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Vol. 50 No. 8 August 1975

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JOURNAL OF Medical Education

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Programmatic Computer Simulation Model for Medical School Planning
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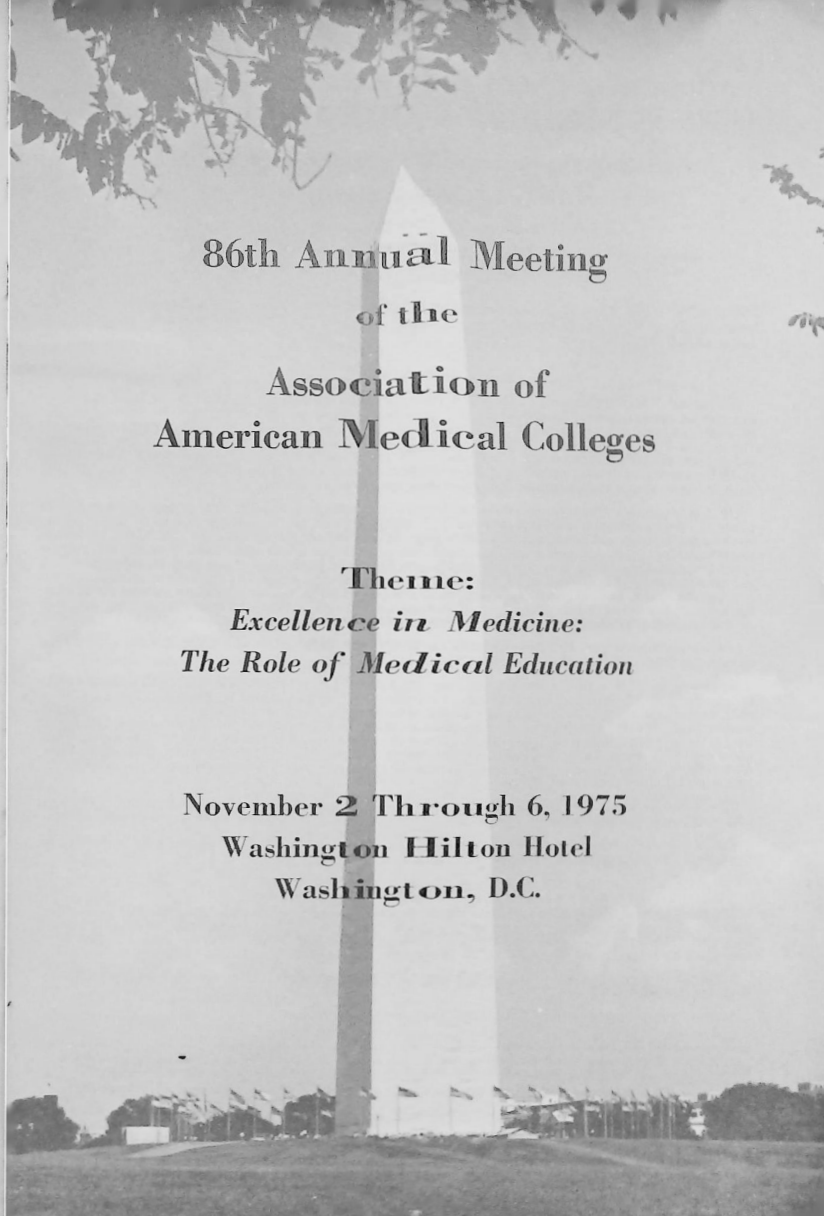

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Subscription Rates: $15.00 per year, $2.00 per single copy; students, $10.00 per year; foreign, $18.00 per year, $3.00 per single copy; Latin America and Canada, $15.00 per year. Paperbound supplements, $4.00. Hardbound, $6.00.

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Volume 50 • Number 8 • August 1975

Programmatic Computer Simulation Model for Medical School Planning—Ben R. Forsyth, Richard Laverty, and Pamela Hebert 757

Resident Participation in Residency Programs—John J. Frey, Bery J. Engebretsen, Jane Westberg Olson, and Lynn P. Carmichael 765

Objectives of Pharmacological Education—Jean Sicé 773

The Quebec Health Care System: Its Implication for Medical Education—Jacques E. Des Marchais 779

The Two-Course System in Gross Anatomy—John T. Willson, Theodore J. Tarby, Raymond U. Seale, and David G. Whitlock 788

Predicting Academic Success for Military Paramedical Personnel—Jerry M. Goffman 797

Communications:

Impact of Retention Program for Disadvantaged Medical Students upon the Medical School Community—Carter L. Marshall, Stephen Margolis, and Edward D. Joseph 805

Uncharted Waters: A Preliminary Evaluation of Faculty Attitudes Toward Medical Students—David B. Marcotte and Donald E. Manning 807

Mortality Among Medical Students and Young Physicians—Richard B. Everson and Joseph F. Fraumeni, Jr. 809

Predicting Supervisor, Peer, and Self Ratings of Intern Performance—Penelope Kegel-Flom 812

Michigan Council of Deans and Cooperation in Medical Education—Ralph E. Lewis 815

A Preliminary Examination of the In-Training Evaluation Report—Ernest N. Skakun, Donald R. Wilson, William C. Taylor, and G. Ross Langley 817

Combined Surgery-Psychiatry Course: An Experimental Model—Laura Bleiweiss, Philip G. Mechanick, Julius A. Mackie, John H. Valentine, and Francis E. Rosato 819

Education of Foreign Medical Graduates for Practice in Sweden—Hjordis M. Foy 821

Editorial: The Medical Staff Organization Vis-à-Vis the Faculty Organization 823

Datagram: Women Physicians on U.S. Medical School Faculties 825

Book Review 829

Letters to the Editor 830

Bibliography 833

Index to Advertisers xiv

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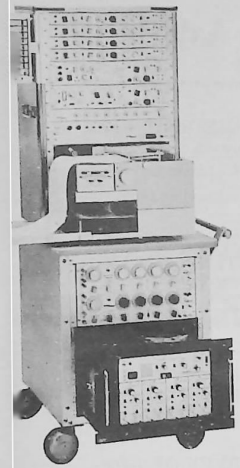

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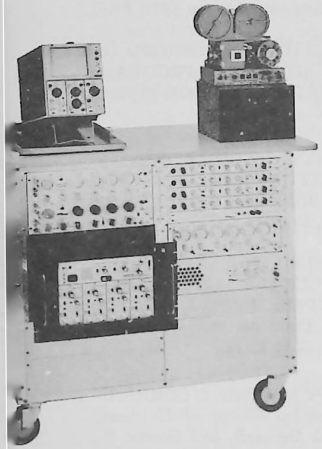

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Ben R. Forsyth, M.D., Richard Laverty, and Pamela Hebert

Abstract—A comprehensive programmatic computer simulation planning model for a school of medicine was generated by integrating several separate simulation models with on-site cost study information. An elementary validation of the model was achieved. The model generated program costs in terms of both faculty hours and dollars. Results indicated that the size of the medical class could be increased from 75 to 100 students within the present resource limitations by transferring faculty time to education from other programs. The maximum class size was limited by the availability of clinical material. The basic science departments could handle this class size easily without significant reduction in other programs, but the clinical departments could not do so unless inpatient levels increased significantly.

There are currently many extrinsic and intrinsic forces which are affecting the operation of all medical schools. These include changing federal priorities for biomedical research and training, increasing public demand for better distribution of health services, and public and governmental demands that medical schools train more physicians with an increased emphasis on primary care and family practice.

The University of Vermont College of Medicine has established a formal planning process involving the entire faculty in an attempt to plan for and manage the changes resulting from these forces. Computer modeling techniques have been used as part of this planning process in order to provide some data on the possible consequences of some proposed plans. In this paper some of the specific planning problems at the University of Vermont College of Medicine are reviewed, and there is a discussion of the planning methods and techniques utilized in the analysis of these problems.

Historical Perspective

The University of Vermont College of Medicine is one of the oldest four-year medical schools in this country, having been founded in 1822. Vermont is the smallest state in terms of population that supports a four-year medical school, and the College of Medicine in Burlington is located in a metropolitan area with a population of less than 100,000. During the past 20 years, the College of Medicine has

This report was supported in part by contract N01-MI-24360 from the Division of Manpower Intelligence, Bureau of Health Resources Development, Health Resources Administration, U.S. Public Health Service, Department of Health, Education, and Welfare.

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experienced exponential growth. The enrollment has almost doubled from an entering class of 40 to one of 83; however, the clinical base for the training of medical students essentially has remained unchanged. This fact has caused continued concern about the patient population available for clinical training. With reference to medical schools nationally, the University of Vermont is in about the 20th percentile in terms of total expenditures, sponsored project expenditures, and regular operating expenses.

Methodology

The College of Medicine has made extensive use of program cost studies in analyzing and managing all programs of the school for a number of years. The results of these studies have been used extensively with the university trustees, central university administration, department chairmen, faculty, and staff to describe and analyze the costs and income of the various programs of the College of Medicine. Because of the familiarity in this institution with the program cost studies, this format was adopted for all institutional planning, including computer modeling.

Undergraduate medical education (UG) has the highest priority of all programs at Vermont. In attempting to assess the effects of the forces described above, the authors evaluated the consequences of increasing educational activities coupled with decreasing research and research training in an institution with a defined and limited clinical base. The intent was to determine to what extent increased educational activities could absorb any surplus faculty efforts. It was assumed that the institution would not radically change and that total number of faculty would not change. In order to accomplish this objective, it was necessary to undertake a detailed analysis of the UG program and of total program efforts of the school in general.

The detailed analysis of the UG program was obtained primarily through the use of two computer models, UGEDUC and TRANEE (MPS) (1). UGEDUC analyzes in detail the resource utilization nonclinical medical school education (primarily the basic science portion of the program), and TRANEE (MPS) analyzes resource requirements for clinical training (the clinical sciences portion of the curriculum where patients are a necessary resource).

The College of Medicine conducted a program cost allocation study for fiscal years 1968–69, 1969–70, 1970–71, and 1971–72 which closely followed the techniques and methodology developed and sponsored by the Association of American Medical Colleges (1). Data from the cost study was used in determining certain relationships for this study.

BASIC SCIENCES MODEL

The input for the models was obtained primarily through interviewing faculty and students. For UGEDUC the data consisted of a curriculum file, an activity file, and the student offerings. Each course was then described by the related activities necessary (for example, lecture and laboratory) and the required resources (for example, faculty hours per week, room size, and number of microscopes). The model integrated this data with the class size and the week-by-week exposure to the various curricula. Thus, simulations could be run which would indicate what the resource requirements would be for a specified class size of medical students under any specified set of curricula (either the present curriculum or a proposed curriculum).

The most important output from this model was a determination of the faculty hours per week necessary to support the program at various class sizes. This number indicated "in class" course instruction time only (faculty hours in the model were the minimum faculty hours necessary to support undergraduate medical education).

The total number of faculty hours necessary to support UG education was then constructed using five categories of faculty effort. These were: course instruction, preparation time, advising time, administrative time, and patient care related time. Available cost study data indicated how time was spent in all of these activities. Since the information desired was total faculty time needed for the UG program, these cost study data were integrated with the model output to determine new total time allocations at existing enrollment levels.

Calculations for the new levels of these activities were done in the following manner. They were divided into three categories: (*a*) student sensitive (advising, administrative), (*b*) patient sensitive (patient care), and (*c*) relatively insensitive (preparation time). The student sensitive activities were summed and divided by class size to determine the hours per student increment in faculty time needed. The same method was used for patient-sensitive activity except that the number of patients was used as the denominator. The relatively insensitive activities were derived directly from the cost study. In this manner the model could be used to determine the total increase in faculty hours required for various medical student class sizes. Thus, by integrating the model output with the cost study data on course instruction, it was possible to generate levels of course instruction activity commensurate with various class sizes.

The limits of class size in the basic sciences were determined by the physical resources (space) and amount of time available from other programs. An arbitrary assumption here was that no departmental program would be reduced by more than 50 percent.

CLINICAL TRAINING MODEL

The clinical training model (TRANEE) was used to analyze the clinical training portion of the undergraduate medical program and the intern-resident program (2). In the present study the model was used to determine the number of faculty patient-care-related teaching hours required for varying medical student class sizes.

The new class size had a direct effect on two programs, intern-resident education (IR) and undergraduate medical education. This was due to the shared resources and joint effort in these programs. The faculty hours needed for the undergraduate medical education were calculated by using the general method discussed previously. However, in order to support any class in the UG program, there is related effort needed in the IR program, since interns and residents do much of the actual clinical teaching of the students. The TRANEE model supplied output in terms of faculty hours per week necessary to teach interns and residents, teaching hours per week from interns and residents to students, and the number of patients needed for each class size.

Since the IR and UG are joint programs, the number of intern-residents also varied as the number of medical students changed. The same output calculations were then applied to the IR program at these new levels.

The total additional faculty time necessary for both these programs was determined, and that sum was the amount of time reallocated from other programs. The output and analysis derived from both models were used to generate the program activity allocation tables from these pro-

grams for various class sizes. Finally, this model was used to determine the minimum number of patients required to support the clinical education program for varying medical student class sizes.

SUMMARY MODEL

The total faculty time in any department for a new medical school class size was determined using the following formula:

$$T_j = K + C_j + \left[\frac{(\Sigma\epsilon + \Sigma A)}{n_i} \cdot (n_j)\right] + \left[\frac{\Sigma P}{N_i} \cdot N_j\right]$$

where: T_j = total faculty time in UG program for class j (for any department), K = preparation time (from Cost Study, considered constant over this range), C_j = course instruction time for class j (adjusted output from UGEDUC), ϵ = advising time (hours/week from Cost Study) per faculty, A = administration time (hours/week from Cost Study), n_i = number of students in original class size, n_j = number of students in new class size, P = patient care related teaching (output from TRANEE), N_i = number of patients (actual), and N_j = number of patients needed for class j (output from TRANEE).

In considering the allocation of total faculty hours to UG and IR education, time was transferred from other programs within the limitation discussed previously.

PROGRAM BUDGETING MODEL

The next step in the analysis was to prepare program budget information to represent the changes in program costs due to the new allocations of effort. Since faculty costs related to the program can be determined by allocating specific individuals (that is, specific salaries) to certain programs and since there can be some flexibility as to these assignments, ranges were used to represent possible cost configurations.

Initially, the faculty members in each department were categorized according to salary groups, and average salary per group was determined. Three levels of program costs were calculated. The highest cost for a given program was obtained by arbitrarily assigning faculty effort to that program starting with the highest paid faculty and working downward along the salary-group scale until the total number of hours required to support that program had been obtained. An inherent assumption was that the faculty was generally flexible enough to perform any educational activities required throughout the range of programs.

Calculations then were made starting from the lowest salary group and working upwards. This yielded the lowest possible faculty cost for any program. An historical index of how allocations have been made from salary groups to programs then was used to determine an estimated cost which represented the most probable faculty cost of any program.

Results

The results for the basic science model, clinical science model, summary model, and program budgeting model will be presented separately.

BASIC SCIENCES MODEL

Using the methodology described, the authors proceeded, department by department, to determine how they could increase both undergraduate medical education and allied health education in the basic sciences by reallocating effort to education from research without cutting research more than 50 percent in any one department, without changing faculty numbers, and within the present curriculum and physical limitations.

In the first analysis in the basic sciences, the arbitrary limits of a 20 percent increase in the number of medical students

and 5 percent increases in the number of allied health and other University of Vermont undergraduate students were used. These assumptions did not produce a significant increase in the number of faculty instructional hours required except for one department which required a 15 percent increase in faculty hours. The only limit on increasing students from any department in the existing curriculum would be the physical capacity of lecture halls.

Within the 20 percent limit on increased medical class size, an additional analysis was made using the desired ideal number of students for a particular classroom setting rather than the actual or maximum size for conferences and seminars. This was based on the assumption that the quality of education increases as the instruction becomes more personalized. A determination was then made of how many more faculty hours would be required to achieve these levels. This analysis yielded no overall significant increases in faculty time required, although two departments would utilize some additional faculty hours.

The analysis was then repeated, with the number of medical students being increased progressively until one department would have to decrease research and research training activities by more than the designated 50 percent. Two departments reached this level with an increase in the number of medical students to 120. Therefore, 120 students became the limit on student expansion with present staff throughout the seven basic science departments. The percentage increase in faculty effort for undergraduate medical education that resulted from increasing the number of medical students from 75 to 100 or 120 is illustrated in Figure 1.

Four departments were most affected by this increase in class size. The additional effort required by these departments was significantly above the average, while the additional effort in three other departments was substantially below the average. One department's efforts increased proportionately with the average increased total effort. This analysis demonstrated that increasing the class size did not impose an equal additional requirement of faculty time on all of the basic science departments.

