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ABSTRACT

Part 5 of a seven-volume report made by Graduate Medical Educational Advisory Committee (GMENAC) on the relationship between the education environment and specialty and subspecialty career choices is presented. After background information, Section 2 examines such conceptual and methodological issues as boundaries of the educational environment, specialty preferences vs. specialty choices vs. specialty attainment, timing of specialty preference formation and choice, aggregating or grouping specialties, input-output analyses, and the interrelationships among specialty and other career choices. In a third section on physician specialty choice literature (does it indicate possible mechanisms for modifying specialty distribution via the educational environment?) admission/student characteristics and institutional environment influences are discussed. The final section offers several recommendations such as: the applicant pool must be broadened with regard to students' individual characteristics and to reduce the financial barriers to medical education which limit diversity: undergraduate medical education must be broad-based: the first year of graduate medical education should be a broad-based clinical experience to serve as the foundation for further specialty training: and programs of loans and scholarships should be expanded. Extensive references are provided. (LC)

Report of the Graduate Medical Education National Advisory Committee

to the Secretary, Department of Health and Human Services

Volume V

Educational Environment Technical Panel

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Health Resources Administration

The Report of the Graduate Medical Education National Advisory Committee to the Secretary, Department of Health and Human Services, consists of seven volumes:

Volume I GMENAC Summary Report
Volume II Modeling, Research, and Data Technical Panel
Volume III Geographic Distribution Technical Panel
Volume IV Financing Technical Panel
Volume V Educational Environment Technical Panel
Volume VI Nohphysician Health Care Providers Technical Panel
Volume VII GMENAC Members' Commentaries and Appendix

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Report of the
Graduate Medical Education National Advisory Committee

to the Secretary, Department of Health and Human Services

Volume V

Educational Environment
Technical Panel

U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
Public Health Service
Health Resources Administration
Office of Graduate Medical Education
DHHS Publication No. (HRA) 81-655

September 30, 1980

The Honorable Patricia Roberts Harris
Secretary
Department of Health and Human Services
Washington, D.C. 20201

Dear Madam Secretary:

The attached Report of the Graduate Medical Education National Advisory Committee (GMENAC) is in fulfillment of the Committee's responsibilities under the Charters of April 20, 1976, and March 6, 1980.

The charge of the Committee was to advise the Secretary on the number of physicians required in each specialty to bring supply and requirements into balance, methods to improve the geographic distribution of physicians, and mechanisms to finance graduate medical education.

GMENAC significantly advanced health manpower planning in direct and indirect ways.

GMENAC introduced new scientific methodology: Two new mathematical models were developed to estimate physician supply and requirements.

GMENAC refined the data bases; figures for estimating the supply of practitioners in every specialty and subspecialty from the distribution of first-year residency positions have been developed.

GMENAC integrated the estimates of supply and requirements for physicians with nurse practitioners, physician assistants, and nurse midwives.

GMENAC introduced new concepts to clarify assessment of the geographic distribution of physicians and services; standards are proposed for designating areas as adequately served or underserved based on the unique habits of the people in the area.

GMENAC recommends that medical service revenues continue to provide the major source of funds to support graduate medical education.

GMENAC has initiated a collaboration between the private sector and the Government; the unique expertise of each achieves a level of comprehensiveness in health manpower planning not previously experienced.

GMENAC estimates a surplus of 70,000 physicians by 1990. Most specialties will have surpluses, but a few will have shortages. A balance by 1990 cannot be achieved. Until supply and requirements reach a balance in the 1990s, GMENAC recommends that the surplus be partially absorbed by expansion of residency training positions in general/family practice, general pediatrics, and general internal medicine.

Recommendations are directed at achieving five manpower goals:

1. To achieve a balance between supply and requirements of physicians in 90s, while assuring that programs to increase the representation of minority groups in medicine are advanced by programs to broaden the applicant pool with respect to socio-economic status, age, sex, and race;

2. to integrate manpower planning of physicians and nonphysician providers when their services are needed, and to facilitate the function of nonphysician providers;

3. to achieve a better geographic distribution of physicians and to establish improved mechanisms for assessing the adequacy of health services in small areas;

4. to improve specialty and geographic distribution of physicians through financing mechanisms for medical education, graduate medical education, and practice, and

5. to support research for the next phases of health manpower planning.

The Committee unanimously recommends the immediate establishment of a successor to GMENAC. Its establishment is essential to the implementation of the manpower goals and recommendations in the Report. The full GMENAC methodology must be applied to the six specialties which have not been analyzed. The requirements estimates for each of the specialties and subspecialties must be tested, monitored, and reassessed on a continuing basis. Important studies on financing, geography, and nonphysician providers should be undertaken.

The collaborative working relationship between the private sector and the Government facilitated a congruence of interest in planning and in implementing improvements to best meet the needs of the Nation. The momentum of this collaboration should be continued without interruption.

Respectfully submitted,

Alvin R. Tarlov

Alvin R. Tarlov, M.D.
Chairman
Graduate Medical Education
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For the Committee

Enclosure: Volumes I-VII

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I. BACKGROUND OF PANEL REPORT

The Graduate Medical Education National Advisory Committee (GMENAC) engaged in the first national effort to project, according to anticipated levels of actual disease conditions, the U.S. need for physicians in 1990 (GMENAC, 1979). Because the GMENAC projections are based on disease incidence and medical judgments of treatment needed, rather than on physician-to-population ratios for example, they yield ranges of figures indicating separate needs for different types of physicians to treat different constellations of related conditions, in other words, for physicians trained in different specialties.

Until recently there has been little public concern or effort directed towards: (a) Determining separate requirements for physician generalists and specialists and, distinguishing among the latter, the requirement in each specialty, and (b) assuring that the medical education system produce the required "mix." Early health manpower legislation (that of 1963, 1965, and 1968) was addressed simply to increasing the aggregate number of physicians and other health professionals (Barish, 1979). But, "Aggregate national manpower statistics . . . unfortunately serve to conceal significant disparities in distribution by specialty and geography" (Stambler, 1979, p. 9). Not until the passage of the Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157) was there any attention paid to distinctions among physician specialties and to different requirements by specialty. With respect to medical education, P.L. 92-157 singled out family medicine and provided funds for the support of residency training in the newly certified specialty.

Five years later, this attempt to influence the specialty distribution of new physicians by providing more opportunities for training in the then identified specialty of need changed into the approach of the Health Professions Educational Assistance Act of 1976 (P.L. 94-484). The latter established that, for continued capitation grant eligibility, the medical schools must nationally meet certain "minimum requirements for percentages of first-year residency positions in the primary care specialties" (Jacoby, 1979, p. 22), namely that, by 1977, 35 percent of first-year residencies must be in primary care, by 1978, 40 percent and by 1979, 50 percent. (Actually the effect was more apparent than real, since Graettinger (1976) reports that in 1976, one year before the legislation was implemented, 51 percent of the first-year residencies which were offered were in the primary care specialties designated by the legislation. Moreover, the legislation failed to account for the switching into nonprimary care specialties which occurs after the first year of residency, a phenomenon of major proportions (Hunt, 1979). This switching during the early years of residency training results, in large part, from nonprimary care specialty board certification requirements for a general, broad based first year or two of training as a prerequisite for subspecialty training (see Table 1).

During the congressional debates on P.L. 94-484, much attention was focused on the issue of physician specialty distribution. To avoid passage of precipitate legislation which would have established a regulatory mechanism for monitoring the specialty distribution of first-year residencies, GMENAC was conceived. It was chartered by the Secretary of Health, Education, and Welfare in April 1976 to make recommendations regarding U.S. requirements in 1990 for physicians by specialty and ways to achieve those requirements. In 1978, the Secretary, speaking before the Annual Meeting of the Association of American Medical Colleges, listed as one of four national health manpower problems the maldistribution of physicians by specialty (Califano, 1979). The final report of GMENAC confirms that specialty imbalances in physician supply will occur unless present trends are corrected.

Since the medical education environment has been pointed to as one of the factors in influencing new physicians to continue to enter specialties, GMENAC established a Technical Panel on the Educational Environment in April 1979 to "study the relationship between the education environment and specialty and subspecialty career choices. The educational environment is to be defined in its broadest sense and is to be considered a continuum." The present report is the response of the Panel to that charge, and it is grounded more heavily in the intimate knowledge of the educational environment possessed by the Panel members and consultants than in the research literature. As explicated in subsequent pages of this report, the specialty choice research literature suffers from major inadequacies in providing guidance for policymakers and only rarely can provide unequivocal evidence regarding various influences on physician specialty choice.

The second part of this report delimits the boundaries of the issue and explains the difficulties, both conceptual and methodological, in separating the influence of the educational environment on physician specialty choice from other influences. The third chapter is an overview of the recent literature on physician specialty choice. The final section contains GMENAC's conclusions and recommendations which evolved from the Panel's discussions and from the examination of the literature. 1/

1/ That literature is voluminous, having reached the point where there can be said to exist a literature of literature reviews on specialty choice. To avoid duplicating the work represented by those literature reviews, no individual examination has been made of the literature which was published prior to 1975, since the most comprehensive of the literature reviews were published in 1975 and 1976. Instead the approach relied upon: (1) Those bibliographies and literature reviews listed in the reference section of this paper under the heading "Bibliographies and Literature Reviews" and (2) an examination of the literature on U.S. students and residents published since 1975 which was identified as pertinent by a National Library of Medicine Medline/Medlars search. Those publications are listed in the reference sections under the heading "Recent Studies."

Table 1

Requirements for Specialty Board Certification

American Board of	P.G. Years Required to Certification: Preliminary Training Requirements	Specialty Residency Training Requirement	Creditable Transition or Practice Experience	Total P.G. Years to Certification	Full License Required	Creditable Federal or Military Experience	Doctors of Osteopathy Acceptability	Fifth Pathway Acceptability
Allergy & Immunology	2	2	1	5	-	-	YES	NA
Anesthesiology	1	3	(1-2)	4	YES	-	YES	YES[1]
Colon & Rect. Surg.	4	1	(2-preceptor-ship)*	5	YES	-	-	NA
Dermatology	1	3	1/2	4	YES	-	YES	YES[2]
Family Practice		3		3	YES	-	YES	YES
Internal Medicine		3	1/2	3		YES	YES	YES
Neurological Surgery	2	4	1	7	YES	YES	-	-
Nuclear Medicine	2	2		4	YES	-	YES	NA
Ob/Gyn		4	2	6	YES	YES	YES	YES[2]
Ophthalmology	1	3		4	YES	-	YES	YES[2]
Orthopaedic Surgery		5	1	6	YES	YES	YES	YES
Otolaryngology	1	3		4	YES	-	YES	YES
Pathology		4	1	4	YES	YES	YES	YES
Pediatrics		3	1	3	-	-	YES	YES[2]
Phys. Med. & Rehab.		3	1	4	-	YES	YES	YES[2]
Plastic Surgery	3	2	1	5	-	-	-	YES
Preventive Medicine	3	1	1	5	YES	YES	YES	YES[2]
Psych. & Neuro.		4		4	YES	-	YES	YES[2]
Radiology		4	1	4	-	-	YES	YES[2]
Surgery		5		5	-	-	-	YES
Thoracic Surgery	5	2		7	-	-	YES	NA
Urology	3	3	1 1/2	6 1/2	YES	YES	YES	YES

* See special requirements under the Specialty listed in the '78/'79 Directory of Residency Training Programs.
[1] See published requirements under the Specialty listed in the '78/'79 Directory of Residency Training Programs.
[2] Requires unrestricted license.
NA-Not applicable

Source: The American Board of Medical Specialties Annual Report 1978 - 1979. Evanston, Illinois: ABMS, 1979.

