BUREAU OF HEALTH PROFESSIONS

# ASSESSING PHYSICIAN SPECIALTY IMBALANCES: BACKGROUND AND SHORT-TERM OPTIONS FOR THE COUNCIL ON GRADUATE MEDICAL EDUCATION


HEALTH RESOURCES
AND SERVICES ADMINISTRATION

# ASSESSING PHYSICIAN SPECIALTY IMBALANCES: BACKGROUND AND SHORT-TERM OPTIONS FOR THE COUNCIL ON GRADUATE MEDICAL EDUCATION

Discussion Paper

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By

Louis P. Garrison, Jr.
Peter J. Neumann
Julie A. Schoenman

Project HOPE
Center for Health Affairs
Two Wisconsin Circle, Suite 500
Chevy Chase, Maryland 20815

## PREFACE

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## EXECUTIVE SUMMARY

### PURPOSE

The Council on Graduate Medical Education (COGME) is charged with examining "current and future shortages or excesses of physicians in medical and surgical specialties and subspecialties." This discussion paper has been prepared for COGME's Subcommittee on Physician Manpower. The two major objectives are to:

1) Provide background on recent, ongoing, and planned studies that assess physician specialty imbalances, and

2) Present COGME with short-term options for addressing questions concerning this issue.

Although COGME has been established for a ten-year period, its first report is due July, 1988. The Subcommittee on Physician Manpower must make recommendations on what can reasonably be accomplished in time for the immediate report as well as what should be the long-term approach to assessing specialty imbalances. The focus of this paper is on the former objective, though the implications for COGME's long-term plans are also discussed.

### BASIC CONCEPTUAL APPROACHES

In Section 2 a distinction is drawn between two basic approaches to assessing specialty imbalances: 1) comparison of requirements and supply and 2) examination of market signals. In addition, there is also an important distinction among approaches falling into the first area--whether requirements are demand-based or needs-based. Comparisons of requirements and supply examine quantities: the number of physicians required at a point in time, as determined by either demand or need, compared to the number available--the supply. The second approach examines market signals, such as physician incomes and prices, and asks whether the market is indicating, through relative income levels

or changes in income levels, that more or fewer physicians are desired.

The comparison of requirements and supply has been the more popular approach. The two approaches to estimating requirements are best exemplified by the efforts of the Graduate Medical Education National Advisory Committee (GMENAC)--a needs-based approach--and the ongoing demand-based forecasting model of the Bureau of Health Professions (BHPr). Both models also have associated supply projections; however, these are essentially independent of the requirements projections. Economists have a long history of studying physician incomes and calculating rates of return to educational investments as indicators of whether there is a long-term shortage or surplus of physicians. But such calculations require a large amount of data, and have generally not been applied with regard to the status of particular specialties.

**PREVIOUS ASSESSMENTS**

Section 3 of the paper describes approaches which have been employed in the past to assess physician imbalances. The most comprehensive demand-based requirements model--developed and maintained by the Bureau of Health Professions--is discussed in Section 3.2 along with the BHPr methodology for projecting future supply. The general weakness of demand-based requirements estimates is that there is little explicit consideration of the level of care which "ought to be" provided. Instead, past trends in utilization are projected into the future with the implicit assumption that these utilization patterns are the ones which should be perpetuated. The BHPr supply model also employs a sophisticated extrapolation of past trends in factors influencing physician supply. Although the components of these models are updated periodically, the use of the past to predict the future may not be accurate if markets are changing over time.

Of major importance for COGME is the fact that the BHPr requirements model is not currently able to project requirements on a detailed specialty level. In addition, BHPr staff have some reservations about the feasibility of expanding the model to encompass such detail. Another essentially demand-based approach for estimating requirements is the use of standards derived from studies of staffing patterns in closed health care systems such as HMOs. Although the data requirements for the approach are modest, the implied physician-to-population ratios are difficult to interpret because they apply to unique populations.

Needs-based approaches to estimating requirements are illustrated by the GMENAC effort, which is discussed in Section 3.3. The conceptual weakness of a pure needs-based approach is that there is no consideration of the ability and willingness of consumers to pay for the medical care that they need. As an "adjusted" needs-based approach, GMENAC attempted to overcome this shortcoming by considering the realities of the market. Still, there is no assurance that the "needed" number of physicians would be demanded. In contrast to the BHPr model, GMENAC did project imbalances on a detailed specialty level.

GMENAC represents a substantial, one-time effort while BHPr is ongoing. Both models have large data requirements but, since both are empirical approaches, it would be feasible to adjust certain model parameters so as to derive alternative estimates of physician requirements and supply. Both models predict a surplus in the aggregate number of physicians, with the GMENAC projections being much larger. Supply estimates of both models are similar but GMENAC projects much lower requirements estimates.

Section 3.4 discusses studies which have relied upon market signals such as relative income levels or rates of return to medical education as indicators of physician imbalances. These

studies have found that many specialties have quite high returns to specialization, indicating a shortage in these fields. In general, the fact that real net physician income has remained relatively constant over time (perhaps declining slightly in recent years) has been interpreted by some analysts to mean that there is not a surplus of physicians. Findings such as these are in contrast to those of both GMENAC and BHPr.

In summary, the methods that have been used to assess imbalances do not provide a consensus. In addition, even if there were consensus concerning supply and demand at the national level, the conclusions might be radically different for alternative definitions of market areas such as nonmetropolitan areas.

**ONGOING AND PLANNED STUDIES**

Section 4 presents ongoing and proposed studies which are being undertaken by the American Medical Association (AMA), the Council of Medical Specialty Societies (CMSS), and the Association of American Medical Colleges (AAMC). The AMA is currently developing a series of econometric models which, when completed, will be able to project both supply and demand for physician services. These models will use data from the AMA Physician Masterfile and the Socioeconomic Monitoring System and will consider 13 categories of specialties. Preliminary supply projections have just been made available but the entire modeling effort is not scheduled for completion until June 1989.

The CMSS is currently attempting to design a consistently-defined minimum data base for the physician manpower data of its member societies. This organization is also using a matrix format by which to solicit projections of supply to the year 2010 from each of its specialty societies. CMSS is making this information available to COGME. In addition to the organized efforts of CMSS, a number of specialty societies have undertaken

their own assessments of their manpower situation. The studies performed as of 1985 have been summarized in previous works in this area (BHPr, 1986). COGME has requested that CMSS solicit information from its members about recent, ongoing, or planned studies which they are conducting concerning specialty imbalances. This information will be made available to COGME in early June 1987.

The AAMC began collecting data on medical students in 1983, and these data are currently being readied for use. They also collect data on the graduate medical education process, and these provide an excellent source of data for modeling specialty choice. The AAMC's Task Force on Physician Manpower expects to decide by November 1987 what (if any) modeling efforts it will undertake in the future.

The final subsection of Section 4 considers issues of data adequacy. Included there is a discussion of the relative merits of AMA versus specialty society data for estimating existing supplies of physicians and availability of physicians' services. Data limitations for requirements estimates include the estimation of physician productivity, utilization by specialty, and the issue of substitution between particular specialties in the provision of certain services. Finally, the limitations of physician-to-population ratios as indicators of the amount of "available services" to "needed services" are explored.

**COGME'S SHORT-TERM OPTIONS FOR ASSESSING IMBALANCES**

The major question addressed here is: in the time available for analysis in preparing the first COGME report, what approach or approaches are likely to be of most use in assessing specialty imbalances? Obviously, the time constraint in and of itself places a severe limitation on the amount of new or quantitative modeling and estimation that can be undertaken. In any case, it

would be technically difficult to construct any new models and gather data for analysis in such a short period. Nonetheless, there are some options building upon work of others that may help COGME in the short-term.

The options vary along two dimensions and can be arrayed as shown in Figure 1. The first dimension is level of specificity: will the analysis examine all physicians, primary vs. non-primary physicians, a more detailed breakdown of specialties, or selected specialties? The second dimension is concerned with the amount of qualitative and quantitative content and manipulation of data that would be required. The six options listed in the figure are not necessarily mutually exclusive.

The level of specificity has a major impact on what is feasible in the short run. Finer specialty breakdowns will require much more effort to develop and analyze. A major factor in choosing the level of specialty chosen is the specific policy questions that COGME wishes to address in its first report.

Briefly, the six basic alternative approaches are:

1. Survey professional opinion.
2. Synthesize information from market signals and indicators.
3. Use BHPr's requirements projections (not possible on a specialty level).
4. Modify GMENAC requirements estimates.
5. Compare specialty-to-population ratios from HMOs or other closed populations with supply.
6. Analyze geographic variability in specialty-to-population ratios.

FIGURE 1

ARRAY OF SHORT-TERM OPTIONS

| | MORE QUALITATIVE ← | | | | | → MORE QUANTITATIVE |
|---|---|---|---|---|---|---|
| | 1. | 2. | 3. | | | 4. |
| LEVEL OF SPECIFICITY | SURVEY PROFESSIONAL ~~OPINION~~ societies | SYNTHESIZE MARKET SIGNALS | USE BHPr MODEL | MODIFY GMENAC MODEL | USE HMO STANDARD | ANALYZE GEOGRAPHIC VARIABILITY |
| ALL PHYSICIANS | | | | | | |
| PRIMARY VS. NON-PRIMARY | ✓ | ✓ | ✓ | X | X | → |
| DETAILED SPECIALTIES | | | X | | | |
| SELECTED SPECIALTIES | | | X | | | |

Snapshot of where we are ~ GMENAC

A.R.F. — Update What Is Known

NCHS
NCHSR
Intramural

RAND
difference

In this summary, we outline each of these options and list the advantages and disadvantages. Section 5 provides discussion of each.

## 1. Survey Professional Opinion

Approach: Use qualitative professional opinion to make judgments about requirements.

Method: Design short qualitative questionnaire to send to specialty societies or other experts to solicit their opinions about requirements and imbalances, especially regarding GMENAC. Alternatively, small panels of experts could be convened to provide their opinion or to review the results provided by the specialty societies.

Advantages:

- Allows experts to make and explain judgments about these complex issues.
- Allows detailed specialty consideration.
- Well-designed questions would help to focus COGME's attention.

Disadvantages:

- Is not directly quantitative.
- May not achieve a consensus.
- Panelists may not have a good perspective on physician imbalances.

## 2. Synthesize Information from Market Signals and Indicators

Approach: Use latest information from the market to gain a qualitative impression about how the requirements compare with supply.

Method: Gather and collate information by specialty on relative incomes, recent growth in supply, rate of return to education, and the demand and supply of residencies.

Advantages:

- Provides good information on the current market situation.
- Allows some degree of specialty breakdown.

Disadvantages:

- Based on existing reimbursement arrangements and subsidies which are undergoing rapid change. May not be representative of the future or what is socially desirable.
- May be too uncertain to support any strong recommendations about specific specialties.

### 3. Use BHPr's Requirements Projections

Approach: Compare existing BHPr demand-based requirements projections with supply. Do not attempt a finer specialty breakdown.

Method: Have BHPr produce the most up-to-date version of the projections. Use for addressing aggregate supply question and policy issues about primary vs. nonprimary imbalance.

Advantages:

- Builds upon the most comprehensive demand-based model and estimates ever constructed.
- Could be completed in short-term.
- Allows some questions about primary vs. nonprimary imbalances to be addressed.
- Is currently operational and could be used to examine alternative assumptions.

Disadvantages:

- Does not allow detailed or accurate specialty breakdown.
- Does not address concerns about accuracy of underlying data.

4. **Modify GMENAC Requirements Estimates**

Approach: For each of the specialties considered by GMENAC, identify major parameters that may have changed (such as productivity or new procedures) and calculate implications for requirements.

Method: Suggested adjustments to model parameters could be made by 2 or 3 experts in each specialty who would have to review GMENAC's detailed report. Calculations could be made by COGME staff. It would also be possible to work with a more qualitative method: the experts could be asked to draw a qualitative conclusion about the net change in requirements as a result of the adjustments.

Advantages:

- Builds upon the most comprehensive needs-based model and estimates ever constructed.
- Allows detailed specialty breakdown as well as primary vs. nonprimary care formulation.

Disadvantages:

- Does not address fundamental criticisms of GMENAC approach, such as the lack of a geographic dimension, the sensitivity of the results to a few parameters, and potential panel bias.
- Since most specialties were previously projected to be in or near oversupply, adjustments are likely to only make this greater.

5. **Use Specialty-to-Population Rations from HMOs or Other Closed Populations**

Approach: Compare latest information from HMOs or other closed populations on specialty-to-population ratios with national supply.

Method: Obtain information from closed populations about the numbers of specialists providing care to their population.

Advantages:

- Provides some sense of minimal requirements.

- Allows detailed specialty breakdown.

Disadvantages:

- May not be representative of U.S. population.
- May not be adequate standard of care.
- May not provide a reliable benchmark because of variability.

6. **Analyze Geographic Variability in Specialty-to-Population Ratios**

Approach: Update work done by GMENAC's geographic panel. Report on variability in specialist-to-population ratios and procedures across geographic areas to give sense of what market is indicating about requirements.

Method: Use Area Resource File (government database with county-level physician supply) to calculate these ratios for different definitions of market area.

Advantages:

- Would provide a sense of access problems.
- Gives sense of the likely reliability of national requirements estimates.
- Allows detailed specialty breakdown.
- Presents the latest information.
- Can address primary vs. nonprimary care issue.

Disadvantages:

- Only a crude indicator of demand-based requirements.
- Not clear if will support specialty-specific recommendations.
- Would be difficult to adjust adequately for population characteristics and other area-specific factors.

## POLICY QUESTIONS AND IMPLICATIONS FOR MODELING

Finally, Section 6 of the paper discusses implications of short and long-term options and addresses broader policy issues of concern to the Council. While, in the limited time available, it would be difficult for COGME to undertake any substantial modeling, it seems feasible for the Council to engage in more qualitative analyses and in data manipulation on a more modest scale. A prudent approach in both the short and long run would be to rely upon a combination of method and data sources. One feasible and potentially productive short-run option would be a systematic, targeted survey of specialty societies and other experts.

Section 6 also highlights some of the broader issues that COGME faces in formulating its research agenda regarding physician manpower studies. It will be important to consider policy options likely to be considered by the Council and by Congress. If, for example, the future agenda is likely to consider questions about whether shortages of primary care physicians still exist in some regions, it will be important to collect data on that level (both in terms of geographic and specialty breakdown).

Finally, the section considers the implications of over- and undersupplies of physicians. Some have argued that the potential costs to society of an undersupply of physicians are much greater than the costs of an oversupply. Given the considerable uncertainty about whether imbalances actually exist or lie ahead, it is important to consider the future consequences to society of the risks associated with alternative physician manpower policies.

# SECTION 1
# INTRODUCTION

## 1.1 PURPOSE

One important portion of the charge of the Council on Graduate Medical Education (COGME) is to examine "current and future shortages or excesses of physicians in medical and surgical specialties and subspecialties". To aid in the accomplishment of this task, this paper provides COGME's Subcommittee on Physician Manpower with:

1) background on recent, ongoing, and planned studies assessing physician specialty imbalances, and

2) an analysis of short-term options for addressing questions concerning this issue.

COGME must produce its first report by July, 1988. However, the Council has been established for a ten-year period, and thus has the time to develop and implement long-term analytical projects. It is important that the first report address, as far as is possible, immediate policy issues as well as establish a sound basis for the long-term activities of the Council. This paper aims to assist COGME in meeting this short-term goal by providing background and options with regard to assessing specialty imbalances.

During the March 1987 plenary meeting of COGME, the Subcommittee on Physician Manpower heard several reports on various models and studies used to generate estimates of physician requirements and supply as a means to assessing physician manpower imbalances. In light of these presentations the Subcommittee recommended that a background paper be commissioned to identify and describe past, current, and planned studies of specialty imbalances so as to synthesize current knowledge in this area. The paper was intended to serve as a technical yet operational piece to assist the Council in determining its approach to

specialty assessments in a timely fashion. As such, the paper would provide the Council with a starting point in the June sessions for developing the Council's approach to specialty assessment for its first report to the Secretary of the Department of Health and Human Services and to Congress.

Two general comments are in order at the outset. First, there are no simple or obvious answers to the policy questions that COGME is charged with addressing. In making judgments and recommendations it will be necessary to synthesize a complex set of information of varying character and quality. Second, this paper has a narrow focus, examining only a small piece of the puzzle. The question here is: in the brief time available for short-term analyses (i.e., approximately three months in order for the Subcommittee to advance its recommendations to the full Council by this fall), what approach or approaches are likely to be of most use in assessing specialty imbalances?