Another finding was that four departments could utilize any excess or un-

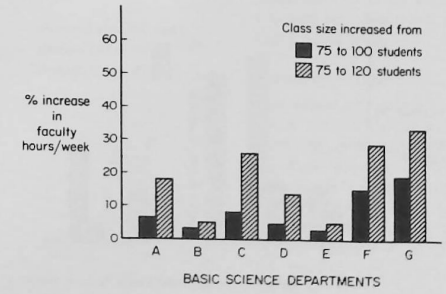

FIGURE 1
Percentage increase in faculty effort of basic science departments for undergraduate medical education of increasing number of medical students.

funded research effort for undergraduate medical education, while two other departments could not effectively transfer all the potential excess research effort to education even with a 60 percent increase in class size.

CLINICAL SCIENCES MODEL

The results of the analysis in the basic science departments indicated that a class size of 120 undergraduate medical students could be accommodated within the constraints previously described. The resource implications of this class size for the clinical departments were then analyzed to determine whether the clinical requirements for a new class of 120 could be met when this class entered clinical training as junior clinical clerks (JRCCs). The number of interns and residents was fixed at the present level for the initial analysis, but was varied in subsequent analyses if the number was found to be the limiting factor in the model.

These analyses revealed that four of five clinical departments could not support a class size of 120 even with a reduction in the number of interns and residents, because of an insufficient number of patients. The analyses were then repeated using a lower number of medical students. It was found that the maximum class size that could be accommodated by the clinical departments was 100 medical students, but even this number would be a strain on the clinical resources of some of the departments.

Once the maximum class size was established, a determination was made of the hours that needed to be transferred to education to support a class of that size. The TRANEE model was used to determine the total additional faculty hours necessary for both the undergraduate medical education and intern-resident programs for the new class size. The percentage increase in faculty effort for undergraduate medical education that resulted from increasing the number of medical students to 100 and 120 from 75 is illustrated in Figure 2.

This analysis demonstrated that increasing the class size to 100 had a different effect on the various departments, and certain departments would require major curriculum changes to accept this increase in students. The major limitation was the availability of patients.

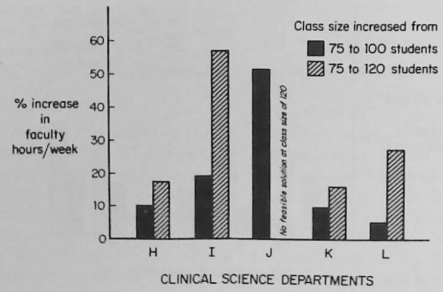

FIGURE 2

Percentage increase in faculty effort of clinical science departments for undergraduate medical education of increasing number of medical students.

PROGRAM BUDGETING MODEL

A program budget for each department was prepared utilizing the faculty hour allocations derived from the model and the methods described previously. Total program budgets were determined by summing the departmental program budget. These results for varying class sizes are illustrated in Table 1.

TABLE 1

COMPLETE PROGRAM COSTS FOR FACULTY SALARIES ONLY FOR TWO MEDICAL STUDENT CLASS SIZES*

Program Costs†	No. of Medical Students per Class	
	75	100
Undergraduate Medical Education		
High		
Total	992.0	1,092.0
Per student	3.3	2.7
Estimated		
Total	782.0	875.0
Per student	2.6	2.2
Low		
Total	613.0	699.0
Per student	2.0	1.7
Intern-Resident Education (Total)		
High	568.0	598.0
Estimated	438.0	459.0
Low	349.0	360.0
Other Education (Total)		
High	564.0	581.0
Estimated	357.0	373.0
Low	287.0	297.0
Research (Total)		
High	1,077.0	956.0
Estimated	844.0	737.0
Low	716.0	625.0
Service (Total)		
High	1,353.0	1,327.0
Estimated	1,072.0	1,049.0
Low	827.0	811.0
Total		
High	4,554.0	4,554.0
Estimated	3,493.0	3,493.0
Low	2,792.0	2,792.0

* Complete program costs for 120 medical students per class could not be calculated since one department could not support a class of that size.

† Program costs (faculty salaries only) are in thousands of dollars.

Of course, it was impossible to allocate lowest costs to each program because that would mean that faculty members with the lowest salaries would support all activities. The same is true for highest salaries. The data in the table show the largest range of faculty costs possible for each program. The estimated cost is an estimate of actual costs across the programs based on current faculty assignments.

The constraints on this calculation were that total hours from any salary group would be constant; that is, faculty types would not be added or deleted from the system. Thus, individual program costs would vary because hourly requirements per program were changed, but total program costs would not change because total number of faculty hours remained the same.

In the basic science departments the research program effort was decreased in order to accommodate increases in undergraduate medical education. No one department was cut below 50 percent of present research effort. However, in some of the clinical science departments which are not as heavily involved in research, effort from other programs had to be reallocated in order to free time for the UG and IR educational programs at certain student levels.

Discussion

The many intrinsic and extrinsic forces which currently affect medical schools require that each institution carefully evaluate these changes and attempt to assess their impact on its various programs. The ramifications of potential shifts are not always readily appreciated; therefore, a careful analysis of all of the activities of the medical school may be necessary in order to plan effectively to deal with change.

In recent years expansion of medical school enrollment has been a major con-

cern at every medical school. It has often been assumed that this expansion can easily take place by reprogramming faculty time and that this was an effective way of dealing with changes in other programs. Because of previous experience at Vermont relating to difficulties in dealing with increased numbers of students, it was felt that it was absolutely necessary that these assumptions be examined in a systematic manner and an attempt be made to project accurately the consequences of programmatic shifts resulting in increased medical student and other teaching.

The results of this study clearly demonstrate that at Vermont increasing medical student enrollment places an unequal load on the various academic departments. Certain departments, especially in the basic sciences, could accept a substantial increase in the number of medical students without a major change in faculty effort. Other departments within the basic sciences could accept lesser numbers of medical students with relatively minor changes. The limiting factor in the basic science departments was the ability to reprogram existing faculty to teach medical students. In addition, a major expansion of the medical student class would require renovation of existing teaching space.

The clinical departments presented a completely different problem. There it was apparent that the limiting factor was the availability of patients to be used in teaching medical students. It was also apparent that certain departments were having difficulty with the existing class load and that this problem could not be readily improved by manipulation of the numbers of interns or residents or other members of the health care team.

These results had several implications for the College of Medicine. First, it was obvious that an increased number of patients was necessary to accommodate any significant expansion of the medical students' classes; in fact, it was necessary to attempt to develop increased clinical resources for some of the existing clinical training programs. For these reasons there has been a search for alternative clinical teaching sites, including the active development of an ambulatory care program as well as affiliations with other area hospitals.

In addition, the potential availability of additional space for basic science students has led to a consideration of contractual arrangements with other institutions for the teaching of basic science students at the College of Medicine, with clinical training to be carried out at another site. It was also apparent that in certain basic science departments the potential faculty time available, if there were significant funding shifts, was far in excess of any capacity needed for any reasonable medical student teaching increase. These departments, therefore, were encouraged to broaden their teaching activities and have become actively involved in teaching other health sciences and general university students.

In summary, these models permitted an examination of both the financial implications and the effect on faculty effort of any planned programmatic changes and proved to be effective techniques for both the planning and management of the medical school.

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Resident Participation in Residency Programs

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Abstract—Residents need to participate more fully in decisions involving their educational process and their learning/work setting. In the Department of Family Medicine at the University of Miami School of Medicine, residents are involved in designing their curriculum, monitoring their work/learning settings, selecting their peers, and evaluating their peers and faculty. This style of residency program has significant implications not only for patient care but also for future physicians, medical departments, and medical associations.

During the past few years a growing number of students, educators, and members of the medical profession have been voicing their contention that physicians-in-training should participate more fully in decisions involving their educational process and their learning/work setting (1–3). On the undergraduate level there are indications that these ideas have moved beyond mere rhetoric. Medical students are serving on medical school committees; and they can be found in policy-making groups, the Council on Medical Education, and the American Medical Association (AMA). In recent years some medical students and residents have been active in helping to bring about significant changes in their work settings (4).

Ironically, however, residency programs which are the final stepping stones in the physician's formal education are relatively untouched by the growing wave of participation and activism. House staffs are providing most of the care in medical centers and are daily making difficult emotional and clinical decisions concerning the lives of thousands of people. Yet resident physicians frequently find themselves in programs which are modeled on the parent-child relationship.

Many departmental chairmen relate to residents in an autocratic and sometimes condescending manner. Curriculum is usually planned for them. The residents' peers are selected by the department faculty. Residents occupy inferior positions in the hierarchy of health workers who will soon be their colleagues. In general, department chairmen and faculty have an unduly large amount of control over residents' lives and future.

Unlike medical students, residents until recently were not even represented on the national boards which have power over their programs and their lives. Their voices were not heard on residency review com-

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mittees, specialty boards, or national accrediting bodies.

This incongruous situation has been recognized by the AMA. In June of 1970 the following was one of the statements added to the "Essentials of an Approved Internship" and "Essentials of Approved Residencies" (5):

> It is inappropriate that house officers be expected to assume increasing responsibility for patient care, while not at the same time participating effectively in communication which contributes ultimately to policy-making decisions. The intern and resident must be integrated into the medical staff as true colleagues in order that effective programs of medical education and patient care be carried out.

New Style Residency

Although this statement was issued more than four years ago, most residency programs are still largely unchanged. One of the exceptions, however, is the residency program in family medicine at the University of Miami School of Medicine. This program, established in 1966, is community based and primarily focused on ambulatory care and it emphasizes the social-emotional aspects of health care as well as the traditional medical aspects. For many years the program was administered in a somewhat traditional manner; then, in the early part of 1971, radical changes were made.

At that time the faculty suggested that the residents participate in making decisions about their residency program and in so doing have more control over their lives. A few residents did not want to assume the amount of work they felt was implicit in this kind of approach; yet they were upset with the policies governing one of their field placements. Consequently, when other more activist residents began talking about undertaking an experiment in resident control, the residents, as a group, elected to be a part of it. Today, although the new style program is still in its childhood, it does illustrate some significant areas and issues which need to be studied.

All of the approximately 45 people in the continuous three-year residency are a part of the Family Medicine Residents' Association—a nonincorporated organization with a constitution and bylaws adopted in 1972 and revised in 1974. The steering committee, composed of representatives from all three levels of the program, is the elected body which governs those aspects of the program directly affecting the residents. Members of subcommittees on facilities, medical education, curriculum, and selection present information and recommendations to the steering committee. After hearing the reports, the steering committee generally decides policy. If any issue is felt to be unusually controversial, however, it is brought as a referendum to the entire association.

Decision-Making Responsibility

A recurring source of confusion for both residents and faculty related to the issue of areas of authority. It was often not clear if decisions in a particular area were to be made by the resident steering committee or the faculty. However, in late 1973, approximately a year and a half after the formation of the Resident Association, the lines of authority were clearly drawn at a faculty resident retreat. Decision-making areas were categorized (Table 1) as resident decisions (category 1), faculty decisions (category 3), or "gray area" decisions (category 2). Decisions in category 1 and 3 are made by the respective groups. Category 2 decisions require resolution by an arbitration committee (if there is conflict between resident and faculty judgment) and finally a general departmental vote (in which residents and faculty have equal voice) if still unresolved after arbi-

TABLE 1

CATEGORIZATION OF DECISION-MAKING AREAS FOR FACULTY AND RESIDENT DECISIONS

Decision-Making Areas	Category*		
	1	2	3
Graduate education			
Recruitment of new residents		x	
Selection of new residents		x	
Peer review of residents			
Evaluation	x		
Discipline	x		
Promotion		x	
Certification (intern and residents)		x	
Dismissal from program		x	
Number and ratio of residents		x	
Curriculum change to involve only future residents			x
Curriculum change to involve present residents		x	
Elective curriculum	x		
Individual variations in curriculum	x		
Acquiring a new facility			
Development with no commitment	x		x
Contract			
Present residents affected		x	
Future residents affected			x
Assignment of individual residents to a facility	x		
Acceptance and maintenance of a resident in a facility		x	
Determination of resident program goals		x	
Undergraduate education			
Student curriculum and evaluation in health center and ward		x	
All other undergraduate activity			x
Continuing education			x
Postgraduate education (fellows)			x
Research and development			x
Budget and funding			
Unlabeled or graduate education money		x	
Labeled money (other than graduate)			x
Facilities			
Management		x	
Scheduling of duty hours	x		
Personnel			
Selection of faculty with greater than 50 percent graduate responsibility		x	
Selection of faculty with less than 50 percent graduate responsibility			x
Graduate faculty assignments		x	
Definition and list of faculty			x
Evaluation and continuation of faculty		x	
Visiting faculty			x
Faculty salary			x
Faculty travel			x
Nonacademic			x
External Affairs			
Other departments			x
Administration of			x
Other schools			x
Organized medicine			x
Political			x
Public relations			x

* Category 1 = resident decisions, category 3 = faculty decisions, category 2 = decisions requiring mutual agreement of faculty and residents.

tration. Usually, however, category 2 areas have been resolved by consensus of faculty and resident groups. Neither arbitration nor general meetings have yet been needed to resolve category 2 decisions; this is probably a reflection of the close communication and respect between the groups.

It might appear that these changes in decision-making responsibility have made it possible for faculty to abdicate responsibility in the residency program. In fact, this has not been the case. Although the resident group shoulders much of the decision-making responsibility, the faculty retains two major areas of responsibility. The first is to provide information. This includes not only the traditional didactic and clinical information but also information of a conceptual, political-economic, or procedural nature within the framework of which the resident group can make its decisions. One member of the faculty is always a member of the Steering Committee and is charged with providing this latter input. The second major responsibility of the faculty is the implementation of decisions. An innovative curriculum change, for example, depends largely on faculty to become a reality. The department administrators feel that resident participation, as a whole, has increased rather than decreased faculty input and responsibility. More important, this participation has demanded that faculty "sell" issues on their merits rather than implementing them by simple authoritarian decree.

Peer Selection

The subcommittees of the residents steering committee address themselves to matters of resident concern. One of the key areas—peer selection—is handled by the selection and information subcommittee composed of four residents and the director of graduate education. Subcommittee members interview prospective residents and judge them on the basis of their academic record, interpersonal relationship abilities, interest in family medicine, and long-range career goals. In particular, the subcommittee looks for self-motivated individuals who want to be active learners.

For obvious reasons residents want authority in the selection of their peers. Selecting future residents probably does more to shape a program than any other single factor. Beyond this, however, there are good indications that residents are able to select peers who will be successful in their future practices. This has been substantiated by Korman and Stubblefield (6), who studied internship performance in terms of three forms of medical school evaluations: grade-point average, faculty ratings of "physicianship" (raters included five clinical and seven preclinical members), and peer ratings. They discovered that by far the best predictors of future internship success were peer ratings.

Facilities

The subcommittee on facilities performed a major function from 1971 through 1973 during two major controversies. One of the first controversies centered around the proposed departmental participation in the prison medical service of Dade County. A number of residents had made a voluntary commitment to the prison medical system and sought support for an extension of services. Another larger number of residents felt this was inappropriate for the department as a whole. No consensus could be reached as to a course of action, and the majority voted against an extension of services. Continued individual participation on an elective basis was permitted, and the prison medical service operated for a time as an official operation of the program.

This controversy illustrated the difficulty which true collective decision-making process poses for any group. In this process it remains unclear what right an individual has to act outside the group (4).

The second major controversy concerned the primary care unit—a large service unit staffed by family medicine residents within the emergency room of the teaching hospital. Faced with the perennial problem of providing quality care in a crowded county hospital, where good instruction is difficult, residents feared that a move to a more remote location in an outpatient building would result in even more intolerable working conditions.

After months of discontent the residents announced that they would discontinue their services in the primary care unit unless some changes were made. Meanwhile they began deciding precisely what changes they felt were necessary. They worked out a proposal covering all phases of the proposed new unit's operation, including architectural plans and 20 pages of demands, such as better laboratory support, the use of patient advocates, and more professional staff.

When the residents presented their demand to the hospital administration in a series of meetings, the department found itself in a difficult position. On the one hand, the residents were vehement about striking and had announced a deadline at which time they would do this. On the other hand, the hospital administration was not used to dealing with residents and could not understand why the department could not "keep them in line." Members of the departmental faculty made it clear that the residents were a part of the department and, consequently, had a significant voice in decisions concerning them made by the department. The residents felt strongly that their actions were not negative but rather a positively oriented demonstration by a group of physicians who were aggressive in their demands for a more responsible health care system.

Finally the hospital administration and the faculty of the Department of Family Medicine reached a compromise. Although the hospital administration did not make all the changes demanded by the residents, they did make some immediate changes and also agreed to make additional changes over a 12- to 18-month period. It is not yet clear what the long-range total impact will be.

The residents were not the first physicians in training to engage in this kind of power struggle. But they were the first group to act within the framework of their residency program. Medical students and residents in other cities have formed coalitions of people who want to bring about change; however, these groups are usually heterogeneous; that is, they are made up of people coming together primarily as individuals or house staffs, not as departments.

Curriculum

While the facilities task force determines where the resident learns, the curriculum subcommittee is interested in how the resident learns. Curriculum may be defined as a set of educational goals and methods by which an individual reaches those goals. The first step is to develop educational goals in family practice which have content fundamental to the education of a good family physician. The residents, with the help of faculty, have expanded an extensive list of educational objectives* for the training program in family practice which had been developed over a period of years by a faculty member.