This report did not attempt to anticipate the results of full GMENAC deliberations concerning the distribution of physician tasks among the medical specialties. At issue are: (a) Whether changes in the distribution of the functional tasks performed by physicians will result from the delegation of tasks to nonphysician health providers and (b) whether the distribution of physician tasks among the various specialties needs to be modified. GMENAC may identify the need for such changes; and that identification will have ramifications for medical school curricula and residency training content, perhaps even for the organizational structure of undergraduate and graduate medical education. Recommendations concerning changes in the content and structure of medical education to accommodate changes in the task distribution of medicine must, of course, be developed in concert with recommendations concerning changes in medical education to influence specialty choices.

II. CONCEPTUAL AND METHODOLOGICAL ISSUES

Medical education is generally regarded as the scientific and professional training of physicians provided by medical schools and teaching hospitals. An often used distinction is that between the undergraduate and graduate phases--undergraduate medical education (UGME) refers to the medical school period and graduate medical education and (GME) refers to the hospital or residency period. However, what is the "educational environment"? Unfortunately for the task at hand, there is no easy answer to the question.

The following subsections discuss briefly conceptual and methodological issues regarding: The definition of the boundaries of the educational environment; the distinction between specialty preferences and specialty choices; the timing of specialty choices; the aggregation or grouping of specialties; input-output analysis and the utility of its results for policymaking, and the interrelationships of various aspects of career choices.

BOUNDARIES OF THE EDUCATIONAL ENVIRONMENT

Assessing the impact of the educational environment on specialty choice is little different from assessing almost all of the factors which impact on specialty choice, especially if one defines the medical education continuum "in its broadest sense," as GMENAC directed the panel to do. The reason for the lack of distinction between educational factors and other factors lies in the fact that the educational environment is closely related to events both prior to and subsequent to an individual's direct contact with that environment.

With regard to factors whose impact on specialty choice would seem to precede contact with the educational environment, both self-selection and the medical school admission process determine (1) whether an individual becomes a medical student (Cuca, et al., 1976; Hutchins, 1977) and (2) in which institution/environment that individual matriculates (Sherman, 1978; Sherman and McShane, 1978). The medical school enrollee brings to the educational environment certain characteristics which were either ascribed, e.g., race, sex, location of high school, etc., or achieved prior to medical school matriculation, e.g. premedical grade point average, scientific interests, etc.; and the aggregate of the characteristics of the students enrolled at a particular medical school becomes an important aspect of its milieu or educational ecology.

For example, it has been shown that older students tend to prefer primary care specialties. If the student body of a school consists of a large proportion of older students, it would tend to provide more reinforcement and support for primary care career plans than would a school with a younger student body, other things being equal. The school may not necessarily "select on" or pay attention in its admission process

to a particular characteristic, yet because of unstated preferences of admissions committees as well as student self-selection, there may occur in a single class, or a long succession of classes, an unique rather than a normal (in the statistical sense) distribution on a particular characteristic. Therefore, since student body characteristics are an undeniable element of the educational environment, it is difficult to ignore such factors even though they predate entrance into the medical education environment.

With respect to factors which are in force after an individual has left the educational environment, i.e., when he or she is in practice, medical students and residents possess certain information, expectations, misconceptions even, regarding those factors. Salient to the present subject are student conceptions regarding how the practice of medicine is organized and reimbursed and the responsibilities and personal demands placed upon physicians in different specialties. These ideas may be brought to or formed during a student's passage through the educational environment. In any case, they exist during that time; and central to the present effort is consideration of the manner in which the environment shapes, reinforces, or modifies those ideas. Thus, the educational environment embraces posteducational elements, too.

SPECIALTY PREFERENCES vs. SPECIALTY CHOICES vs. SPECIALTY ATTAINMENT

It will be helpful for subsequent discussion to introduce, at this point, Vroom's distinction between occupational preferences, choices, and attainment as explicated by Matteson and Smith (1977):

> An occupational preference is that occupation which at a given time an individual would most like or prefer to enter. The chosen occupation is that occupation which an individual chooses to enter and then subsequently engages in behaviors to implement that choice. Finally, occupational attainment for an individual is represented by the actual occupation of which the person is a member. For some individuals then, preference, choice, and attainment are the same; for others, totally different careers may be involved in each of these three steps in the occupational decision process. (p. 548)

This distinction recognizes that events may intervene between preferences and choices which will reroute actual attainment. The present effort focuses on identifying (and evaluating the efficacy of) such intervening events in the educational environment. Unfortunately, much of the research on medical specialty choice fails to maintain the distinctions among preferences, choices, and attainment. Thus, in a typical study medical students are surveyed for their specialty preferences at some point during their first, second, or third year of medical school. Then these early preferences are compared to the specialties of their first (or later) year of residency or of their practice. It has been observed that until the recent scarcity of residency positions in certain specialties there was no difference among preferences, choices, and attainment. However, this observation puts the

entire onus for diverting preferences on the supply of residencies and fails to acknowledge the continued likely influence of other factors such as those concerning personal situations and the phenomenon of faculty sponsorship (Marshall, et al., 1978).

A modification or elaboration of Vroom's distinction is needed to accommodate the fact that the specialty career attained by an individual at completion of GME is not immutable. Holden and Levit (1978) have recently documented the not inconsiderable extent of such posteducational specialty switches (which can include a return to the educational environment for GME training in a new specialty). Perhaps, in Vroom's scheme, a physician's initial practice specialty is to be considered a choice leading to the attainment of an ultimate specialty. This is an important consideration in the evaluation of how much impact interventions in the educational environment can have on practicing physicians' specialty distribution.

THE TIMING OF SPECIALTY PREFERENCE FORMATION AND CHOICE

No matter how identified, whether by board certification, training, self-designation and/or medical practice activities, almost all U.S. physicians are now specialists. (The certification of family practice as a specialty in 1969 contributed greatly to this phenomenon.) Moreover, almost all new M.D.'s now plan to acquire their specialty through graduate training and seek board certification (Johnson and Cuca, 1978).

The points on the educational continuum at which students form their preferences for a specialty and make their choices is critical to the identification of effective mechanisms for influencing their choices. With regard to the timing of preference formation, it is possible to divide students into two groups. One group is constituted of those students whose specialty preferences crystallized before medical school and who do not seem to waiver from those preferences anywhere along the continuum. In a recent study of the national cohort of 1976 U.S. medical school graduates, for 27.7 percent their specialty preference at application to medical school was the same as the specialty of the residency program which was their first choice in the National Intern and Resident Matching Program (NIRMP) (Cuca, 1977). Even for these students, however, it is unclear whether their preferences are so strong that they are impervious to influences in the educational environment or whether they attend medical schools and take residencies in teaching hospitals which reinforce their preferences and make available opportunities for choices which are in line with their preferences.

The other group of students in this dichotomy are those who seem to have no clear-cut preferences for a particular specialty as they enter the educational continuum. While they may seem to have no preferences, there is a fair amount of research which seems to indicate that certain personality types have basic psychological predispositions to certain broad areas of medicine (Collins and Roessler, 1975; Erdmann et al., 1979; Hadley, 1975; Matteson and Smith, 1977). Nevertheless, it would seem that, compared to students who have a decided preference at entrance to medical school, these are the students who are more susceptible to the influence of the educational environment and, therefore, to interventions via that environment.

While the dynamics of preference formation and actual choice may be separate processes, these two aspects of intended specialization first come together for most students in January of their senior year of medical school. It is at this time when they must submit a list to the National Resident Matching Program (NRMP) ranking the residency programs in which they would like to take their first year of graduate training. 2/ This is, for the majority of students, the first point on the continuum at which they must make a choice. (Some medical schools do permit students to specialize in broad areas or pathways of medicine (Phillips, et al., 1978) but only 24 of the 124 medical schools in 1978-79 had "formal specialty tracks" as opposed to 31 in 1974-75 (AAMC, 1978b) and not every student at those 24 schools necessarily participates in such programs.)

While preparation of the NRMP rank-order list may be the first choice (as opposed to preference) point on the continuum for the majority of students, there are also a few students who avoid making a choice at this point. They do so by applying to flexible programs or to programs in specialties such as general internal medicine, general surgery, etc., which can serve as a prerequisite to different specialties. This is not to say that all of those applying to flexible, general internal medicine, etc., first-year programs are doing so to gain time to decide on a specialty. In fact, many who do, have definite career plans and are taking such first-year programs to fulfill prerequisites for entrance into second- and later-year programs or even as a substitute for their first choice in which a program was unavailable. It is not known, however, what proportion of applicants to such programs are delaying choice, what proportion are electing the programs as a prerequisite to training in another specialty, nor what proportion are taking them as the graduate training for their intended specialty. What is known, however, is that almost all recent medical school graduates plan eventually to obtain board certification in a specialty--94 percent of the 1978 graduates (Johnson and Cuca, 1978). It should be pointed out that, with the establishment of a certifying board for family practice in 1969, the situation in physician manpower has now arrived at the point where there is no such thing as an American physician who is not a specialist.

According to Table 1, there are 10 specialties which have no GME prerequisites for entrance into a residency in those specialties: Family practice, internal medicine, obstetrics/ gynecology, orthopedic surgery, pathology, pediatrics, physical medicine and rehabilitation, psychiatry, radiology, and general surgery; they, along with flexible first-year residencies which were offered in the 1979 NRMP were of the seven types listed and were filled by 83 percent of U.S. graduates (Graettinger, 1979).

The timing of the second major choice (not preference) point depends upon the specialty being considered and the decision for the resident is basically one between continuing his/her GME training in the general specialty which is prerequisite to the subspecialty he/she is considering

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2/ Preliminary activities related to that choice are made in the spring of a student's third year when he/she applies to interview for residencies. The actual interviews usually take place in the fall of the senior year.

or branching to a residency in the subspecialty. There are, of course, residents who during the first or even subsequent years of GME switch from one major area of medicine to another, such as from family practice to pediatrics, but such switching is much less usual than branching and, moreover, residents who do make such switches eventually come to the same general specialty-or-not branching decision point in their newly chosen specialty.

Thus, according to Table 1, towards October or November of their first year of GME training in a flexible, family practice, general practice, or internal medicine program, any one of which can serve as a "clinical base" prerequisite, those first-year residents who are unsure of their early career plans and are considering specialization in anesthesiology, dermatology, neurology, obstetrics/gynecology, psychiatry, or radiology (either diagnostic or therapeutic) must make a decision either to continue in their GME-I specialty or to branch off to one of these six specialties. For those continuing on in internal medicine, they may branch off in their fourth year to one of 10 internal medicine subspecialties. Obviously, for those with definite early career goals, these branching decision points are mere formalities.

First-year residents in general surgery who are unsure of their career plans must consider whether to branch off in their second year to neurosurgery, orthopedics, or otolaryngology; while second-year surgery residents must consider branching to urology in their third year; third-year surgery residents must consider plastic or colon and rectal surgery for their fourth year; and fourth-year surgery residents must consider thoracic surgery or entering practice in general surgery.

Similarly, those residents in third-year residencies in pathology, instead of remaining in general pathology, can decide to switch to forensic pathology in their fourth year or can decide to enter practice in general pathology; while those in fourth-year pathology can decide to switch to neuropathology in their fifth year or, having one more year of GME than the minimum required, can decide to enter general pathology practice. Those in general pediatric residencies face the subspecialization decision point during their second year of GME, if they are considering pediatric allergy, or during their third year, if debating between pediatric cardiology or entering practice in general pediatrics.