### 1.2 ORGANIZATION OF THE PAPER

Section 2 presents a discussion of some basic conceptual distinctions and some useful definitions. Section 3 describes previous attempts to assess imbalances, outlining their methods, data requirements, results, and limitations. Section 4 summarizes the status of ongoing and planned activities by other organizations and addresses the general issue of data adequacy. Section 5 outlines a number of options available to COGME for the short-term, while Section 6 considers longer-term options as well as some fundamental questions which might help COGME determine the most appropriate option(s) to undertake.

## SECTION 2

## DEFINITIONS AND FUNDAMENTAL APPROACHES TO ASSESSING SPECIALTY IMBALANCES

### 2.1 INTRODUCTION

Before examining previous approaches to assessing specialty imbalances, it is useful to provide a broad overview on some of the concepts and distinctions used in this paper. This section presents a conceptual overview on three dimensions:

1) Defining terminology used in assessing specialty manpower imbalances.
2) Discussing three broadly-defined approaches used in assessing specialty imbalances:
   - o Needs-based approaches to requirements estimation.
   - o Demand-based approaches to requirements estimation.
   - o Market-signals approaches.
3) Noting the importance of considering the geographic distribution of specialists.

Section 2.2 presents a review of terminology which highlights some important technical aspects of economic terms, especially the differences between demand and need. The discussion in Section 2.3 makes the point that, although there are numerous ways to classify approaches, a fundamental distinction can be drawn among approaches that focus on the need for physicians, those that focus on the demand for physicians, and those that are based on market signals, such as physician incomes and the prices of physician services. Section 2.4 underscores the importance of addressing the issue of geographic distribution under any approach to assessing imbalances.

It is important to note that these issues are complex and require concepts that are somewhat technical at times. It is also important to emphasize there are many ways in which to

classify approaches to physician manpower studies. Three ways are presented in Section 2.3 for clarity and organizational purposes. However, there is a good deal of overlap among the several approaches.

## 2.2 DEFINITIONS

Before discussing the various approaches to assessing specialty imbalances, it is useful to define some terminology that underlies some important conceptual distinctions. Debate on this topic often becomes muddled because discussants are not using the same terms or not defining their terms in the same way. Following general usage among health services researchers, we briefly review the following terms: supply, demand, equilibrium, surplus, shortage, need, requirements, oversupply, undersupply, and imbalance. The first five terms are economic terms that have specific technical meaning to economists. The last five terms are general terms whose meaning is less precise and less well-accepted. We discuss the economic terms first in order to provide a frame of reference.

### 2.2.1 Basic Economic Terminology

**Supply** - The schedule that reflects the amount that the sellers of a good or service are willing to supply at different price levels.

It is important to note that the **supply of physicians** differs from the **supply of physician services.** The supply of physicians refers to the number of physicians in a market area, usually at a given time. The supply of their services is the amount of service they would be willing to provide at varying price levels. When most analysts mention "physician supply" they explicitly mean the number of physicians, though they are usually assuming a more or less fixed relationship to the total services available.

**Demand** - The schedule that reflects the amount that the buyers of a good or service are willing to buy at different price levels.

Demand and supply are economic concepts that provide the basis for judging whether markets are in **equilibrium** or **disequilibrium.** Markets are in equilibrium if the amount that buyers are willing to buy at the prevailing price is equal to the amount that suppliers are willing to supply at that price. Markets that are in disequilibrium can exhibit either a **surplus** or a **shortage.** In a surplus, the quantity supplied exceeds the quantity demanded at the prevailing price. In a shortage, the quantity demanded exceeds the quantity supplied at the prevailing price. A disequilibrium can create pressure for prices to change and for demanders and suppliers to alter the amounts demanded or supplied. With regard to physician markets, the short-term is considered the period in which the number of physicians is more or less fixed.

In medical manpower markets it is also useful to draw a distinction between a **short-term** and **long-term surplus** or **shortage.** A market may exhibit a short-term shortage, for example, if demand exceeds supply at the current wage rate. Markets for nurses frequently appear to exhibit such a short-term shortage: hospitals demand more nurses than are available at the prevailing wage. But whether there is a long-term shortage may be best indicated by the relative salary levels or "rates of return" to the educational investment for a given profession. Simply stated, the rate of return expresses the level of earnings accrued over one's lifetime compared to the level of investment spent on education and training. On the surface, at least, if salary levels for one profession are higher than those attainable in alternative professions (thus, implying higher rates of return), then the market appears to be demanding the profession. That is, there is a long-term shortage. It is this reasoning which forms the theoretical basis for the use of market indicators

as signals of either shortage or surplus. It is important to note that markets for physicians are affected to an unusual extent by various subsidies for medical education and medical care consumption, and institutional arrangements such as insurance. In addition, factors other than monetary rates of return, such as number of hours worked and the kind of work performed, are obviously important factors to consider when interpreting market signals. As a result, the prevailing relative incomes--relative to other professions or relative among specialties--are a less-than-perfect indication of relative societal value.

### 2.2.2 Health Manpower Planning Terminology

**Need** - A measure of the amount and types of medical services that should be consumed by a population based on a normative medical judgment of what is appropriate.

Need differs from demand in that it ignores the ability and willingness of consumers to pay for care and it employs a higher standard of knowledge--that of the medical expert rather than the consumer. Need may exceed demand for those who are poor, for example. Or demand may exceed need if those with insurance consume care that is inappropriate. What is observed in the market is likely to be closer to demand than to need, since it reflects existing ability and desire to pay. Still it may not be a good indication of what consumers would demand if they had better information or incentives.

**Requirements** - The number of physicians required to fulfill some predetermined standard as to the amount of care needed or demanded.

This definition underscores the fact that requirements can be based either on needs or demand, or even on a blend of the two. For example, GMENAC used an "adjusted needs-based" model that

attempted to adjust physician judgments about medical need for institutional realities.

A comparison between supply and requirements can be made that is similar to the economic comparison of supply and demand. In this paper--to avoid confusion with economic terminology--we refer to any difference between supply and requirements as an **imbalance**, or as an **oversupply** or **undersupply**, depending on the direction of the imbalance. Obviously, an imbalance between requirements and supply does not necessarily imply shortage or surplus in an economic sense.

## 2.3 CLASSIFYING APPROACHES TO IDENTIFYING SPECIALTY IMBALANCES

The methods that have been used to identify specialty imbalances could be classified in many ways. Some are more qualitative, while others are more quantitative. Some use disease-specific information; others aggregate across diseases. Finally, some are descriptive, while others are normative. For purposes of this paper, however, it is useful to categorize as follows:

1) Comparisons of requirements and supply

    a) Needs-based estimates of requirements
    b) Demand-based estimates of requirements

2) Examination of market signals.

The first broad approach examines quantities: approaches in this category project the number of physicians available--the <u>supply</u>--and compare it to the number <u>required</u>. The approaches differ in how they view requirements. Needs-based approaches consider how many physicians will be needed while demand-based approach consider how many the market will demand. The second broad approach looks at other market signals or indicators, such as physician incomes and prices, asking whether the market is

indicating, through relative income levels, for example, that more specialists of a given type are desired. A more sophisticated version of a market signals approach is the construction of market-level econometric models that attempt to explain the demand and supply for physicians.

Needs-based and demand-based requirements models have been the most popular approaches because they are less complex and because they require less data, though their data requirements can be substantial. They are less complex in the manner in which they handle feedback or interaction between the supply and demand sides of the market. Models using market signals must incorporate prices and incomes as mediating factors, so that there is a feedback or loop: other demand and supply factors affect price, which in turn affects the amount demanded and supplied. Prices and incomes can be interpreted as indicators of the situation in the market.

Needs-based and demand-based approaches typically do not model any direct response of supply to requirements though these two factors may be related through third factors, such as growth in the elderly population. Also, factors on the demand/requirements side, such as new technologies, can affect both the number of new entrants and the rate of retirement, but these connections generally are not modeled explicitly. On the other hand, the market-signals approach examines specialty incomes, incorporates both demand and supply factors, and, in theory at least, allow for an immediate feedback or interaction between the two.

### 2.3.1 Needs-Based Approaches

As noted above, both needs-based and demand-based approaches generally measure the supply of physicians in the same way. The supply side of these models tends to be a more or less sophisticated form of extrapolation in which the current stock of

physicians is "aged" to the future, adding new graduates and subtracting retirees and deaths. Individual estimates will, of course, differ depending on assumptions made about trends and on the data sources used.

The two approaches differ, however, in the way in which they measure physician requirements. Needs-based models have a normative aspect, asking how much care a population should receive in order to achieve a desirable state of health. By definition, needs-based models require some element of judgment about the medical "need" of a population and are not based solely on current data. An obvious conceptual problem with a needs-based requirements approach is that producing the number of physicians needed would carry no guarantee that they will be employed or distributed appropriately.

### 2.3.2 Demand-Based Approaches

Broadly speaking, demand-based models use recent data to estimate the interrelationship between current utilization and factors that might affect it. This statistical relationship and trends in the relationship are the basis for extrapolation to the future. There is little or no consideration of what, in fact, might be the most appropriate level of care. A principal problem with a demand-based requirements approach is that extrapolating from existing patterns of demand assumes that the current situation is an accurate reflection of true consumer demand. This assumption may not be valid in a market with substantial government involvement. Government involvement may, of course, reflect valid societal concerns about equity. This last point underscores a second problem with any demand-based approach: existing patterns of demand may not be a good starting point for estimating requirements because demand, even if it has been increased by government intervention, may not reflect the medical "needs" of the population.

It is important to recognize that the distinction between needs- and demand-based models can become blurred. For example, GMENAC used an "adjusted" needs-based approach. It did rely on the expert judgment of physicians to forecast needs in 1990; however, these experts were instructed not to think in terms of an ideal world with no barriers to care. Also, a central Modeling Panel adjusted some of the specialty-specific estimates so as to better reflect realities concerning, for example, insurance coverage and the availability of nonphysician providers. Similarly, models using either HMOs or closed populations to derive requirements standards can be seen as falling between a pure needs-based and a pure demand-based approach. While physician-to-population ratios in an HMO would certainly reflect the demands of the subscribing population, some advocates would argue that HMOs have more incentive to provide the appropriate amount of care. Thus, using them as a standard would have some normative content as well.

In practice, there are other difficulties with both approaches. These are best illustrated by reviewing each approach in detail, as is done in Sections 3.2 and 3.3.

### 2.3.3 Market-Based Signals

Studies which employ market-based signals may be seen as falling into two categories: studies that examine market signals such as physician incomes and rates of return to medical training, and those that attempt to construct market-level econometric models of the demand for and supply of physicians.

Although economists have been calculating rates of return to educational investments in medical training for many decades, it is not clear how seriously policymakers have taken them as indicators of imbalance. While they are arguably the best

indicators of current market demands, they do not reflect an unfettered market. Instead, it is a marketplace substantially affected by subsidies (through insurance) and regulated interspecialty pricing patterns (through insurance fee screens). Policymakers have reason to distrust the signals that the existing market provides. Studies which have employed this approach are discussed in Section 3.4.

A major disadvantage of a market-signals approach is the amount of information required. A model that projects future incomes and supply responses to this information is much more difficult to estimate, especially for differing specialties and market areas. Because the data necessary for projecting specialty incomes in market areas are not generally available, these approaches tend to make only current estimates at a more aggregate level (although some models have extrapolated trends in exogenous variables so as to make estimates of the future values of endogenous variables). Models forecasting incomes need to project future quantities as well as prices.

Market-level models sometimes attempt to use econometric tools to examine how the demand for and supply of physicians responds to selected factors. For example, models have been constructed to address the question of whether the market is responsive to increases in the supply of physicians.

## 2.4 GEOGRAPHIC DISTRIBUTION

Both the comparison of supply and requirements estimates and the analysis of market-based indicators are assessment methods which are usually applied at a high level of aggregation (e.g., national or, in a few instances, states). In considering specialty manpower studies, it is important to assess the degree to which studies compare physician-to-population ratios across market areas or across different subsets of the population. The

discussion has thus far abstracted from the issue of geographic distribution. Over- and undersupplies or surpluses or shortages may exist for particular specialties in some local markets and not others. Discussions at the national level concerning aggregate imbalances must pay some attention to this distinction. Locational approaches to assessing specialty imbalances are discussed in Section 3.5.

## SECTION 3
## PREVIOUS APPROACHES TO ASSESSING SPECIALTY IMBALANCES

### 3.1 INTRODUCTION

Sections 3 and 4 of the paper describe recent and ongoing attempts to assess physician specialty imbalances; Section 3 focuses on previous approaches which studies have undertaken while Section 4 describes projects currently underway. Section 4 also includes a subsection on the adequacy of available data. Together, these sections should provide a good overview of the current state of the art in assessing specialty imbalances.

In this section we summarize the major alternative approaches to assessing physician specialty imbalances and briefly discuss the results and strengths and weaknesses of each approach. Section 3.2 describes the model constructed by the Bureau of Health Professions (BHPr) which is the most comprehensive demand-based model ever developed for estimating requirements. Studies which derive requirements standards from HMOs are also essentially demand-based models and these are discussed in a subsection of Section 3.2. Section 3.3 discusses needs-based models as exemplified by the efforts of the Graduate Medical Education National Advisory Committee (GMENAC). Section 3.4 considers market-based studies, which are based upon the interaction of supply and demand. Section 3.5 discusses approaches which consider variations in physician-to-population ratios across geographic regions or demographic groups. Table 3-1 summarizes the main points of the approaches discussed in these sections.

TABLE 3-1
SUMMARY OF HIGHLIGHTS OF PAST APPROACHES

| Previous Approaches | Name of Study | Comments |
|---|---|---|
| Demand-Based | Bureau of Health Professions Model | Large data requirements<br>Does not consider optimal level of health care<br>Can alter model parameters to derive alternative projections<br>Currently operational<br>Periodically updated<br>Not specialty specific |
| | HMO-based standards<br>Mason; Scitovsky and McCall | Data generally available<br>Interpretations subject to many caveats<br>HMO population not representative |
| Needs-Based | Lee-Jones<br>GMENAC | Large data requirements<br>Does not consider demand for health care<br>Can alter model parameters to derive alternative projections<br>Specialty specific |
| Market-Based | Sloan; Fein and Weber; Lindsay; Leffler; Glandon and Werner; AMA; Noether; BHPr; Hixson and Mocniak; Hu and Yang; Dresch; Sloan and Schwartz; Frank; Brown and Reid | Interaction of supply and demand at either individual doctor level or aggregate market level<br>Sometimes specialty specific |
| Locational | GMENAC<br>Rand<br>OTA | Consideration of doctor-to-population ratios for subnational areas<br>Data generally available<br>Interpretation of ratios subject to many caveats |

## 3.2 DEMAND-BASED REQUIREMENTS/SUPPLY COMPARISONS

### 3.2.1 Bureau of Health Professions Modeling Efforts

The Bureau of Health Professions (BHPr) has addressed the question of future health manpower imbalances through its continued modeling efforts in this area. The two major components of this effort are a supply model which is able to predict the total supply of active MDs and DOs up to the year 2010 and a demand-based requirements model which can predict the number of medical personnel which will be required in any year in the future. The BHPr then compares projections derived from these two components in order to determine whether future supply is likely to be greater or less than the number of medical personnel likely to be demanded. It is important to note that the two components of the BHPr modeling effort are essentially independent. One could compare the BHPr supply projections with requirements estimates derived from other than the BHPr requirements model and vice versa. In fact, the two BHPr component models are quite different in terms of the level of specialty detail which they provide. As will be seen in the following sections, the BHPr supply model is capable of projecting future supply by a very detailed specialty breakdown (e.g., thoracic surgery), while the BHPr requirements model considers only very aggregated categories of physicians (e.g., one category for all surgeons). The two components are described below.

#### 3.2.1.1 BHPr Physician Supply Model

The BHPr physician supply model is comprised of three component submodels. The Aggregate Model projects the total number of active physicians in the U.S. The Specialty Model distributes the projected total supply according to 37 specialty categories developed by the American Medical Association (see Figure 3-1). The Subnational or State Model distributes the

FIGURE 3-1

THIRTY-SEVEN SPECIALTY CATEGORIES AS MAINTAINED BY THE AMA

**General Practice**
- General Practice
- Family Practice

**Medical Specialities**
- Allergy
- Cardiovascular Diseases
- Dermatology
- Gastroenterology
- Internal Medicine
- Pediatrics
- Pediatric Allergy
- Pediatric Cardiology
- Pulmonary Diseases

**Surgical Specialties**
- General Surgery
- Neurological Surgery
- Obstetrics and Gynecology
- Ophthalmology
- Orthopedic Surgery
- Otolaryngology
- Plastic Surgery
- Colon and Rectal Surgery
- Thoracic Surgery
- Urology

**Other Specialties**
- Aerospace Medicine
- Anesthesiology
- Child Psychiatry
- Diagnostic Radiology
- Forensic Pathology
- Neurology
- Occupational Medicine
- Psychiatry
- Pathology
- Physical Medicine and Rehabilitation
- General Preventive Medicine
- Public Health
- Radiology
- Therapeutic Radiology
- Other Specialty
- Unspecified

projected national supply according to expected practice locations. All three of these submodels use data from the 1981 AMA Physician Masterfile census of MDs as a starting point and project past trends into the future.