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* The list of educational objectives and copies of the constitution and the departmental publication, "Delegation of Decision-Making Responsibility Within the University of Miami Department of Family Medicine," are available from the authors on request.

The second step is to plan the method, the series of graduated educational experiences which comprise the residency program activities. When the department faculty restyled the residency program, it had to make a decision about whether to continue to use the horizontal curriculum which allows for continuity of care or to submit to the pressure from some of the residents and the rest of the school and use the block system.

The block system has its counterpart in preclinical medical school education, where students are taught academic disciplines such as biochemistry and pharmacology in blocks and are left on their own to assimilate and to relate the material to clinical problems. On the graduate level the block system takes the form of rotation through various specialty services. There is usually little opportunity to integrate or to follow through with the experience gained on each rotation.

The department decided that the block system was not a useful or relevant structure for teaching of family medicine because family physicians must be concerned with continuity and process, which are time related. Consequently, the department developed a structure whereby each physician-in-training could follow families through all three years of residency but could also be exposed to a variety of facilities and physician models. Today, the structure resembles its original design, but changes are made each year when the residents and faculty review and reorganize it.

The relationship between family medicine and other specialties is another area on which the committee is focusing. Currently, family medicine has its own inpatient services and its own ambulatory facilities. The committee, however, would like to move toward more integration with other departments in the medical school and hospital.

Medical Education

The curriculum subcommittee deals with the overall learning process; the medical education subcommittee directs its attention to specific facets of the program, such as the morning conferences. Currently, conferences deal with family life cycle, inpatient service, outpatient service, primary care, and the doctor/patient relationship. Although the residents have worked with this format for more than three years, the content in each of these areas changes with the requests and needs of the residents.

Peer Review

"Gripe sessions" are a part of most residents' lives. Unfortunately, many of their suggestions are not heard by faculty members. At the University of Miami there is a peer review subcommittee which handles grievances and also makes judgments and decisions about disciplinary action. In addition, this committee has significant influence on the life of a resident because it assesses each resident's progress from year to year and determines his level in the program. The committee is attempting to make peer review an ongoing process of constructive evaluation and education rather than a task focused on judgment and discipline. Faculty members provide essential input to the process, but decisions in peer review are made as outlined in the table.

Conclusions and Implications

The residency program at Miami is exciting because the residents, the faculty, and all the members of the department are taking risks. It is likely that the type of residency program described here will result in self-learners who will be successful in continuing their life-long learning. Scientific knowledge is always subject to new findings, but people who understand process can seek out and work with ever changing data.

The graduates of such a program may also be less authoritarian than traditional physicians because they are not trained in an authoritarian model. Residents who are reduced to children are likely to reverse the role when they go into practice and become the autocratic father. On the other hand, residents who have been treated as adults hopefully will tend to establish adult-adult relationships.

From their experiences as active members of the department, residents should be more knowledgeable about and more able to deal with medical institutions, organization, and systems. For instance, during the primary care unit controversy, family medicine residents were faced with the realities involved in negotiating with a large county-owned tertiary care facility.

Medical departments will certainly be affected by the new style residency program. Neat, well oiled hierarchies will grate, and initially the machinery may not run with great efficiency. But a group of people who all have a voice in what happens to them will be likely to develop a program which will be able to respond to needs and adapt to changes.

One of the changes might be a shift in priorities from hospital-based laboratory research to the investigation of the delivery of health care services. Many young physicians see themselves as patient advocates in relation to the bureaucracy, which they feel overwhelms patients with red tape, and as patient advocates in relation to university medical centers, where they feel academic concerns at times take precedence over patient care. Resolutions and statements made by young physicians and house staff at the National House Staff Association meeting in Atlanta in March of 1972 indicate their interest in working in the community with an eye toward the early prevention, early recognition, and prompt treatment of disease. Already residents are requesting that they have more opportunities during their residency to work with the types of patients whom many of them will be seeing in their practices, that is, those in the early stages of illness. In the future, particularly if residents have more input into their departments, there may be requests for more electives that permit exploring alternative financing and delivery systems as well as gaining experience in various types of health planning, all of which will help to prepare the physician for postresidency realities.

This potential shift in priorities is even more important at a time when funding for medical education and research is being restricted. What traditionally has been acceptable as "clinical research" may well be altered in light of residents' demands for patient-care-related research and their interests in making adequate health care a reality for their patients.

If resident participation were extended beyond the departmental level, it would mean that residents would be involved in professional organizations dealing with graduate medical education. Bodies such as the AMA Council on Medical Education, residency review committees, certifying bodies for specialty boards, and various relevant committees of specialty organizations would all benefit from the active participation of physicians in training.

In the spring of 1973 two residents from the Miami program approached the board of directors of the Florida Academy of Family Practice. Their request was for voting representation on the board of directors. In June of 1973 three resident members from throughout the state residency programs were seated on the board with full voting privileges. This body has been instrumental in seeking and obtaining

significant state funding for residency training.

In May of 1973 a faculty member of the Miami program, with the aid of key staff of the American Academy of Family Practice, proposed a similar idea to a group of residents at a national meeting of family practice directors. Out of this grew the seating of two residents and two students in the House of Delegates of the academy.

This participation has helped to convey the concerns and interpret the views of residents directly to those bodies which most directly affect their education. In addition, residents will help to evaluate the relevance and practicality of proposed programs and to assess the appropriateness and quality of existing training programs. Resident participation will give a fresh look at old problems and bring vitality and new ideas to these organizations.

Finally, resident participation will help make medical associations and organizations more accessible and responsive to the younger membership. It is important that there be a hastening of communication of the actions of these bodies to those affected. Resident participation will assure that the large and active group of physicians in training will not be ignored.

To improve individual physicians' ability to change, there must be an improvement in the adaptability of their educational process. While residency participation in residency training programs is only a beginning in that direction, it has set as one of its goals the development of a physician who is able to assume responsibility for his own life. Rigid, anachronistic residency training methods, which were applicable to the days when there was a need to give order to medical chaos, are no longer necessary (7). Residency training programs must be structured in such a way that they are more responsive to change if physicians who are able to respond to change are to be produced.

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Objectives of Pharmacological Education

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Abstract—Pharmacological education is presented as a continuous undertaking of preclinical students, clerks, and physicians and surgeons in training and practice (1). Carrying out this activity requires five operations: (*a*) selecting criteria of effective and safe drug use in patients; (*b*) defining attitudes, knowledge, and skills of clinicians who practice effective pharmacotherapy; (*c*) developing these attitudes, knowledge, and skills in prescribers; (*d*) evaluating the proficiency of prescribers at certification and in actual practice; and (*e*) identifying causes of prescribing deficiencies in order to amend inappropriate methods of instruction.

Critics of current prescribing practices have been concerned with means of improving pharmacological education (2, 3). Some urge teaching the practical aspects of drug use, which have not received the attention they deserve. Others maintain that facts and theories underlying pharmacotherapy should be taught more extensively than in the past. This debate, which has lasted a decade, has revealed the complexity of the problem facing educators and practitioners, but it has produced few significant changes.

The deadlock, however, mainly involves the contents of what candidates should be taught, must learn, or ought to know. All seem to agree that the efficacy of pharmacotherapy depends on what prescribers actually do—and not on what they were taught but did not understand, learned but forgot, or know but cannot apply (4, 5).

This dichotomy between intent and action indicates that pharmacologists could get out of the present impasse by shifting their main concern from what they should teach to what their students must practice before being certified. Such emphasis, however, requires that the various actions which candidates should actually perform at the successive stages of their training be defined.

Objectives

Pharmacological education is offered to student physicians in order that they will practice a rational pharmacotherapy when treating patients. The basic objectives of this education, therefore, are the displays of the personal aptitudes, technical skills, attitudes, and habits, which have been shown to be essential to this function. These objectives can be organized for instructional purposes in three complementary series which correspond to the main or conventional educational stages: preclinical studies, clerkships, and residen-

This article has been adapted from a presentation at the Symposium on Teaching of Pharmacology and Toxicology in Medical Schools and Health Science Centers at the Fifth International Congress on Pharmacology, San Francisco, 1972.

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cies. Such a division, however, should not distract from the fact that the practice of pharmacotherapy requires that all these objectives be fulfilled.

PRECLINICAL STUDENTS

Initial education in pharmacology has two goals. The first is correct selection of the typical medications which must, or should not, be administered in managing common diseases studied during clerkships. The second is appreciation of the social functions of drugs (6) in order to instruct patients and to secure compliance (7). Reaching these goals requires:

Identifying beliefs and expectations—Patients are led to state their attitudes toward drugs (8) and their own evaluations of their current regimens. This intelligence must be adequate for obtaining reliable drug histories, instructing patients, reassuring them, and quelling unrealistic expectations and harmful abuses.

Complying with regulations—Prescriptions conform with the rules promulgated by agencies charged with regulating the use and trade of pharmaceuticals.

Obtaining technical information—Drugs are used and patients instructed according to valid information obtained from reliable treatises, formularies, and periodicals. Misinformation due to methodological flaws in drug evaluations or offered in promotional materials (9) is recognized and rejected.

Displaying scientific skills—Drugs are used according to their physiological or physicochemical mechanisms of action and kinetics. Laboratory determinations and other applicable examinations are requested when necessary for prescribing drugs, evaluating their therapeutic effects, and identifying or measuring their adverse effects.

Instructing patients—Therapeutic regimens are explained in order to ensure compliance by the patients, especially regarding: (*a*) why a particular class of drugs was selected for treating their disease; (*b*) which improvements can be expected regarding their specific complaints if medications are taken as directed; (*c*) when these effects will appear and how long they will last; (*d*) which dysfunctions cannot be cured or relieved by pharmacotherapy.

Warning patients—Circumstances which might affect drug actions are described in plain words: (*a*) medications, OTC (nonprescription drugs), diet, recreational or illicit agents, and other environmental conditions; (*b*) physiological conditions (such as exertion or pregnancy), symptoms of dysfunctions (such as renal or circulatory problems), genetic traits, and other personal characteristics; (*c*) symptoms of adverse reactions.

The reasons why these interferences must be avoided or promptly reported if they should occur are explained and specified.

CLERKS

The goal of the clerkship is to enable students to treat the diseases which they study and thus to be ready to assume the responsibilities of house officers. The students, therefore, must:

Obtain drug histories—All drugs taken since the last visit or during the past three months, including OTC and recreational or illicit products and exposures to fumes, solvents, aerosols, and other household or industrial chemicals, are identified by interview, from records, and by examining vials dispensed in drugstores.

These surveys include: (*a*) official name or constituents of every product; (*b*) dosage, schedule, and duration of every medication or exposure; (*c*) reasons for taking every drug and for deviating from prescribed regimens; (*d*) identification of drug interactions; (*e*) search for adverse reactions.

Display scientific skills—Toxic or unnecessary medications are stopped. Drugs, including parenteral fluids and blood fractions, are used according to the results of appropriate laboratory and other diagnostic determinations; and therapeutic plans are drawn for patients who are treated for a single characteristic disease.

Compose prescriptions—Legible, explicit orders or prescriptions specify: (*a*) official name, dose, mode (10), route, schedule, exact duration, refills, and appropriate labeling of every medication; (*b*) factors which might interfere with drug effects or therapeutic response; (*c*) symptoms of serious adverse reactions which should be reported to the doctor; (*d*) recommendation to bring all drug vials at the next visit.

Ensure understanding by patients—The prescription is read by the patient and questions are invited. Answers to every query are explained until any misunderstanding that might impair compliance has been cleared.

Monitor efficacy of treatments—Dosages are adjusted according to tissue levels of drugs and other applicable pharmacokinetic data (11). Appropriate physiological, biochemical, or behavioral characteristics of the patient are measured at suitable intervals. These values are compared with those which would be considered normal for the same healthy person and with those obtained at previous examinations. The results of these determinations are applied to modifying the present regimen and planning future pharmacotherapy.

Identify adverse reactions—Precise reports of adverse drug reactions (12) include: (*a*) symptoms, signs, sites, intensities, time of occurrences, development, and management of the reaction; (*b*) exact identification of the offending agent—its dose and route, schedule and duration of administration, and reasons for the treatment; (*c*) circumstances which might have predisposed to the reaction; (*d*) measures taken, prognosis, and recommendations regarding specific products which might be hazardous to the patient in view of the current episode.

Treat emergencies—Appropriate drugs and care are administered to patients presenting with pulmonary edema, diabetic or hypoglycemic coma, anaphylactic reactions, and other acute life-threatening emergencies which can be controlled with specific pharmacotherapy.

RESIDENTS

The goal of house officers, and of practicing physicians and surgeons, is to use appropriate drugs for preventing, diagnosing, alleviating, or curing diseases. They must, therefore, plan, execute, and record all procedures involving the use of drugs. Thus they practice:

Pharmacodiagnosis — Comprehensive protocols of diagnostic procedures are prepared in order to avoid omissions and duplications and to obtain all the information that every battery of tests can give. These documents include: (*a*) a statement of the purpose, rationale, relevance, and limitations of every test proposed for solving the diagnostic problem, and of the reasons for excluding or postponing alternative or related procedures; (*b*) a sequential list of all tests to be done and the dates of their performances, allowing for washout periods when the agent of one test might affect the results of another; (*c*) a list of the agents to be used, reasons for selecting them, time and modes of their administration, possible interferences (such as iodides in thyroid tests), precautions, potential adverse reactions, and means to manage such effects; (*d*) specimens to be collected, schedule and methods of collection, and measurements to be recorded.

After completion of every test, its results are evaluated in the light of previous and related laboratory findings, symptoms, signs, and diagnostic possibilities; and its conclusions are recorded, including recommendations for repeating the test and ordering complementary or alternative procedures.

Pharmacotherapy—Protocols of all therapeutic procedures are prepared or revised in order to avoid omissions, duplications, drug interactions, and adverse reactions. These documents include: (*a*) a statement of the rationale of every medication according to diagnosis and prognosis, and of the reasons for selecting a regimen when several are available (such as probenecid and allopurinol in gout); (*b*) a list of the effects of these drugs on concurrent diseases and therapies, including those managed by other doctors, and a notification of colleagues regarding drugs given to mutual patients; (*c*) a list of the expected results, beneficial and detrimental, immediate and long-term, including criteria for modifying the proposed regimen if responses should be disappointing; (*d*) a schedule of the measurements to be performed for monitoring the efficacy of the regimen; (*e*) a note regarding the ability of the patient to afford the cost of the regimen (13); and (*f*) a description of nonpharmacological treatments in conditions for which no effective drug is available (14, 15).

Evaluations—Controlled drug evaluations are performed to determine the most effective management of the diseases commonly treated in the hospital, thus providing norms of drug utilization for the population served by the institution. Participation of residents in these trials includes: (*a*) explaining to patients the information necessary for them to decide whether they consent to enter the project; (*b*) providing diagnostic, prognostic, and therapeutic criteria appropriate to the objectives of these evaluations; (*c*) collaborating in the selection of patients and collection of results; (*d*) preparing concise reports of the methods, results, and conclusions of these trials.

SPECIAL MATTERS

Pharmacological education of medical students and practitioners cannot be geared to striving for the expertness required of drug investigators or consultants (16). Moreover, the pharmacological competence of anesthesiologists, radiologists, and other specialists who use particular drugs is not a realistic objective for clinicians who do not use these medications. Thus, it would not be appropriate to require that all practitioners know: (*a*) names, dosages, and minor characteristics of all analogous pharmaceutical products within drug classes; (*b*) minor pathways of drug elimination, individual steps of intricate drug degradations, and properties of inert metabolites; (*c*) heuristic theories that are not directly related to prescribing drugs for patients; (*d*) uses of investigational tools, experimental substances, and obsolete medications; (*e*) drugs used in treating exotic diseases.

Implementation

Several approaches are being tried at various schools in order to develop processes that would fulfill the objectives of pharmacological education for medical practice. Thus, students can be involved in auditing drug use in hospitals and offices, reviewing appropriate sections of New Drug Applications (6), and evaluating pharmaceutical advertisements (9, 17). It would be premature, however, to judge these techniques before their efficacy has been formally evaluated (18).

Students in the program at Cook County Hospital asked that instructors transfer not only their knowledge but also their skills and attitudes. They also preferred small-group discussions which dealt with specific drug problems occurring in patients who they were actually following.

Evaluation

The efficacy of this program had to be evaluated by conventional methods which were ill-suited to this end. Immediate knowledge of facts and analytical and interpretative skills were measured through standard multiple-choice tests given by the department of pharmacology at the end of the year. The results of these examinations, however, could not be used to determine how this knowledge was, or will be, applied (19). Synthetic skills and those involving personal interactions were evaluated by controlled oral examinations, but it is unlikely that candidates would have been naive enough to reveal a behavior deviating from what they anticipated their judges to favor.

Valid evaluations of pharmacological education that really measure the extent to which its objectives are fulfilled would require determination of actual prescribing practices (18, 20). The collaboration of many institutions will be necessary if such determinations are to be made because of the dispersion which occurs after graduation.