Given the foregoing time schedule of choice points, it becomes evident that the timing of, or points on the educational continuum at which interventions are made in order to influence specialty choices will depend upon the type of intervention employed, i.e., voluntary or regulatory. Voluntary interventions do not imply legal sanctions for nonparticipation or noncompliance; therefore, they require a longer time period to take effect since they are directed at changing behavior by changing knowledge and attitudes. Regulatory mechanisms, on the other hand, impose penalties for failure to conform to legislated rules controlling behavior; they are effective immediately because they change behavior by fiat. (One implication of behavior change by fiat is the resumption of old behaviors upon removal of the regulatory mechanism.)

For those students lacking firm specialty plans upon entrance to medical school, then, voluntary interventions must occur or be experienced by students prior to January of their senior year of medical school when their preferences and choices must crystallize for participation in the NRMP. For optimum effectiveness, voluntary interventions which are designed to modify subspecialization patterns must occur or be experienced most intensively by residents in the early years of graduate medical education. Regulatory interventions can be effective at any point throughout GME or afterwards.

AGGREGATING OR GROUPING SPECIALTIES

One major obstacle to synthesizing the literature on specialty choice is the variety of ways in which specialties have been grouped. Some groupings have been based on dichotomies: General practice vs. specialization; hospital-based vs. office-based specialties; primary care vs. nonprimary care, patient contact vs. technological specialties. The composition of the primary care grouping has also varied, sometimes including family practice (usually studies performed since family practice became a certified specialty in 1969), sometimes not (earlier studies).

Another often used grouping is that which distinguishes among primary, secondary, and tertiary care specialties. The combinations of individual specialties which have been used are myriad and the rationale underlying them has as often been due to the form in which the data were available to the researcher as to any conceptualization regarding commonalities among the specialties or regard to the purposes of the study. Until recently, the research on specialty preference/choice has not been driven by the need to provide information for program evaluation or policy formulation. It has been shaped, in large part, by the interests of psychologists in personality research and the interest of sociologists in occupational choice and status research. Not until recently have there been sharply focused analyses which provide guidance to policymakers; these usually economics oriented analyses have not been numerous.

The issue of specialty groups is related to current issues in the planning of human resources for medicine. One is the correctness of considering internal medicine a primary care specialty, especially in studies of medical student career and training plans. Since a great proportion of students who plan to take their early GME training in general internal medicine also plan to take further training in a subspecialty of internal medicine, those analyses which group internal medicine career plans with family practice, general practice, and general pediatric career plans yield highly misleading estimates of the future resources for primary care. The foregoing caution does not deny that, for many internal medicine subspecialists, a large part of their actual practice may be devoted to the delivery of primary care, though they may not on average be the most economic type of manpower for primary care.

Another issue concerns changes which need to be made in the way specialties are/will be practiced and concomitant changes in specialty training. Such changes are related to changes in the demographic and socioeconomic characteristics of the population, to changes in medical knowledge which occur through scientific breakthroughs and to changes in

physician productivity which occur through technological and human resource development. A case in point is the field of geriatrics.

With the realization that the age structure of the U.S. population will require greater attention to the health care of the elderly, a perception has formed that geriatrics needs to be included in the training of physicians. But how shall it be integrated--as a component of all clinical clerkships, as a separate clerkship, as a new specialty, as a new subspecialty (if as a subspecialty, of what specialty--family practice, internal medicine, or another specialty)?

INPUT-OUTPUT ANALYSES

One of the most frequently used research designs in the specialty choice literature has, until recently, been that of input-output analysis. 3/ Input-output analyses treat the medical school environment as a "black-box" which: Receives input in the form of students with either tentative or fairly firm preferences for specialties, impacts on those preferences in unknown ways, and produces an ouput cohort of new physicians with declared choices for certain specialties. Black box research has usually not attempted to identify the particular elements in the educational environment which impact specialty choice, but has simply documented either an output (graduation) specialty distribution or input-to-output (admission-to-graduation) changes in specialty choice (the latter whether cross-sectionally or longitudinally). Obviously, the utility of such research for policymaking is limited since, at most, it identifies patterns/profiles for either individual medical schools or for groups of medical schools. Its implication for policymaking at the national level is the support of schools whose output patterns support national goals, while at the school level it provides data for self-assessment regarding the congruence of national and school manpower goals.

Opposed to black-box research, both in research approach and in dividends for policymaking, is research directed towards evaluating the impact on specialty choice of separately identified elements in the educational environment. With regards to both undergraduate and graduate medical education, these elements generally concern admission/selection, role models, curriculum or training experiences, organizational structure, and funding. Specifically there have been evaluations of administrative clerkships, family medicine preceptorships, Area Health Education Center (AHEC) programs, early admission to medical school, three-year curricula, clinical role models, etc. Focused studies such as these, when well designed, permit policymakers including medical school administration and faculty to know, for example, whether such programs should be continued or not and, if continued, whether with increased, unchanged, or reduced support.

3/ One suspects that it has been so popular because it makes use of information which is the by-product of other medical school activities, i.e., admission and graduation recordkeeping, and is therefore an almost cost-free way to obtain data and to conduct research. Perhaps for the same reason, most input-output analyses are concerned with the medical school rather than the residency hospital environment.

Many of the previously mentioned general components are interrelated, however, and until recently the method employed in many of the studies failed to account for these interrelationships. Social science research method is based on the use of either statistical control or experimental design to eliminate the effect of all factors other than the effect of that (or those) being examined. Unfortunately, the use of experimental design to control for the effect of other influences has been almost nil in the medical specialty choice literature because: (1) There have been very few conscious efforts to impact specialty preference or choice in any particular way until very recently and (2) only recently have data sets containing variables reflecting many aspects of individuals and institutions become available to permit multivariate analyses. The earlier research is characterized by bivariate, rather than multivariate, analyses and therefore does not acknowledge the complexity of the educational environment's impact on specialty preference and choice.

THE INTERRELATIONSHIPS AMONG SPECIALTY AND OTHER CAREER CHOICES

The research literature on physicians' career choices has focused almost exclusively on specialty choice until recently. (The probable reasons for this concentration are two: (1) Lack of manpower planning in medicine and a concomitant lack of interest in how physicians' services are made available to the public and (2) an interest by sociologists in specialty choice as both a secondary occupational choice and as an indicator of status within the medical profession.) Other aspects of physicians' careers which have assumed recent importance are their geographic locations, their professional work activities, their practice/employment settings, characteristics of the patient populations which they serve, their work load, etc. At the risk of stating the obvious, these various aspects are interrelated; nevertheless, they can be untangled fairly easily through logical reasoning with the confirmation of recent research.

Of special interest are the geographic locations of physicians. In the instance of specialty and location choices, each of the two choices can act (but does not necessarily act) as a constraint upon the other choice, depending upon which choice assumes primacy for the individual physician. If the physician's preference/choice of a particular location is his/her primary concern, specialty choice is constrained only to the extent that the geographic location reduces access to the facilities and to the population of patients which will permit practice in that specialty. For physicians preferring/choosing highly urban areas, there are essentially no constraints on specialty choice attributable to location choice. It is when rural areas are preferred/chosen that certain specialties are precluded. Such specialties would be those requiring sophisticated technologies or those concerned with infrequent conditions or diseases. The latter require a higher population density to yield a patient load sufficient to sustain a practice in the specialty.

When specialty rather than location is of prime importance to the physician, the same considerations, i.e., level of technological sophistication and prevalence of disease/condition, apply. Preference for a specialty involving a sophisticated technology or infrequent conditions restricts location choice to urban areas, while preference for

a specialty not heavily reliant upon technology nor patients with unusual conditions, e.g., family practice or pediatrics, implies no constraint on location choice.

The same constraint dynamics apply to the interrelationship of professional activities and location choice as they do to the interrelationship of specialty choice and location choice. The constraint on location results when teaching and/or research is the preferred professional activity. Since these activities are usually practiced in an academic medical center and since most academic centers are located in urban areas, a rural location is precluded. When practice is the preferred professional activity, then the specialty choice-location choice dynamic outlined previously would be operative; while for a preferred professional activity of administration, an employment setting-location choice dynamic would probably become operative.

III. THE PHYSICIAN SPECIALTY CHOICE LITERATURE: DOES IT INDICATE POSSIBLE MECHANISMS FOR MODIFYING SPECIALTY DISTRIBUTION VIA THE EDUCATIONAL ENVIRONMENT?*

It has been usual to organize the specialty choice literature in terms of: (1) Economic considerations, i.e., medical education costs to individuals, anticipated earnings; (2) student characteristics, i.e., (a) psychological or personality traits, (b) academic and/or intellectual abilities and aptitudes, and (c) sociological or background attributes), and (3) institutional influences, i.e., medical schools, teaching hospitals. This three-category organization somewhat parallels the framework which will structure this brief overview. It is based upon identifying the various influences on an individual's specialty choice as he/she progresses through the medical education environment in order to ascertain at which point changes to influence specialty choices can most effectively be introduced.

The evidence on the economic motivations of individuals in relation to specialty choice is scarce and inconclusive. A recent review of the research regarding the effects of income on specialty (Fruen, et al., 1980) discovered only two studies on the subject. Moreover, the review concluded that the two "studies showed that the impact of income on specialty choice, if any, is weak."

However, there is a new element intruding itself into the economic picture--namely, large increases in medical school tuition. While it is too soon to document whether or how it will affect specialty choices, speculation has: (1) Assumed that it will and (2) forecast two completely different scenarios. One scenario is that high levels of debt and a need to pay them off quickly will influence students to forego or at least postpone lengthy graduate training. In terms of board certification requirements, opting for less graduate training implies specializing in primary care. The results of the other scenario would be the opposite--an increase in specialization in nonprimary care due to: (a) An increase of medical students from higher socioeconomic backgrounds who tend to enter the subspecialties and/or (b) an increase in the proportion deciding for one of the more lucrative subspecialties in order to recover more quickly the costs borne for medical education. In any case, the evidence regarding economic considerations at the level of the individual does not provide any clear-cut direction for possible policy initiatives.

Student characteristics, the major category of variables in the usual literature organization, can be utilized only at or prior to the point of admission to medical school. Once students pass the admission point their attributes, traits, and abilities become a "given" of the physician manpower equation. However, economic considerations are salient along

* This literature review was prepared for the GMENAC Technical Panel on the Educational Environment by Janet Melei Cuca, Public Health Service Staff Fellow, Office of Graduate Medical Education, Health Resources Administration.

the entire continuum (though not necessarily to the same degree), while the separate institutional influences of medical schools and teaching hospitals are operative during well-defined segments of the educational continuum.

ADMISSION/STUDENT CHARACTERISTICS

The examination of specialty choice in relation to student characteristics accounts for the greatest part of the specialty choice literature. Table 2 lists the various characteristics which have been studied either singly or in combination and, where results have been consistent, the direction, whether positive or negative, (not the strength) of their relationship to specialty choice. The many empty cells of the table demonstrate the inability to predict or associate specialty choice with student characteristics except in the most spotty way. Family/general practitioners, psychiatrists, and surgeons are the most clearly characterized specialists.

Sociological characteristics distinguish family/general practitioners from other physicians, while psychological characteristics distinguish psychiatrists and surgeons from other physicians. It is unclear whether this difference in type of distinguishing characteristics is due to actual differences among the three physician specialist groups or simply to historical trends in research interest. "Nevertheless, in other specialties ... there has been much less success both in consistently identifying types who enter the specialties and in predicting specialty choice. The field of personality differences in relation to specialty, important as they are, is not a promising one for policymakers who wish to put right particular imbalances in the supply of doctors" (Hutt, 1976, p. 466).