In essence, the Aggregate Model projects the future supply of physicians in a given year by adding new graduates and FMGs for that year to the active supply and then subtracting separations due to death, retirement, and emigration. The model begins with 1981 as the base year and proceeds in an iterative fashion to produce supply estimates for each year through 2010. Three series of projections are developed using alternative assumptions about the number of first-year enrollees, student attrition rates, and FMGs. The "basic" projections are considered to be the most reliable; the high and low series give an upper and lower bound for the basic estimates. The incoming cohort of graduates is distributed into age groups by using the average age distribution of graduates (a parameter of the model).

Age and gender-specific mortality and retirement rates derived from studies of MDs are then used to reduce the active supply of doctors by the expected number of deaths and retirements. The resulting calculation represents a projection of the total active physician supply in the U.S. for a given year in the future. This aggregate number is classified into six cells based on gender and country of origin (United States/Canadian Medical Graduate, United States Foreign Medical Graduate, and Alien Foreign Medical Graduate) and is then further categorized by post-graduate year (PGY).

Projections of the supply of physicians by the 37 specialty categories defined by the AMA are derived only after the total number of physicians has been projected by gender, country of medical training, and PGY for each year in the projection period. Each of the six cells defined by the combinations of gender and

country of origin is associated with a series of PGY-specific specialty distributions. These distributions were derived using AMA data on first-year residencies. For early years of the model, 1968, 1970-74, and 1976 data on first-year residencies by specialty were extrapolated to produce specialty distributions up through 1981. Certain specialties were adjusted for "leakages" due to specialty switching and subspecialization which occur after the first year of residency. For years after 1981, the specialty distributions used for each PGY are those which were observed in 1981.

The specialty distributions for early PGYs change primarily due to trends away from the general specialties to the subspecialties. Distributions begin to stabilize in later PGYs, reflecting lower rates of specialty switching and subspecialization as physicians move toward their final specialty of practice. The stabilization point occurs at various PGYs, depending on specialty, and all specialties are assumed to reach this point by PGY 10. No further specialty redistribution is allowed to occur after the stabilization PGY has been reached.

In any given year of the projection period, the aggregate number of physicians in each of the six cells is disaggregated into the various specialties by applying the PGY-specific specialty distributions. As a purely hypothetical example, intended only to illustrate this process, imagine that the Aggregate Model had projected a supply of 2000 male FMGs for the year 1990. Assume further that 20 percent of the male FMGs who are in their first post-graduate year (PGY 1) are expected to select family practice as their specialty. This percentage might decline to say 15 percent by PGY 2, reflecting the trend toward increased subspecialization. If 200 of the projected 2000 male FMGs in 1990 are in PGY 1 and another 100 are in PGY 2 then their contribution to the total supply of family practitioners in 1990 would be 55 doctors (200*0.2 + 100*0.15). Similar calculations

across all six cells and all PGYs yield the total projected supplies of each specialty.

This specialty model is also capable of projecting physician supply by the 82 specialty categories designated by the AMA. However, as pointed out by Mr. James Cultice (of the Bureau of Health Professions) in his presentation at the March 17, 1987 meeting of the Physician Manpower Subcommittee of COGME, these detailed projections are nothing more than a redistribution of the 37 specialty projections using the assumption that the 1981 distribution of the 82 categories is applicable to the future. Thus, this methodology introduces the potential for bias if younger cohorts of physicians are entering the various subspecialties at different rates than did their older predecessors.

The projected total supply of MDs can also be distributed among the states in much the same way it is distributed among specialties. As above, the methodology employed assumes that past trends will continue into the future. It allows state distributions to vary during the first ten PGYs, with earlier PGYs reflecting greater changes as physicians undertake residency training and then move on to a practice location. The distributions stabilize in later PGYs as doctors become established in their chosen practice location. This methodology is capable of producing estimates of state supply by major specialty group only (i.e., primary care, other medical specialties, surgical specialties, and other specialties) and cannot make detailed specialty projections by state.

In sum, the BHPr supply model is a sophisticated extrapolation of past trends into the future. There is no explicit modeling of the influence of demand factors on the projections of physician supply as would be the case in an integrated econometric model of the market for physicians services. Instead, this feedback is

more implicit in that the past trends upon which the supply projections are based already incorporate the influence of demand factors. However, if the market is changing then an extrapolation such as this will not capture these changes.

#### 3.2.1.2 BHPr Physician Requirements Model

The BHPr methodology used to predict requirements for health manpower assumes that recent and current patterns of health care utilization and health manpower employment and productivity will continue into the future. Under this approach "requirements" is defined as the number of personnel likely to be necessary in the future in order to provide the current pattern of health services. The model is demand-based in that utilization is used as a proxy for demand and no attempt is made to define appropriate (or needed) standards of care. Although this section discusses the model in detail, it is important to note at the outset the model's present inability to predict physician requirements on a detailed specialty level.

Structure

The first major component of this model is a utilization matrix. Forty population groups are defined based on family income, age, and gender and twenty health care categories are defined using various combinations of delivery setting (e.g., medical office) and form of care (e.g., psychiatric care). These categories are displayed in Figure 3-2. Base-year per capita utilization rates are specified for each care category and for each population category (800 rates or cells in all). Note that these utilization rates reflect the utilization of a particular populaton category for a particular form of care rather than their utilization of a particular type of doctor.

Typically, these utilization rates have been actual rates, based on past experience and estimated using primarily the Health Interview Survey (HIS) and National Hospital Discharge Survey data sets. However, the utilization rates are specified as inputs to the model. As such, alternative assumptions regarding utilization can be employed and the BHPr model can provide alternative estimates of health manpower requirements. For example, one might hypothesize that the increased prevalence of AIDS will translate into higher utilization rates (for some forms of care and/or population groups) in the future. Use of these updated rates will yield requirements predictions which differ from those based on historical utilization rates.

Given the per capita utilization rates (800 cells) as inputs to the model, the next step is to project the growth of the population and its redistribution among the forty population cells. Projections by the U.S. Census Bureau have shown a population which is growing relatively older, with higher family incomes. For a given form of care, the baseline per capita utilization rates for each population category are combined with the projected population levels in each cell to derive the projected utilization level for that cell. Summing across all forty population categories yields the total utilization for the particular form of care which is predicted to be forthcoming due to demographic factors alone. Utilization growth rates are derived for each form of care by dividing total predicted utilization by the actual baseline utilization.

To reflect the fact that utilization can also be affected by factors other than population, a utilization trend analysis is employed in the BHPr model of requirements. In essence, this analysis disaggregates past trends in utilization into the portion attributable to changes in the out-of-pocket price and the portion attributable to nonprice factors, such as technological

FIGURE 3-2

DEFINITIONS OF CATEGORIES USED IN THE UTILIZATION MATRIX OF THE BHPr REQUIREMENTS MODEL

A. 40 Population Groups are defined by taking all possible combinations of the following income, age, and gender categories:

| Income | Age | Gender |
|---|---|---|
| Under $ 5,000 | Under 14 | Male |
| $ 5,000 - $ 9,999 | 14 - 24 | Female |
| $10,000 - $14,999 | 25 - 44 | |
| $15,000 - and over | 45 - 64 | |
| | 65 and over | |

B. 20 Health Care Categories are defined as follows:

| Setting | Form of Care |
|---|---|
| Medical Office: | General Care |
| | Pediatric Care |
| | Obstetric-Gynecological Care |
| | Psychiatric Care |
| | Vision Care |
| | Other Medical Office Care |
| Short-Term Hospital: | Outpatient Care |
| | Surgical Care |
| | Medical Care |
| Long-Term Hospital: | Psychiatric Care |
| | Other Long-Term Hosp. Care |
| Additional Health Care Settings: | Nursing Home Care |
| | Dental Care |
| | Pharmacy Services |
| | Laboratory Services |
| | Optometric Care |
| | Podiatric Care |
| | Other Patient Care, not elsewhere specified |
| Nonpatient Care Settings: | Administration, Teaching and Research |
| | Veterinarian Services |

change or shifts in consumer preference. Utilization growth factors related to price and nonprice components are developed and used to adjust the utilization growth rates derived earlier based on the analysis of demographic changes only.

The second major component of the BHPr requirements model is a health personnel matrix which distributes members of twenty-eight different health personnel categories (see Figure 3-3) according to the proportion engaged in providing each of the twenty forms of health care designated in the utilization matrix. For each form of care, the utilization growth rate derived from the analysis of demographic changes and adjusted for price and nonprice influences is applied uniformly to all personnel types providing that care. For example, if the utilization of psychiatric care in the office setting were projected to increase by 25 percent then the requirements for each category of health personnel currently providing that care would be 25 percent greater than the current number of providers.

Future requirements for each of the twenty-eight types of health personnel are then derived by summing the changes in requirements needed to accommodate the changed utilization for each category of care in which the provider is involved. Thus, to continue the example begun above, since psychiatrists are involved in the provision of psychiatric care in both the medical office and long-term hospital setting (two categories of care), the future requirements for psychiatrists will be the sum of the number needed to provide the predicted utilization level for each form of care.

The BHPr requirements model also contains a number of "contingency" submodels designed to explore occurrences for which trend data are not available. In addition to models predicting the likely impact of National Health Insurance and task delegation (e.g., the use of physician extenders, etc.), there is a submodel

FIGURE 3-3

DEFINITIONS FOR HEALTH PERSONNEL CATEGORIES USED IN THE PERSONNEL MATRIX OF THE BHPr REQUIREMENTS MODEL

| | Estimated Supply in 1975 |
|---|---|
| Physicians (MD): | |
| General[1] | 116,430 |
| Pediatric | 21,746 |
| Ob/Gyn | 21,731 |
| Ophthalmology | 11,129 |
| Psychiatry | 26,502 |
| Surgery[2] | 76,017 |
| Secondary Specialist[3] | 48,322 |
| Noncare Specialist[4] | 18,403 |
| Physicians (DO) | 14,532 |
| Dentists | 114,999 |
| Optometrists | 20,101 |
| Podiatrists | 7,300 |
| Pharmacists | 122,500 |
| Veterinarians | 31,060 |
| Registered Nurses | 961,000 |
| Physician Extenders | 7,854 |
| Allied Health Personnel: | |
| Administrative Personnel | 682,098 |
| Medical Library Personnel | 10,701 |
| Medical Records Personnel | 64,001 |
| Clinical Laboratory Personnel | 182,000 |
| Dietary Services Personnel | 75,001 |
| Radiologic Services Personnel | 105,001 |
| Therapy Personnel, not elsewhere specified | 165,499 |
| General Medical Personnel[5] | 86,527 |
| Nursing Care Personnel (other than RNs) | 1,468,999 |
| Vision Care Personnel (other than ophthalmologists and optometrists) | 35,000 |
| Pharmacy Assistants and Aides | 100,333 |
| Dental Hygienists, Assistants, and Technicians | 175,801 |

[1]Includes general and family practice, internal medicine, and "specialty unspecified" (presumed to provide predominantly primary care).

[2]Includes general surgery, neurological surgery, orthopedic surgery, otolaryngology, plastic surgery, colon and rectal surgery, thoracic surgery, urology, and anesthesiology.

[3]Includes allergy, cardiovascular diseases, dermatology, gastroenterology, pediatric allergy, pediatric cardiology, pulmonary diseases, radiology, diagnostic radiology, therapeutic radiology, neurology, physical medicine and rehabilitation, and "other specialties".

[4]Includes occupational medicine, general preventive medicine, public health, aerospace medicine, pathology, and forensic pathology.

[5]Includes ambulance attendants, biomedical engineers and technicians, health educators, EKG and EEG technicians, orthotists, prosthetists, and surgical aides.

which incorporates the influence of HMOs into predictions of requirements. It is assumed that at least 6 percent of the U.S. population will be enrolled in an HMO by 1990. The HMO population is treated as separate from the U.S. population; HMO members are assigned their own (usually lower) utilization rates and their own personnel matrix (the categories of which reflect the sometimes unique personnel requirements of HMOs). There is no price adjustment in the HMO submodel since price does not generally influence demand in the capitated setting. Otherwise, the calculations for projections of personnel requirements for the HMO population are analogous to those for the general population. National requirements are the sum of the general and HMO requirements.

#### 3.2.1.3 BHPr Results and Limitations

In Table 3-2 the projections of the BHPr supply and requirements models are presented. The table indicates that an oversupply is predicted for both 1990 and 2000. The numbers given in the 1982 Report to the President and Congress on the Status of Health Personnel in the United States showed a predicted oversupply of 21,000 physicians in 1990; this was predicted to increase to 32,500 by the year 2000. Subsequent revisions to the 1982 estimates show oversupplies of ever increasing magnitudes due to the continued downward revisions to predicted requirements. The supply projections have not changed to an appreciable extent over time.

The BHPr and its external contractors have conducted several studies in the past to expand and update particular components of the requirements model. For example, an attempt was made to refine the utilization matrix by using categories based on health status and race/ethnic origin in addition to the original age,

TABLE 3-2

COMPARISON OF BHPr SUPPLY AND REQUIREMENTS PROJECTIONS, 1990 AND 2000

| | 1990 | | | 2000 | | |
|---|---|---|---|---|---|---|
| | Supply | Requirements | Oversupply | Supply | Requirements | Oversupply |
| 1982 Report-Basic Series | | | | | | |
| Low Series | 591,200 | 570,200 | 21,000 | 704,700 | 672,200 | 32,500 |
| High Series | 589,000 | | | 693,500 | | |
| | 609,200 | | | 754,300 | | |
| 1984 Report-Basic Series | | | | | | |
| Low Series | 594,600 | 559,300 | 35,300 | 706,500 | 654,700 | 51,800 |
| High Series | 592,600 | | | 695,800 | | |
| | 608,200 | | | 749,900 | | |
| 1986 Report-Basic Series | | | | | | |
| Low Series | 587,680 | 541,000 | 46,680 | 696,550 | 618,800 | 77,750 |
| High Series | 583,000 | | | 674,800 | | |
| | 593,700 | | | 722,380 | | |

Table includes all professionally active physicians (MDs and DOs).

The BHPr Supply Model provides three series of estimates based on alternative assumptions about support to medical education, medical school enrollments, student attrition, and entry of FMGs. The Basic Series is regarded as being the most realistic while the Low and High series provide lower and upper bounds to the supply projections regarde

Source: The figures reported here were gathered from the 1982, 1984, and 1986 reports of the Bureau of Health Professions on the status of health personnel in the United States.

gender, and income categories. This expanded the number of population categories from 40 to 320. Estimates of utilization rates for these population groups were obtained from 1978 HIS data. However, the researchers involved in this effort noted that these data were often inadequate for a reliable estimation of utilization rates for population groups defined at this level of detail. In addition to this attempt at refining the utilization matrix, the personnel matrix has been updated several times: once from the original 1970 base year to 1975 and, more recently, from 1975 to a 1980 base year. These periodic revisions help to ensure that the BHPr requirements model produces relatively up-to-date estimates, given the model as it is structured.

Several other refinements to the BHPr models are either underway or envisioned by BHPr staff. On the supply side, recent efforts have attempted to make specialty projections more realistic by considering recent trends in residency and early practice choices. It is anticipated that efforts in this area will continue and that additional attention will be paid to mid-career specialty switches, specification of retirement and mortality rates, and the FMG contribution to overall physician supply.

On the requirements side, in addition to the studies outlined above updating the utilization and personnel matrices, there has also been some work attempting to account for the continued growth in utilization by the elderly population.

Significantly, for the work of COGME, there has been no effort to date to modify the model so as to produce requirements estimates by either detailed specialty or by the primary/nonprimary care distinction. BHPr staff believe that such an effort is feasible but stress that it would require at least one year of very intensive work and may be fraught with difficult conceptual problems. For example, the development of a personnel matrix

with more specialty detail is difficult due to the fact that different specialties are often close substitutes for one another in the provision of certain services. In addition, physician specialties are not designated with a high degree of accuracy in HIS data, making the determination of utilization rates by specialty a difficult task. Before having BHPr undertake intensive efforts in this direction, COGME must determine the level of specialty detail which is necessary as a basis for its policy recommendations. In any event, it will be impossible to obtain projections on detailed specialty imbalances from the BHPr before the deadline for COGME's first report to the Secretary of HHS and to Congress.