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The Quebec Health Care System: Its Implication for Medical Education

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Abstract—Since November 1, 1970, doctors in Quebec have been operating under a government-controlled compulsory and universal "fee-for-service" insurance plan. After a review of some characteristics of the new system, the author describes the impact of this social legislation on physicians' lives, control of health delivery costs, and various policy issues. He examines the implications of these changes for medical education. A qualitatively different kind of physician must be able to deal comfortably and effectively with a reality which includes: (*a*) the concept of "global medicine" and its social implications, (*b*) greater external control of costs and increased public concern with quality, (*c*) a new concept of the role of the hospital and its integration within the system, and (*d*) the concept of team care. Possible changes associated with the new system include a reevaluation of the criteria for a good clerkship, an acquisition of a new perspective on community health ecology, and a need to become an efficient team-worker.

In a free enterprise system, can physicians live with socialized health care? Since November 1, 1970, doctors have been subjected to this new social experiment in Quebec. Within the Canadian structure each province has full responsibility for all health and hospital services, health science education, and the regulation of the health professions. The British North America Act, the closest equivalent to the United States Constitution, has been interpreted in such a way that health is defined as a provincial responsibility. This policy is believed to have a better chance than a uniform system to fulfill the needs and political philosophies of each province (1).

After giving a brief historical background, the author reviews the major characteristics of the new system and evaluates their implications for the provision of health care in Quebec. Then the following questions are raised: If the concept of health changes, will physicians have to behave differently? What effect will a different structure of power have on doctors? Will these changes have a determinant influence on medical education? Does the new organizational setting offer a better opportunity to train medical students who will be more responsive to societal needs? If these policy changes have consequences for medical education,

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should an attempt to develop a rationale for possible changes in health education be undertaken?

Historical Background

Following a great political shift in the province of Quebec, the first step toward a socialization of medicine came in 1961 with the adoption of a compulsory universal insurance plan covering the cost of hospital care (not the doctor's remuneration). Subsequently, under the auspices of the Quebec government, an in-depth study of the whole problem of health, family, and social welfare was made. In 1966 the Commission of Inquiry on Health and Social Welfare started analyzing Quebecers' needs in this domain and devising ways to fulfill these needs (2).

Under the strong influence of former Social Affairs Minister Claude Castonguay (before being appointed minister, he had been the commission's chairman), Quebec has been taking the initiative to reorganize completely health, family, and social welfare policies and services according to the recommendations of the provincial commission of inquiry. Thus, though the reorganization is still in process, health policies implying drastic change are discernible (3–8).

Characteristics

The socialized health care system does not merely represent a different way of allocating money among patient, doctor, and third party. There are at least two other important aspects of the new system: an underlying philosophy and a new organization of health care services, which is undergirded by a new politics involving consumers' participation.

UNDERLYING PHILOSOPHY

An underlying philosophy is apparent in the commission's recommendations (2). Instead of focusing on the cure of diseases, the commission proposed the concept of more "global health" (about the equivalent of the American comprehensive health care), including attention to the physical, psychological, and social needs for health. From this point of view, health care is no longer a privilege but a right, both for the individual and for the society; that is, everyone has the right to the best possible health; therefore, resources maintaining and improving health must be available for everyone. Through its various regional organizations, the whole society has the responsibility for providing accessibility to care and adaptability of that care to community needs. The emphasis is placed upon the individual through the group. Realization of these objectives requires money.

The way this money is gathered illustrates the philosophy of the system. Each year every citizen is taxed a certain amount of money for the system whether or not he or his family utilizes the health care system. From this tax revenue physicians are paid on a fee-for-service basis, with a uniform fee schedule applied to physicians' services. Since November 1, 1970, the cost of all services provided by physicians, whether in their offices, at clinics, at patients' homes, or in hospitals, has been covered in Quebec by the universal and compulsory insurance plan.

Different types of physician remuneration might be legislated in the future, replacing fee-for-service with salary contract or capitation (9). However, whatever financial arrangements are made with physicians, it should be recognized that for the patient monetary barriers to health care are definitely abolished.

ORGANIZATION OF SERVICES

Universal health insurance does not, however, guarantee an adequate system of health delivery services. When everyone pays for services, the expectation is that those services will be locally available. The uneven distribution of services both within and between urban and rural areas constitutes an acute problem (10). In order to deal with this issue in Quebec, two new entities recently have been introduced within the system: regional councils and community health centers (CHC).*

The regional council is the mechanism for establishing priorities and for making efficient allocations of resources with respect to the delivery of health care within a particular region. With community participation, these councils will determine policy for the delivery of health care and social services for the region. The councils will be an intermediary between the Provincial Health and Welfare Department and the various community institutions, for example, the hospitals. It is clear that these councils have the potential for exerting significant influence on medical and social policy.

The second new entity, the community health centers, have been created to coordinate the day-to-day needs of the population for health and social services (10). The centers will be a link between private offices, hospitals, and other medical and social services. They will provide people with a means of entry to the health care and social service system. Intake, client service, and community action are the three key tasks of the centers. Their general aim is to supply physical and psychological health to individuals within the community. Prevention, consultation, diagnosis, rehabilitation, treatment of minor injuries, research on community needs, patient teaching, referral and transfer to a more specialized hospital services, and special programs for health applied to the community are all services that are offered.

In these CHCs it is impossible for the physician to work alone (11). Social workers, psychologists, nurses, physicians, and others will operate within the concept of a global medicine. Working as a team, those professionals also have to share power in decision-making. The new distribution of health care is tightly bound with an initiation of social reform. People have to make up new behaviors in distribution of health and at the same time develop different attitudes in order to initiate an unfamiliar distribution of power. This dual transformation is mostly responsible for difficulties in implementing these CHCs.

The new social structures suggest that in Quebec the era of "medical laissez-faire" is gone. Consumers are represented within regional councils, CHC boards, and hospital boards of trustees and councils. In June 1973 the first public election was held for all members of newly constituted boards of trustees for all institutions. Consequently, the traditional and powerful influence of physicians on hospitals' boards of trustees and on various hospital councils is being strongly contested.

Impact

Although some aspects of the changing situation are only now becoming discernible, effects can be recognized in three areas: the physician's life, the control of cost, and the policy issues.

PHYSICIANS' LIVES

Before the Quebec system was completely implemented, opponents made dire predictions about the effect the system would have on the physician's life. It was argued that working conditions would become intolerable and that removal of direct cost to the patient would place unreasonable demands on physicians. Recently, however, a careful analysis has been done on the effects of "free" medical care on medical practice in Quebec (5).

The investigators, who focused on a

* Centre local de services communautaires (local center of services related to society, here called "community health center").

two-year period, before and after the implementation of the system, report that although the average daily patient contacts seemed to fall from 82,262 to 74,463, the number of patients seen in the office increased from 23,840 per day to 31,509 for the medical group observed. Telephone, home, and inpatient hospital contacts decreased. Patients judged by doctors to have sought medical advice without reasonable cause rose from 1.1 percent of all patients seen to 1.9 percent, whereas those who physicians thought should have sought medical advice sooner fell from 2.6 to 1.8 percent. Overall, the physician's time involved with seeing patients in the office increased, while time spent with each patient decreased from 19 to 16 minutes. Moreover, the physicians also took more days off. Full days of vacation changed from 27 to 31 after implementation of the system. There was also a slight decline in the number of physicians working weekends. Most dramatic of all, the average work week dropped from 54.8 hours to 46.3 hours, although the number of physicians in the practice group did not increase during the study period (5).

It appears that there is not strong evidence of overutilization of the new medical care system, but there is support for the belief that the absence of economic barriers permitted some to seek early treatment. It is paradoxical that in spite of devoting less time to patients, physicians also appeared to be less involved in other types of professional activities.

CONTROL OF COST

The impact of control of costs has already been felt throughout Canada (12). The problem of rapidly escalating costs of health care is one of the most pressing in the Western world. Canada, for example, spent $204.94 per capita in 1970 as compared with $80.45 in 1960. The annual increase was 11.7 percent for the period 1960 through 1969, or 4.9 percent of the gross national product (GNP) in 1969 (4). Regardless of the criteria used for assessment, Canada is now expending one of the highest proportions of GNP on health services among the nations of the world (12). The Quebec province health and welfare expenditures equal more than a third of the total provincial budget. More than 90 percent of the amount expended for health is used to cover the physician and hospital costs (8). Medical services and demands can proliferate almost indefinitely through increased use by consumers, expansion of the types of care offered by physicians, and through increasing the number of physicians (1). Health expenditures must be kept at a constant rate without affecting health care delivery. Physicians will be asked to be active participants in this process by reducing their overabundant investigation, by establishing more rigid criteria for mandatory operations, and by developing additional public educational programs.

POLICY ISSUES

The new medical care system has changed the structure of power in the whole health system (4, 6). In the past, power has been divided between the medical profession and the voluntary organizations, most often the Congregations of Nuns. Now, the provincial government has assumed significant power, largely replacing the Congregations. A third partner in the new politics will be the consumer, although, because the system is so new, the recently formed consumers' organizations are comparatively weak. Therefore, for the moment, the struggle for power is between the new health-care bureaucracy and the doctors. The former is trying to implement control mechanisms in order to stabilize and legitimate the new system. At the same time, the physician groups are trying to preserve their traditional autonomy in prescribing, choosing the type and the area of practice, defining the pace and the amount of activities, controlling technical definitions of need and demand, and retaining the privilege of self-regulation. Thus, new health legislation tends to be perceived by physicians as a challenge to their authority and their knowledge.

Medical Education

Medical education must reflect the trends of the future and be geared to implement the plans for producing adequate manpower, both quantitatively and qualitatively, for the new health care system. This qualitatively different physician required for the new system must be able to deal comfortably and effectively with a reality which includes: (*a*) the concept of global medicine and its social implications, (*b*) a tighter external control of costs and increased public concern with quality, (*c*) a new concept of the hospital and its integration within the system, and (*d*) a concept of team care.

GLOBAL MEDICINE

Medical education with its primary focus on scientific technical medicine must also be reoriented for the future, and physicians must have broad social perspectives.

Former Minister Castonguay has urged doctors to accept the concept of global medicine (9). Global medicine means that the new system must include personal and familial physical and mental health care provided on a continuing basis, including prevention, diagnosis, treatment, and rehabilitation. Accessibility, knowledge of the population's needs, and continuous adaptation to the particular milieu are prerequisites for implementing the global medicine concept. This view of medicine requires a shift from the focus on disease to a focus on the patient and his milieu.

The concept of global medicine implies an understanding of the social aspects of medicine. For more than 25 years medical educators have put strong emphasis on the scientific and technical aspects of medicine, often at the expense of its social implications. One can argue that physicians-at-large have great dedication to their own patients but at the same time act out of a very narrow definition of social responsibility. An expansion of the physician's social responsibility can be viewed as "the essential challenge incited by the new health care system" (9).

Prevention, rehabilitation, gerontology, and chronic disease represent major areas of medicine which have been on the fringe of physicians' concerns even though they have been of central importance to the public. In the Quebec system community health centers, regionalization, and system integration are the arenas in which the medical concerns of the public will confront scientific, technical medicine. It is obvious that general practitioners will both be influenced by and have influence on these trends. It may not be equally evident that the specialist also will have to take into account an array of social consideration. Evans (1) has said, "For the physician, particularly the specialist, regionalization involves reorientation of thinking towards the needs of the community as a whole rather than identification with the interest of a specific hospital."

ECONOMICAL ASPECTS

If cost continues to grow at the present rate, by the year 2000 the total Quebec budget will pay only for health and education (9). It is obvious that a stabilization of cost is mandatory. How then can costs be stabilized, how can physicians participate, and how can the results influence medical education?

The Quebec government has almost completely stopped building new hospitals

and other facilities which increase the number of patient beds. Attempts have been made to stabilize the number of general beds, to reduce the number of mental health beds, and to increase substantially the number of chronic disease beds in order to achieve greater efficiency. Two other priorities also have been established which might influence costs. Plans are being made for effective sharing of medical and support services among hospitals and other health centers of the same region and for a greater use of ambulatory and extended care facilities for patients.

The physician's role in cost control is very important. Stabilization of cost and growth can be achieved without reduction in the quality of services only if physicians accept responsibility for effective and economic use of health resources (1). Discriminating use of laboratory tests, radiological examinations, consultations, and hospitalization are absolutely essential to cost control. This introduces a question with great potential for conflict. Are cost control and quality control compatible? Castonguay (9) believes that they are, and the provincial government has just begun to set up some criteria. If these criteria are to reflect the needs of quality medicine, it is urgent that physicians become actively involved in the decision process.

Both the need for cost control and the criteria used to define quality have an impact on medical education. Without an understanding of the social consequences of his decisions, no physician will be able to define criteria that deal with both quality and cost control. The medical education system must come to terms with the question of thoroughness vis-à-vis judicious selectivity; for example, educators have to rethink teaching that thoroughness (quality index) involves the utilization of all available tests and procedures rather than a wise choice among those that are actually indicated.

Further, a major portion of health care will be delivered in doctors' offices and at outpatient clinics. The emphasis on hospitalizing patients will be reduced. This, in turn, will change the character of clinical education and clerkship experiences.

Another significant cost factor is the total number of doctors required by a rational, integrated medical system. Based on the available data (5), it can be tentatively concluded that more doctors will be needed because physician productivity appears to decrease while consumer demand seems to increase. Physician-population statistics (13) indicate that for a population of 6,077,147, there are 9,083 licensed doctors, or a global ration of one M.D. to 670 people. Fifty-three percent of all physicians are specialists. With no increase in hospital beds and with an expansion of primary care facilities (CHC), more generalists will be required. The projection for 1976 indicates that medical manpower in Quebec will increase 20 percent while the population will increase 3 percent.

Any plan to increase medical manpower further should be questioned. It may be that a rise in number of doctors will add to the cost of health services without necessarily improving health (1), and so other measures for improving or stabilizing health care must be found.

This analysis indicates that medical school admission criteria should be revised. In the present competitive selection process, when choosing between candidates with the same scholastic performance, it would be preferable to pick a larger proportion of those applicants who have demonstrated social involvement in the past and who might have a better chance to become the type of physician needed for the society.

HOSPITAL, A LINK

The plan for hospitals within the new system is that they become more of a

community service center linking on one hand the doctor's office with the ambulatory care of the community health centers and on the other hand the institutionalized programs in rehabilitation with nursing centers. The outpatient clinics will be hypertrophied, responding more efficiently to primary care requirements. A specialized institution or program may serve a whole region. The organizations of hospital service will be determined by regional needs and the available resources within the region. Hospitals will also arrange a variety of continuing education programs for the several health professional groups.

The new health care delivery system will change the patient population in teaching hospitals. With financial barriers abolished, everyone can reach the doctor of his choice. Socialized medicine has broken down the two classes of private and public patient. Physicians may have to reshape their attitudes toward groups of patients when all patients come from the public sector.

TEAM WORK

It is evident that physicians will have more and more difficulty sustaining an individualistic entrepreneurial approach to practice.

Medical training has tended to present the ideal physician as one who is totally autonomous—one who alone diagnoses; treats; deals with complications; decides when, why, and how long a patient should be hospitalized; and prescribes what and how much medication is needed. Some constraints on physician autonomy are present in modern hospitals, and the new system is likely to introduce further legal and social controls. Loss of autonomy is a central concern to physicians (14). The ability to work effectively with others who are power equals or in settings where relations are defined on the basis of task rather than prestige may become an important physician skill. Within a more complex and interrelated health delivery system of global medicine, the future physician will have to spend more time on community committees and more time interacting with a greater number and variety of health and social service professionals and community members and leaders.

All of these developments place another burden on the medical education system. Future doctors will need training and experience as team-workers. The community health center becomes an appropriate place for medical students to witness team care in action. Working in this environment might have a strong influence on the attitudes acquired by future physicians. Simulation games and work participation within a health care team would help them to master team-work skills.

Effective medical leadership will be dependent in part upon the ability to work effectively within a group. Doctors will be involved in many committees in order to ensure adequate representation at the various levels in health policies decision-making. However, the return to active community involvement provides an opportunity for doctors to regain the social influence they lost when medicine became exclusively preoccupied with its technical and scientific aspects.

Rationale for Changes

The shift toward socialized medicine has changed patient behavior as well as physician behavior. The interaction between various parts of very rapidly changing community and institutional structures has a powerful influence upon every part of the system.

From the previous analysis, change can be predicted in at least four areas: (*a*) a new type of clerkship will need to be developed, (*b*) community health ecology perspectives will be implemented, (*c*) team

work will supplant solitary practice, and (*d*) medical manpower may become better utilized rather than increased in number.