A few words should be addressed to one of the psychological characteristics listed in Table 2, namely interests and early specialty preferences. One would think that the specialty in which medical school applicants express an interest might be predictive of the specialty in which they later train and practice. However, a recent study based on national data found that over 40 percent of the 1976 U.S. medical school graduates had expressed no specialty preference as applicants and of the less than 60 percent who had expressed a preference, slightly more than half did not choose a first-year residency in the specialty of their original interest (Cuca, 1977). In other words, only approximately 28 percent expressed interest in the same specialty at the beginning and end of their medical school training. Other studies have found that only for psychiatry and surgery are choices made early and adhered to more often than in other specialties.

Setting aside the issue of the inability to predict specialty choice from personality characteristics, there remains a major obstacle to manipulating the distribution of personality characteristics in order to modify specialty distribution, namely, the legal propriety of and societal distaste for doing so. It is true that assessment of and attention to personality characteristics is now a part of the medical school admissions process; however, it is done rather unsystematically from information obtained from the interview, letters of recommendations, and sometimes the biographical essay (Cuca, et al., 1976). In fact, the difficulty of

Table 2

Student Characteristics Examined in the Medical Specialty Choice Literature and Consistent Findings

	SPECIALTY					
	Family or General Practice	Internal Medicine	Pediatrics	Obstetrics-Gynecology	Psychiatry	Surgery
I. Sociological/Background Characteristics:						
A. Sex. . . . . .Men	--	--	Women	--	Women	Men
B. Racial/ethnic identity. . . . . --	--	--	--	Minority	--	White
C. Religion. . . . . .Non-Jewish	Protestant, Jewish	--	--	Non-Jewish	Protestant, Jewish, None	Non-Jewish
D. Age at graduation. . . . . .Older	--	--	--	--	--	--
E. Marital status at graduation. . . . . .Married (Men)	--	--	--	--	Single	--
F. Children/dependents . . . . . .Yes	--	--	--	--	--	--
G. Family background						
1. Parental occupations. . . . . .Not Professional	--	--	--	--	--	Physician
2. Parental education. . . . . .Less Education	--	--	--	--	--	More Education
3. Parental income. . . . . Lower-Income	--	--	--	--	--	--
4. Number of siblings. . . . . .More	--	--	--	--	--	--
H. Home community						
1. Geographic location. . . . . .Rural	--	--	--	--	--	--
2. Population size. . . . . .Small Community	--	--	--	--	--	--
I. Premedical education						
1. Undergraduate major. . . . . --	--	--	--	--	--	--
2. Years of formal premedical education --	--	--	--	--	--	--
3. Undergraduate college characteristics*. . . . . .Public	--	--	--	--	--	--
II. Psychological Characteristics:						
A. Cognitive style. . . . . --	--	--	--	Preference for Abstract Thinking-ing, Tolerance for Complexity;	Dogmatic;	
B. Attitudes/values . . . . . --	--	--	--	Social, Aesthetic, Theoretical	Practical, Realistic, Economic	
C. Interests (inc. early career and specialty preferences) . . . . . --	--	--	--	Interested in Specialty as Premeds		
D. Personality traits . . . . . --	--	--	Extroverted, Sensing	Introverted, Intuitive	Extroverted, Sensing, Judging, Authoritarian, Dominant	
III. Abilities/Aptitudes:						
A. General academic/intellectual. . .Lower	Higher	--	--	Problem-Solving		
B. Scientific . . . . . --	--	--	--	Higher	--	
				Lower	--	

* While undergraduate college characteristics are, in the strictest sense, institutional influences, they have been included in the table on student characteristics for their greater relevance to the admission point of the educational continuum than to any other point.

interpreting information from these sources is often cited as the reason for the over-reliance upon quantitative indices (of cognitive aptitude and achievement such as test scores and grade point averages) which is deplored by almost everyone concerned with medical school admissions.

To systematize the assessment of personality characteristics means to quantify it via either personality tests or numerical ratings by interviewers. Since interviewers are humans, they vary among themselves and even for the same individual from occasion to occasion in the standards which they apply. This variability will not go uncontested by applicants if personality characteristics become more heavily weighted than they have been in the admissions process. Rejection of interviewer ratings would, then, leave personality tests as the major means of assessment. However, it seems unlikely that American distaste for the Orwellian degree of social regimentation implied by screening on the basis of personality would ever permit routine use of personality tests to select physicians--even in view of so desirable an end as to make available the types of physicians who will fill societal needs.

An idea which has been put forth as a solution to another problem, that of the inevitable disappointment of qualified applicants not being accepted to medical schools because of heavy competition from many other equally qualified applicants, might also be a solution to the issue of personality screening for admission to medical schools. The idea is that of a two stage screening process, the first stage involving screening on the basis of intellectual and academic qualifications, the second involving a random lottery. Such a process would assure that acceptees would (a) be intellectually qualified (b) have an equal chance for selection at the second stage (with "fate" making the final decision and thus shouldering the blame for nonacceptance) and (c) display personality traits in proportions representative of those occurring in the population of qualified applicants.

Since systematic use of personality characteristics in selective admissions seems unlikely, will sociological or aptitude factors permit accurate identification of those persons likely to select different specialties? The answer, unfortunately, is negative. It is ironic that the one characteristic among these factors which has shown the most consistent relationship to specialty choice, namely sex (Otis, et al., 1975; McGrath and Zimet, 1977), is beginning to lose its predictive powers in the face of changes in women's specialty preferences (Cuca, 1979; Weissman, et al., 1980). (Those aggregate changes have been away from pediatrics, psychiatry, and pathology and towards internal medicine, family practice, and obstetrics/gynecology over the period from 1960 to 1978.)

Though the association between sex and specialty choice has been more consistent than that between any other student characteristic and specialty choice, it is not strong enough to predict with the degree of precision requisite for its utilization as a criterion for selective admission and for modifying specialty distribution. It follows, then, that no other student characteristic can be used with confidence as a predictable selection criterion either.

A recent literature review on the selection of medical students in relation to health care needs states that "If one single synoptic

statement can be made for the present review it would have to be that for the short run, i.e., the next decade, the promise lies not in the selection of students, though much remains to be done there, but in the shaping of the educational experiences to which a pluralistic cohort of very bright and well motivated students will be subjected" (Hutchins, 1977). Another concludes that "Although it is clear that generalizations of subgroups can be made, definitive individual determinants of specialty choice do not presently exist, and may never be developed" (GMENAC, 1978).

Moreover, a recent study comparing the professional socialization of Ph.D. students in biochemistry, residents in internal medicine, and residents in two types of psychiatry training programs concluded that "For all four programs we studied, the outcomes were more closely related to the program characteristics than to the entry characteristics of the trainees" and "regardless of the entry characteristics and predilections of trainees and regardless of the fact that they were adults who were actively involved in managing their own socialization, the programs studied were highly successful in modeling and shaping trainees' emerging sense of professional identity and commitment and the way they came to define their own professional roles" (Stelling and Bucher, 1979). In spite of the fact that admission criteria are not reliable predictors of later specialty choice, it has been shown that institutional preferences for student characteristics do exist (Cuca, 1978; Sherman, 1978; Sherman and McShane, 1978). In a discussion of "approaches to producing competent primary care physicians", Sarnacki (1979) compares the heredity versus environment argument to that which pits the admission process/student characteristics approach against the curriculum change approach. He contends that "only the environmental strategy is a viable solution to the problem at hand. Furthermore, it is also contended that reliance upon the genetic strategy represents an abdication of educational responsibilities since this approach in essence represents no solution at all ... Certainly, one of the primary responsibilities of the medical school is to make students aware of occupational trends and opportunities. The establishment of structured courses is a viable method of suggesting the relevance of primary care careers by providing a sense of credibility to a medical career that is often interpreted as undesirable" (p. 227). Let us examine, then, what is known about institutional influences on specialty choice.

INSTITUTIONAL ENVIRONMENT INFLUENCES

Institutional environment influences on specialty choice can be distinguished on the basis of the immediacy of their impact on the exposed individual. Thus, first-order effects are those which have a direct influence; second-order effects are filtered through the first-order elements; third-order effects are filtered through second-order factors, then first-order factors. While it is logically possible to extrapolate this ad infinitum, any effects much beyond the third-order would be so diluted by intervening effects that they would be of little interest to policymakers seeking efficient and effective methods of influencing specialty distribution.

What specifically are the first and second order influences on specialty choice in the educational environment? First order factors can all be subsumed under the general heading of socializing agents. They are

those entities or processes which shape the knowledge, skills, values, attitudes, and interests of the trainee or recruit to those of the group of which he/she will be a member. A recent study documents this process in detail for one medical school class (Coombs, 1978). Role models are the primary socializing agents since they serve as examples of the already socialized group members whom trainees are attempting to, if not emulate, at least imitate. Teachers (in the generic sense) are role models designated to operate in an active, didactic mode while other role models assume a more informal or passive function. In this regard Gerber (1979) points out that "attending physicians are not just teaching and modeling skills; they are passing on attitudes and values which can have broad and long-term impact."

As important to the process of socialization as the availability of role models is the availability of opportunities to role play, i.e., to test or practice newly acquired knowledge, skills, values, and attitudes (Stelling and Bucher, 1979). Role playing permits the trainee to "perfect" his/her performance of role behavior by receiving feedback from others--where "perfection" means conformity to the standards and customs of the group.

From the particular complex or configuration of the types of role models, role playing opportunities, and other trainees which make up a socializing institution there emerges an overall orientation which is often referred to as its value climate or culture. The emergent value climate is more than the sum of the values and attitudes of its individual members since a new quality arises from and is added to it. (This emergence is the essence of social as opposed to individual behavior.) In sum, then, first-order influences, on career choice concern socialization of the individual.

Second-order influences concern those factors which shape or determine the type of socialization which the trainee will receive by selecting the types of role models, role playing opportunities, and other trainees to which the trainee is exposed. Organizational or institutional considerations characterize second-order influences. While the medical school and the residency segments of the medical education continuum each include first-, second-, and subsequent-order elements, the specific elements are not necessarily the same.

Medical School

The medical school segment of the medical education continuum has, in most medical schools, involved two distinct phases with distinct types of role models and role playing opportunities. The first phase, usually called the "basic sciences" years, corresponds with the first two years of a four-year curriculum and involves mainly a lecture class and laboratory mode of instruction. It is devoted to the mastery of the biological and chemical sciences in a structured sequence. In comparison, the second phase, the "clinical sciences" or last two years of medical school, is typically conducted in a seminar class and hospital clinic/ward format. It is devoted, for the most part, to a student-selected sequence of required and elective medical specialty "clerkships."

From this description of the usual medical school curriculum it becomes evident that the role models and role playing which occur in the two different phases are themselves quite different. In the basic sciences years of the traditional curriculum, it is not doctors of medicine (M.D.s), but doctors of philosophy (Ph.D.s) in the biological and chemical sciences who are the most visible role models, and laboratory investigation is the major role playing activity. (It is probably not coincidental that during this period when information overload and an apparent lack of curriculum relevance to patient care are highest, attrition and other signs of student dissatisfaction/ maladjustment are also at their highest.)

