplus/Shortage (-)*
GENERALISTS				
2000				
30/70	180010	168440	224586	-44576
40/60	181724	168440	224586	-42862
50/50	183440	168440	224586	-41146
2005				
30/70	189095	175370	233827	-44732
40/60	199830	175370	233827	-33997
50/50	210564	175370	233827	-23263
2010				
30/70	196893	183211	244281	-47388
40/60	216507	183211	244281	-27774
50/50	236120	183211	244281	-8161
2015				
30/70	200517	190946	254594	-54077
40/60	228671	190946	254594	-25923
50/50	256824	190946	254594	2230
2020				
30/70	198562	198737	264982	-66420
40/60	234650	198737	264982	-30332
50/50	270737	198737	264982	5755
SPECIALISTS				
2000				
30/70	391012	238623	294770	96242
40/60	389298	238623	294770	94528
50/50	387582	238623	294770	92812
2005				
30/70	423062	248441	306898	116164
40/60	415812	248441	306898	108914
50/50	408564	248441	306898	101666
2010				
30/70	440197	259548	320619	119578
40/60	424069	259548	320619	103450
50/50	407943	259548	320619	87324
2015				
30/70	447118	270507	334155	112963
40/60	422449	270507	334155	88294
50/50	397783	270507	334155	63628
2020				
30/70	443316	281544	347789	95527
40/60	410714	281544	347789	62925
50/50	378114	281544	347789	30325

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