NEW CLERKSHIP

Hospitalized patients are already and will continue to represent a smaller part of the health care delivery system. The number of patients seen at doctors' offices have substantially increased. The community health center will become an important link within the health care system. Also, outpatient clinics will really expand their facilities. Diagnostic procedures will increasingly be done outside the hospital. The need for primary care physicians is always urgent. Thus, it becomes imperative that medical students experience "real-world" medicine in their training. This means that requirements for contact time between medical students and hospitalized patients should be reevaluated. The result probably will be movement away from the exclusively hospital-based clerkship in favor of several other possibilities more closely related to the evolving character of medical practice. This, in turn, means that the criteria for a "good" clerkship must also be revised.

COMMUNITY HEALTH ECOLOGY

Often in the past public health and health policy instruction have been inappropriately presented by faculty and poorly accepted by students. The significance of public health instruction will change, and the classic public health instruction will be reformulated and incorporated into the new perspective. Community health ecology does not necessarily mean the absence of physical disease. Rather, it means that physical disease is only one among many barriers to health. It implies that costs stress, life styles, noise, pollution, and a host of other psychological and social variables impinge on health. But, for the time being, there is not an adequate paradigm for classifying these problems.

The recent introduction of the behavioral sciences into medical curriculum may lead to a reconceptualization of medicine which in turn will dictate new physician behavior. Physicians see themselves relating to one patient at a time. How can they possess at the same time a perspective on the health ecology of a community? Not only knowledge but also a fundamental attitude shift, a new dimension in medical ethics, will be required.

It is difficult to conceive how this attitude could be developed through lecturing. The community health center seems to present an ideal opportunity for medical students to develop the appropriate attitudes. Early involvement seems mandatory. Certain tasks such as patient teaching could provide excellent training situations. Group discussions and simulated games could be powerful instruments for attitude change. It can be envisioned that this community health ecology perspective could become a mandatory criterion for M.D. graduation.

Conclusion

The new health care system in Quebec already has had a real impact on medicine. In addition to the financial readjustment of regulated fees for service, the system reflects an underlying philosophy of a new type of society within the free enterprise environment. Traditional medical laissez-faire is contested to its deepest roots. Physicians' autonomy and freedom are restricted by a group of state administrators who exert pressure on efficiency, cost control, and accessibility of care. The two-partner structure of power is changed by the presence of a third party, the consumer, albeit still quite weak. The new health care system presents a challenge to medical education. The global medicine concept of health care delivery, the need for a community health ecology perspective, and the requirement for team work skills call for a new kind of physician to address community health needs. Responding to this challenge can give physicians the opportunity to regain their old social credibility and influence, which was lost during past years of emphasis on scientific and technical aspects of medicine.

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The Two-Course System in Gross Anatomy

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Abstract—In response to the continuing pressures facing anatomy and other basic sciences in medical education, the Department of Anatomy at the University of Colorado School of Medicine has instituted a parallel two-course system of teaching gross anatomy. Students in both the longer and shorter of the two courses appear to be prepared adequately by their experiences in the courses they elected. Statistically significant differences (students in the longer course scoring higher) were, however, observed on both departmental examinations and certain national examinations administered subsequent to the completion of the courses. Student responses to both courses were extremely favorable. Since the differences between the two groups were generally small and advantages were noted in presenting two courses simultaneously, it is concluded that the concurrent presentation of two differently organized basic science courses (within a single subject area) offers an effective response to the instructional needs of our medical school and medical students.

Widespread interest exists in "experimental" or "innovative" courses within the medical core curriculum (1,2). In response to the demands or needs of some students, faculty, or administrators, curriculum changes affecting everybody involved have been instituted in some cases. Yet the traditional medical curriculum may very well be ideal for some, or even a majority, of the students in medical school in the United States today. Something should, however, be done for those students who would benefit from an altered curriculum. A choice between two courses within the same subject area may present an effective response to this need.

Gross anatomy as traditionally taught relies heavily on dissection of the entire cadaver. Many anatomists, as well as many physicians, feel that a total dissection is the best way for a student to learn anatomy; most feel that some dissection is essential. The desirability of this approach has long been recognized, but recently the benefits to be derived from dissection have given way to the grumblings of some about its difficulty or tediousness. This discontent and the continuing pressure to increase physician output that has been developing during the current "information explosion," coupled with the increasing availability of audiovisual aids, have led to many attempts materially to shorten

The research reported here was supported in part by contract 71-4012 from the National Institute of Health. The computer analyses were carried out in a facility supported in part by the U.S. Public Health Service, NIH grants RR 404-2 and RR 404-3.

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courses in gross anatomy. These attempts have almost universally resulted in abandoning dissection.

In order to offer an alternative to total dissection without committing all students to an untried curriculum, the anatomy faculty at the University of Colorado has elected to present two courses in gross anatomy, one that is traditional and one that is shorter; the latter, which relies heavily on peer-group interactions and audiovisual technology, also requires some dissection. The simultaneous presentation of these two courses has permitted an evaluation of the two approaches.

Gross anatomy at Colorado is taught during the second quarter of the freshman year. This report deals with the evaluation of results obtained from classes graduating in 1973, 1974, and 1975.

Anatomy 501A is a traditional (although shortened*) course in gross anatomy. This course relies heavily on a reasonably thorough but not minutely detailed dissection of the cadaver. The time allotted, 20 hours per week for an 11-week quarter, is almost totally required for dissection. Each week two hours are devoted to lectures presented by the faculty and one-and-one-half hours are scheduled for presentations by clinical associates or for motion pictures. Lectures delivered by the anatomy faculty either are general—attempting thereby to provide a framework for learning in the laboratory—or they deal with areas difficult to examine adequately with the time and material available. These lectures often include developmental aspects of the topic being considered. Motion pictures tend either to emphasize developmental anatomy or to present the material being studied in a clinical setting. Clinical correlation topics and speakers are selected with a view toward stimulating the interest of the student in learning anatomy.

Within the context of a broadly general dissection schedule, the students are given substantially free range in managing their time in the dissecting hall, subject to scheduled examinations at the completion of study of each anatomical region. They have available to them at all times individual faculty assistance and a growing collection of skeletal materials, prosections, specimens embedded in plastic, an 8mm film library of special dissections, and other study aids.

Textbooks required for Anatomy 501A include a systemically organized reference text, a medical dictionary, and a dissection manual. Students regularly supplement the required texts with an atlas of anatomy.

Anatomy 501B is designed to help the student develop, in less time than is normally required, an understanding of the human body. Each student may select a specific region for thorough dissection. The remaining regions are studied from material dissected and presented by other members of the class.

For convenience in dissection, the body is divided into six regions: thorax and abdominal wall; abdomen, pelvis, and perineum; head and neck (predominantly neck); head and neck (predominantly head); upper extremity; and lower extremity. Each region requires the same investment of dissection time as the others. Each student may negotiate with his classmates in choosing the region he will dissect, subject, of course, to the limitations set by the need for thorough dissection of all six regions by the class as a whole.

The first three weeks of the course are devoted primarily to a reasonably thorough dissection of the selected region and to lectures on systemic anatomy presented by the anatomy faculty. During these first

* In 1955 the average time devoted to gross anatomy at 87 schools in the United States and Canada was 330 hours (3).

three weeks, 20 hours per week are assigned to Anatomy 501B. Each student during the first week also selects from designated subregions within the region of his dissection one for presentation to the class. The students also receive instruction in audiovisual techniques as an aid to preparation of their presentations. Throughout the quarter approximately one and a half hours per week are devoted to clinical correlation sessions and motion pictures.

The remainder of the quarter is devoted primarily to formal, one-hour presentations by the students followed by two-hour laboratory tutorial sessions. During this period, students in Anatomy 501B have only 12 hours of assigned class time per week while students in Anatomy 501A have 20 hours per week of assigned class time. Of these 12 hours, nine are typically devoted to three three-hour student presentation-demonstration sessions. The remaining three hours per week are devoted to the clinical correlation sessions and motion pictures described previously and to occasional review sessions conducted by the anatomy faculty.

Each presentation is the responsibility of two or three students, but the laboratory demonstrations are undertaken by all of the students who have dissected that region. For example, the presentation entitled "The Axilla" might be the responsibility of only two students, but all of the students who dissected the upper extremity would participate in the subsequent laboratory demonstrations. The students make extensive use of audiovisual aids for both the presentations and the demonstrations. They show no hesitation in the production of 8mm movies, television tapes, 35mm slides or models. Anatomy faculty members attend all of the student presentations and demonstrations in order to answer occasional questions beyond the scope of the presentation and to minimize or correct errors.

Textbooks required for Anatomy 501B include a textbook of regional anatomy, a medical dictionary, and the same dissection manual used in 501A. Most students similarly supplement these texts with an atlas.

Anatomy 501B relies heavily on peer-group interaction at multiple levels. Students must work closely together, not only while dissecting but also while preparing their separate but related presentations. They must also lecture to the entire Anatomy 501B class and tutor small groups of their fellow students during the subsequent demonstrations. These multiple responsibilities may serve as inducements to students to become particularly competent in the region to be presented. Preparation for a presentation also may lead each student to consider general anatomical concepts, which are reinforced and extended by the presentations of fellow students. Such experience in the art and technology of communication may be expected to serve these students well later in their careers.

Testing Procedures

The tests used in this experiment served several purposes. First, examinations given before the courses began were used to check the assumption that the students choosing 501B were not significantly different as a group from those choosing 501A. Second, examinations given at the end of the two courses were used to evaluate the proficiency in gross anatomy of the two groups of students immediately after completing whichever course had been selected. Since both faculty-generated tests and examinations of the National Board of Medical Examiners (NBME) were used, the performances of the two groups could be compared from two separate (and perhaps different) viewpoints. Third, the scores achieved by these groups of students on the anatomy section of the NBME Part I examination which was administered at the end of the second year, were also compared to one another and to the national mean as measures of their relative proficiency in anatomy at that time.

Finally, scores derived by averaging the section scores on NBME Part I examination excluding the anatomy section score, for the two groups of students were compared each year to determine whether differences, presumably unrelated to their instruction in gross anatomy, had developed during their first two years in medical school.

In addition, the students who participated in the first two years of the two-course program were asked at the end of the course to evaluate the course they had just completed. In addition to being given questions related specifically to course evaluation and criticism, each student was asked, "If you knew then what you know now, which course would you have taken, 501 A or 501B?"

The two tests used to check the assumption that the two groups of students were drawn from a single population were the Medical College Admission Test (MCAT) and the anatomy pretest, a sample unit examination in anatomy prepared, administered, and scored by the NBME. This examination was not specific to gross anatomy but also contained items more usually designated as relating to microscopic anatomy or neuroanatomy.

The tests used to evaluate the proficiency of the two groups of students in gross anatomy immediately following the completion of the two courses were the course final examinations and an anatomy posttest (4) prepared, administered, and scored by the NBME. The posttests administered to the first two experimental classes (like the pretests) contained items relating to microscopic anatomy and neuroanatomy. The posttest administered to the third experimental class was specific to gross anatomy. Since the two courses were quite different, it was decided to prepare separate departmental examinations for each course. In order to compare the performance of the two groups of students, however, approximately 70 percent of the questions on the Anatomy 501A and Anatomy 501B final examinations were common to both examinations.

The scores achieved by the two groups of students on the anatomy section of the NBME Part I examination permitted both a comparison of the two groups and an implicit comparison of each group to the national mean for the anatomy sections of the NBME Part I examination. Comparison of the scores derived by averaging the nonanatomy sections of the NBME Part I examination of the two groups of students was used as a further check on the assumption that the two groups of students were drawn from a single population.

Results

The results of the evaluation of three classes that were taught gross anatomy under the two-course system will be presented in three segments. First, the mean scores of the students on the MCAT sections will be presented as will the mean scores of these students on the NBME pretests. Second, the mean scores of these students on the departmental final examination and on the NBME posttests and NBME Part I Anatomy examination will be presented. Third, the mean scores of these students on the remaining sections of the NBME examination will be compared. The results presented in the first and third segments relate principally to testing the assumption that during each year the stu-

dents electing 501B were not significantly different from those electing 501A. The results presented in the second segment will be concerned with three measures of proficiency in anatomy and the comparison of these groups of students using these measures.

MCAT AND PRETEST

Table 1 presents the mean scores of three classes of students on the four sections (Verbal Ability, Quantitative Ability, General Information, and Science) of the MCAT. When the scores on the sections of the MCAT for students in the two courses are compared using the chi-square test (5), those who chose the shorter course tended to have higher mean scores than those who chose the traditional course. In fact, only on the quantitative section for the first year was the mean score higher for those who chose Anatomy 501A, the traditional course. The differences in the mean scores, however, were generally small (Table 1) and were significant at the 5 percent level for only two pairs, the Verbal Ability and General Information subtests for the class of 1973. If the overall MCAT mean scores are compared for the three classes, the class of 1973 shows a difference in favor of those students electing Anatomy 501B that is significant at the .05 level. The difference between the overall MCAT mean scores for the class of 1974 is marginally significant with $.05 < p < .10$ and for the class of 1975 is not significant with $0.7 < p < 0.8$.

In addition to the comparison of the mean scores on the MCAT, the mean scores on a pretest in anatomy administered by the NBME were compared. In all three years (Table 2) the pretest scores ranked at or below the first percentile for all national board candidates. For the third class, however, the A group scored significantly better than the B group on the pretest ($p < .05$). Since the pretests contained questions which required knowledge of microscopic anatomy, a course the students had had, and neuroanatomy, a course none of the students had had, it is likely that any differences observed reflect differences in acquisition or retention of knowledge of microscopic anatomy rather than differences in knowledge of gross anatomy.

TABLE 1

MEAN SCORES AND STANDARD DEVIATIONS OF MCAT SCORES FOR THREE CLASSES OF STUDENTS ELECTING ANATOMY 501A AND ANATOMY 501B

MCAT Means and Standard Deviations	Class of 1973		Class of 1974		Class of 1975	
	A (N = 81)	B (N = 34)	A (N = 82)	B (N = 31)	A (N = 72)	B (N = 53)
Quantitative Ability						
Mean	613.9	607.9	619.3	649.5	584.7	609.2
S.D.	73.6	70.4	82.4	76.3	83.2	80.3
Verbal Ability						
Mean	543.1	584.1*	540.0	574.7	550.7	552.4
S.D.	84.8	74.6	93.9	63.5	88.8	83.8
Science						
Mean	572.3	586.5	550.6	556.6	546.1	547.3
S.D.	69.9	43.8	67.1	67.8	75.1	74.9
General Information						
Mean	546.2	579.4*	536.7	550.2	539.0	560.1
S.D.	78.8	87.6	78.4	62.0	71.4	63.0

* Significantly different at the .05 level.

TABLE 2

MEANS OF STANDARD SCORES AND PERCENTILE RANKS (PR) ON PRETESTS AND POSTTESTS AS REPORTED BY THE NBME TOGETHER WITH THE MEANS OF THE DIFFERENCES BETWEEN THOSE SCORES*

NBME Anatomy Tests	Class of 1973				Class of 1974				Class of 1975			
	A		B		A		B		A		B	
	Mean	PR	Mean	PR	Mean	PR	Mean	PR	Mean	PR	Mean	PR
Pretest	64.3	1.0	63.3	0.3	64.1	1.0	63.9	1.0	246.6	1.0	220.9	0.3
Posttest	73.0	11.0	73.1	11.2	76.3	24.9	75.7	23.1	547.6	67.5	486.7	42.4
Means of differences	9.0		9.9		12.2		11.8		307.3		266.1	

* For the class of 1975 the differences between the group means were significant for all three measures, with $p < .05$ for the pretests, $p < .001$ for the posttests, and $p < .01$ for the means of the differences.

POSTCOURSE EXAMINATIONS

The mean scores on the departmental final examinations for the three years were compared using a simple analysis of variance. The groups that took the standard course did better on the average than those who took the shorter course. The differences between the averages (about 5 to 6 points) were statistically significant (Figure 1).

Since the students selected the course in which they participated, bias in the selection process might have been unintentionally introduced. To test this possibility, the MCAT subtest scores and the pretest scores were used as covariables in an analysis of covariance to compare group mean scores on the departmental final examination. In this analysis the MCAT subtest scores and the pretest scores, assumed to be independent measures of student ability, were used to normalize the final grade for each student, thereby hopefully minimizing any differences in intrinsic ability between the groups before comparing their mean final scores. Of the covariables used, the MCAT Quantitative Ability score was the most valuable, being significant at at least the .05 level. However, this analysis leads to the same conclusion as the simple analysis of variance, that is, that the groups that took the standard course did better on the average by a small amount on the departmental final examination than those who took the shorter course.

Shortly after the completion of their courses in gross anatomy, each class took an NBME posttest. The test administered to the first two classes was the anatomy unit examination. As can be seen from Table 2, there was no significant difference between the two groups in either year. These examinations contained items which required knowledge of microscopic anatomy, a course all the students had had, and neuroanatomy, a course none of the students had had. To help alleviate the difficulties in interpretation that resulted, a special unit examination in gross anatomy sponsored by the Association of Anatomy Chairmen and constructed and administered by the NBME was used as a posttest for the third class and is available for future pretests and posttests. When examined only in gross anatomy, a large and significant ($p < .001$) difference in favor of the longer course appears. Since the A group of the third class had scored significantly higher on the pretest, an analysis of variance was performed on the gain in

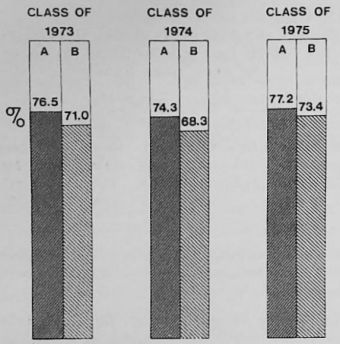

FIGURE 1
Mean scores on the common portion of the departmental final examination of three classes electing Anatomy 501A or Anatomy 501B.