It may be possible to use the BHPr models as they are currently structured to derive some very rough projections of imbalances for the primary/nonprimary care distinction. This approach will be imperfect, however, due to the facts that: 1) the requirements and supply models make their projections at different levels of specialty disaggregation and 2) requirements for some categories of physicians which one might wish to consider as primary care cannot be broken out of estimates for the broader groupings used in that model. Still, one might wish to consider alternative definitions of primary care physicians and match requirements estimates against supply projections. For example, the requirements model produces estimates for the MD categories of general, pediatric, obstetrics-gynecology, and surgery. The "general" category is comprised mostly of primary care physicians. Health planners sometimes include pediatricians in the definition of primary care doctors. The pediatrician category of the BHPr requirements model excludes pediatric cardiologists and pediatric allergists and, thus, is likely to be comprised mainly of primary care pediatricians. Obstetrician/gynecologists have been included in past definitions of primary care and they could be included here as well since they are treated as a separate category in the model. The same is not true of general surgeons. Although these

doctors are sometimes considered to be primary care doctors it will not be possible to do so with the BHPr model since they are aggregated into the broader category containing all surgeons.

The requirements projections derived for these alternative definitions of primary care physicians can be matched against the BHPr supply projections by aggregating the supply estimates of the component specialties up to the level used in the requirements model. Separate supply estimates are available for general practitioners, family practitioners, internists, pediatricians, obstetrican/gynecologists and general surgeons. One problem with this comparison is that the broad category of internal medicine contains many subspecialties which one may or may not wish to categorize as primary care. Since these cannot be disaggregated in the requirements model one would have to be content to either include or exclude <u>all</u> internists in the primary care definition.

In general, the major weakness of a demand-based approach is that there is no consideration of medical need; current utilization/demand patterns are implicitly assumed to be the ones which should exist in the future. For the BHPr modeling efforts in particular the inability to predict physician requirements on a detailed specialty level is the major (and insurmountable, in the short term) weakness of this approach if COGME wishes to assess imbalances at this level of detail. As just discussed the comparison of requirements and supply at even the primary care level of distinction may also be problematic.

On the positive side, the demand-based approach is empirical and it is feasible to alter certain model parameters in order to simulate their expected effect on manpower requirements. The discussion above emphasizes that the BHPr is continually updating both the supply and requirements models in an attempt to keep their parameters consistent with reality. This and the fact that the models are currently operational suggest that COGME may wish to:

1) consider the existing model's latest predictions concerning imbalances or 2) alter selected model parameters to derive alternative predictions.

### 3.2.2 HMO-Based Studies of Estimation of Requirements

Another approach to developing physician requirements is to use as a standard the observed ratio from an HMO or some other closed population (e.g., in a relatively self-contained geographic service area). Such an approach is essentially a demand-based approach in that it examines the staffing requirements necessary to provide all care demanded by the population enrolled in the closed health care system. Several researchers have attempted to develop requirements standards by calculating the ratio of physicians or specialists per HMO enrollee (Mason, 1972; Scitovsky and McCall, 1976; Steinwachs et al., 1986; Tarlov, 1986).

Tarlov and Steinwachs et al. have used HMO-derived standards to adjust the GMENAC predictions for the growth in HMOs which occurred after completion of that report. Mason compared specialty-to-population ratios across six HMOs, while Scitovsky and McCall attempted to extrapolate from HMO experiences to develop new requirements estimates for the entire U.S. population. Requirements estimates based on these standards are then compared with actual or predicted supply to determine or project health manpower imbalances. Table 3-3 which presents the requirements ratios found by three of these studies shows that there is disagreement as to the number of people that one physician can optimally serve.

TABLE 3-3

COMPARISON OF OPTIMAL PHYSICIAN-TO-POPULATION RATIOS DERIVED FROM STUDIES USING THE HMO STANDARDS APPROACH

| | |
|---|---|
| Mason - 1972 | 1:978 - 1:1,118 |
| Scitovsky & McCall - 1976 | 1:676 |
| Tarlov - 1986 | 1:833 |

The primary advantage of the HMO approach is that the requisite data (the number of enrollees and the number of physicians on staff) are readily available. However, the interpretation of these staffing ratios is subject to many caveats, including:

- HMO enrollees may not be representative of the general population
- HMO enrollees may seek care outside of the HMO setting
- HMOs vary greatly with regard to the services they provide
- HMOs use different combinations of specialists to provide the same package of services.

Studies of HMOs generally reveal staffing ratios of many fewer physicians per 100,000 population than occurs in the general population. This may be due in part to the fact that HMOs are not as self-contained as health care delivery systems as one might think. For example, enrollees may call upon doctors from outside of the HMO for services which are not covered by their plan, implying that HMO staffing patterns may understate true requirements.

Additionally, physician-to-population ratios may not be

generalizable across HMOs because the comprehensiveness of plans often varies. The figures in Table 3-3 illustrate the range of staffing ratios which can occur when comparisons are made across HMOs. Even for plans offering the same package of services, the staff's specialty composition may vary from plan to plan due to different definitions of the role of given specialties; one plan may choose to rely mainly on general surgeons, for example, while another substitutes surgical specialists for the general surgeons. The choice of the optimal specialist-to-population ratios will be determined by one's qualitative determination of the appropriateness of the relative roles of the different specialties. Also, staffing patterns are determined to a certain extent by unique characteristics of the local market in which the HMO operates. Thus, observed ratios must be interpreted carefully in light of information about the HMO's surrounding environment.

In his analysis of staffing patterns of six HMOs, Mason discovered wide ranges in specialist-to-population ratios, illustrating the problems discussed above concerning the interpretation of observed ratios. For example, he observed HMO staffing patterns which implied that one family practitioner can serve as few as 2300 people or as many as 8435. The range for general surgeons was from 1:8056 to 1:17,824, while estimates for internists varied by a magnitude of nearly 3.5 (1:2192 to 1:7510). Use of these estimates would imply tremendous variation in the number of specialists required to serve a population of a given size.

Another major drawback of this approach is that, even if observed staffing patterns could be properly interpreted given all of the caveats mentioned, the HMO requirements standards may not be useful for health manpower planning because HMO enrollees are not usually representative of the general U.S. population. Any generalization of HMO physician requirements to a larger population must at least attempt to account for differences

between the two populations which might influence the utilization of health services and, therefore, requirements.

In addition, to the extent that many of these studies using this methodology have dealt mainly with the aggregate number of physicians or the primary care specialties, they are somewhat limited in their ability to help COGME address the issue of detailed specialty imbalances.

These studies might, however, help COGME in addressing whether or not there are imbalances at the primary and nonprimary care level. Steinwachs et al., for example, compared staffing patterns in primary care specialties in these HMOs. The study compared GMENAC projections with norms of care based on actual practice in the HMOs in order to estimate physician requirements in general pediatrics, general internal medicine, and family practice. The study found that although there were a variety of staffing patterns among the different plans, HMOs required fewer primary care physicians for both children and adults. This kind of study could help the Council address both the appropriate number of primary and nonprimary care physicians and existing variations among different health care delivery systems and across different geographic regions.

## 3.3 NEEDS-BASED REQUIREMENTS/SUPPLY COMPARISONS

### 3.3.1 Overview

Needs-based approaches to estimating physician requirements for comparison with supply have a long history, going back to the classic Lee-Jones study (1933). A needs-based approach to estimating requirements for physician specialties attempts to answer the following question for some time in the future: for a specific condition how much and what types of specialist care should be used to provide the medically appropriate level of

care? In accordance with the definitions of need and demand presented above, analysts have emphasized the conceptual distinction that the needs-based models are normative--concerned with what should be--and that the demand-based models are descriptive or "positive"--concerned with what is or will be.

In practice, two other important features distinguish the two approaches. First, needs-based approaches tend to focus on diseases, relying upon epidemiological data and medical treatment patterns, and specifying diseases and treatments in great detail. In contrast, demand-based approaches typically focus on gross categories of care such as inpatient utilization, surgical operations, and outpatient visits. Second, needs-based approaches tend to rely to a much greater extent on professional judgment in making estimates of parameters than do demand-based approaches, which have typically used statistical relationships and trends from empirical data. There is clearly a potential middle ground between these two approaches. Demand-based approaches could be disaggregated to a greater extent by disease and could incorporate professional judgment, especially using consensus techniques for the extrapolation of some trends. As yet, no one has attempted to work in this complicated middle ground.

### 3.3.2 GMENAC's Framework

The requirements/supply comparison of the Graduate Medical Education National Advisory Committee (GMENAC) is the most recent and the most comprehensive effort ever to take a needs-based approach to measuring requirements/supply imbalances. Both the supply and requirements sides of the model and the estimation techniques have been described in detail elsewhere (McNutt, 1980; JWK International, 1980; GMENAC Summary Report, 1980a) and will not be repeated here. In essence, the supply side is a complex, specialty-specific extrapolation model. The growth of each of

some 40 specialties was forecasted based upon the current supply, expected additions, and expected losses due to retirement and deaths.

GMENAC's approach to needs-based modeling was called "adjusted" needs-based modeling for several reasons. First, because the estimates were based on data from existing utilization patterns, they reflected to an unknown extent existing constraints and institutional realities. Second, the participating physicians were instructed not to operate in the ideal world of providing all efficacious care to all of those in need. In fact, the GMENAC panels were generally asked the normative question of how much specialty care "should" be provided for a given condition in 1990. To the extent their answers reflected what they thought was likely to happen and societal constraints on the provision of care, the estimates begin to approximate a demand-based approach. In this case, the difference between GMENAC and the BHPr requirements model becomes more a matter of estimation technique, with the former relying more heavily upon consensus and professional judgment. Third, GMENAC had a central Modeling Panel that adjusted some of the estimates to better reflect realities concerning, for example, insurance coverage and the availability of nonphysician providers.

A simple example illustrates the essence of the requirements side of the GMENAC model. Consider one of the 56 conditions considered by the Delphi panel used for neurologists (Garrison, Bowman, and Perrin, 1984). The neurology Delphi panel projected that 250 persons per 100,000 population would have new cases of migraine in 1990. They recommended that 100 percent of these cases should see a physician and that 75% should see a neurologist. In addition to an initial 50-minute visit to the neurologist, it was estimated that they would average 4 additional visits with a mean duration of 20 minutes. From this information it is possible to calculate the amount of neurologist time needed to treat these

new cases in 1990. And given the panel's estimates of the average neurologist work year, the number of full-time equivalent neurologists required could be calculated. The neurology panel made these types of estimates for each of 56 disease conditions, for both new and old cases separately.

The GMENAC requirements would require the estimation of thousands of parameters. The new cases for migraine, for example, required the estimation of six parameters by the panelists. If the other specialty panels considered on the order of 30 conditions directly, then they would be estimating 180 parameters, not to mention the other parameters estimated for productivity, hours worked, teaching, etc. Applied to 40 specialties, this means that over 7200 parameters would be estimated; and this is only if the top 30 conditions are considered. For surgical and other specialties seeing many more conditions, adjustments to the model had to be made and sometimes many more parameters than this were estimated.

If one reads the specialty-specific requirements reports of GMENAC carefully, it can be seen that although GMENAC's generic model provided a framework, each specialty Delphi Panel custom-tailored the model to fit the special conditions as well as the quality of the available data. For example, the surgical specialties did not make their estimates directly on a condition basis. Instead, they worked with surgical procedure rates per 100,000 population and projected those to 1990. This is obviously a modification to the needs-based framework that was necessitated by the lack of background information linking surgical treatments to disease conditions.

### 3.3.3 Criticisms and Limitations of GMENAC

Although the ambitiousness and importance of the GMENAC effort is widely recognized, there have also been many criticisms

of the process and estimates (see, for example, American College of Surgeons, 1980; Reinhardt, 1981; Bowman and Walsh, 1982; Harris, 1986). Critics have argued, for example, that considerable uncertainty exists in these estimates (Reinhardt, 1981; Harris, 1986). GMENAC itself recognized this in its recommendation that the process be institutionalized and carried out on an ongoing basis. This was not done, perhaps, because GMENAC was an expensive and labor-intensive effort. This could be one of the analytic issues facing COGME in the long run: is there enough confidence in the structure and reliability of estimates of a GMENAC-type approach to institutionalize it?

It has been pointed out that uncertainty exists on both the supply and demand sides of the equation. Reinhardt (1981) noted that while it may seem relatively easy to project the future supply of physicians with some accuracy, past efforts indicate that this is not necessarily the case. It has proven difficult to project physician immigration, physician decisions on retirement, and their choice of professional activity.

Others have noted the difficulty of predicting future requirements. There is always considerable uncertainty, for example, about technological change and the desired level of public health. Harris (1986) pointed out that the GMENAC panels could not foresee such changes as the increase in cesarean sections, the rise in liver transplants, and cardiologists' use of streptokinase to dissolve blood clots. While each individual change in technology might have a small impact on the aggregate requirement for physician services, the combined effect of hundreds of changes could be substantial. Harris and others have also noted that when GMENAC issued its report in 1980, the existence of AIDS had not been reported. This will obviously change existing physician requirements predictions (although the extent of its impact on physician versus nonphysician requirements could be much debated).

extent of its impact on physician versus nonphysician requirements could be much debated).

As mentioned above, the major weakness of a pure needs-based approach to requirements estimation is that even if the system could somehow be influenced to produce the optimal number of physicians, as defined by need, there is no guarantee that this would coincide with the number actually demanded. Also, they would not necessarily practice in the desired patterns or in the appropriate locations, as a number of critics have emphasized in the past.

The American College of Surgeons (1981) noted, for example, that it was unreasonable for GMENAC panels to assume that there will be greatly reduced financial barriers to care in 1990. Reinhardt (1981) further pointed out that the future political and economic climate will influence whether an individual's perception of need for medical intervention actually translates itself into effective demand. He notes that "it is always effective demand, and not perceived need, that interacts with the effective supply to determine the actual utilization of health services and of health manpower."

There have been a number of other criticisms of GMENAC as well. The American College of Surgeons (ACS, 1981) criticized GMENAC for a number of perceived methodological flaws: 1) unrealistic assumptions, 2) unrepresentative panelists, and 3) ex-post manipulations of the estimates. ACS also noted that the panels had few members and could easily be dominated by a single member with strong views. ACS also pointed out that there were little data on the supply and use of nonphysician providers. An additional criticism was that there was little information about the geographic distribution of physicians.

### 3.3.4 GMENAC's Results and Subsequent Modifications

The final results for 1990 of the GMENAC effort are shown in Table 3-4. In total there is projected to be an oversupply of 63,000 physicians or about 12 percent of requirements. The 40 specialties are sorted on the basis of the relative shortfall of physicians. Recognizing the uncertainty in the estimates, GMENAC used the rule of thumb that any difference of greater than 20 percent was significant. The 17 specialties at the top of the chart are considered to be in oversupply in 1990. There are 12 specialties that are considered to be in near balance. For only 9 specialties is there considered to be a significant undersupply. It should be noted that if one applies the 20 percent criterion at the aggregate level, for 1990, GMENAC does not forecast a significant oversupply in physicians.