One variation on the traditional curriculum has to do, not with the content and format of the basic sciences years, but with their physical location. A very few medical programs such as the University of Florida's Program in Medical Sciences (PIMS) and the University of Minnesota - Minneapolis School of Medicine, are set up in such a way that students receive their basic science education at feeder universities (Florida State and Florida A & M for PIMS) or feeder campuses (University of Minnesota - Duluth) which do not themselves have a medical school. The effect of this "remote site" basic science training on specialty choice does not seem to have been examined. While the major role models (nonphysician scientists) and the role play component (lab work and lecture classes) would not be different for students in these basic sciences, nonmedical-milieu programs than for students in the basic sciences at medical schools, the difference for socialization lies in the presence of and the casual contact with physician faculty and upper-class medical students which students in "basic sciences" schools do not have. It is unknown how, if at all, this experience affects career choices.

It is not until the clinical sciences years that most medical students have physicians as their major role models, though there are a few medical schools such as the Universities of Arkansas, Kansas, and Washington which have structured their programs to ensure that students, under the supervision of clinical faculty, will have patient contact from their very first year of study. Nevertheless, the usual pattern is little patient or physician faculty contact and few opportunities to play the physician role until the third year. Generally the third-year student follows a fairly standard and content-structured program in which the greatest amount of clerkship time is devoted to medicine and surgery (See Table 3). Obstetrics/gynecology, pediatrics, and psychiatry (and perhaps another specialty) take up equal parts of the remaining third-year time. In most medical schools, the fourth-year student has almost complete freedom to select his program from among a wide variety of elective courses (AAMC, 1978b) and through this selection determines which faculty will be his/her role models, whether positive or negative.

A look at the aggregate characteristics of medical school faculty is useful. Table 4 shows that (a) there has been little recent change in faculty composition; (b) 85 to 87 percent of the faculty are in the clinical sciences; and (c) about 57 percent of the clinical faculty are volunteer. Table 5 shows that (a) medical students constituted about 6.6 percent less of the teaching responsibilities of the medical school faculty in 1976-77 than they did in 1966-67; (b) medical students in recent years occupy about 36 percent of faculty teaching responsibilities; (c) residents occupy about one-fourth; and (d) other students occupy over

one-third. These numbers show that (a) medical students are in competition with residents and other students for the time and attention of the faculty (though the data do not indicate whether this is equally true for the basic and clinical sciences faculty); (b) compared to the basic science faculty, those in the clinical sciences are the predominant role model, and (c) over half of the clinical sciences faculty (the volunteer faculty) are practicing physicians.

Table 6 presents the specialty distribution both of salaried faculty (specialty defined as academic department)* and of the board certification plans of the 1979 U.S. medical school graduates. Whether full-time or part-time, in 1967-68 or in 1977-78, the predominant faculty and graduate-planned specialty is internal medicine. Psychiatry, pediatrics, surgery, pathology, and radiology follow internal medicine in the percentages of the total and of the clinical science faculty they command. With the removal of pathology, the order is the same when the specialty distribution of only the clinical faculty is examined. Among graduate-planned specialties, however, the next most popular specialties after internal medicine are family practice, surgery, pediatrics, and obstetrics/gynecology.

Comparing the percentages of the clinical science faculty and of the graduates in each of the different specialties, rather large differences can be seen for family practice (3.1 percent of the clinical science faculty versus 17.2 percent of the graduates), psychiatry (14.9 versus 4.0), and radiology (8.2 versus 3.8). One would draw two conclusions from these figures: (1) that the prevalence of role models in a specialty, while important, is "not all" in determining specialty choice and (2) that role models can exert a negative influence.

It is unfortunate that there are no data available on the specialties of the volunteer faculty who, as mentioned before, constitute over half of the faculty--at least in terms of absolute numbers. It is likely, though, that in terms of full-time equivalents they probably represent a much smaller proportion of the faculty and, in this sense, are less of a role model influence. What is important about volunteer faculty is that it is they who are the role model of a practicing, community physician since, as Table 7 shows, only 13-15 percent of the full-time faculty have any private practice experience; moreover, in each specialty save that of family practice, the percentage has declined over the past decade. Not only does the family practice faculty have more private practice experience but, in a study by Quenk and Heffron (1975), were found to differ from other physicians in that they include "a larger percentage of persons who tended to be practical, realistic, present-oriented, organized and able to deal effectively with factual information ... These personality types are similar to those found in the older field of general practice" (p. 195).

*The data show a very high correspondence among the specialties of an individual's academic department, primary board-certification, residency and declared clinical specialty (Higgins, 1979).

Table 3

Required Clerkships and Average Duration

No. of Schools	Specialty	Average Duration, in weeks
47	Family medicine	6
121	Internal medicine	12
119	Obstetrics/gynecology	7
120	Pediatrics	8
118	Psychiatry	7
121	Surgery	9
41	Surgical specialties	5
116	Others	4

Source: J.A.M.A. 243(9):856, 1980.

Table 4

U.S. Medical School Faculty by Employment Status and Science Area 1968-69, 1973-74, 1978-79

	1968-69		1973-74		1978-79	
	No.	%	No.	%	No.	%
Total	-	-	105,389	100.0	142,385	100.0
Full-Time	23,014	-	34,394	32.6	46,598	32.7
Part-Time	N/A	-	9,085	8.6	9,692	6.8
Volunteer	N/A	-	61,910	58.7	86,095	60.5
Basic Sciences	-	-	14,709	14.0	18,959	13.3
Full-Time	7,098	-	9,881	9.4	12,685	8.9
Part-Time	N/A	-	919	0.9	922	0.6
Volunteer	N/A	-	3,909	3.7	5,352	3.8
Clinical Sciences	-	-	90,680	86.0	123,426	86.7
Full-Time	15,916	-	24,513	23.3	33,913	23.8
Part-Time	N/A	-	8,166	7.7	8,770	6.2
Volunteer	N/A	-	58,001	55.0	80,743	56.7

Source: J.A.M.A. 210(8), 11-24-69; 231 (Supplement), 1-1-75; 243(9), 3-7-80.

Table 5

Estimated Total Teaching Responsibilities of Medical School Faculty and Student-Faculty Ratios, 1968-69, 1973-74, 1978-79

	1968-69		1973-74		1978-79	
	No.	%	No.	%	No.	%
A. Numbers and Percents of Students:						
Total Students	89,195	100.0	126,625	100.0	163,235	100.0
Medical students	35,833	40.1	50,217	39.7	62,754	38.4
Residents	23,462	26.3	35,599	28.1	44,920	27.5
Basis science-master's	2,061	2.3	3,565	2.8	3,356	2.1
-doctoral	5,831	6.5	7,581	6.0	9,752	6.0
-postdoctoral	1,200	1.3	2,269	1.8	3,119	1.9
Clinical fellows-postdoctoral	4,966	5.6	5,825**	4.6	5,801***	3.6
Other students-MSE*	15,842	17.8	21,569	17.0	33,533****	20.5
-number	(235,054)		(486,298)		(762,114)	
B. Student-Faculty Ratios:						
Medical students to full-time faculty	1.6		1.5		1.3	
Total students to full-time faculty	4.0		3.6		3.5	

Source: J.A.M.A. 210(8), 11-24-69; 231 (Supplement), 1-1-75; 243 (9), 3-7-80.

* Medical Student Equivalent - The teaching responsibilities of faculty for dental, pharmacy, nursing, and other allied health students computed in terms of their equivalency to medical students.

** Total of nonforeign other graduate trainees (not interns or residents) in all specialties. For comparison the number of such trainees in 1968-69 was 4,065.

*** Total of fellows in fellowship programs in subspecialties of internal medicine, obstetrics/gynecology, pediatrics, and surgery.

**** Calculated on basis of equivalency rate for 1973-74: 1 "other" student = .044 medical students.

Table 6

Specialty Plans of 1979 U.S. Medical School Graduates in Comparison to Departmental Distribution of Salaried Full-Time and Part-Time Medical School Faculty, 1967-1968 and 1977-1978

Department	Specialty in Which 1979 Graduates Plan to Obtain Certification*	Faculty 1977-1978 Full-Time and Part-Time No.	%		Part-Time No.	%	Full-Time No.	%	1967-1968 Full-Time No.	%	1967-68 - 1977-78 Difference Full-Time No.	%
Basic Science												
Anatomy		1,509	3.2		59	1.1	1,450	3.5	758	4.3	692	-0.8
Biochemistry		1,681	3.6		46	0.9	1,635	4.0	922	5.2	713	-1.2
Microbiology		1,337	2.9		40	0.8	1,297	3.2	645	3.6	652	-0.4
Pathology		3,028	6.5		189	3.5	2,839	6.9	1,319	7.4	1,520	-0.5
Pharmacology		1,156	2.5		30	0.6	1,126	2.7	580	3.3	546	-0.6
Physiology		1,544	3.3		56	1.1	1,488	3.6	821	4.6	667	-1.0
Other Basic Science		576	1.2		51	1.0	525	1.3	232	1.3	293	0.0
(Subtotal)		(10,831)	(23.3)		(471)	(8.8)	(10,360)	(25.2)	(5,277)	(29.6)	(5,083)	(-4.4)
Clinical Science												
Anesthesiology	2.4	1,599	3.4	4.8	91	1.7	1,508	3.7	504	2.8	1,004	0.9
Dermatology	1.1	293	0.6	0.9	64	1.2	229	0.6	125	0.7	104	-0.1
Family Practice	17.2	1,026	2.2	3.1	231	4.3	795	1.9	71	0.4	724	1.5
Internal Medicine	27.7	8,496	18.3	25.5	829	15.6	7,667	18.6	3,052	17.1	4,615	1.5
Neurology	1.9	1,056	2.3	3.2	84	1.6	972	2.4	425	2.4	547	0.0
OB-GYN	8.4	1,613	3.5	4.8	255	4.8	1,358	3.3	579	3.3	779	0.0
Ophthalmology	2.9	767	1.6	2.3	202	3.8	565	1.4	262	1.5	303	-0.1
Orthopedics	4.9	511	1.1	1.5	98	1.8	413	1.0	141	0.8	272	0.2
Otolaryngology	1.7	485	1.0	1.5	89	1.7	396	1.0	184	1.0	212	0.0
Pediatrics	8.7	3,891	8.4	11.7	427	8.0	3,464	8.4	1,501	8.4	1,963	0.0
Phys. Med. & Rehab.	0.3	582	1.3	1.7	78	1.5	504	1.2	274	1.5	230	-0.3
Psychiatry	4.0	4,977	10.7	14.9	1,078	20.2	3,899	9.5	1,682	9.4	2,217	0.1
Public Health & Prev. Med.	0.2	1,205	2.6	3.6	189	3.5	1,016	2.5	527	3.0	489	-0.5
Radiology	3.8	2,716	5.8	8.2	198	3.7	2,518	6.1	879	4.9	1,639	1.2
Surgery	9.3	3,912	8.4	11.7	622	11.7	3,290	8.0	1,420	8.0	1,870	0.0
Other Clinical Science	5.5	191	0.4	0.6	134	2.5	57	0.1	2	-	55	0.1
(Subtotal)	(100.0)	(33,320)	(71.7)	(100.0)	(4,669)	(87.7)	(28,651)	(69.6)	(11,628)	(65.3)	(17,023)	(4.3)
Other Depts.		2,329	5.0		185	3.5	2,144	5.2	887	5.0	1,257	0.2
Unknown		6	-		-	-	6	-	9	-	-3	-
TOTAL		46,486	100.0		5,325	100.0	41,161	100.0	17,801	100.0	23,360	131.2

Sources: Higgins, 1979; and unpublished data from the AAMC 1979 Graduation Questionnaire Survey.

*Based on responses of the 8,001 graduates who were either "definitely decided" (72%) or who thought the indicated specialty the one in which they would "most likely" obtain certification (28%).