TABLE 3
MEAN SCORES AND STANDARD DEVIATIONS OF NBME PART I EXAMINATION FOR THREE CLASSES OF STUDENTS ELECTING ANATOMY 501A AND ANATOMY 501B

NBME Means and Standard Deviations	1973 A (N = 78)	1973 B (N = 30)	1974 A (N = 74)	1974 B (N = 28)	1975 A (N = 64)	1975 B (N = 50)
Anatomy						
Mean	528.5	484.7	538.4	523.8	488.6*	455.8*
S.D.	106.8	96.0	98.8	93.5	89.9	80.0
Nonanatomy						
Mean	513.0	477.5	510.9	509.5	490.3	484.8
S.D.	89.5	73.1	98.8	93.5	89.9	80.0

* Significantly different at the .05 level.

knowledge, as measured by the difference between the posttest and pretest scores. In this analysis the A group scored approximately 41 points higher (307.3—A; 266.1—B), and the difference was significant at the .01 level. Similar analyses for the first two years revealed no significant differences between the two groups in either year.

Since the scoring system used by the NBME was changed during the course of this experiment, all scores are also reported here as percentile ranks.

Following their second year in medical school, all medical students at the University of Colorado School of Medicine are required to take Part I of the NBME examinations. When group mean scores for the anatomy section were compared (Table 3), small differences in favor of the groups that took the traditional course were observed. These differences were not significant for the first two classes, but the difference was significant at the .05 level for the third class.

NBME NONANATOMY SECTIONS

Since the possibility existed that the process of selection of the two courses might have resulted in two groups of differing composition, the performances of these students on the remaining sections of the NBME Part I examination were compared (Table 3). When group means of the averages of the scores on the remaining sections of NBME Part I examination were compared, no significant differences were observed.

Discussion

From the comparison of the performances of the two groups on the MCAT and the pretest, the authors feel justified in assuming that the two groups of students did not differ significantly in intrinsic ability. While there do not appear to be any significant differences detectable using these criteria, one would expect to be able to determine the characteristics which lead the students to choose a particular course. Members of the Department of Psychiatry at Colorado are currently attempting to assess the personality traits which distinguish these two groups of students.

The function of any course in medical school may be broadly described as preparing the medical student for his further medical education and for the practice of medicine. The assessment of such preparation of the student is difficult to evaluate directly; therefore, educators choose instead to measure student performance on their own examinations. The quality of the course is then retrospectively determined by the relative performances of similar groups of students on these examinations. The traditional course better prepares the student for the departmental final examination, for the NBME-administered posttest (at least when the posttest deals only with gross anatomy) and to a limited degree for the anatomy section of NBME Part I examination. Since those differences that are statistically significant are also generally small, the authors feel that a student would be adequately prepared regardless of which choice made. It should not, however, be inferred that either course alone would be adequate for all students.

Of the approximately 250 students involved in the first two years of this experiment, only one from the traditional course and one from the shorter course indicated that the other choice would have been made had all the information about the two courses that was acquired during the courses been available prior to their commencement. Such overwhelming satisfaction with the selected course is, in fact, a major benefit both to the students and to the faculty of the two course-system.

Since the shorter course has become a regular part of the curriculum and its experimental aura has subsided, it has become more acceptable to the students. In the third year 72 students elected the traditional course and 53 students the shorter course, a marked increase in enrollment in the shorter course over previous years.

The three-week dissection period in the shorter course and the limited number of students dissecting any particular region present a greater opportunity and attraction for residents and clinical associates to participate in teaching in the laboratory. Such teaching by residents is of particular value since, when properly handled, everyone benefits. Not only do the students benefit from the clinical experience of the residents, but also the residents, in becoming teachers, relearn and extend the scientific bases of their clinical specialties. Furthermore, both the basic science staff and the clinical staff are relieved of the responsibility of presenting redundant review courses.

It appears from these results that when presented in the context of a two-course system, either course represents adequate preparation in gross anatomy. This, combined with students' satisfaction with the opportunity of electing their gross anatomy courses, is adequate justification for

the presentation of two courses. There are, however, several other advantages to the two-course approach in modern medical education.

The availability of alternative routes through the core curriculum permits a wider variety of student abilities and interests to be accommodated. For example, the existence of a shorter course accommodates those students who feel that they have chosen a specialty that they consider not to require a total dissection without denying the advantages of total dissection to other students. This same shorter course designed around a single region of dissection presents an opportunity for students to return to the course during their third or fourth years for further specialized studies. However, few students have availed themselves of this opportunity because, as has been observed elsewhere (6), an abbreviated basic science course or curriculum is most commonly supplemented with clinical rather than basic science electives.

The concurrent presentation of two courses has advantages over either course presented alone. This approach can be viewed as offering flexibility in core course content or as providing flexibility in instructional method. In either case, this two-course approach represents parallel paths through core material rather than divergent paths to different medical practices.

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Predicting Academic Success For Military Paramedical Personnel

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Abstract—The utilization of selected cognitive, demographic, and personal history measures as predictors of academic success for Naval Hospital Corps School personnel undergoing paramedical training was investigated using a sample of 1,448 students. A composite criterion score reflecting grade-point average as well as administrative discharge was related to a number of preservice cognitive and noncognitive predictors. Multiple regression techniques were used to weight specific variables and to predict performance in a crossvalidation sample. Findings indicated that demographic and personal history measures contributed uniquely to prediction of academic success.

The implementation of an all volunteer force has resulted in limited enlistments of professional medical care personnel into the U.S. Navy. This shortage of medical doctors has placed added responsibility upon paramedical personnel to supply vitally needed health care services.

Each year the Naval Hospital Corps School, San Diego, California (HCSD), trains approximately 5,000 enlisted personnel as hospital corpsmen to qualify as medical specialists both afloat and ashore. A number of the students who enter HCSD (10 to 12 percent per year) do not graduate because of academic failure, extended illness, or administrative reasons. Individuals may be dropped administratively because they pose disciplinary problems, or they may be considered psychologically unsuited for the rating of hospital corpsmen. This annual attrition rate, which is substantial in view of the shortages of personnel in this critical occupation, emphasizes the need to select, train, and graduate qualified hospital corpsmen in order to maintain adequate levels of health care services in the U.S. Navy.

Presently, the Navy's program of selection for paramedical training is an outgrowth of a validation study (1) for which investigators used the Basic Test Battery (BTB) to predict a grade-point average (GPA) attained at graduation from paramedical school. A recent revision of the BTB validation study (2) established the present requirements for admission to paramedical training schools. These studies indicated that useful prediction of academic success can be obtained when using a combination of cognitive measures, the General Classification Test (GCT) plus the Arithmetic Test Score (ARI).

This is Report 74-51, supported by the Bureau of Medicine and Surgery, Department of the Navy, under Research Work Unit MF12.524.002-9002. Opinions expressed are those of the author and are not to be construed as necessarily reflecting the official view or endorsement of the Department of the Navy.

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There are few studies available which demonstrate the value of noncognitive measures as predictors of academic success in paramedical specialties. However, one relevant study (3) did show the practical usefulness of combining cognitive with noncognitive measures for predicting success in Hospital Corps School. The study, using a sample of Hospital Corps School graduates, related demographic variables (age and education level completed) and personality variables (Minnesota Multiphasic Personality Inventory scores and Taylor Manifest Anxiety Scale scores) as well as cognitive measures (BTB) to a criterion of GPA. The results, although not cross-validated, suggested that noncognitive measures provided unique predictive validity.

The previously mentioned Navy studies have dealt with samples that included only those individuals who were graduates or academic dropouts from Hospital Corps School. Administrative dropouts were not included in the samples, and the criterion predicted was solely GPA attained at graduation. The use of this type of sample and criterion does not allow for the prediction of success in Hospital Corps School for all individuals who enter. In other words, selection for Hospital Corps School should be based upon all those who drop out as well as upon those who graduate. Therefore, a more practical method for predicting success in Hospital Corps School might be developed by incorporating into one study both cognitive and noncognitive predictors while using a criterion which identified all individuals who drop out of the school. In addition, the findings from such a study would need to be cross-validated to establish the stability of the results.

The purpose of the present study was to identify variables which could be used to predict success at the Naval Hospital Corps School, San Diego, California, for those enlisted personnel selected to attend. More specifically, the goal of this investigation was to develop an equation which could aid Navy classifiers in selecting individuals who would successfully complete the Navy's paramedical training program.

Procedure

Subjects were 1,448 students who entered HCSD between November 1966 and August 1967. This sample provided complete predictor information and an adequate time interval subsequent to graduation for conducting a series of longitudinal studies of effectiveness.

All students received their basic training at the Naval Training Center, San Diego, after July 1, 1966. For purposes of analysis, these students were divided into three groups. Group I and Group II consisted of 477 students and 474 students, respectively, who entered HCSD during the time period of November 3, 1966, to May 11, 1967. Group I was designated as the validation sample, and Group II served as the initial cross-validation sample. Group III was composed of 497 students who entered HCSD during the time period of May 18, 1967, to August 24, 1967. This latter sample was used for generalizing validities to classes which entered Hospital Corps School at time periods subsequent to the initial validation and cross-validation samples.

Criterion

The success criterion was a score ranging from 0 to 9 assigned to each student who attended HCSD. Students who failed the course academically or who were dropped from the school administratively were assigned a criterion score of 0. Students who graduated from the course were assigned a criterion score based upon GPA attained at graduation. Each graduated student received a criterion score ranging from 1 to 9, depending upon the interval of the gradepoint scale in which he scored. The GPA range of 64 to 99 was divided into equal interval segments of four units. A value of 1 was assigned to the first segment of 64 to 67 and a value of 9 for the highest interval range of 96 to 99.

Predictors

All predictors used in this study were obtained from documents administered prior to the subjects' entry into Hospital Corps School. The cognitive measures were test scores from the BTB; the subtests used were measures of verbal, arithmetic, clerical, and mechanical abilities.

The second set of predictors consisted of 20 items of demographic and personal history data. This information was obtained from a questionnaire, the Medical Screening Form Personal Information, routinely administered to each recruit entering basic training at the Naval Training Center, San Diego. The form included age at entry into service (AGE BC), age at entry into Corps School training (AGE HCS), marital status (MARSTAT), highest school grade completed (EDUC), whether the subject would have enlisted if there were no draft (DRAFT), whether the subject intended to reenlist (REENLIST), whether the subjects' parents were alive and living together (FAMSTAB), and number of expulsions or suspensions from school (EXPUL).

The third set of predictors was from an attitude and symptom inventory, the Recruit Temperament Survey (RTS), routinely administered at the Naval Training Center. This screening form consisted of 150 yes-no response questions pertaining to attitudes, interests, and physical and emotional well-being.

Analysis

The analysis was conducted in four stages. Stage one consisted of two phases. The initial phase involved identifying items from the Recruit Temperament Scale (RTS) which correlated significantly with the success criterion. Items which were not significantly related to the criterion ($p < .05$) were eliminated from subsequent analyses. The second phase involved clustering the items of the RTS which were significantly related to success. The clustering technique (4) was applied to the intercorrelation matrix of significant items to obtain composite variables which would act as more reliable predictors of success than the individual questions of the RTS. Scores for each cluster were obtained for each student by algebraically summing responses to the questions comprising each cluster. These cluster scores were used in subsequent stages of the analysis as predictors.

The second stage of the analysis employed a technique (5) to linearize all variables in the analysis which were curvilinearly related to the criterion.

The third stage processed the validation and cross-validation samples independently to produce a least squares regression equation, optimized with respect to the two samples used. The technique (6) generated an equation which best predicted the criterion in the validation sample and systematically applied this equation to the cross-validation sample. All combinations of predictors were used in order to obtain that equation which had the highest cross-validity with the least number of predictors present.

The fourth stage was designated the final cross-validation. In this stage the

optimized equation, produced in the preceding stage, was applied to the final cross-validation sample to determine the predictive validity of the obtained equation.

Results

The criterion means for the three experimental groups were comparable. The validation sample, Group I, had a criterion mean value of 4.83 while the cross-validation sample, Group II, had a criterion mean value of 4.85. The final cross-validation sample, Group III, had a criterion mean value of 4.68, which was slightly lower than either Group I or Group II. However, the difference was not statistically significant ($p < .05$).

Table 1 presents the correlation coefficients for all variables used in the analysis which were significantly related to success. The table shows the most valid predictors of success to be, in order of importance, GCT, ARI, EDUC, AGE BC, and AGE HCS.

The analysis of the Recruit Temperament Survey (RTS) yielded 25 items from the validation sample which were significantly related to the success criterion. The cluster analysis produced three distinct clusters which significantly discriminated the success criterion. The clusters were labeled Somatic, Challenge, and Control. Their respective linearized correlations with success were −.20, .19, and −.23. For the purpose of further analysis, however, the variables used were the three clusters and those items from the RTS which were also related to success but which were not included in the clusters.

The first cluster, labeled Somatic, included the following items: Are you often bothered by back pains? Are you often troubled by headaches? Was anyone in your family bothered by sick headaches? The composition of the cluster reflects somatic complaints expressed by the subject or his family. The negative correlation of this cluster with the criterion indicates that the poorly performing student answers more of these items affirmatively.

TABLE 1

PEARSON PRODUCT MOMENT CORRELATIONS OF PREDICTORS SIGNIFICANTLY RELATED TO SUCCESS IN HOSPITAL CORPS SCHOOL

Predictor Items	r*
Age HCS	.32
GCT	.56
ARI	.43
MECH	.21
CLER	.23
Age BC	.33
MARSTAT	.12
EDUC	.42
DRAFT	.13
REENLIST	.08
FAMSTAB	.09
EXPUL	−.13
Had you planned to join the Navy for more than a year before you enlisted?	.10
Did you fail two or more grades in school?	.12
Did you belong to any clubs in school?	.13
Do you cry easily?	.09
Do you think that most people are really honest?	.17
At home, did you have to make your own bed?	.10
Do you usually watch TV more than three hours a day?	.13
Are you a slow reader?	.11
Are you afraid of spiders?	.09
Have you ever been this far away from home before?	.10
SOMATIC	−.20
CHALLENGE	.19
CONTROL	−.23

* For a sample of the size used in this study, a correlation of .09 is significant at the 5 percent level of confidence (one-tailed test), an r of .12 is significant at the 1 percent level of confidence, and an r of .15 is significant at the .001 level of confidence.

The second cluster, labeled Challenge, was related to the subject's attitude and perseverance with respect to challenging tasks. The Challenge cluster included the following items: Do you enjoy the challenge of a tough job? Do you work better when you are under pressure? The positive correlation indicates that the better performing student answered these items affirmatively.

The third cluster, labeled Control, was formed from these eight items of the RTS: Do you often say things you are sorry about afterwards? Are you the kind of person who just can't hold on to money? Right now, do you feel like you would like to back out and go home? Do you frequently feel that you just don't care what happens to you? Have you had more than your share of bad luck? Do you find it hard to keep your mind on a task or a job? Do you sometimes wonder if you can ever really love someone? Were you often late with your assignments in school? The Control cluster correlated −.23 with the success criterion and appeared to measure a behavior trait which is related to the subject's response to external controls. In addition, the cluster seems to tap the degree of responsibility the subject is willing or able to assume for his actions. The sign of the correlation indicates that the student who performed poorly replied affirmatively to these items.

Following are summaries of the background characteristics that best describe the experimental sample; the values in the parentheses are the mean criterion values assigned to the segments to linearize the predictor-criterion relationships.

AGE HCS—The age distribution for this variable was markedly skewed. The subjects' ages ranged from 17 to 32 years, with a mean of 19.4 years. Approximately 25 percent of the subjects were 18 years of age or less. Forty percent were 19 years of age (age 19 or less = 4.466; 20 years = 4.917; 21 years to 23 years = 6.125; 24 years or older = 7.571).

EDUC—The years of school completed for this sample ranged from 10 through college graduation. Ninety-eight percent were high school graduates. Five percent had graduated from college. Forty-nine percent had not gone beyond high school. The mean number of school years completed was 12.58 (education completed 11 years or less = 2.000; 12 years = 4.292; 13 years = 4.790; 14 years through 15 years = 6.000; 16 or more = 7.400).

GCT—GCT scores ranged from 38 to 76. Approximately 9 percent of the subjects had GCT scores less than 50. Fifty-two percent of the subjects had scores ranging from 50–61, while 32 percent of the subjects had scores ranging between 62–70. Seven percent had scores greater than 71. The average GCT score was 58.81, almost one standard deviation above that of the average sailor (GCT score 49 or less = 2.643 criteria weighing; 50–55 = 3.892; 56–61 = 4.597; 62–67 = 5.584; 68–70 = 6.324; 71 or greater = 7.412).