It is not clear how well either the individual Delphi panels or the central Modeling Panel were able to make adjustments for institutional realities and constraints or to predict new developments. Since the final GMENAC estimates were produced, a number of researchers have attempted to examine and adjust the results in light of new developments observed in the 1980s. Most notably, the chairman of GMENAC, Alvin R. Tarlov, has suggested that the numbers be adjusted for the increased participation in health maintenance organizations (Tarlov, 1986). GMENAC's overall physician-to-population ratio for requirements was estimated to be 194 per 100,000 in 1990. He notes that it is conceivable that as many as 120 million of the projected 270 million Americans in the year 2000 could participate in prepaid group practices (HMOs). Assuming a staffing pattern in prepaid group practices of 120 physicians per 100,000 subscribers, this would imply a requirement of 144,000 physicians in 2000. With supply projected at 629,000, this would imply that the physician-population ratio for those not in prepaid group practices would be 323 per 100,000, substantially above the 194 per 100,000

TABLE 3-4
SUMMARY OF GMENAC SPECIALTY RESULTS

| | Physicians | Total Residents/ Fellows | Total Supply | Requirements | Oversupply/ Undersupply | Percent Oversupply/ Undersupply |
|---|---|---|---|---|---|---|
| All physicians | 504,750 | 88,500 | 535,750 | 473,000 | 62,750 | 13 |
| OVERSUPPLY | | | | | | |
| Pulmonary diseases | 6,600 | 1,050 | 6,950 | 3,600 | 3,350 | 93 |
| Cardiology | 14,250 | 1,900 | 14,900 | 7,750 | 7,150 | 92 |
| Neurosurgery | 4,850 | 700 | 5,100 | 2,650 | 2,450 | 92 |
| Endocrinology | 3,700 | 500 | 3,850 | 2,050 | 1,800 | 88 |
| Rheumatology | 2,850 | 500 | 3,000 | 1,700 | 1,300 | 76 |
| Nephrology | 4,600 | 700 | 4,850 | 2,750 | 2,100 | 76 |
| General surgery | 32,100 | 9,200 | 35,300 | 23,500 | 11,800 | 50 |
| Allergy and immunology | 3,000 | 150 | 3,050 | 2,050 | 1,000 | 49 |
| Obstetrics-gynecology | 32,300 | 6,200 | 34,450 | 24,000 | 10,450 | 44 |
| Infectious diseases | 3,050 | 500 | 3,250 | 2,250 | 1,000 | 44 |
| Plastic surgery | 3,700 | 600 | 3,900 | 2,700 | 1,200 | 44 |
| Thoracic surgery | 2,700 | 450 | 2,900 | 2,050 | 850 | 41 |
| Ophthalmology | 15,400 | 2,600 | 16,300 | 11,600 | 4,700 | 41 |
| Radiology--Diagnostic | 24,400 | 3,500 | 25,650 | 19,200 | 6,450 | 34 |
| Orthopedic surgery | 19,000 | 3,150 | 20,100 | 15,100 | 5,000 | 33 |
| General pediatrics | 35,300 | 7,050 | 37,750 | 30,250 | 7,500 | 25 |
| Urology | 8,800 | 1,600 | 9,350 | 7,700 | 1,650 | 21 |
| IN BALANCE | | | | | | |
| Gastroenterology | 6,550 | 1,000 | 6,900 | 6,500 | 400 | 6 |
| Pathology | 16,000 | 2,450 | 16,850 | 15,900 | 950 | 6 |
| Dermatology | 7,150 | 700 | 7,350 | 6,950 | 400 | 6 |
| Otolaryngology | 8,000 | 1,400 | 8,500 | 8,000 | 500 | 6 |
| Osteopathic general practice | 23,050 | 2,300 | 23,850 | 22,750 | 1,150 | 5 |
| General internal medicine | 66,500 | 20,800 | 73,800 | 70,250 | 3,550 | 5 |
| General-family practice | 61,750 | 7,600 | 64,400 | 61,300 | 3,100 | 5 |
| Neurology | 8,300 | 950 | 8,650 | 8,350 | 300 | 4 |
| Emergency medicine | 8,900 | 1,000 | 9,250 | 135,000 | -4,250 | -3 |
| Hematology-oncology | 7,850 | 1,300 | 8,300 | 9,000 | -700 | -8 |
| Anesthesiology | 18,750 | 2,050 | 19,450 | 22,150 | -2,700 | -12 |
| Pediatric cardiology | 850 | 400 | 1,000 | 1,150 | -150 | -13 |
| UNDERSUPPLY | | | | | | |
| Radiology-Therapeutic | 2,050 | 300 | 2,150 | 2,500 | -350 | -14 |
| Psychiatry (general) | 29,250 | 3,550 | 30,500 | 38,500 | -8,000 | -21 |
| Preventive medicine | 5,550 | NA | 5,550 | 7,300 | -1,750 | -24 |
| Physical medicine and rehabili | 2,350 | 150 | 2,400 | 4,050 | -1,650 | -41 |
| Pediatric nephrology | 200 | NA | 200 | 350 | -150 | -43 |
| Neonatology | 700 | NA | 700 | 1,300 | -600 | -46 |
| Child psychiatry | 4,050 | 200 | 4,100 | 9,000 | -4,900 | -54 |
| Pediatric hematology-oncology | 500 | 200 | 550 | 1,650 | -1,100 | -67 |
| Pediatric endocrinology | 250 | NA | 250 | 800 | -550 | -69 |
| Pediatric allergy | 750 | 450 | 900 | 900 | NA | NA |
| Nuclear medicine | NA | NA | NA | 4,300 | NA | NA |
| All other and unspecified | 9,200 | 1,450 | 9,700 | NA | NA | NA |

Source: Bowman et al., (1983)

needed. Thus, the lower physician requirements for HMOs and the rise in the proportion of the population enrolled may have exacerbated the projected trend toward an oversupply of physicians.

Steinwachs et al. (1986) compared data from three HMOs with the physician-to-population ratio of GMENAC. They found that HMOs needed only half as many general internists as family physicians and two-thirds as many as pediatricians. When projected to the nation, this suggests that 20 percent fewer primary care physicians for children and 50 percent fewer for adults will be needed in 1990 than predicted by GMENAC. While there was considerable variation in the staffing patterns among the HMOs and there are problems with projecting these results to the national population (see Section 3.2), the study highlights the fact that the GMENAC projections may already be well off base.

An article by Lanska et al. (1984) argued that the GMENAC numbers should be adjusted to reflect the increased proportion of female physicians. Some have reported that female physicians tend to work fewer hours per week and per year and also tend to see fewer patients per hour than their male counterparts (Reinhardt, 1981). Bowman and Katzoff (1980) point out that, in theory at least, the GMENAC studies did use sex-specific death and retirement rates on the supply side and on the requirements side instructed the Delphi panels to account for the impact of female physicians when estimating the future productivity of physicians. How well this was factored into the requirements estimates is an implicit issue that is certainly open to debate. Lanska et al. can be interpreted, at least, as arguing that GMENAC did not sufficiently account for this impact in its productivity calculations.

Since much of the data used by the panels were epidemiological measures and utilization-based descriptions of medical practice, it is not clear how much the resulting GMENAC estimates differ

from those derived from a utilization-based estimate such as the BHPr model. In Table 3-5 we present a comparison of the aggregate supply and requirements projections generated by the GMENAC and the BHPr methodologies.

We see that when the GMENAC estimates are adjusted to value residents and fellows as one full-time equivalent (FTE) doctor instead of only 0.35 FTE, both the GMENAC and the BHPr models predict essentially equivalent aggregate supplies of physicians (MDs and DOs). The requirements estimates differ substantially, however, implying predicted oversupplies of radically different magnitudes. Previous researchers have suggested that this difference is due in large part to the fact that the utilization trend analysis of the BHPr requirements model results in the forward extrapolation of a strong positive trend in utilization, while the GMENAC methodology does not incorporate such a trend. Finally, one notes that the BHPr requirements estimates have been continually adjusted downward as the model has been updated and revised. With supply estimates remaining approximately steady, the oversupply predicted by the BHPr is growing larger and converging to some extent with that predicted by GMENAC, although substantial differences still exist.

### 3.4 MARKET-SIGNALS APPROACH

What we are calling a "market-signals" approach can be differentiated from the requirements/supply comparisons discussed in the two previous sections in two ways. First, and most important, market-based approaches assume an interaction between the supply and demand sides of the market. Second, market-based approaches can examine other signals coming from the market such as prices and incomes, instead of concentrating on quantities alone. On the surface, a market-signals approach has considerable appeal for forecasting the future patterns of prices, incomes, supply, and quantity. However, the data requirements for a full

TABLE 3-5

COMPARISON OF SUPPLY AND REQUIREMENTS ESTIMATES GENERATED BY GMENAC AND BHPR FOR 1990

| | Supply | Requirements | Oversupply |
|---|---|---|---|
| GMENAC | 593,250* | 473,000** | 120,200 |
| BHPr*** | | | |
| 1982 Report | 591,200 | 570,200 | 21,000 |
| 1984 Report | 594,600 | 559,300 | 35,300 |
| 1986 Report | 587,680 | 541,000 | 46,680 |

* Supply estimate is composed of 504,750 physicians and 88,500 residents and fellows. GMENAC's own supply estimate was only 535,750 because residents and fellows were treated as 0.35 FTEs. They are treated as 1.0 FTE in this table so that comparisons with BHPr estimates may be made.

** Requirements estimate is revised from the original estimate of 466,000 to reflect revised estimates of requirements for a number of subspecialties (see Bowman et al., 1983).

*** Supply forecasts are from the BHPr Supply Model basic series estimates.

econometric specification of a market model are substantial. In fact, the data necessary to estimate a specialty-specific market model, at either the national level or some more disaggregated level (which would be more desirable) are not available. As a result, market models have taken either one of two courses: 1) analysis of physician incomes and associated rates of return to investments in medical training using individual physician data, and 2) highly aggregated models of the relationship between physician expenditures and physician supply. Each of these basic types of models is now discussed in turn.

### 3.4.1 Analysis of Individual Physician Income

The calculation of rates of return to medical training has a long history in economics (Friedman and Kuznets, 1945; Kessel, 1958). These early studies tended to support the argument that the medical profession acted as a cartel, keeping the specialty in a shortage, incomes artificially high, and yielding high returns to medical training. However, the studies over the years (Sloan, 1970; Fein and Weber, 1971; Lindsay, 1973, 1976; and Leffler, 1978) have not yielded definitive conclusions on this issue. By and large, the studies have supported the general consensus that, at least through the mid-1970s, there was a shortage of physicians. More recent evidence suggests that physician incomes have declined slightly (Glandon and Werner, 1979; AMA, 1986), and the most recent empirical analyses (Noether, 1986) suggest that the increasing supply of physicians is associated with an increase in competition and a decline in their incomes.

In general, many of these studies are of limited assistance in assessing specialty imbalances since they tend to aggregate over all physicians. In addition, since the rate of return is calculated as the private rate of return as opposed to the social rate of return, they tend only to support the notion that market

forces play a role, without indicating the socially optimal level of supply. A few recent studies (Dresch, 1978; Burstein and Cromwell, 1985) have computed rates of return to investments in specialty training. The results from both studies suggest that, with the exception of pediatrics, specialization has been highly profitable to physicians.

For the policymaker attempting to assess imbalances this information may be of limited value. If one believes, for example, that relative prices in the market overcompensate specialists, then this result suggests only that specialization will continue, not that it necessarily should. At the same time such noted analysts as William Schwartz and Frank Sloan have stated that income information supports the view that the U.S. does not suffer from an oversupply of physicians in general. They note that:

> We don't think there is any compelling evidence that there is an appreciable physician surplus at this time. Increased competition has led to wider diffusion of physicians, and other changes, such as aging of the population and technological change, have also bolstered demand. In fact, during the period 1980-1984, supply and demand were in approximate balance as evidenced by the fact that net physician income remained virtually constant, as documented in Medical Economics. (Quoted in Iglehart, 1985.)

The relatively modest declines in physician incomes over the past decade, in the face of substantial increases in the supply of physicians, suggest that society continues to place a relatively high value on the output of physicians. However, given perceived rigidities and distortions in the relative compensation of different specialties, most analysts would be uncomfortable with using relative rates of return to different specialties alone to make judgments about surplus or shortage, though they seem comfortable in concluding that there is not a serious surplus of physicians.

### 3.4.2 Econometric Market Models

There have also been attempts to develop and estimate market-level models of the demand and supply for physicians and to explain the pattern of physician expenditures. Hixson and Mocniak (1980) developed an aggregate time series model of the demand and supply for physician and hospital services. They found that the market is responsive to increases in the supply of physicians in the conventional way, with an increased supply of doctors associated with a decline in the price of physicians' services. They suggest that there is an equilibrating mechanism but do not make a judgment as to whether the market is in shortage or surplus. Hu and Yang (1985) estimate a similar model taking advantage of new econometric tools involving disequilibrium. Using time series data from 1950 to 1980, they find that the market is in disequilibrium and that the price does not adjust as rapidly as one might like. They suggest that in all likelihood if the market were in a state of oversupply the resultant price adjustment would be slow. In a sense, this argues that market signals will have limitations as indicators of surplus or shortage.

Sloan and Schwartz (1983) examined expenditures for physician's services over the decade of the 1970s and found that only about one-fifth of the observed increase could be attributed to the increased number of physicians. Based on their findings from the 1970s, they predicted that the 1980s would witness a very slight increase in gross income per doctor but that net incomes would remain approximately unchanged or even fall as the supply of doctors continued to rise. These authors conclude that a large surplus of physicians is not likely. Of course, this study did not consider potential imbalances on a specialty level.

Frank (1985) responded to the puzzling results of studies which had found that increases in physicians' fees were associated

with more physicians per capita. He focused his efforts on the pricing and location of physician services in one particular specialty--psychiatry. His market model allowed the supply of providers to adjust slowly to changes in demand and yielded predictions which were more consistent with the predictions of the competitive model. Brown and Reid (1981) also concentrated on one particular specialty when they modeled the market for general practitioners. These researchers also concluded that the competitive market model seems to be applicable since their results showed that GPs tended to distribute themselves into new markets as a result of demand shifts. If, indeed, the markets for particular specialties are characterized by the standard competitive market model, then the analysis of market signals such as income can yield some insight into the question of manpower imbalances. However, for these studies to be of help to COGME they need to be performed for each specialty individually, or, at least, they should make the distinction between primary and nonprimary care physicians, rather than for all physicians in the aggregate.

Finally, it should be noted that the BHPr has developed its own eight-equation simultaneous model (BHPr, 1986) which models both the supply and demand for various forms of health services and which focuses on the interrelatedness of the principal factors. The model is estimated with national time-series data and is used to forecast health care prices and expenditures under a variety of likely scenarios about the future. At present, the approach is being used to assess the impact of an increased supply of doctors but it is not forecasting on a subnational level.

### 3.5 LOCATIONAL DISTRIBUTION

One of the obvious problems with national-level comparisons of requirements and supply is that they are by definition national averages over a diversity of local market areas with very

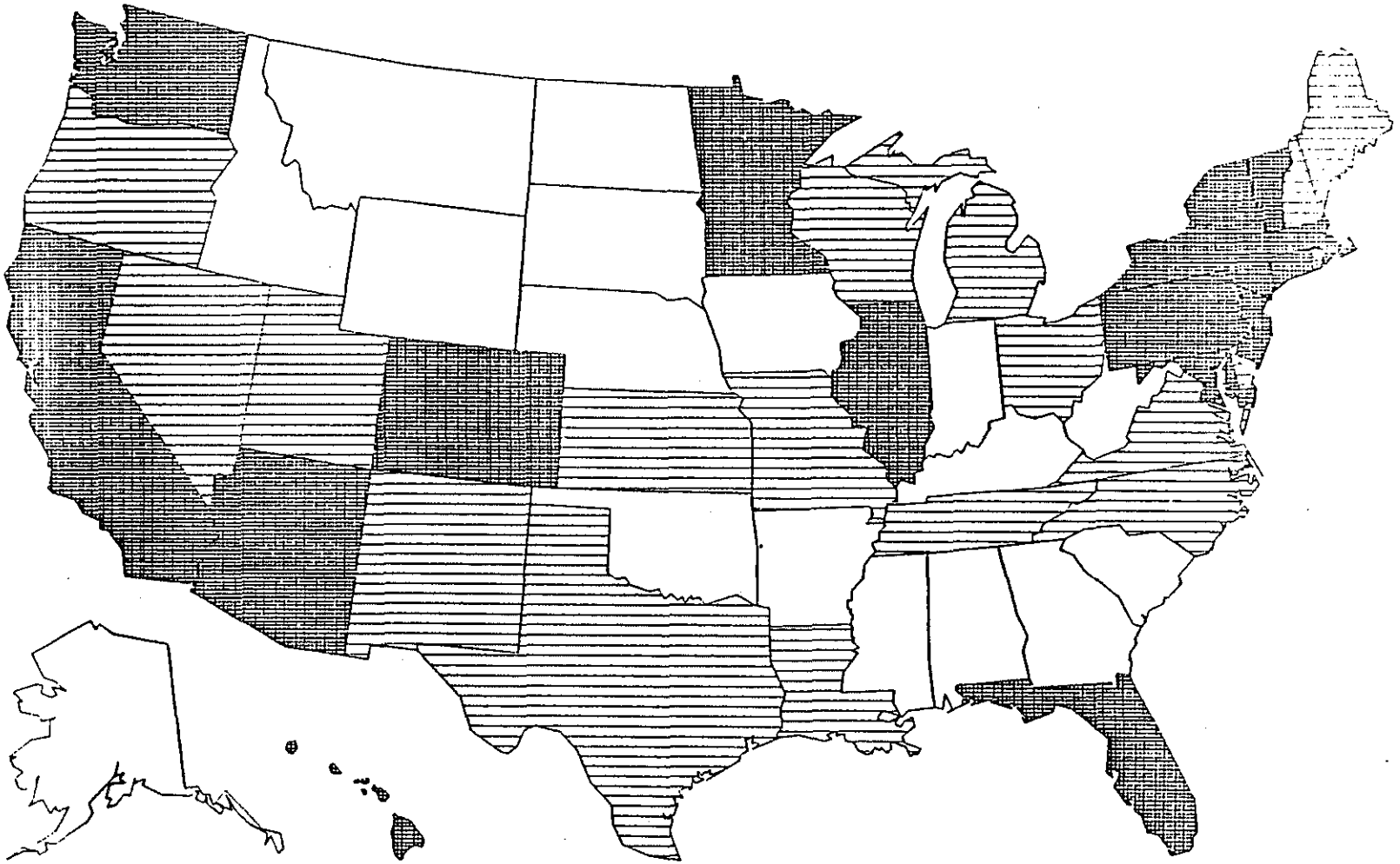
different demands and needs for as well as supplies of physicians. The optimal local supply will depend upon local area market size, composition of the population, and population density. It is obvious that even if the national level of supply were at appropriate levels, a geographic or locational maldistribution could result with some areas being overserved and others being underserved.