Table 7

Percent of Total Full-Time M.D. Medical School Faculty with Private Practice Experience, 1967-68 and 1977-78

Clinical Science Specialty	1967-68	1977-78	Change 1967-68 to 1977-78
Anesthesiology	22.4	17.4	- 5.0
Dermatology	18.6	8.5	-10.1
Family Practice	11.7	28.3	16.6
Internal Medicine	11.1	8.6	- 2.5
Neurology	11.4	8.1	- 3.3
OB/GYN	25.5	18.0	- 7.5
Ophthalmology	17.4	13.9	- 3.5
Orthopedics	27.0	19.3	- 7.7
Otolaryngology	25.2	14.4	-10.8
Pathology	11.6	9.1	- 2.5
Pediatrics	21.0	15.1	- 5.9
Physical Medicine/Rehabilitation	24.5	23.8	- 0.7
Psychology	20.3	16.7	- 3.6
Public Health/ Preventive Medicine	12.5	10.0	- 2.5
Radiology	20.0	16.0	- 4.0
Surgery	16.3	13.6	- 2.7
Other Clinical	5.1	4.5	- 0.6
Unknown	12.5	5.1	- 7.4
Total	15.2	13.2	- 2.0

Source: Higgins, 1979.

The other important aspect of socialization, learning through role playing, is related to specialty choice through the aspects of settings, patients, and tasks. The third- and fourth-year medical student takes the major part, if not all, of his clinical training in the setting of the academic medical center, specifically in the wards and clinics of its hospitals. Hospitalized patients, not having responded to less drastic therapeutics, are more seriously ill, and they more often suffer from unusual ailments. Also, patients are often hospitalized to undergo testing with expensive, technologically sophisticated machinery not elsewhere available. Thus, there is little about the training setting which is not unusual when compared to the nonuniversity hospital and nonhospital settings in which most health care is given. In the university hospital setting, specialization is inevitable and inescapable. In this regard Carter, et al. (1974) discuss the "subtle discouragement" given to primary care specialization by the academic health centers in terms of the prestige of the specialist clinician, the high value placed on the science of medicine, the academics' disparagement of local physicians and the greater exposure to inpatient, rather than ambulatory care.

In order to give students more exposure to private practice and other nonacademic settings of service delivery, various preceptorship programs have been initiated during the decade of the 1970's (Barish, 1979; Evashwick, 1979; Friedman, 1978; Friedman, et al., 1979; Harris and Bluhm, 1977; Johnson, et al., 1976; Marshall, 1979; Warner, 1975). These preceptorships expose students to role models and role playing opportunities different from those available in the medical school setting, with many of them having been specifically intended to influence students' career choices toward primary care in underserved areas. What is the success of these programs in doing so? Since the majority of the programs have been in existence for only a few years, and since student participation in such programs has been low, it is difficult to evaluate them with conclusiveness. However, the data which do exist suggest mixed results.

Johnson, et al., (1976) reporting on 18 students in a "senior-year experience similar to an internship" initiated in community hospitals, indicated that "The 12 that are entering primary care specialties plus the two in obstetrics/gynecology ... represent a percentage significantly above that of University of Michigan students who have entered primary care fields in the past" (p. 174).

Under section 772 of the Comprehensive Health Manpower Training Act (P.L. 92-157, passed in 1971), $28 million was spent between 1972 and 1977 to support preceptorships in about 75 medical and osteopathic schools (Barish, 1979). The preceptorships were designed to give students the opportunity to experience for a minimum of 2 weeks full-time the direct provision of primary care medicine under a preceptor physician who specialized in family, general, or internal medicine, or pediatrics, or who practiced in an underserved area. Examination in 1977 of the specialty intentions of students completing medical school that year (class of '77) and those who had graduated 3 years earlier (class of '74, most of whom were third-year residents) showed that for both classes 70-77 percent of those intending to specialize in family medicine had participated in one or more preceptorships. This compared to preceptor-

ship participation by only 38-46 percent of those intending to specialize in another primary care field and 41-50 percent of those intending other specializations. It was pointed out that these results may have been due to self selection, that is, that those already interested in family medicine, motivated by that interest, sought out, and participated in the preceptorships.

The Report of the Secretary of Health, Education, and Welfare: An Assessment of the National Area Health Education Center Program considered the impact of the national AHEC program on career choices (USDHEW, 1979). A total of 4,918 medical students who graduated in 1976 were compared in four groups: (1) AHEC participants, (2) nonparticipant students at schools with AHEC programs, (3) students at "volunteer schools"--schools actively considered but not selected for the original AHEC contracts, and (4) students of "control schools." The proportions of the four groups choosing a primary care specialty in 1978 were: 66 percent of AHEC participants, 55 percent of nonparticipants, 58 percent of "volunteer school" students, and 58 percent of "control school" students. Though statistically significant differences were found in the specialty patterns among the four groups, it was concluded that "it is probable that students who had a preference for primary care chose to participate in AHEC training. The finding that AHEC participants were more likely to choose primary care than others may be a reflection of student preferences rather than due to the influence of the AHEC program itself. More definitive conclusions about AHEC impact cannot be drawn from the analysis because of the multitude of factors operating in the various settings to influence career choice patterns" (pp. III-9, III-10).

The results reported by Harris and Bluhm (1977) on the University of Utah College of Medicine's Primary Care Preceptorship Program would seem to support the self-selection hypothesis. Of 87 junior and senior medical students, 56 participated in a 4-week preceptorship in either family practice, pediatrics, or internal medicine. "The 31 nonpreceptorship students anticipated a nonprimary care career in such fields as research, academia, or a subspecialty" (p. 577). Moreover, the preceptorship seemed to have little effect on career choice since only four of the 56 changed their career plans after the preceptorship-two switching to family practice (from internal medicine and "don't know") and two switching away from it (to internal medicine and surgery).

Two studies reporting on the AHEC program at the University of North Carolina, Chapel Hill, were in agreement that the program had had little effect on career choice. "The extent of such experiences as measured by the AHEC rotation index appears unrelated to whether or not a student chooses a primary care specialty for internship/residency training" (Evashwick, 1979, p. 12). Of 116 students, "only 11 students indicated that their feelings about specialty choice had changed; no students indicated that the experience had actually changed their career plans" (Friedman, et al., 1979, p. 572). While career choices may have been unaffected, the latter study observed that "Most numerous of the comments related to program and site were those focused on the quality of care students observed in the preceptors' practices (N=39 out of 75). Students were enthusiastic--and in some cases surprised--that high-quality patient care can occur with consistency in rural practices. Some felt they had been misled by an attitude pervasive in the tertiary care setting that the 'LMD' local medical doctor provides an inferior brand

of care" (p. 572). In a similar vein, another study compared "teaching hospital and remote-site clinical education" concluding that it was erroneous to characterize clerkship sites as either "academic" or "community" based since community hospitals differ and can offer an experience similar to that of the academic referral center (Friedman, 1978).

In his critique and personal view of AHEC's for the Carnegie Council, Odegaard (1979) expressed his view that the "AHEC concept provides a needed antidote to the imbalance in the outcomes of the educational process that has dominated the educational scene for health professionals in the post-World War II years. The changes in learning environment provide indications that they will contribute to better distribution of health providers, both geographically and by specialty, and to the upgrading over a lifetime of service of the knowledge and skill of health practitioners, although additional innovations in actual delivery systems may also be needed to bring health providers to neglected populations in particularly difficult circumstances. I reach this general conclusion despite the fact that there are varying degrees of success and failure among the pioneering projects" (p. 107).

An important alternative to the traditional allopathic medical education model is the osteopathic medicine model in which family medicine "is the foundation upon which all further medical education is based. It begins not at the residency level, but in the undergraduate medical education years . . . Osteopathic predoctoral education is patient-centered and emphasizes the education of an individual to become a well-qualified physician to care for the needs of family groups of all ages and whose training exposes him to all the disciplines of medicine . . . Traditionally the training of osteopathic physicians has occurred in community settings . . . As a result of this process a significant number of D.O. graduates have chosen GP (General Practice) as their major career choice" (Magen, 1974, pp. 1, 3).

Other new and innovative programs are also providing alternatives to the traditional medical education model. In 1975 Warner identified by level of medical education "programs designed to influence physicians' specialty choices". At the undergraduate level, five types of "programs" were identified: (1) The establishment of departments of family practice; (2) the establishment of new "medical schools for the express purpose of producing primary care physicians," e.g., Mercer University School of Medicine and Northwestern Ohio Universities School of Medicine; (3) "preclinical contact programs" in which first- and second-year students observe actual medical practice in other than a university hospital setting, e.g., the Medical Education and Community Orientation (MECO) Project of the American Medical Student Association (AMSA) Foundation; (4) family practice and primary care clerkship and preceptorship programs in which third- and fourth-year students participate in the delivery of medical care in other than a university hospital setting, e.g., AMSA, National Health Service Corps (NHSC) and other preceptorships, and (5) interdisciplinary programs in which a "team" approach to health care delivery is emphasized. In addition to these types of programs are others such as the National Institutes of Health's Medical Scientist Training Program, other combined degree programs (B.A./B.S.-M.D.; M.D.-M.S./M.P.H.; M.D.-Ph.D.; M.D.-J.D.), and programs such as AHEC and WAMI (a Washington,

Alaska, Montana, and Idaho project) to decentralize medical education but which may have an impact on choice of specialty as well as choice of geographic location.

A recent series of reports describes various programs which are designed to interest students in the provision of primary care to the underserved at the Universities of Alabama, Arizona, Nevada, New Mexico, and Washington, the School of Biomedical Education at City College of New York, and Meharry Medical College (Arradondo, 1980; Baldwin, et al., 1980; Geiger, 1980; Gellhorn and Schuer, 1978; Kaufman, et al., 1980; Rosenblatt, 1980; Scutchfield, et al., 1980; Spencer and Outcault, 1980). The curricular experiments described in the reports "are encouraging, but the mainstream of medical education exhibits relatively little innovation, experimentation, or renovation in training physicians to work with the underserved.... Moreover, many of the schools with large numbers of NHSC scholarship recipients are private ones with high tuition, based in urban medical centers whose traditional mission has been training academicians and practitioners of specialty and subspecialty medicine. The need for curricular reassessment in all these schools is acute" (Mullan, 1980). "Within the current structure of the medical school those staffing the people- and community-oriented programs should fight for required curriculum time and other indicators of legitimacy in the dramaturgy of the medical student's experience" (Mauksch, 1980).

As was noted earlier, second-order factors are those which, while not determinants of first-order factors, i.e., role models, role play opportunities, and the value climate which emerges from them, have a strong influence on them, thus an indirect influence on career choices. With reference to medical education, second-order factors might include the medical school accreditation process, the financing of medical education, and the intrinsic structure and historical evolution of medicine as a science and as a profession. The part played by second- order influences in putting first-order influences into place is easily seen in the similarity of the distributions across specialty (or department) of medical school expenditures (shown in Table 8) and of faculty (as previously shown in Table 6).

Given the imprecision of the criteria used to evaluate medical schools for accreditation (Liaison Committee on Medical Education, undated), there seems little in that second-order factor which would shape or constrain the first-order influences on students' career choices.

The science and profession of medicine is not amenable, except over the very long run, to any redirection. Stevens' landmark work (1971) speaks to the historical evolution of specialization in U.S. medicine. Thus, the major second-order factor in medical education is its financing.

The financing of medical education has experienced shifts in recent years as Table 9 shows. While the dollar amount of revenues from every source increased over the 10-year period (total revenues more than tripled from $1,175 to $4,316 million), the percentage distribution of contributions to medical school support shifted. Constituting 33.2 percent of all revenues in 1967-68, Federal contracts and grants for research was the largest single source of funds; and research contracts and grants from all sources constituted a total of 40.3 percent of all revenues in 1967-68. In 1977-78, the comparable figure was 22.9 percent or a drop of 17.4 percent.