ARI—ARI scores ranged from 38–70. Approximately 15.5 percent of the subjects had ARI scores less than 50, while 56 percent of the subjects had scores ranging from 50–60. Twenty-nine percent had scores of 62 or greater. The average ARI score for this sample was 56.62 (ARI score 49 or less = 3.384; 50–55 = 4.220; 56–61 = 4.883; 62 or greater = 6.088).

CONTROL—The distribution of affirmative responses was markedly skewed. Twenty-seven percent of the subjects did not answer any of the eight items affirmatively. Twenty-seven percent answered only one item "yes." Approximately 9 percent answered five or more items "yes." The average number of items answered affirmatively was 1.60 (two or less items = 5.083; 3 to 6 items = 4.432; 7 or more items = 2.273).

Table 2 lists the regression coefficients, beta weights, and probabilities for the

TABLE 2

COGNITIVE AND NONCOGNITIVE PREDICTORS AND REGRESSION WEIGHTS FOR PREDICTING SUCCESS IN HOSPITAL CORPS SCHOOL

Predictor	Regression Coefficient	Beta Weight	Correlation with Criterion*
Regression Constant = −6.231			
GCT	.636	.358	.558
ARI	.467	.205	.434
EDUC	.528	.224	.425
CONTROL	.656	.152	−.234
Regression Constant = −3.293			
GCT	.676	.380	.558
ARI	.417	.183	.434
EDUC	.588	.250	.425

* For all correlations $p < .01$

variables which predict the success criterion. Two regression equations are reported in the table. The first equation reported is the optimum equation derived using general multiple regression analysis. This equation included four variables and resulted in a final cross-validation coefficient of .649. The second equation reported is with the CONTROL variable omitted. This equation yielded a final cross-validity for the multiple composite of .637. Therefore, results were obtained to evaluate the contribution of CONTROL to the classification program. The validity of the equation with the four variables of GCT, ARI, EDUC, and CONTROL explains approximately 42 percent of the criterion variance. However, using the validity obtained from the equation with the three variables GCT, ARI, and EDUC would explain approximately 41 percent of the criterion variance.

Discussion

The results of this study indicate that demographic, personal history, and attitude variables act as unique contributors to account for academic performance criterion variance. If the multiple composite derived from this study were to be used—GCT, ARI, EDUC, and CONTROL—for which the validity is .649, the criterion variance accounted for would be 42 percent.

The findings were consistent with those of other investigations (7, 8). The variables found most valid for predicting academic success were GCT and ARI, with the GCT variable having the highest correlation with success. The GCT variable is of such importance that it alone accounts for about 35 percent of the variance explainable by the combined four significant predictors. The ARI is second in importance, being slightly more valid than EDUC. However, a large portion of the increase in predictive validity is attributable to the EDUC variable. The variable CONTROL, a measure of emotional stability and psychological adjustment, yielded a modest correlation with success, but the CONTROL cluster did contribute significantly to explaining criterion variance. Thus, the CONTROL variable is of greater importance in predicting success than variables, such as AGE HCS or AGE BC, which have higher individual validities with the criterion. Of greater concern, however, is the practical utility of including CONTROL in the predictor equation. It should be pointed out that using CONTROL would involve appreciable altering

of present administrative procedures for classification of personnel. Therefore, including CONTROL must of necessity provide a substantial increase in validity in order to warrant the administrative changes needed to provide the required information. Presumably, the 1 percent increase in explainable criterion variance does not justify the inclusion of the variable at this time. The findings that personal history and attitude variables do contribute unique predictive validity are encouraging and suggest that further refinement of this type of noncognitive variable could have practical application for prediction of academic performance.

The predictive validity of the final equation, $R = .65$, indicates that the composite of four variables is a very good indicator of academic performance in Hospital Corps School and that naval classifiers should be able to make decisions about future personnel input efficiently using this method. The practical use of the derived equation can best be appreciated by considering the following example. A prospective student has the following characteristics: GCT score of 58 (value = 4.597); ARI score of 65 (value = 6.088); completed 12 years of school (value = 4.294); and he has answered two items of the CONTROL cluster in the affirmative (value = 5.083). Using the above linearization values along with their respective regression coefficients (see Table 2) in the following equation:

$$.636\,(4.597) + .467\,(6.088) + .528\,(4.294) + .656\,(5.083) - 6.231 = 5.14$$

yields a predicted success score of 5.14. Converting this score to an estimate of school performance requires substitution of the success score into the following formula:

$$\text{GPA} = 4\,(\text{Success Score}) + 61.5$$

for the obtained value in the above sample the formula would be

$$\text{GPA} = 4\,(5.14) + 61.5.$$

The predicted performance for this subject in terms of GPA would be 82.06.

The above findings suggested that the selection of recruits to attend Hospital Corps School, San Diego, could be accomplished validly by computing success probabilities based on the equation derived in this study. Such a procedure could be readily accomplished by clerical personnel, thereby allowing classifiers to function primarily as counseling agents.

The above equation is intended merely as a guide for selection and counseling of prospective students for Hospital Corps School. Scores should be interpreted as estimates of the probability for successful completion of the corps school course but are subject to some uncertainty.

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COMMUNICATIONS

Impact of a Retention Program for Disadvantaged Medical Students upon the Medical School Community

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The first article on the medical education of the disadvantaged student appeared in 1967 when Hutchins (1) asked whether society is best served by the exclusion from medicine of those who are less well qualified or whether they should be admitted to medical school and brought up to standard regardless of the costs involved. With a mixture of apprehension, excitement, and even guarded enthusiasm, the nation's medical schools chose the latter alternative. The literature contains additional articles dealing with the recruitment, admission, and retention of minority students (2–8). Some chronicled the rising numbers of students enrolled, while others dealt with maintaining standards; and still others described the content of special educational programs. Only one article alluded to the effects of such a program on the institution, and this consisted of a single sentence which mentioned "some" faculty negativism (9).

The relatively sudden influx of disadvantaged students represented a major challenge to medical education quite without precedent. As schools have struggled to adjust, institutional friction was inevitable but was neither prolonged nor irreversible.

A previous report (10) described a program designed to identify and correct academic deficiencies of first-year medical students from backgrounds characterized by educational or economic deprivation or both. Over its four year history, this program has gradually evolved from an ad hoc stopgap measure toward a well defined curriculum which parallels, but does not duplicate, the formal first-year curriculum. Although the students participating in the program have not changed appreciably in terms of grade-point averages or Medical College Admission Test (MCAT) scores, their academic performance in the medical school curriculum has steadily improved over the years with the result that there is presently little difference scholastically between the disadvantaged group and their other colleagues. The effects of this program are both positive and negative and quite specific to the Mount Sinai School of Medicine. However, this experience is no doubt relevant to other medical schools, and it is presented in the hope that it will prove instructive for those schools which have started or are thinking of starting similar programs.

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Effect on Students

The presence of a formal tutorial program for disadvantaged students has aroused no hostility and little interest among the student body as a whole. Since the program involves only first-year students, it is not a presence which follows students throughout medical school. Many first-year students are unaware of the program's existence, although a few of the non-disadvantaged first-year students have sought sporadic help from the faculty member in charge of it. In this sense the program has acted in a very limited way as an extra departmental, and therefore informal, source of academic assistance.

Without question, the disadvantaged students themselves are the most ardent supporters of the program. At the beginning of the 1971-72 academic year, one student expressed the fear

that the program would isolate him from the bulk of his classmates. The matter of program-induced isolation has also been a concern of the school administration, but it has proven to be a phenomenon which persists only as long as the program itself, that is, throughout the first year. By the middle of the second year, the tendency to cliquishness has largely disappeared, leaving no traces whatever in the clinical years. With the one exception cited previously, the students have found the separatism the program creates during the first year to be the program's greatest advantage, greater even than its academic contribution. The reason for this seems to be the mutual protection, attention, and concern fostered by the group during the extreme stresses of the first year of medical school. A problem that exists is that the disadvantaged students observe very few role models at the medical center, a factor which is being alleviated through extramural clerkships. This temporary separation is considered a positive force, and it is felt that similar groups exist among other first-year students but escape attention because they are less conspicuous.

During the 1973-74 academic year, the program received attention when its virtues were pointed out by first-year students not in the program who were critical of the teaching in one of the basic science departments. The importance of this otherwise routine incident is the dual implication that disadvantaged students receive more and better teaching than others and that the retention program represented a standard of teaching excellence not attained generally by the basic science departments.

Effects on Administration

Since its inception, the administration has been supportive and protective of the program. This has been true even though Mount Sinai has had three deans during the life of the program and the national commitment of medical schools generally to disadvantaged students has waned in recent years with the falling off of federal moral and fiscal support. Although the isolation issue has been the subject of much discussion, the academic success of the program has legitimized this kind of activity as a proper concern of medical education while immunizing the administration against the charge that the admission of disadvantaged students lowers the academic standards of the school.

The program will provide a base for the development of a formal tutorial program for all students, which will be situated in the Department of Medical Education. The incorporation of this function in a departmental structure has the important effect of providing for faculty working in this area an equal opportunity for promotion.

The academic success of students who entered the school with less impressive grade-point averages has strengthened the commitment of the school to the attempt, through personal interview evaluation, to assess the whole student rather than judging his fitness to study medicine solely on the basis of grades or MCAT scores.

Effect on Faculty

While faculty reaction to the program has not been totally positive, there has never been a serious faculty effort to eliminate, reduce, or subvert the program. Present faculty tends toward the positive view that the program is a valuable adjunct to first-year teaching that should be expanded in a manner which will facilitate participation by more students. Over the four-year period the program seems to have achieved recognition as a valuable and permanent supplement to the curriculum.

The subject of medical education for disadvantaged students is an area of much faculty ambivalence. On the one hand, there seems to be general agreement that once admitted every effort should be made to prevent academic failure. On the other hand, there seems to be a tendency among some faculty members to deny the success of the program for the disadvantaged student. This takes the form of questioning the "disadvantagedness" of the student and, by extension, the need for a retention program.

The impact of this program has been most apparent on the basic science faculty. The problem is threefold. First, the very existence of the program might be interpreted as a negative comment on the teaching capabilities of the departments responsible for implementation of the first-year curriculum. Second, the tendency to view the retention program in this light is probably determined in large measure by the preexisting biases or lack thereof in individual faculty members. Third, individuals who are basically indifferent to the program may nevertheless use the program as a springboard to their real concerns, both academic and nonacademic. Given this background, it is not surprising that the program has been an occasional subject of controversy.

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Uncharted Waters: A Preliminary Evaluation Of Faculty Attitudes Toward Medical Students

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Although medical educators have long been occupied with evaluating cognitive information retained by students, there has only recently been interest in evaluating changes in students' affective lives as a part of the process of medical education (1–3). In one significant early study Becker (4) outlined developmental stages through which medical students must pass. Other investigators have attempted to identify the problems students encounter in relation to their self-expectations and the nature of their role with patients (5–8). Sachs (9) specifies a lack of faculty "psychological-mindedness" which forces a student to adopt a professional mask and thus lose spontaneous emotional responses. All of these studies (3,5, 6–9) indicate that medical students' emotional lives will influence both their performance and their comfort as they proceed through the preclinical and clinical years.

Equally important in the view of the authors is the affective life of a faculty member. There is a paucity of information concerning this aspect of the faculty members with respect to their relationship with the students. Obviously, in the student-teacher dyad, both parties have expectations, hopes, aspirations, and investments (10). Becker notes in *Boys in White* (4) that the faculty held vastly different attitudes toward different classes of students; however, no systematic observation of faculty members concerning these attitudes was undertaken.

Method

Because of this sparse information concerning faculty attitudes, a pilot study was undertaken at the Medical University of South Carolina in which faculty members evaluated groups of medical students in four successive clinical

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rotations through the Department of Psychiatry in 1974. In each rotation the faculty members were asked to rate on a scale from zero to four (failing to superior) the current group of medical students in relation to the previous group of medical students on seven parameters, such as performance, interest, enthusiasm, and response. These highly subjective, nonspecific parameters were designed to obviate the necessity of dealing with statistical variance among the parameters in this preliminary study. Each of the evaluation questionnaires was completed by the faculty members one week after the previous rotation ended and four weeks before the end of the current rotation. It was hypothesized that the previous group of students would be rated higher than the current group of students and that when a current group finished the rotation and entered the previous group category, its rating would improve.

The ratings assigned to the four student rotation groups were totaled on all parameters for both the current and the previous students. A mean score and range of all evaluations were obtained for both the previous and the current students in each of the four groups studied. Two tests were then applied to this data. In each group a two-tailed t test was performed, accepting $p < .05$ as significant. In addition, all the current student categories in Groups I, II, and III were compared with all the previous student categories in Groups II, III, and IV. All students in these groups and categories were evaluated as both current students and as previous students in order to minimize differences in ability between groups of students. Again, a mean and a range were obtained for the previous student categories and the current student categories. An unpaired two-tailed t test was then applied to this data, accepting $p < .05$ as significant. The results are shown in Table 1.

TABLE 1
DIFFERENCE BETWEEN MEAN RATINGS OF CURRENT STUDENT AND PREVIOUS STUDENT CATEGORIES

Student Group	No. of Raters	Mean Rating*		Difference Between Means	t
		Current Students	Previous Students		
I	13	13.0	17.3	4.3	2.97‡
II	9	10.4	14.3	3.9	2.19†
III	9	11.7	17.3	5.7	2.11†
IV	4	10.8	18.2	7.5	2.51
All Current Students (I, II, III)	31	11.9			
All Previous Students (II, III, IV)	22		16.3	4.4	3.27§

* Maximum possible rating = 28.
† Significant at .05 levle, two-tailed t test; ‡ Significant at .025 level, two-tailed t test; § Significant at .01 level, unpaired, two-tailed t test (all current students versus all previous students).

Results

Statistically significant differences in ratings were found in the faculty evaluations of the current students when compared with the previous students in three of the four group ratings. Each of the four consecutive student groups was rated lower when compared with the preceding group. The mean rating of all current students versus the mean rating of all previous students was also statistically significant.

Conclusions

The data support the hypothesis that faculty rate students lower early in their clinical rotation when compared with the previous students. There are several possible explanations for this phenomenon. Even though nonproficiency items such as interest and enthusiasm were included, it may be that the faculty rated only proficiency, which could be expected to be higher at the end of the rotation. Another explanation is that each consecutive group of students in this study was, in reality, poorer than the preceding group. A third possibility is that subjective evaluations by the faculty are influenced by their affective investment in the dyadic relationship and its vicissitudes over time.

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Mortality Among Medical Students and Young Physicians

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Medical students and young physicians are occupationally exposed to various diseases known or suspected (for example, Hodgkin's disease) to have an infectious etiology and to a unique and often stressful working situation. A survey of deaths in this group was conducted to determine how mortality patterns differed from the general population and high socioeconomic groups.

Methods

Numbers and causes of deaths among medical students over a four-year period, June 1967 to June 1971, were gathered from reports of attrition sent by U.S. medical schools to the Association of American Medical Colleges. A report is obtained for each matriculated medical student who does not continue his program; this makes possible a virtually complete ascertainment of medical student deaths. The death rate was calculated from total enrollment statistics published in the *Journal of the American Medical Association* (J.A.M.A.). This rate was compared with that of U.S. white males aged 20–24 for 1967, excluding the Armed Forces stationed overseas.

Deaths of physicians aged less than 40 over a five-year period, 1966–1970, were abstracted from the death notices column of J.A.M.A. Fifteen deaths in Vietnam or Korea were eliminated, leaving 493 fatalities. To obtain the physician population at risk, the number of U.S. physicians of both sexes under age 40 on December 31, 1967, excluding temporary foreign physicians (the number being based on information provided by the American Medical Association), was multiplied by five (that is, the number of years covered by the study). U.S. white male death rates for ages 25–39 were computed from mortality statistics and applied to the physician population to yield expected numbers of physician deaths. Tests of statistical significance were made using the ratio of a Poisson variable to its expectation (1).

Results and Comment

Among medical students only 55 deaths were recorded compared with 271 expected from the death rate for U.S. white males aged 20–24; so mortality was only 20 percent of that antici-

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pated. The death rate of medical students of all ages was 37 per 100,000 while that of U.S. white males aged 20–24 was 183 per 100,000. This finding is in contrast with earlier reports (2, 3) that the death rate for medical students equaled or slightly exceeded that of the general U.S. white male population. These studies, however, apparently overestimated the death rate by considering students to be at risk for only one year instead of the entire four years of medical school. The causes of death were specified for only 26 of the 55 medical students (14 accidental deaths, five suicides, two probable suicides, three carcinomas, one leukemia, and one serum hepatitis). This sample is limited and may be biased, but it suggests no excess mortality from any of these causes in comparison with the general population.