Figure 3-4 provides an indication of the variation in physician-to-population ratios by state. Of course, there is probably more variation within states as well. Table 3-6, from the GMENAC report, provides an indication of the variation which existed by county in 1975. Recent county-wide specialist-to-population ratios can be constructed using data from the Area Resource File (ARF) and might be useful for COGME to consider in the future. Projections of future physician-to-population ratios have been generated by the BHPr model on a regional basis for four broad categories of specialization. These data are of more limited use for addressing regional variation in specialty availability since they are aggregated to a larger degree.

Researchers in the past have analyzed the geographic distribution of physicians in a number of ways. In a separate volume of their final report, GMENAC (1980) presented selected data on the distribution of physicians by county for 18 specialty classifications. The data indicated substantial differences in the physician-to-population ratios across geographic regions. Large differences were present in each of the specialties examined. As the report noted, however, physician-to-population ratios should be interpreted cautiously.

First, the presence of a physician in a market area does not necessarily mean that the physician practices in that area. Similarly, the fact that patients will often cross into a market area other than their one of residence to receive care means that

**FIGURE 3-4**
NONFEDERAL PHYSICIANS
PER 100,000 CIVILIAN POPULATION 1983




SOURCE: PHYSICIAN CHARACTERISTICS AND
DISTRIBUTION IN THE U.S., 1984 (AMA)

TABLE 3-6

SELECTED PHYSICIAN DISTRIBUTION STATISTICS BY SPECIALTY, 1975

| Specialty | Number of Physicians in U.S. | Physicians per 100,000 Population in U.S. | Number of Counties Without Physician | Percent of All Counties (3084) | County Ratios per 100,000 Population | | |
|---|---|---|---|---|---|---|---|
| | | | | | 50th Percentile | 90th Percentile | 100th Percentile |
| All Specialties | 307,155 | 144.2 | 167 | 5.4% | 52.8 | 122.8 | 1299.4 |
| Adult Medicine | 109,615 | 51.4 | 180 | 5.8% | 32.9 | 57.6 | 485.9 |
| General Practice/ Family Practice | 49,521 | 23.2 | 208 | 6.7% | 25.2 | 47.4 | 136.4 |
| Internal Medicine | 48,459 | 22.7 | 1633 | 53.0% | 0.0 | 15.7 | 380.8 |
| Cardiovascular Diseases | 6,381 | 3.0 | 2377 | 77.1% | 0.0 | 3.0 | 28.2 |
| Gastroenterology | 1,945 | .9 | 2730 | 88.5% | 0.0 | .5 | 25.0 |
| Pulmonary Disease | 1,885 | .9 | 2700 | 87.5% | 0.0 | .7 | 43.5 |
| Allergy | 1,424 | .7 | 2703 | 87.6% | 0.0 | .6 | 55.6 |
| General Surgery | 31,640 | 14.8 | 1202 | 39.0% | 5.8 | 16.1 | 108.5 |
| Obstetrics | 21,177 | 9.9 | 1881 | 61.1% | 0.0 | 10.1 | 55.9 |
| Pediatrics | 20,399 | 9.5 | 1978 | 64.1% | 0.0 | 8.2 | 86.0 |
| Psychiatry | 19,525 | 9.1 | 2144 | 69.5% | 0.0 | 6.8 | 104.2 |
| Orthopedic Surgery | 10,666 | 5.0 | 2218 | 71.9% | 0.0 | 6.1 | 74.6 |
| Ophthalmology | 8,952 | 4.2 | 2079 | 67.4% | 0.0 | 5.2 | 53.0 |
| Urology | 6,092 | 2.8 | 2256 | 73.2% | 0.0 | 3.7 | 35.8 |
| Otolaryngology | 4,791 | 2.2 | 2366 | 76.7% | 0.0 | 2.7 | 58.8 |
| Dermatology | 3,372 | 1.5 | 2504 | 81.2% | 0.0 | 1.7 | 52.9 |
| Neurosurgery | 2,886 | 1.3 | 2675 | 86.7% | 0.0 | 1.2 | 23.5 |
| Plastic Surgery | 2,066 | .9 | 2750 | 89.2% | 0.0 | .6 | 44.4 |
| Thoracic Surgery | 2,044 | .9 | 2668 | 86.5% | 0.0 | .9 | 19.6 |

Source: GMENAC Report to the Secretary, Department of Health and Human Services, Volume III, 1980.

use of only the resident population to construct physician-to-population ratios for the market area will artificially inflate the ratio. Second, as pointed out above, market areas differ considerably by size and by characteristics of the population. GMENAC noted that service requirements are determined not only by population size, but also by age, sex, race, income, education, willingness to travel, and proximity to another large community. Thus, the geographic distribution of physician-to-population ratios can be expected to be uneven. Utilization of physician services can also differ because of differences in professional judgments concerning the value of specific treatments. And as noted in Section 3.3, physician-to-population ratios can differ markedly depending on the way the health services are organized. Despite these caveats however, it is still important to monitor variations and consider how to determine whether imbalances exist in certain regions.

GMENAC recommended that small area population-based data on the availability, requirements for and utilization of physician services be collected, analyzed, and used in manpower planning policies. GMENAC also recommended that specific standards be established for defining health manpower shortage areas as well as minimum time/access standards to various physician services. GMENAC recommended, for example, that five basic types of health care services should be available with these maximum travel times: 30 minutes for emergency medical care; 30 minutes for adult medical care; 30 minutes for child medical care; 45 minutes for obstetrical care; and 90 minutes for surgical care services for 95 percent of the population in 1990. The report further recommended that 50 percent of the specialty-to-population ratios suggested by the GMENAC Modeling Panel be established as the minimum acceptable ratio for all areas.

An important empirical question for policymakers is to what degree increases in the supply of physicians help to alleviate

the problem of underserved areas. The topic has been addressed in a number of studies, most notably those conducted by researchers at Rand. Newhouse et al. (1982) reported that as the supply of physicians increased during the 1970s the medical and surgical specialties diffused into smaller and smaller communities. In fact, by 1979 "nearly every town with a population of 2500 had ready access to a physician." They further noted that only a small percentage of towns with a population of more than 20,000 were without the services of an internist, obstetrician-gynecologist, pediatrician and radiologist and that even orthopedists, ophthalmologists, and urologists were present in all such communities. In a related study reporting on the time that it takes to get to physicians (Williams et al., 1983), they found that for both 1970 and 1979, approximately 80 percent of residents in towns of less than 25,000 outside metropolitan areas lived within 10 miles driving distance of some physician and 98 percent lived within 25 miles. The study noted, however, that during the 1970s, the distance to medical and surgical specialists decreased substantially as the geographic distribution of specialists became more even.

In the past, the U.S. Government has developed a criteria to identify health manpower shortage areas (HMSAs) as a basis for addressing underserved areas. In general, the Government has determined HMSAs by choosing specific physician-to-population ratios for different regions as cutoff points to determine whether an area is eligible for aid. Government aid includes assistance such as staffing by the National Health Services Corps. The ratio is also adjusted for indices of medical need. The 1976 Health Professions Educational Assistance Act designated that shortage areas include population groups and institutional settings as well as geographic areas (OTA, 1980). Population groups include Native Americans, migrant workers, and the aged, while institutional settings include locations such as hospitals,

state mental health facilities, long-term care facilities, migrant health centers, and Federal and State prisons.

Only primary care physicians are included in the physician-to-population ratios used to determine HSMAs. For this purpose, primary care physicians include general practitioners, family practitioners, obstetrician-gynecologists, pediatricians, and internists. Psychiatrists are also included in the definition of primary care physicians in mental health facilities.

For nonmetropolitan areas, the government has determined that a HMSA exists if there is a primary care physician-to-population ratio of 1:3,500 or higher (fewer physicians). This means that only those areas meeting this criterion are eligible for government aid. Once designated as an HMSA and selected for staffing by the National Health Service Corps, physicians are provided until a ratio of 1:2,000 is reached. When measured by county, most metropolitan areas have an adequate number of primary care physicians. However, since this ratio may mask needs in certain sub-county urban areas (such as inner cities), the government measures the need for physicians in these areas by examining the needs of low-income populations. In order to be eligible for designation, the population must also have a physician-to-population ratio of 1:3500.

Examining geographic variation is an important issue that COGME may want to address. Options for including this level of specificity in the analysis are included in more detail in Section 5. For example, COGME could update the county data on the distribution of specialist-to-population ratios as reported by GMENAC. As noted, data could also be obtained from the Area Resource File and used to calculate these ratios for different definitions of market areas.

# SECTION 4
# OTHER STUDIES AND DATA LIMITATIONS

## 4.1 INTRODUCTION

In addition to the recently completed studies discussed in the previous section, a number of medical and specialty societies are currently carrying out or preparing to carry out studies related to the issue of physician/specialty manpower. This section, combined with the background provided in the preceding section, is intended to present the reader with a summary of the state of the art in efforts to assess specialty imbalances. Research projects and data collection efforts of the American Medical Association, the Council of Medical Specialty Societies, and the Association of American Medical Colleges are discussed below. The information provided is based upon discussions with research staff at each of these organizations. Table 4-1 summarizes the studies discussed in Section 4.2.

Section 4.3 considers data limitations which may hamper attempts to assess specialty imbalances. It is important that COGME members and policymakers have a good understanding of not only the general approaches to determining specialty manpower imbalances but also the data shortcomings which make each approach less than ideal. With this understanding, COGME members will be better equipped to make recommendations about the approach(es) they believe will be most amenable to use in the short term.

## 4.2 ONGOING AND PLANNED STUDIES

### 4.2.1 American Medical Association

The AMA has collected data and analyzed issues concerning physician manpower for many years. In the past, the AMA has not made recommendations about how to arrive at an optimal number of

TABLE 4-1

ONGOING ATTEMPTS TO STUDY PHYSICIAN SPECIALTY MANPOWER ISSUES

| Organization | Data Source | Scope of Analysis* | | Projected Date of Completion |
|---|---|---|---|---|
| | | Specialty | Geographic | |
| American Medical Association | AMA Physician Masterfile<br>SMS | 13 specialties | NA | May 1986 - June 1989<br>Preliminary results available, May 1987 |
| Council on Medical Special Societies | Matrix Distributed to Specialty Societies | 24 specialties | NA | Preliminary data in June 1987 |
| Association of American Medical Colleges | Surveys of Medical Students and Residents | NA | NA | Data collected since 1983<br>Currently being readied for use |

* See text for detailed discussion.

physicians and has emphasized a reliance on market forces to determine the number of physicians in the United States. More recently, though, the AMA has begun developing computer models in order to make projections about the future demand for, and supply of, physicians in the U.S. The projections are intended to aid the Association in considering manpower policies in the future. The AMA has expressed its willingness to share results with COGME.

Projections by the AMA will rely on new computer models using updated forms of existing databases. The AMA has two data sources which contain a wealth of information on physicians in the United States:

1) AMA Physician Masterfile:
This file contains information on numbers of physicians by specialty, major professional activity, location, sex, age, medical education, hospital affiliation, type of employment, and board certification. In addition, there are geographical data by state, county, and metropolitan area.

2) Socioeconomic Monitoring System (SMS):
This file contains information on hours worked by physicians, patient visits, hospital utilization, fees, expenses, and income. The information is broken down by specialty group, census division, age, type of practice, urban vs. rural location, and employment status.

The AMA has used this data in recent years for a number of studies on physician manpower. Summary data from the Physician Masterfile are published periodically, most recently in Physician Characteristics and Distribution in the U.S. 1986. Most recent results from the annual SMS survey are published in Socioeconomic Characteristics of Medical Practice 1986. On occasions, the AMA also receives additional information from telephone and mail surveys.

In the future, the AMA plans to provide projections regarding the market for physician services in the United States. The Association has already commenced its effort and intends to develop its models over the next several years, gradually adding layers of sophistication about patterns of health care consumption by the public and about the changing demographics of the physician population. The AMA envisions gathering the information over a period of approximately three years.

In the first year, which ended in May 1987, the AMA developed the capability to project the supply of physicians under various scenarios regarding the number of future U.S. medical school enrollees and foreign medical school graduates. Preliminary projections were recently published in The Demographics of Physician Supply: Trends and Projections. These projections use a new computer model called the AMA Demographic Model of the Physician Population (DMPP). The model is based on the Physician Masterfile and includes functions on physician retirement, mortality, and accession. The model includes information on 10 specialties from the SMS file.

In the second and third years (June 1987 to May 1989), the AMA plans to develop a model to project the future demand for physician services. There are also plans to continue developing the supply model. The demand model will use data from the 1980 National Medical Care Utilization Expenditure Survey (NMCUES), the 1980 and 1985 Health Interview Survey (HIS), and the 1981 and 1985 National Ambulatory Medical Care Survey (NAMCS). The model will use population projections and trends in utilization patterns to project the growth in the demand for physician services.

The more sophisticated supply model to be developed during the second and third years of the AMA effort will incorporate information about physician productivity and the rate of return

to training investments in different physician specialties. In analyzing the number of hours worked by physicians, for example, the AMA will adjust for differences between U.S. and foreign medical graduates and between male and female physicians. There will not be information on differences between HMO and fee-for-service physicians.

Currently, there are also plans to break down both the supply and demand models into physician specialty categories. For the supply model, the AMA plans to expand the 10 specialty categories currently listed in the SMS file into 13 categories: general/family practice; general internal medicine; internal medicine subspecialties; general surgery; surgical subspecialties; pediatrics; obstetrics/gynecology; radiology; psychiatry; anesthesiology; pathology; emergency medicine; and an "other" category. On the demand side, the AMA hopes to break down the specialties in more or less the same way though it is uncertain whether or not data will be available on radiologists, anesthesiologists, and pathologists.

To some extent, however, the supply and demand models taken together should eventually be able to provide some projections on the entire market for particular physician specialties. This will enable the AMA to project future over- and undersupplies under a number of different assumptions. The AMA hopes to analyze several specific areas in the future. Among these are: changes in patterns of health care consumption in the United States; changes in jobs of other health professions; changes in health care technology; changes in individual physician practice patterns.

Research to model physician supply and demand by subnational geographic areas is currently ongoing and the AMA hopes to eventually integrate these plans into its other studies. However, this research has a lower priority and there will probably not be any results for at least two to three years.

There are several ways in which COGME could use the AMA data both in the short and long term. As noted, the AMA already has the capability to run its supply model under different assumptions. COGME could, in the short term, provide the AMA with its own assumptions or sets of assumptions regarding the number of future U.S. medical school graduates or foreign medical graduates and have the AMA run the model. The obvious limitation is that this would only provide estimates of the future supply of physicians. The AMA hopes to have preliminary estimates on the demand side by late spring 1988, and thus it may be possible for COGME to use some initial results on both demand and supply in its July 1988 report. However, given the short time frame and the newness of the AMA demand model, it is highly unlikely that these numbers will be ready in time for the COGME publication.

### 4.2.2 Council of Medical Specialty Societies

The Council of Medical Specialty Societies (CMSS) is a federation of 24 national medical specialty societies. The Council was established to provide a forum to enable the various medical specialty societies to meet together and participate in issues of concern to specialized medicine. CMSS is organized into several committees including a Health Manpower Committee whose role is to identify, study, and make recommendations on relevant national physician manpower studies as well as on legislation affecting specialized medicine. CMSS can thus serve as a useful source of information and as a conduit to inform COGME about physician manpower studies undertaken by various specialty societies. CMSS reported to COGME in March 1987 that it could best serve COGME by coordinating information and requests for manpower data between COGME and the specialty societies.

CMSS is currently involved in two activities which should eventually provide some useful information on the supply of

physicians in various specialties. The CMSS Health Manpower Committee is currently designing a consistently defined minimum data base for physician manpower for its members. This effort is intended to provide a means by which the various societies' databases can be matched by provider identification number thereby facilitating more comprehensive analysis of this data in the future. Presently, it is not known however, when this effort will be completed.