Table 8

Percentage Distribution of U.S. Medical School Expenditures by Academic Department, 1977-78

Total Basic Sciences	22.5
Anatomy	2.6
Biochemistry	3.6
Microbiology	3.3
Pathology*	2.8
Pharmocology	3.0
Physiology	3.3
Other	3.9
Total Clinical Sciences	77.5
Anesthesiology	3.5
Dermatology	0.7
Family medicine	2.8
Medicine	18.5
Neurology	2.5
Obstetrics/gynecology	4.2
Ophthalmology	2.0
Orthopedics	1.0
Otolaryngology	0.5
Pathology*	3.2
Pediatrics	7.7
Physical medicine	0.9
Psychiatry	7.3
Public health/ preventive medicine	1.3
Radiology	5.4
Surgery	8.9
Urology	0.5
Other	6.6

Source: J.A.M.A. 243(9), 3-7-80.

* As originally reported.

Table 9

Summary of Medical School Sources of Revenue, 1967-1968 to 1977-1978*

Source	1967-1968 Amount	1967-1968 %	1972-1973 Amount	1972-1973 %	1977-1978 Amount	1977-1978 %
Total Revenue,	$1,175	100.0	$2,181	100.0	$4,316	100.0
Federal contracts and grants	619	52.7	978	44.8	1,293	30.0
For research	390	33.2	482	22.1	797	18.5
For teaching and training	154	13.1	254	11.6	198	4.6
For public service	+	...	108	5.0	83	1.9
Recovery of indirect costs	75	6.4	134	6.1	215	5.0
Non-federal contracts and grants for restricted programs	108	9.2	377	17.3	558	12.9
Nonfederal contracts and grants for public service	+	...	204	9.4	250	5.8
Nongovernment contracts and grants for research	70	6.0	105	4.8	174	4.0
Non-federal contracts and grants for teaching and training	17	1.4	42	1.9	95	2.2
State, city, and county contracts and grants for research	13	1.1	11	0.5	17	0.4
Recovery of indirect costs on nonfederal contracts and grants	8	0.7	15	0.7	22	0.5
Medical school/university activities	236	20.1	444	20.4	1,491	34.5
Tuition and fees	48	4.1	92	4.2	231	5.4
Professional fee (medical service plan) income	48	4.1	159	7.3	616	14.3
For general operations	48	4.1	159	7.3	481	11.1
For restricted programs	...	...	...	...	135	3.1
Income from college services	21	1.8	54	2.5	42	1.0
Income from endowments	30	2.6	48	2.2	53	1.2
Hospitals and clinics	...	...	...	...	285	6.6
For general operations	...	...	...	...	226	5.2
For restricted programs	...	...	...	...	59	1.4
Other income	89	7.6	91	4.2	265	6.1
For general operations	89	7.6	91	4.2	233	5.4
For restricted programs	...	...	...	...	32	0.7
Other sources of funds	173	14.7	382	17.5	974	22.6
State appropriations to public schools	143	12.2	313	14.4	825	19.1
State, city, and county grants-in-aid, or subsidies to private schools, or payments via interstate compacts	16	1.4	46	2.1	75	1.7
State funds for restricted programs	...	...	...	...	24	0.6
Unrestricted gifts	14	1.2	23	1.1	50	1.2

Source: J.A.M.A. 243(9), 3-7-80, p. 863.

*Data reported by 89 medical schools in 1967-68, 96 in 1972-1973, and 112 in 1977-1978. Data are in millions of dollars. Totals may not equal the sum of the parts because of rounding.
+Data not available in this detail; therefore, total revenue is not equal to the sum of the subtotals.

This drop was almost wholly covered by an increase of 10.2 percent in professional fee income and 7.9 percent in "other sources of income" (the latter included an increase of 6.9 percent in "state appropriations to public schools." What these figures show, then, is a shift in medical school activities and most probably in faculty activities from research to service. At the first-order level, this means that role models, role playopportunities, and the value climate have shifted from a research orien- tation to a service orientation. Recent shifts in career plans of students, i.e., decreased interest in research and increased interest in direct patient care (Funkenstein, 1978), should not then be surprising.

Second-order factors put first-order influences into place, but what puts second-order factors into place? Since financing is the second-order factor in undergraduate medical education which is most responsive to intervention, let us consider briefly the third-order factors which determine its character. Those third-order factors are essentially economic and sociopolitical--economic in terms of the unavoidable costs of personnel, facilities, equipment, and services necessary to educate students; sociopolitical in terms of the groups/organizations/individuals who decide or influence the distribution of monies to medical schools and within medical schools. These sociopolitical factors are implied in the conclusion drawn by Funkenstein (1978) in a study of one medical school's graduates from 1940 to 1976 who chose primary care careers. He characterizes the different societal eras and their impact on medical careers as: The Specialty Era (1940-58), the Scientific Era (1959-1968), the Student Activism Era (1969-1970), the Doldrums Era (1971-1974), and the Primary Care and Increasing Government Control Era (1975 to the present) and concludes that the career orientations and preparations of students are more related to factors outside the medical school than within it.

At the same medical school, different authors evaluating "the effect of a course in family medicine on future career choice" conclude that "the minor trends which do develop seem to indicate that forces outside the medical school may have more of an effect on student behavior and career choice than do individual courses" (Rosenblatt and Alpert, 1979). Hanft (1979) notes that the pressures on physicians' careers and career decisions from Federal involvement in biomedical research and training, manpower training, and patient care financing have been conflicting. Ginzberg (1979) also discusses the Federal Government's physician manpower policies.

Residency Hospital

The second major period in the education of a physician has in recent decades become the residency period. Whereas in earlier times this period of graduate medical training, if taken at all, was about a year in length and referred to as "the internship," it has now become the rule rather than the exception. Moreover, it has been extended to a minimum of 3 years and a maximum of 7 or 8 years and is now referred to as "the residency."

Institutional rather than student characteristics are relevant during this period since, as was pointed out earlier, once students are admitted to medical school their characteristics become a "given" for human resource issues in medicine. The generic first-order institutional

influences on career choice are the same for graduate medical education (GME) as they are for undergraduate medical education (UGME)--role models, role playing opportunities, and the emergent value climate.

Role models include both physician faculty who "attend" in a particular "service" or specialty, including the head of the service/specialty/department as well as, in larger hospitals, senior or "chief residents" in a specialty. The latter since they are still in training are much less potent role models than the former, if they are role models at all. Depending upon the type of affiliation a hospital has with a medical school, its attending staff may or may not be physicians with a private practice. The attending staffs of teaching hospitals owned by medical schools include, in addition to part-time and volunteer faculty, physicians who have full-time appointments to the medical school/academic medical center, who perhaps do research, who teach both medical students and residents, and who may or may not receive income directly from charges to patients depending upon whether they are "strictly full time" (no patient income) or "geographic full time" (with income from private patients). The majority of the attending staff in nonacademic teaching hospitals have private practices from which they receive income, teach only residents, and rarely do research. It is the latter, the teaching staff in hospitals not owned by a university, who constitute a role model for residents, additional to those to which they had been regularly exposed as a third- or fourth-year medical student/clerk.

The resident is exposed to a series of different role models and a series of role play opportunities through the "rotation" format of residency training. In this format, the resident spends a minimum of 3 months and usually 6 assigned full-time to a specialty service in a hospital. The "rotations" are not necessarily in the same institution but the usual predominant value climate has been that of acute care for hospitalized patients. However, as in undergraduate medical education, there have been recent attempts in GME to counteract the prevailing value climate.

Eisenberg (1980) describes the results of his 1977-78 survey of 337 internal medicine residencies in which the organization and curricula of 59 responding primary care versus traditional residencies were compared. In primary care programs, (1) residents spent 38 percent of their training in ambulatory care (versus 21 percent by those in traditional programs) and "48 percent of (their) ambulatory care training time in continuity of care experiences, compared with 39 percent for traditional residents;" (2) more electives outside internal medicine were offered; (3) "out-of-hospital-ambulatory practices and neighborhood health centers were also utilized more frequently," and (4) a "National Resident Matching Program number was used which was different from the number used by the traditional residency program at that institution." While these results are interesting, two problems exist: (1) They are based on a program response rate of 17.5 percent which, furthermore, most likely does not constitute an unbiased sampling of programs, and (2) they fail to address the issue of program impact on specialty choice.

Boufford (1977) provides "a case study of a primary care residency training program" at Montefiore Hospital; Crandall, et al. (1978) report on the "evaluation of a rural clinic rotation for medical residents" in the University of Florida's Department of Medicine; Kirkwood, et al.

(1978) report on the Family Medicine Postdoctoral Training Program of the University of Rochester at Highland Hospital; Pozen, et al. (1979) report on Boston City Hospital's traditional and primary care residency programs; and Rosinski and Dagenais (1978) report on the nine primary care residency programs supported by the Robert Wood Johnson Foundation. A large scale study found that "analysis of the residents' pathways during training and their career patterns after training demonstrated no significant differences between residents from hospitals which currently offer specific primary care training in general internal medicine and general pediatrics and those which do not (Steinwachs, 1979).

All of these studies are program reports which address issues which are salient only after students have self-selected themselves for application to the programs on the basis of prior preferences and choices. However, the crucial issues for physician specialty distribution are: (1) Assuring that these and other acceptable programs in specialties of need exist and can accommodate all interested applicants (Graettinger, 1976) and (2) intervening in the medical education system in ways to attract (and retain) applicants to residency programs in specialties of need. Both assuring the availability of training opportunities and interesting students and residents in taking advantage of these opportunities would seem to imply second-order, institutional considerations concerned with financing, student, and faculty career counseling/ information dissemination, and requirements for specialty certification.

While the issue of the financial support of medical education and medical practice was taken up in detail by the GMENAC Technical Panel on Financing, it is not untoward to mention in passing that third-party payment systems influence case mix (thus, also role playing opportunities) in teaching and other hospitals and, in turn, influence the specialty mix of residency positions. By reimbursing for the provision of inpatient rather than ambulatory care, procedures rather than diagnosis, and disease care rather than health promotion, third-party payers for medical care have a profound influence on graduate medical education. As Table 10 shows, patient revenue provides 87 percent of the dollar support of house staff, while the major source of patient revenues for hospitals are third-party insurers.

With regard to the guidance of students to different careers, there have been indications in the research literature that faculty and program directors are an active force going beyond that of role modeling. Marshall, et al. (1978) hypothesized a "divergent paths" model of medical education in which students are differentiated by academic status at entrance (Medical College Admission Test (MCAT) scores). Some are encouraged by sponsors to enter elite paths, others are "cooled-out" to low status paths, and the remainder enter a "contest mobility" path. Of the latter, it was found that career status (as measured by a specialty status scale, an organization/practice setting scale, and professional activity/orientation scale) was directly related to National Board of Medical Examiners (NBME) test scores.

In another study, Zuckerman (1978) found no empirical support for his hypothesis that career outcome results from different patterns or paths of training. For 2,154 students, 1,146 different career paths were followed, though it was found that "good" students from "clinical" schools did not have the same GME training opportunities available to

them as did "poorer" students from "academic" schools. Since both of these studies are based on 1960 medical school graduates, however, it is difficult to know whether the informal sponsorship/social stratification systems described are operating to the same degree as they were two decades ago, especially given the fact that the increase in medical schools in that period has been almost entirely in State-sponsored "clinical" schools.