CMSS is also currently coordinating the completion of a matrix by its members which will provide physician supply projections from specialty society data. The matrix is intended to provide past and present data on the supply of specialists as well as estimates of physician supply from 1987 to 2010. The matrix is scheduled to be available in June of this year and should be of some use to COGME. Members of CMSS have been asked to make annual projections of the future supply of specialists from 1987 to 2010 based on several factors: the supply of specialists at the start of each year; the annual residency program output; annual specialist immigration; and estimated annual deaths and retirements.

While this matrix should be helpful for COGME as an additional source of information on projected physician supply by specialty, a number of likely limitations should be mentioned. First, there may be substantial differences in the ability of different specialty societies to provide data. Second, the matrix provided by CMSS to its members asks only about the projected supply of specialists. Since there will be no information about the demand for these specialists, or about other factors which affect the market such as rates of return to education, the data will not by themselves speak to the issue of specialty imbalances. Third, the matrix requests that members project the supply of specialists for all years 1987 to 2010; obviously, there will be a great deal

of uncertainty in projections made for years so far into the future.

Despite the limitations of these data, the information provided by the specialty societies could be useful as a starting point for examining the supply side of future physician specialty imbalances. The data could also be used in the short term as background information in surveys of physicians attempting to assess physician specialty imbalances. This type of policy option is discussed in more detail in Section 5.

In the past, various specialty societies have conducted studies of future imbalances in their particular specialties. The American College of Radiology and the American Thoracic Society, for example, have projected the future supply of radiologists and thoracic surgeons respectively. Studies completed as of 1985 are described in A Review of Health Professions Requirements Studies (BHPr, 1986). COGME has requested that CMSS coordinate the gathering of any specialty society studies undertaken in the recent past. Any additional information that the societies can provide is expected to be available in early June 1987.

### 4.2.3 Association of American Medical Colleges

The Association of American Medical Colleges (AAMC) represents all accredited M.D. degree-granting medical schools in the United States. In 1983 the Association began collecting comprehensive data on all students involved in either undergraduate or graduate medical education in its member institutions. On the undergraduate medical education level, a file is begun on every student taking the MCAT exam and information is subsequently collected on that student's application to medical school and his/her progress through school (for those admitted and attending school). Information about graduate medical education (GME) is collected

by means of the AAMC's Graduation Questionnaire, a survey administered annually to all senior medical students enrolled in the AAMC member institutions. Information available from this source can be classified into the following four categories: GME plans; career plans; medical school experiences and curriculum; and demographic and financial data. In addition, the AAMC and the National Residency Matching Program collect annual data on physicians in residency positions. All of these types of data are particularly well-suited for studies of specialty choice, specialty switching, and the demand for the number of first year medical school positions and residencies. These data could be utilized by the Bureau of Health Professions if they attempt to refine their model of specialty supply so as to better reflect recent trends in specialty choice.

The data collection efforts begun in 1983 are continuing on an annual basis and the resultant files are currently being edited and readied for use. As of this writing, the AAMC has not yet undertaken any research activities to model either the supply of or demand for medical manpower. However, the AAMC's own Task Force on Physician Manpower is charged with tasks similar to those of COGME, and its decisions about what modeling efforts will be undertaken by the AAMC in the future (if any) are expected in the next three to six months (i.e., by November 1987). Given the relative strengths of the AAMC data, it is anticipated that areas in which research efforts are most likely to be concentrated include: 1) modeling determinants of the number of first-year places in medical schools; 2) modeling determinants of the number of residency positions available in particular specialties; 3) modeling physicians' choice of specialty; and 4) modeling determinants of specialty switching and branching over a physician's career. Although demand for physician manpower is likely to play a part in the modeling of residency positions and specialty choice, the findings of these research efforts are more likely to yield insight into the issue of physician/specialty

supply rather than requirements. Assessment of specialty imbalances would require the coupling of these findings for specialty supply with estimates of specialty demand.

Specialty switching is an important phenomenon to study because it provides some indication of the potential flexibility of physicians in responding to imbalances at a specialty-specific level. Even if predictions are off the mark, the market may be moved toward equilibrium by physicians switching into the specialties where they are needed. The AAMC feels that it can be of use in helping the medical manpower market work more efficiently by providing timely information about the various specialties to prospective medical students and to medical students contemplating residency choices.

### 4.3 DATA LIMITATIONS

Before deciding upon policy options for short-term analysis, it is important to understand the limitations of existing data. Many of these limitations were discussed in Section 3.

Data on current physician manpower are available from several sources, most notably the AMA Physician Masterfile and the AMA Socioeconomic Monitoring System. These files contain comprehensive data on the demographics and professional activity of all physicians in the United States. As such, these data have several distinct advantages over data collected by the specialty societies and others. First, membership lists of specialty societies generally contain only board-certified doctors, thereby undercounting the total supply of physicians (MDs and DOs). The 1980 OTA report, Forecasts of Physician Supply and Requirements (OTA, 1980), estimates that board-certification data exclude nearly 50 percent of the MD supply reported by the AMA and 80 percent of the DO supply reported by the AOA. However, the proportion of physicians who are board certified is growing,

indicating that this potential for undercounting may become less of a problem in the future. Second, a physician may be certified in more than one specialty, implying double or even triple counting when aggregating across the membership lists of various specialty societies. Third, specialty society membership does not necessarily reflect the physician's current area of practice. Of course, the AMA Masterfile is not problem free. In particular, the self-designation of specialty leads to an overstatement of specialty manpower and an understatement of general practitioner supply. Also, the consideration of only the primary specialty designation provides no information on the time devoted to other specialty areas and activities, making the calculation of full-time equivalent manpower difficult (OTA, 1980). Thus, the specialty society data may actually provide better information on the availability of specialty services.

In modeling projections of specialty supply there is only limited data on the specialty choice decision. The BHPr model extrapolates from past trends in first-year residency patterns, but this approach is not ideal because of the specialty switching and branching which takes place during subsequent years of the residency training period. Though the model attempts to correct for this to some extent, it would be better to use final-year residency patters. Unfortunately, such data are not available from the AMA (OTA, 1980). The forthcoming data base of the AAMC may hold more promise for addressing this issue and may allow the BHPr to make specialty choice a response variable in their supply model.

There is also the problem of mid-career specialty switching which is often not adequately accounted for in models of specialty supply and which casts some doubt on supply estimates by specialty. Little could be done in the short term to remedy this, but a longer term recommendation might be to undertake studies of this phenomenon (or to synthesize past studies in this area) and to

incorporate their findings into models of specialty supply. In addition, the AMA plans to improve their capability of measuring specialty switching. The projection of the future is further complicated by the uncertainty surrounding the expected contribution of FMGs; extrapolation of past trends may not be helpful since the situation is subject to change, depending on Federal immigration legislation.

Projections of physician requirements, particularly by specialty, are also subject to data limitations. With needs-based models such as GMENAC, even if epidemiological data were perfect and allowed an accurate prediction of the future need for physician services, the translation into the need for physicians requires data on physician productivity. This parameter can be expected to vary by specialty and to be influenced by a number of factors which must themselves be predicted into the future. Examples of such factors include the extent to which physician extenders will be used and the number of female physicians. Poor predictions of future physician productivity are translated directly into poor predictions of the future requirements for physicians.

Demand-based models for projecting requirements are also subject to data limitations. We have already noted in Section 3.2 that BHPr's attempt to expand the utilization matrix to include 320 population groups instead of 40 taxed the Health Interview Survey (HIS) data to its limits. Furthermore, any attempt to expand the personnel matrix of the BHPr requirements model to include a more detailed specialty breakdown must deal with two conceptual issues related to data availability: 1) the degree to which individual specialties are substitutes for one another is largely unknown, and 2) HIS data do not allow a good determination of utilization rates by specialty. It is likely that both the National Ambulatory Medical Care Survey (NAMCS) and the National Medical Care Utilization and Expenditure Survey

(NMCUES) would provide more accurate data on utilization rates by specialty. NAMCS is a physician-based survey so the specialty designation is reliable, and the longitudinal nature of NMCUES allowed for more careful checking of the doctor's specialty (as reported by the patient) than was possible with the HIS.

In addition to the absolute numbers of specialists, the supply relative to population is also given much consideration in the literature and by policymakers. However, data limitations make the interpretation of physician-to-population ratios subject to many caveats. First, the data are generally available for geopolitical areas such as counties, SMSAs, and states; and these levels will rarely correspond with a relevant health care market area. Patients receive care in areas other than the one in which they live, and doctors treat patients in areas outside their area of residence. Such bordercrossing makes the definition of a market area problematic.

Second, an area's physician-to-population ratio for a particular specialty must be interpreted in light of the specialty mix which exists in the area. Since specialties overlap in the provision of some services, an area which appears to have a shortage of a given specialty still may not be adversely affected if another specialty is providing the needed services.

Third, and perhaps most important, individual market areas are unique and physician-to-population ratios may not give an accurate portrayal of the relationship of "available services" to "needed services" (BHPr, 1982 Report). The amount of physician services available from a given number of physicians is influenced by a multitude of factors, including the practice organization and reimbursement mechanisms (e.g., solo, fee-for-service practitioners versus salaried doctors in group practices) and the utilization of physician extenders. Likewise, the services needed by a population of a given size are influenced by

such factors as the proportion of the population enrolled in HMOs, the proximity to regional medical centers, and the population's socioeconomic characteristics and demographics. These important factors are not adequately reflected in the calculation of physician-to-population ratios from the available data.

# SECTION 5
# COGME'S SHORT-TERM OPTIONS FOR ASSESSING IMBALANCES

## 5.1 IDENTIFYING SHORT-TERM OPTIONS

The major question addressed here is: in the time available for analysis in preparing the first COGME report, what approach or approaches are likely to be of most use in assessing specialty imbalances? Obviously, the time constraint in and of itself places a severe limitation on the amount of new or quantitative modeling and estimation that can be undertaken. The limitations are also budgetary, operational, and technical. COGME has a small internal staff and limited budget for external projects. However, even if substantial funds were available, it would be technically difficult to construct any new models and gather data for analysis over this period. Nonetheless, there are some options building upon work of others that may help COGME in the short-term.

The options vary along two dimensions and can be arrayed as shown in Figure 5-1. The first dimension is the level of specificity: will the analysis examine all physicians, primary vs. non-primary physicians, a more detailed breakdown of specialties or selected specialties? The second dimension is concerned with the amount of qualitative and quantitative content and manipulation of data that would be required. Rankings along this dimension are somewhat arbitrary since the use of any information by COGME will have a qualitative or judgmental aspect. Additionally, the six options listed in the figure are not necessarily mutually exclusive. One or more of them could be undertaken to provide COGME with short-term background information.

FIGURE 5-1

ARRAY OF SHORT-TERM OPTIONS

| LEVEL OF SPECIFICITY | MORE QUALITATIVE ← SURVEY PROFESSIONAL OPINION | SYNTHESIZE MARKET SIGNALS | USE BHPr MODEL | MODIFY GMENAC MODEL | USE HMO STANDARD | MORE QUANTITATIVE → ANALYZE GEOGRAPHIC VARIABILITY |
|---|---|---|---|---|---|---|
| ALL PHYSICIANS | | | | | | |
| PRIMARY VS. NON-PRIMARY | | | | | | |
| DETAILED SPECIALTIES | | | X | | | |
| SELECTED SPECIALTIES | | | X | | | |

The level of specificity has a major impact on what is feasible in the short run. Finer specialty breakdowns will require much more effort to develop and analyze. The level of specialty chosen should be influenced by the policy questions that COGME wishes to address in its first report. Questions of the adequacy of aggregate supply and FMG policies, for example, or of encouraging primary care training may not require as detailed a specialty breakdown in the analysis. Conversely, COGME may choose to let the availability of information limit the scope of the policy questions it addresses in its first report.

Briefly, the six basic alternative approaches are:

1. Survey professional opinion.
2. Synthesize information from market signals and indicators.
3. Use BHPr's requirements projections (not possible on a specialty level).
4. Modify GMENAC requirements estimates.
5. Compare specialty-to-population ratios from HMOs or other closed populations with supply.
6. Analyze geographic variability in specialty-to-population ratios.

These options were identified by considering, for each of the approaches discussed in Sections 3 and 4 of this paper, what might be feasible in the short run. It was recognized, for example, that in the short term, it is feasible to survey professional opinion and to build upon existing databases. Small panels of experts could be convened over a period of two to three months, though the scope of the effort would necessarily be limited. Alternatively, COGME could survey professional opinion by sending a focused questionnaire to the various specialty societies, and perhaps other experts, to obtain information.

Any data generated or used in the short term could come from existing databases and/or build upon existing models such as the BHPr's requirements model or the AMA Demographic Model of the Physician Population (DMPP) which could provide supply projections. Data could also be obtained from projections made in the recent past such as those made by GMENAC. COGME may decide that any combination of any these approaches would be superior to choosing a single option. An approach might consider, for example, gathering existing data and presenting it, along with a questionnaire, to small panels of experts in order to predict whether and to what extent future imbalances are likely. As noted above, an important question that COGME must address early is what level of specificity the effort will entail in terms of both physician specialty and geographic variation.

We now outline each of these options in more detail and list the advantages and disadvantages of each. It is important to remember, again, that they are not mutually exclusive and that COGME will most likely have to make its judgments based on the weight of evidence presented from one or more of these types of approaches.

## 5.2 SURVEY PROFESSIONAL OPINION

Approach: Use qualitative professional opinion to make judgments about requirements.

Method: Design short qualitative questionnaire to send to specialty societies or other experts to solicit their opinions about requirements and imbalances, especially regarding GMENAC. Alternatively, small panels of experts could be convened to provide their opinion or to review the results provided by the specialty societies.

First, any attempt to gather information by professional opinion in the short run is more likely to succeed if it involves a small number of professionals responding to targeted questions.

Conducting a large scale opinion survey, such as the one used by SOSSUS (1978) to ask physicians about local area imbalances would not be feasible in the short run. For SOSSUS, questionnaires were sent to some 10,000 federal and nonfederal physicians having a surgical specialty as one of their three listed specialties. Apart from the logistical considerations, the reliability of the SOSSUS effort has also been questioned (Moore et al., 1978).

A related but more feasible approach may be to prepare a short, targeted questionnaire to ask specialty societies about their perception of the state of balance in their specialty. The CMSS has already indicated its support in canvassing specialty societies, which is in process. COGME has already scheduled public meetings where professional societies will be invited to testify and present their views about imbalances. The questions should certainly cite GMENAC or other quantitative data and ask the specialty societies to respond within a certain page length (presumably they would be invited to submit supporting materials as they desire). Small panels could be convened as an alternative to or in conjunction with these surveys. However, the size and scope of the panels would need to be limited considerably in the short term.

Advantages:

- Allows experts to explain judgments about these complex issues.
- Allows detailed specialty consideration.
- Well-designed questions would help to focus COGME's attention.

Disadvantages:

- Is not directly quantitative.
- May not achieve a consensus.

- Panelists may not have a good perspective on physician imbalances.

Given the difficulties in making quantitative estimates, COGME might be well served by asking experts to make qualitative judgments about the state of their specialty and the important policy issues. Expert judgment may be the best means of synthesizing information on such complex matters. Targeting the questions would allow COGME to focus the analysis to the level of specificity desired.

One disadvantage of this approach is that it would be based upon the qualitative judgments of a relatively small number of individuals. This could be rectified to some extent by focusing the questions and by presenting quantitative material as background information. Another problem is that surveying professional opinion may not achieve a consensus. Sending questionnaires can be problematic because participants do not have a chance to interact and discuss the many complex issues involved. Convening small panels can be problematic because judgments can be swayed by the opinions of a particular member.

### 5.3 SYNTHESIZE INFORMATION FROM MARKET SIGNALS AND INDICATORS

Approach: Use latest information from the market to gain a qualitative impression about how the requirements compare with supply.

Method: Gather and collate information by specialty on relative incomes, recent growth in supply, rate of return to education, and the demand and supply of residencies.

A second option is to assemble and synthesize the studies that have been conducted regarding rates of return to specialty medical training and other market signals of long-term surplus or shortage. There is no definitive study of this issue so COGME might benefit from a paper which attempts to synthesize the

sometimes discordant results in the literature. Of course, a fundamental question remains about the extent to which COGME wants to use market indicators as signals of societal needs and preferences. Sections 2.2 and 3.4 indicated some severe limitations in using such signals for judging over- and undersupplies from a societal standpoint.

Advantages:

- Provides good information on the current market situation.
- Allows some degree of specialty breakdown.

Disadvantages:

- Based on existing reimbursement arrangements and subsidies which are undergoing rapid change. May not be representative of the future or what is socially desirable.
- May be too uncertain to support any strong recommendations about specific specialties.

As discussed previously, market signals can provide good indications about consumers' ability and willingness to pay for medical care and about physicians' choice of specialty and location. It must be noted, of course, that these signals reflect already existing market distortions such as various government interventions. A question that COGME may want to address explicitly at some point is whether and to what extent it wants to make recommendations based upon the medical need of the population. As noted in Section 2, market signals may provide little information about the medical care that society believes is actually necessary.

An additional problem with market signals is that previous patterns may not be representative of what is likely to occur in

the future. Changes in health care delivery systems and in medical technology, increases in the number of female physicians, and a large number of cost containment initiatives being implemented in the private and public sectors, for example, are rapidly changing the market. Simply looking at past market trends would not adequately capture these changes.

### 5.4 USE BHPr'S REQUIREMENTS PROJECTIONS

Approach: Compare existing BHPr demand-based requirements projections with supply. Do not attempt a finer specialty breakdown.

Method: Have BHPr produce the most up-to-date version of the projections. Use for addressing aggregate supply question and policy issues about primary vs. non-primary imbalance.

A third option is to attempt to use the Bureau of Health Professions (BHPr) models of supply and requirements to make judgments about future supply relative to future demand. The structure and limitations of these models was discussed above. In addition to considering predictions about future imbalances of primary and nonprimary care physicians, the specialty estimates of the BHPr supply model could be compared with specialty requirements from a number of sources, such as HMO-derived standards or the opinions of specialty societies.

Advantages:

- Builds upon the most comprehensive demand-based model and estimates ever constructed.
- Could be completed in short-term.
- Allows some questions about primary vs. nonprimary care ambulatory to be addressed.
- Is currently operational and could be used to examine alternative assumptions.

Disadvantages:

- Does not allow detailed or accurate specialty breakdown.
- Does not address concerns about accuracy of underlying data.

One major advantage of the BHPr model is that it is currently operational. BHPr has also made attempts to update some of the model's parameters so as to bring them in line with recent developments. Thus, a feasible short-term option would be to have BHPr generate the most up-to-date estimates using the latest model parameters. Alternatively, COGME might wish to specify different model parameters (such as to account for the expected increase in utilization due to AIDS) and have BHPr generate estimates based on these parameters. The model lends itself well to making a series of alternative predictions based upon various hypotheses about the underlying parameters. The alternative specifications of parameters could be derived by surveying both the literature and selected health care experts as to recent and anticipated developments in the health care arena which might influence manpower requirements and supply in the future.

However, the BHPr requirements model holds no promise for the short-term tasks facing COGME if the Council wishes to assess manpower imbalances on a detailed specialty level. Although the supply model projects specialty distribution, the requirements model operates at a higher level of aggregation, permitting at best a useful distinction between primary and nonprimary care physicians. The BHPr staff has already indicated to COGME the data limitations inhibiting an attempt at specialty-specific modeling. In addition, staff have indicated great concerns about the reliability of the data used to construct the model. It is essential that COGME determine the level of specialty detail it wishes before recommending that BHPr undertake the long-term efforts to use these models to predict specialty imbalances.

## 5.5 MODIFY GMENAC REQUIREMENTS ESTIMATES

Approach: For each of the specialties considered by GMENAC, identify major parameters that may have changed (such as productivity or new procedures) and calculate implications for requirements.

Method: Suggested adjustments to model parameters could be made by 2 or 3 experts in each specialty who would have to review GMENAC's detailed report. Calculations could be made by COGME staff. It would also be possible to work with a more qualitative method: the experts could be asked to draw a qualitative conclusion about the net change in requirements as a result of the adjustments.

Modifying the supply and requirements data from the GMENAC effort represents a fourth option. In principle, it would be possible to change specific parameters in the model (such as the expected number of persons with migraine) and calculate the additional manpower requirements generated given the published estimates on other related parameters. Indeed, since GMENAC was released, several others have attempted such minor adjustments for the increasing number of women physicians and the movement of populations into health maintenance organizations (HMOs). It might be considered, for example, to hire an individual consultant in each of the specialties to review the earlier report and suggest any changes in the parameters due to technological changes or new diseases, etc. occurring since 1980. COGME staff are sufficiently familiar with the model to calculate the implications of any such changes. The resultant new requirements estimates could be compared with supply estimates from GMENAC, the BHPr model, or the AMA.

Advantages:

- Builds upon the most comprehensive needs-based model and estimates ever constructed.

- Allows detailed specialty breakdown as well as primary versus nonprimary care formulation.

Disadvantages:

- Does not address fundamental criticisms of GMENAC approach, such as the lack of a geographic dimension, the sensitivity of the results to a few parameters, and potential panel bias.
- Since most specialties were previously projected to be in or near oversupply, adjustments are likely to only make this greater.

The advantages and disadvantages of the GMENAC approach were considered in detail in Section 3.5. It would obviously not be possible to repeat that effort in the short term, and many observers have expressed reservations about undertaking such an effort in the longer term as well. Nonetheless, GMENAC still stands as the most comprehensive needs-based study ever conducted and represents a good benchmark and a starting point for thinking about future physician specialty imbalances. GMENAC made projections of imbalances by specialty for the year 1990 and in the aggregate for 2000. One possible option is for COGME to simply use those projections in making future policy recommendations. Another approach would acknowledge limitations of that study and would consider changes which have occurred since those projections were made. This approach could also be used with other options noted in this section. For example, GMENAC projections could be presented, along with other data, to medical experts in order to formulate judgments about impending imbalances.

## 5.6 USE SPECIALTY-TO-POPULATION RATIOS FROM HMOS OR OTHER CLOSED POPULATIONS

Approach: Compare latest information from HMOs or other closed populations on specialty-to-population ratios with national supply.

Method: Obtain information from closed populations about the numbers of specialists providing care to their population.

A fifth approach would be to survey the literature or other sources to obtain standards of physician specialty-to-population standards based on either HMO experience or ratios in particular market areas that appear to be in balance or appropriate. If such standards could be found, then they could be compared to forecasts of supply from either GMENAC, the BHPr model, or the AMA.

Advantages:

- Provides some sense of minimal requirements.
- Allows detailed specialty breakdown.

Disadvantages:

- May not be representative of U.S. population.
- May not be adequate standard of care.
- May not provide a reliable benchmark because of variability.

Studies of this kind were considered in more detail in Section 3.2.2. One advantage to this approach is that the data needed for even a detailed specialty assessment are generally available. There are some important limitations to consider in using this data, however. Overall physician-to-population ratios may vary across HMOs, for example, because plans differ in the package of services they offer. Specialist-to-population ratios may vary because the relative roles of various specialties differ across HMOs. Also, enrollees in these plans are often not representative of the national population. For these reasons, this option is probably most useful when used in conjunction with other approaches mentioned. For example, medical experts might review studies of closed populations as well as requirements

numbers generated for the general U.S. population when making judgments.

### 5.7 ANALYZE GEOGRAPHIC VARIABILITY IN SPECIALTY-TO-POPULATION RATIOS

Approach: Update work done by GMENAC's geographic panel. Report on variability in specialist-to-population ratios and procedures across geographic areas to give sense of what market is indicating about requirements.

Method: Use Area Resource File (government database with county-level physician supply) to calculate these ratios for different definitions of market area.

A sixth approach, related to the previous one, would be to study variability in specialty-to-population ratios across different types of geographic areas. In a sense this would be an update of the type of work done earlier by GMENAC's Geographic Panel. Comparing the actual variability in physician-to-population ratios with predicted ratios would give COGME a better sense of the amount of uncertainty involved in assessing specialty imbalances.

Advantages:

- Gives sense of the likely reliability of national requirements estimates.
- Allows detailed specialty breakdown.
- Presents the latest information.
- Can address primary vs. nonprimary care issue.

Disadvantages:

- Only a crude indicator of demand-based requirements.
- Not clear if will support specialty-specific recommendations.

- Would be difficult to adjust adequately for population characteristics and other area-specific factors.

As noted in Section 3.5, there is a great deal of geographic variation in specialty-to-population ratios in the United States. Even if there is general agreement that there is an oversupply in a particular specialty, certain regions or populations may suffer from a shortage. COGME will have to grapple with this question in considering both short and long term options. County-level data are available on the specialty-to-population ratios and could provide a starting point for addressing the question of specialty imbalances.

A considerable problem though is that these ratios provide only a limited amount of information. Ratios can be expected to vary across geographic regions and population groups because of differences in the demographics of populations. In addition, even if ratios were adjusted to take into account demographic variations, other considerations--such as the proximity of regional hospitals--would have to be noted. It is also difficult to define accurately the relevant market area, given the tendency for patients to seek care in areas other than their community of residence; rarely will the aggregation levels of available data correspond to meaningful health care market area definitions. In addition, there is disagreement about the types of physicians needed to treat certain illnesses. The Council may want to limit this kind of analysis to ratios of primary care physicians-to-population in order to identify the problem on a more aggregate level.

# SECTION 6
# POLICY QUESTIONS AND IMPLICATIONS FOR MODELING

## 6.1 INTRODUCTION

In this section, we discuss implications of short- and long-term options for COGME's research agenda and address broader policy issues of concern to the Council. Highlighting some of these broader issues may also assist in formulating an effective research agenda.

Section 6.2 discusses policy issues in light of the short-term options presented in Section 5. Section 6.3 discusses implications for longer-term options. Finally, Section 6.4 provides a discussion of broader issues that are raised in the debate about physician specialty imbalances.

## 6.2 SHORT-TERM MODELING AND POLICY ISSUES

Section 5 identified several short-term options and discussed their advantages and disadvantages. Clearly, in the limited time available, it would be difficult for COGME to undertake any substantial quantitative modeling. It is feasible, however, for COGME to engage in more qualitative analyses and in data manipulation on a more modest scale using existing sources. One productive strategy may be to survey professional opinion using a set of specific questions. Such a targeted effort could help in identifying particular problem areas. COGME could, for example, ask specialty societies to provide information in response to focused questions about whether an imbalance exists in their particular specialty. Alternatively, the Council could have experts review existing data and projects, and answer targeted questions provided by the Council.

Also, COGME could analyze county-wide variations in specialty availability by examining the Area Resource File (a government database with county-level physician supply information). These data could be used to make qualitative judgments about whether geographic differences require policy intervention. In addition, one of the ways that COGME can deal with the constraints it faces in the short run is to narrow the analysis to focus on either major specialty breaks, such as primary versus nonprimary care specialties, or on selected specialties that are believed to represent particular problem areas. However, it would probably not be advisable to attempt to apply any of the six methods to all of the 40 specialties considered by GMENAC. Furthermore, given the limitations of the GMENAC methodology and the changes physician markets since GMENAC (Luft and Arno, 1986), GMENAC's projected over- and undersupplies would not be seen as reliable. More importantly, unless the specific policy questions that COGME wishes to address in its first report are defined soon, it will be difficult to gather any systematic information that will be of assistance.

There are a number of ways that COGME can update and revise previous studies which examined physician specialty imbalances. The two most comprehensive efforts to date are the GMENAC study and the model developed by the Bureau of Health Professions (BHPr). These remain the state-of-the-art efforts in needs-based and demand-based studies. Since these studies are the results of extensive efforts to analyze many of the issues that COGME is charged with addressing, the Council could gain a good deal of information from them without exhausting many of its own resources. Both efforts have been described in detail in this paper. It would be feasible to have experts revise and update GMENAC projections taking into account problems with that study and changes which have taken place since those projections were made. The BHPr model could be useful because the model is up to date and because it would be possible for the Council to modify

assumptions made in the model according to meet its own unique specifications. However, there are limitations to using both studies, particularly in regard to obtaining information about geographic maldistribution. In addition, the BHPr requirements model does not provide information about specialty breakdowns.

Our survey of ongoing and planned studies by professional societies suggests that these offer little in the way of systematic modeling results that can assist COGME in the short run. However, AMA, AAMC, and CMSS all have or can provide some useful descriptive information from previous or ongoing surveys they have conducted. For example, the AMA is the best source of information on the current supply of physicians, as well as changes in physician incomes over time. If COGME chooses to undertake some long-term quantitative modeling, then it will be necessary to investigate the data available from the sources. Alternatively, given that the AMA is embarking upon a long-term project to improve its ability to forecast supply and requirements, COGME may wish to use this information in some manner.

Given the limitations of the methodologies discussed above, a prudent approach in both the short and long run is to rely upon a combination of methods and data sources. It would appear to be most reasonable to have experts synthesize and review existing data sources in order to make qualitative judgments about whether and to what extent physician specialty imbalances exist. Given this approach, there are two aspects for the Council to consider: 1) what data to use, and 2) what level of review would be most effective given the time and resource constraints.

In addition to the information it can obtain from the existing and ongoing studies discussed above, COGME should not underestimate its ability to obtain useful information from other interested parties. Specialty societies and many elements in the

research community are interested in the questions the Council is addressing and are engaged in ongoing efforts to collect and interpret further information. The key will be for COGME to solicit the views and information from these sources in a manner that is targeted at the questions that COGME wishes to address. If COGME only asks people to discuss their ongoing research, then the result is likely to be a compendium of information, much of which is irrelevant for COGME's charge.

## 6.3 IMPLICATIONS FOR LONG-TERM MODELING

COGME has several options with regard to long-term quantitative modeling:

1) Develop its own modeling framework and estimation of parameters of the model.

2) Work with the Bureau of Health Professions to modify and expand its modeling capabilities, especially in the requirements area.

3) Adopt the GMENAC framework and use experts and data to re-estimate parameters of the model.

4) Rely on outside organizations such as the AMA and other researchers, to provide projections of requirements supply and future market conditions for physicians.

A prior question to this is, of course, whether or not COGME thinks the benefits of a single large-scale modeling effort outweigh the substantial costs. This review has highlighted any number of limitations of each of the approaches tried in the past. A major failing of all of them is the inadequate attention that has been given to issues of locational distribution or, in other words, geographic maldistribution. In many ways, then, debate over longer term options resembles the discussion about the pros and cons of short term options though on a larger scale.

In any case, while data can assist in analyzing policies, it is important to carefully consider potential policy issues prior to collecting and manipulating data. There should be a careful consideration of the interaction between the data and modeling efforts pursued and the policy questions to be addressed. Given the limited time and resources available, it will be important to select and use only those data that are pertinent.

## 6.4 OTHER POLICY CONSIDERATIONS

There are two general policy questions that the Council may want to consider in choosing short- or long-term options for data analysis.

1) What kinds of policy options would likely be considered by the Council and by Congress?

2) What are the implications of over and undersupplies of physicians?

Coordination of the research agenda and the policy questions addressed here is of the utmost importance. Even if sound projections could be made at the national level, for example, the data may not be useful if COGME is interested in examining whether certain geographic areas or specific populations still have an undersupply of primary care physicians. This kind of issue underscores the importance of considering the above questions before making recommendations about undertaking a short term study. For example, if the Council, and Congress for that matter, are primarily interested in whether shortages of primary care physicians still exist in some geographic regions, it will be important to collect data on that level (both in terms of the geographic and specialty breakdown). If, on the other hand, the Council is more interested in whether imbalances exist in certain specialties, the data must be collected accordingly.

Second, it is important to analyze the implications of an under- or oversupply of physicians. Recently, Harris (1986) makes the points that 1) considerable uncertainty surrounds any projection of under- or oversupply and 2) policymakers, in assessing specialty imbalances, should consider the relative cost of an oversupply versus an undersupply. He argues that while an oversupply, almost by definition, tends to increase the cost of health care, it may be beneficial in terms of improving geographic access and promoting more efficient delivery systems, as well as improving financial access through lower prices. The cost of an oversupply is that the lack of work may tend to frustrate physicians, lead to greater number of unnecessary procedures, and reduce work loads to the point where skills of surgeons, for example, might suffer. He argues that the costs to society of an undersupply are much greater because it can lead to problems such as geographic maldistribution and specific shortages in the face of unforeseen demands (for example, AIDS) on the current physician stock. While oversupplies of physicians may contribute to problems, such as unnecessary care, Harris argues that benefits of an upside error go to the consumer in the form of higher quality care, lower prices, and a better geographic distribution of physicians.

Much ink has been spilled over the question of whether or not physicians are influenced by market forces. Stated at this broad level, enough evidence has surely been accumulated to argue that indeed market forces are a factor. However, perhaps a more relevant question is the extent to which market forces and institutions are likely to respond to imbalances in ways that will signal and promote desirable adjustments. For example, is there enough flexibility in physician pricing so that falling incomes in a given specialties will serve as a signal of sufficient supply? Indeed, one of the arguments for substantial modeling efforts such as GMENAC's is that these signals work imperfectly, at best, and that the general information provided by a GMENAC-

type study is a useful way to influence both individual decisions about specialty choice and institutional decisions concerning the size of residency programs. The extent to which existing markets and institutions are self-correcting is no doubt an issue that COGME will grapple with over the coming years.

## SECTION 7

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