In a study of the specialty switching and branching, or paths taken, through GME of 1961 to 1975 medical school graduates, Hunt (1979) calculated for each graduate cohort the percentage of persons entering a first-year GME program in a specialty who entered practice in that and other specialties. One of his three main findings was "that nominal GME output is only an approximate indicator of future specialty manpower supply. To predict specialty supply, it is essential to incorporate post-GME changes ... Often these distributions have not become stabilized until 10 to 12 years after medical school--that is, as much as 8 years after GME is completed "(p. 70)."

Levit and Holden (1978) studied the 1976 specialty certifications of the 1960, 1964, and 1968 medical school graduates and concluded that it is not until 12 years "following receipt of the M.D. degree that most physicians will have entered the certification process or be certified." They note "that board certification rates are higher in the more recently graduating classes" which "may represent an increasing awareness on the part of graduating medical students of the desirability of being board certified to obtain recognition for hospital privileges, academic appointments, society memberships, and other rewards. This is especially apparent in the hospital-based specialties..." What these last two studies point to is factors which exist after GME, therefore outside the educational environment, which influence specialty choice and specialty certification.

In sum, what the literature seems to indicate regarding the determinants of physician specialty choice is that (1) individual student characteristics correlate with specialty choice but not very strongly; (2) the first-order influences of role models, role playing opportunities and the emergent value climate are most important, in terms of how they impact on any one individual; (3) second-order institutional influences, such as the allocation of program resources, determine the "flavor" of the first-order influences, and (4) third-order economic and sociopolitical factors both within and without the educational environment affect career choices both directly and through the chain of lower-order influences.

Table 10

Sources of Funding to Support House Staff and Clinical Fellows, 1975-76

Source	Percentage of Dollar Support for House Staff*	Clinical Fellows**
Patient revenue	87%	44
Federal Government	2	
NIH		23
VA and other Federal		14
State and local government	5	6
Medical school	2	1
Private foundation	1	10
Other hospital	2	
Miscellaneous	1	2
Total	100%	100%

Source: Council of Teaching Hospitals. COTH Survey of House Staff Policy and Related Issues. Washington: Assn. Amer. Med. Coll., 1976.

* Excludes VA hospitals.
** Excludes federal hospitals.

IV. CONCLUSIONS AND RECOMMENDATIONS

FRAMEWORK FOR PANEL DELIBERATIONS

Several overarching tenets framed the deliberations of the Panel. These tenets concern: (a) The inseparability of the educational continuum from pre- and post-educational considerations; (b) the merits of voluntary, as opposed to regulatory, mechanisms for change; (c) the need to preserve the present diversity of medical education institutions; (d) the consequences of a projected constriction of the fiscal situation in medical education, and (e) the need to coordinate solutions to the several problems which medical education now faces.

The Panel believed that interventions in the educational environment should not and cannot constitute the sole approach to correcting specialty imbalances. As students progress along the educational continuum, they receive greater amounts of informally relayed information on how medicine is practiced in the posteducational environment--in part because they seek such information as an aid to defining their career plans and in part because they are increasingly exposed to practice patterns through the increasingly clinical orientation of their formal instruction. Thus, it would seem that the practice environment, in a feedback manner, as well as the educational environment, in a direct manner, both affect their career decisions.

One of the prime considerations regarding employment in any field is that of remuneration. The meager amount of investigation regarding anticipated earnings in medicine has not been able to document a significant influence on specialty choice (Fruen, et al., 1980; Cuca, 1979), however, a new element is intruding itself which may have a profound effect on the specialty distribution and career activities of new physicians. That element is high levels of financial indebtedness resulting from major increases in medical school tuitions. Two scenarios now seem possible--either that high levels of debt will encourage students to enter those specialties and subspecialties which are more financially remunerative, i.e., the procedure-oriented nonprimary care specialties which will permit them to pay off their debts more rapidly, or that they will forego any lengthy graduate training to enter immediate practice in primary care. (The latter scenario does not preclude a return for graduate training at a later time.)

In addition to its concern for the potential effect of high financial debt on specialty choice, the Panel believed strongly that current policies in the reimbursement of patient care services reward procedures rather than careful clinical diagnosis, continuity of patient care, patient education, and a preventive approach to medicine. The Panel believed that such differential rewards have repercussions on specialty choice and on how a physician conducts his/her practice.

The Panel deemed it premature and unwise to employ governmental regulatory processes to intervene in the medical education system. The Panel repeats here its conception of the difference between regulatory and voluntary interventions, namely, that regulatory mechanisms impose penalties for nonparticipation or noncompliance (see p. 10 of Section II for fuller explanation).

One of the strengths of medical education in the U.S. lies in the diversity of the institutions which participate in the training of physicians. This diversity emerges from differences in: (a) Goals, whether formally stated or organizationally implicit, for the production of human resources in medicine, e.g., concentration on the production of research scientists for the laboratory and classroom or of practitioners for the local or larger community/society; (b) education and training methods, e.g., the primarily academic model of the medical schools (lectures, laboratories, and supervised clerkships) and the primarily apprentice or case-method model of the teaching hospitals (patient care responsibilities), as well as various educational/training differences among medical schools and among teaching hospitals; (c) degree of accountability to other institutions or bodies, e.g., "private" medical schools which receive few monies from State legislatures, public medical schools which receive varying amounts of public financial support from State legislatures, teaching hospitals which support themselves primarily from charges to patients, and (d) other factors. Elimination of this diversity would stifle creativity and innovation in health professions education, health care delivery, and medical research.

Medical schools and teaching hospitals are not immune to the economic conditions of the larger society and are faced with financial uncertainty (Rogers, 1978). Yet, they are being asked during a time of economic constraint to change enrollment practices and patterns including class sizes while altering the specialty distribution of graduates. Stable, long-term fiscal support of programs to change specialty distribution will be necessary.

Medical education is being asked by those both within and without the profession to mount programs to respond to myriad needed changes. Among those changes are: Providing opportunities in medicine for those previously underrepresented; reducing the psychological stress of students in the environment; developing the teaching skills of faculty; increasing curricular attention to nutrition, thanatology, care for the elderly, human sexuality, cost containment, and, in general, increasing the relevance of the curriculum to the actual practice of medicine; maintaining programs of basic biomedical research; training research scientists, providing services and manpower to local populations, etc. The degree of rationality and success in any approach to changing physician specialty distribution via the educational environment (or any of the programs for change) lies in the degree to which it is coordinated with programs for change in other areas of medical education/medicine and neither inhibits nor is inhibited by them. There should be a mechanism for coordinating these programs and other developments in the profession. (For further discussion of this issue and GMENAC recommendations, see GMENAC Summary Report.)

RECOMMENDATIONS FOR THE LONG TERM

With respect to the issues of physician specialty distribution a dual approach should be taken: Programs which will have long-term impacts versus those which will have immediate impacts. Long-term impact programs will put into place permanent, broad-range mechanisms for improving health system linkage between the production of and need for human resources in medicine. Once underway, these programs should eliminate the need for the temporary, short-term attempts to adjust production to need which can cause abrupt dislocations rather than smooth adjustments in the production system. Immediate impact programs are needed, however, until the longer-term programs begin to have an effect. They are the other prong of the dual approach which should be employed.

Recommendation 1: Individual Characteristics

The applicant pool must be broadened with regard to students' individual characteristics, i.e., socioeconomic status, age, sex, and race. It is anticipated that applications to medical school will decline seriously by the end of the decade and it may be necessary to recruit promising students. GMENAC felt that there is a need for greater diversity among the individuals entering the medical profession. With the anticipated decline in applicants, an opportunity is presented to recruit students with different backgrounds. Increased informational and counseling programs directed at students with different backgrounds are necessary to convince them that medicine is a possible career.

Recommendation 2: Premedical Education

In an attempt to increase the diversity of individuals entering medicine, GMENAC believes that there must be more flexibility in the requirements for admission to medical school. There is not intended to be a departure from medicine's requirement for a keen understanding of the sciences for its effective practice, rather an expansion of the arts and humanities background of medical school applicants is recommended. This would have the peripheral effect of interesting a more diverse student body. Additionally, undergraduate institutions should examine the appropriateness for premedical students of present college science courses. It was proposed that organizations such as professional accrediting organizations, the Association of American Medical Colleges, the American Association of Colleges of Osteopathic Medicine, and regional educational groups, convene conferences to examine alternatives to traditional premedical education.

Recommendation 3: Admission Process

The admission process should be examined in the light of national, regional, and local requirements, and the institutional mission. Medical schools should identify or examine their missions/goals for the production of physicians with respect to needs for physician manpower. A funding mechanism should be available which would encourage the continuance of the laudable experimental projects of this type which have been carried out as well as the stimulation of new projects. Applicants should be provided with information on the type of school, the product of the particular school, and other institutional characteristics that may be of importance in eventual career choice.

Recommendation 4: Broad-Based Undergraduate Medical Education

Education within the medical school should be broad-based and should prepare the student for graduate medical education. While the academic medical center has been traditionally the institutional entity for both the undergraduate and graduate medical education component, it is important to note that some of the newer medical schools are utilizing a base of community institutions. GMENAC felt that the general services of family medicine, general internal medicine, and general pediatrics should be given greater emphasis in the medical curriculum. Increased attention to ambulatory care is essential. GMENAC recommended that there be made available:

-- Project grants to upgrade outpatient services of academic medical institutions to make ambulatory facilities financially viable;

-- grants to foster educational innovation with respect to education in an ambulatory setting;

-- suitable faculty reimbursement for ambulatory care;

-- grants for development of faculty who are competent to teach in the ambulatory setting, and

-- an increased availability of sophisticated career counseling for the student.

Recommendation 5: Graduate Medical Education

GMENAC recommends that the first year of graduate medical education (PGY-1) be a broad-based clinical experience to serve as the foundation for further specialty training. No matter how PGY-1 is structured, GMENAC felt that, at a minimum, undergraduate medical education must provide a broad base upon which the remainder of the educational process is formed and, therefore, recommended that undergraduate year 3 or 4 provide students with educational experiences mainly in the general medical care specialties and with strong emphasis upon an ambulatory component.

Recommendation 6: Practice Choice

Information strategies are needed in this area, as well as more role models and medical educational experiences at both the undergraduate and graduate levels, to make residents aware that medicine can be practiced in other than tertiary care centers. Graduate training should include environments that provide a more realistic experience relative to community practice. Moreover, there should be enough flexibility within graduate training programs to permit a tailoring of the requirements to the demands of students' intended types and locations of practice. The panel strongly recommends that a portion of graduate medical training occur in other than tertiary care centers.

Recommendation 7: Manpower Information Dissemination

Along the entire educational continuum, medical school applicants, students, students' spouses, administration, and faculty should be

continuously provided with information regarding physician manpower needs in the various specialties and different geographic locations (through publications, workshops, or other communication methods).

Recommendation 8: Women and Minorities in Academia

Programs which will increase the participation and visibility as academic role models of women and underrepresented minorities should be instituted.

RECOMMENDATION FOR THE SHORT TERM

Long-term impact programs will be of little utility in producing changes in the specialty choices of physicians graduating during approximately the next decade. However, if nothing more immediate is done to shape the specialty distribution of new human resources in medicine in the direction of projected needs, imbalances of over- and undersupply will become more severe before they are corrected. Short-term impact programs are necessary to fill the gap until long-term programs can be implemented and take effect. Immediate-impact programs to modify present specialty distributions should include:

Recommendation 9: Expansion of Loan and Scholarship Programs

To reduce the financial barriers to medical education which are restrictive to diversity, programs of loans and scholarships should be expanded.

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