Mortality among physicians under age 40 was only 41 percent of that expected for a comparable group of white males. In this age group death rates for physicians and for the white male population were 83 and 201 per 100,000, respectively. Previous surveys using AMA records have suggested that 90 percent of physician deaths are recorded (4), and so only part of the mortality deficit reported in this study can be ascribed to underascertainment. The finding is consistent with earlier reports. In a survey of mortality for 1949–1951 using AMA records, mortality for physicians aged 25–39 was only 69 percent of U.S. white mortality (5). In a second study alumni records for the Harvard Medical School revealed that the cumulative mortality for 15 years after graduation in 1942–1944 was only about 50 percent of that expected for U.S. white males of similar age (6). Much of the favorable mortality experience of young physicians can be attributed to the selection of healthy individuals as medical students. As illustrated in Table 1, the benefits of selection diminish over time, resulting in a narrowing of the difference. In a prior study this trend continued until ages 60–69 when the death rates of physicians slightly exceeded those of white males (5). After age 70, however, physician mortality was again substantially lower.

Young physicians experienced fewer deaths from cancer than expected, with statistically significant deficits for cancers of the skin (primarily melanoma), genital system (primarily testicular cancers), and respiratory tract (Table 2). Brain and colonic neoplasms were present in nearly the expected numbers, as were deaths from leukemia and Hodgkin's disease. Four embryonal or genetic tumors were reported: teratoma of chest, metastatic cloacogenic tumor, embryonal cell neoplasm, and Zollinger-Ellison syndrome with liver tumors.

Several studies have implicated horizontal transmission of Hodgkin's disease, chiefly among individuals under age 40. Susceptibility of the medical profession to Hodgkin's disease is suggested by reports of clusters of cases among medical students and excess mortality among physicians in upstate New York (7). In contrast, no excessive mortality from Hodgkin's disease among young physicians was found in the present study, and no increased risk was observed in a large survey of British physicians (8). In the study reported here, however, an excess of cases with nonfatal disease or with an incubation period exceeding 20 years would not have been identified. Also, although physicians have greater exposure to known infectious disorders, such as hepatitis and tuberculosis, their mortality from these diseases was not excessive.

There were substantially fewer deaths among physicians than expected from disorders of the circulatory, digestive, and genitourinary systems; infective and parasitic diseases; and diabetes (Table 2). In addition to factors influencing entry into the medical profession, low mortality from these causes may result at least in part from socioeconomic status, knowledge and avoidance of health hazards, and easy access to diagnosis and treatment of disease.

Young physicians also experienced considerably fewer deaths from accidents or homocide

TABLE 1

DEATH RATES AMONG U.S. PHYSICIANS AND THE GENERAL WHITE MALE POPULATION UNDER AGE 40

Age	Death Rates (per 100,000)		Ratio of Rates for Physicians/ White Males
	Physicians	White Males	
<30	53.7*	161.0†	0.33
30–34	68.9	179.0	0.38
35–39	123.4	263.5	0.47

* Includes five physicians aged 24 and 88 aged 25–29.

† White male death rate for ages 25–29.

TABLE 2

CAUSES OF DEATH AMONG PHYSICIANS UNDER AGE 40

Cause of Death	Number of Deaths	
	Observed	Expected*
All causes	493†	1,188
Infective and parasitic‡	18†	35
Cancer	95†	142
Skin, including melanoma	2†	11
Genital	2†	11
Respiratory	4†	21
Brain	19	17
Leukemia	19	15
Reticulosarcoma and lymphosarcoma	3	9
Hodgkin's disease	13	14
Colon	7	7
Not otherwise stated	13	7
Other	13†	30
Diabetes mellitus	2†	18
Vascular lesions affecting the central nervous system	28	29
Circulatory	87†	185
Arteriosclerotic heart disease	69†	130
Other	18†	55
Digestive	12†	62
Cirrhosis	1†	38
Other	11†	24
Genitourinary	3†	18
Homicide	11†	59
Accidents	125†	448
Motor vehicle	60†	261
Aircraft	31	26
Other	34†	161
Suicide and poisoning not specified as accidental	88	111
Other§	9†	63
Unknown or withheld	15	18

* Based on death rates for U.S. white males aged 25–39.

† Significant deficit in mortality ($p < .01$).

‡ Includes respiratory and meningeal infections.

§ Two cases with thrombocytopenic purpura, one each from hemorrhage due to hemophilia A, amniotic fluid embolism, idiopathic polyneuritis, spontaneous pneumothorax, status asthmaticus, perivascular foreign body granuloma of lungs, cystic fibrosis.

and a modest deficit in mortality from suicide. This may reflect some lack of ascertainment, but it is in agreement with a study by Craig and Pitts (4), who recorded no excess suicides among male physicians.

There were 11 deaths from suicide or poisoning among physicians whose first names were unequivocally female, whereas five deaths were expected based on rates for white females of similar age in the general population ($p < .05$). This finding confirms reports of excessive suicide among women physicians (4) and psychologists (9). The observation that women chemists are also prone to suicide (10) suggests the importance of easy access to poisonous materials in successful suicides and the need for identifying and preventing stresses felt by women in male-orientated professions.

It is difficult to determine the extent to which low mortality rates among young physicians are attributable to selective factors, socioeconomic status, or health advantages afforded by membership in the medical profession. The mortality experience of young college graduates and professional workers is also more favorable than the general population. A direct comparison of mortality in these groups was not possible, but the reduction in mortality among young physicians tended to be at least twice as great as that of professional workers and was more uniform over the causes of death studied.

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Predicting Supervisor, Peer, And Self Ratings of Intern Performance

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The work of the physician is likely to be viewed somewhat differently by his colleagues, his patients, and by the physician himself. Each "viewer" may, in his turn, contribute a unique and meaningful perspective to the overall assessment of the physician's performance. In order to test, in part, this contention, supervisors of interns, intern peers, and interns themselves were asked to rate the performance of medical interns on four dimensions: knowledge of medical sciences, clinical effectiveness, interpersonal effectiveness, and overall competence/professional promise as a physician. Ratings from the three sources over the four dimensions were compared in order to determine elements of communality and/or difference in the ratings.

In addition, the author questioned the extent to which ratings of intern performance could be predicted from earlier measures of aptitude, achievement, and personality. To answer this question, an assessment was made of the efficacy of medical school admission data (premedical grades, Medical College Admission Test [MCAT] scores, and interview ratings), personality inventory measures,* and medical school grade-point average (GPA) and faculty ratings in forecasting the internship performance ratings. The interns rated were the entire male graduating class of 1968 of the University of California School of Medicine in San Francisco (N = 110). The interns, in residence at 54 medical facilities throughout the United States, were rated at the close of their internship year, June 1969.

Ratings of Interns

In general, supervisors rated intern performance higher than did the interns' peers or the interns themselves; supervisors' ratings were also more variable, ranging from a score of 1 to 12 on every dimension; interns, on the other hand, were reluctant to give very high or very low ratings to their peers or to themselves.

Ratings by supervisors on the four dimensions of performance were highly intercorrelated; correlations among self-ratings and among peer ratings were lower than those among supervisors' ratings, but they also tended to be more highly associated among themselves than with ratings from the other two sources. Cluster analysis of the rating correlation matrix indicated that supervisors, peers, and interns themselves had indeed rated performance differently and that these rater differences were greater than the raters' distinction between the various work dimensions, for example, between clinical effectiveness and knowledge of medical sciences. Three clusters emerged in the analysis, the first based upon supervisor ratings alone and the second and third based most heavily upon self and peer ratings, respectively. In subsequent analyses each intern was given three criterion "cluster" scores. Each predictor variable was then tested for its ability to forecast supervisor, self, and peer rating cluster scores.

Predicting Intern Ratings

No admission variable correlated significantly with supervisor, self, or peer ratings of intern performance (Table 1). MCAT scores tended to be negatively related to supervisor and self ratings and somewhat positively related to peer ratings. Premedical grades demonstrated a low positive correlation with ratings of intern per-

This paper is based on a doctoral dissertation completed at the Institute of Personality Assessment and Research, Berkeley, as part of the institute's continuing program of research in medical education.

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* Two inventories were administered during the first week of medical school: *The Strong Vocational Interest Blank* (SVIB), which measures the similarity of one's interests to the interests of persons successfully employed in various occupations, and *The California Psychological Inventory* (CPI), which assesses 18 positive personal traits, for example, responsibility, tolerance, and intellectual efficiency.

TABLE 1

CORRELATIONS BETWEEN ADMISSIONS, PERSONALITY, AND MEDICAL SCHOOL ACHIEVEMENT MEASURES AND RATINGS OF INTERN PERFORMANCE

	Ratings of Intern Performance		
	Supervisor	Self	Peer
MCAT			
Verbal ability	−.09	−.21	.22
Quantitative ability	−.06	−.05	.17
General information	−.06	−.16	.18
Science	.01	.07	.06
Premedical grades			
Cumulative	.12	.09	.12
Science	.11	.12	.08
Last two semesters	.15	.16	.03
Interview rating	.04	−.04	.12
California Psychological Inventory*			
Dominance	.01	.30†	.11
Flexibility	−.03	−.23‡	.12
Tolerance	.08	−.03	.35†
Strong Vocational Interest Blank*			
Physician	.25†	.16	−.07
Production manager	−.23‡	−.05	−.13
Office worker	−.22‡	−.23‡	−.11
Credit manager	−.22‡	−.14	−.16
Business teacher	−.22‡	−.07	−.04
Chamber commerce executive	−.20‡	−.02	−.17
Life insurance salesman	−.19	−.26‡	−.35†
Banker	−.07	−.23‡	−.14
Mortician	−.06	−.25‡	−.21
Librarian	.13	.03	.34†
Purchasing agent	−.10	−.23‡	−.28‡
Sales manager	−.16	−.20	−.35†
Real estate sales	−.08	−.18	−.27‡
Pharmacist	−.02	−.15	−.33†
Medical school grades			
Year 1	.32†	.22	.39†
Year 2	.16	.32†	.22
Year 3	.29†	.38†	.13
Year 4	.41†	.30†	.26‡
Cumulative grade-point average	.32†	.46†	.35†
Faculty ratings: years 3 and 4			
Academic performance	.37†	.29†	.29‡
Clinical performance	.47†	.35†	.26
Personal qualities	.43†	.31†	.31‡
Recommendation for internship	.44†	.35†	.30‡

* For these tests, only those scales which correlated significantly (Pearson Product Moment coefficient) with one or more criterion measure are listed. Tests were taken at medical school entry.

† $p < .01$; ‡ $p < .05$.

formance; admission interview ratings were almost completely unrelated to ratings of intern performance. It must be concluded that ratings of internship performance for these students were not related to and could not be predicted by MCAT scores, premedical grades, or admission interview ratings.

A number of personality inventory measures correlated significantly with one or more of the ratings of intern performance (Table 1). Although different personality dimensions correlated best with supervisor, self, and peer ratings, respectively, interest scales relating to business and sales occupations tended to correlate negatively with all ratings. In other words, the interests of highly rated interns were decidedly unlike the interests of persons in those occupations. Interns given high ratings by supervisors had interests most like physicians; however, the physician interest scale was not significantly correlated with self or peer ratings of interns. Peer esteem was uniquely and most significantly related to the personality trait of tolerance. On the other hand, it was dominance and (lack of) flexibility which characterized interns who gave themselves the higher ratings.

Grades achieved during the four years of medical school and faculty ratings of student performance in the third and fourth years correlated well with ratings of intern performance (Table 1). Supervisors' ratings of intern performance were best predicted by earlier medical school faculty ratings. Self ratings were highly associated with both medical school grades and faculty ratings. Peer ratings tended to be less associated with medical school performance than were the ratings by supervisor and self.

In order to determine the best and most efficient combination of variables to predict ratings of intern performance, a step-wise multiple regression analysis was conducted using Norman's (1) double-split cross-validation method. The intern sample was divided into odd-numbered and even-numbered subsamples ($N_1 = N_2 = 55$), each predictor variable correlated with the intern performance ratings within subsamples and then multiple regression analysis conducted within each subsample. Equations developed to forecast ratings in Group I (odd-numbered subjects) were cross-validated on Group II (even-numbered subjects) and equations developed in Group II were cross-validated on Group I. The mean of the two cross-validation coefficients was taken as the best estimate of the degree to which ratings in the internship could be forecast from linear combinations of the predictor variables.

Supervisors' ratings were forecast best by combining the following variables: Medical school GPA, year one, medical school faculty rating on clinical performance in years three and four, and the physician interest scale. In other words, the interns rated most highly by their supervisors were those who did well in their medical science course work, excelled in clinical medicine, and possessed the interests of physicians.

The best combination of variables to predict self ratings was the cumulative medical school GPA, the dominance scale of the California Psychological Inventory (CPI), and (negatively) the flexibility scale of the CPI. In summary, interns who rated themselves highly tended to be forceful and self-confident but somewhat rigid persons who had achieved high levels in their medical school work.

Personality variables alone were the best predictors of ratings by peers; prediction was not enhanced by adding medical school performance measures to the regression equations. The best prediction of peer ratings was a combination of personality inventory variables which gave positive weights to tolerance and psychological mindedness and negative weights to scales measuring the interests of pharmacists and life insurance salesmen.

Conclusions

The findings of this study support the contention that the medical intern's performance is viewed somewhat differently by his supervisor, by his intern peers, and by the intern himself and that these differences may often be greater than differences between various aspects of work. When admission data, personality inventory measures, and medical school performance were considered together, it was found that supervisors' ratings of interns were best forecast by earlier medical school faculty ratings, self ratings were forecast best by a combination of personality inventory measures and medical school grades, and peer ratings were best predicted by a unique combination of personality inventory measures.

The fact that premedical grades, MCAT scores, and admission interview ratings failed to predict ratings of intern performance is entirely consistent with earlier studies of medical interns (2), psychiatric residents (3), and physicians in practice (4, 5). The performance of medical interns, like that of physicians in general, is apparently associated more with personal qualities and medical training than with relative levels of aptitude and undergraduate achievement.

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Michigan Council of Deans And Cooperation in Medical Education

Ralph E. Lewis

A new spirit of cooperation has appeared in medical education in Michigan and is evidenced by the Michigan Medical Schools Council of Deans. Although the deans of some medical schools in other parts of the country get together periodically, the Michigan Medical Schools Council of Deans apparently is the only such organization with a full-time paid staff.

The council was organized in February 1973 with the appointment of a full-time executive director and the establishment of an office, although the deans of the four medical schools* had met since late 1970.

The deans, their associate deans, and other key staff members meet with the council director monthly. The council works cooperatively on problems and programs and is the entry point for requests to the medical schools for information, cooperative projects, and other joint efforts. The admissions officers, directors of continuing medical education, financial aid officers, curriculum officers, public information officers, student affairs officers, and directors of community medicine/primary care/family medicine meet periodically with the council director.

Accomplishments

Following are some of the accomplishments of the Council of Deans in its first two years of operation:

1. Cooperation with the Association of American Medical Colleges and the medical schools in California on a pilot matching program for medical school admissions. The three M.D.-producing schools in Michigan participated in the study, which was concluded in conjunction with the schools' regular admission procedures for the 1974–1975 entering class. The results of the "match" were compared with

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* University of Michigan Medical School, Michigan State University College of Human Medicine, Wayne State University School of Medicine, and Michigan State University College of Osteopathic Medicine.

the classes the schools actually accepted. The aim of the program was to determine whether it is feasible to simplify the admissions process.

2. An early decision admission program was instituted by the allopathic schools in the spring of 1973 and is periodically reviewed.

3. The council works closely with health professions advisers in Michigan and sponsors an annual health professions advisers' day. This program, rotated to a different medical school each fall, is designed to help the premedical advisers come to a better understanding of Michigan medical schools, their application processes, the importance of letters of recommendations, the school's curriculums, and other areas. The National Association of Advisors for the Health Professions is sharing office space with the Michigan Medical Schools Council of Deans, and a number of cooperative efforts are being planned.

4. Perhaps the major cooperative effort yet undertaken by Michigan medical schools is a Michigan Senate-funded study on the cost of medical education. Conducted by KMB Health Systems of California, the four medical schools have worked together on the study for more than two years. Similar studies have been carried out nationally, but this appears to be the first of its kind among schools of one state. The Michigan study will hopefully create an understanding of ways in which medical education activities of the four state supported medical schools are being financed and the products which this investment creates.

5. The council is working with the Governor's Office on Health and Medical Affairs on a project funded by the Department of Health, Education, and Welfare for the purpose of developing and implementing a comprehensive health manpower plan for Michigan. Governor William Milliken directed this health planning office to develop a long-range manpower plan; the two-year project was funded to develop, demonstrate, and evaluate a mechanism to establish a state linking system between the stage agencies responsible for health manpower planning and the allocation of funds.

6. The four medical schools assisted the Office of Health and Medical Affairs in a study which resulted in a report and recommendations to Governor Milliken on a new health care system for the Michigan Department of Corrections. The medical schools participated on technical advisory committees, conducted a health assessment of a sample of the inmate population, and will be involved in the follow-up.

7. The executive director serves as secretary to a statewide task force which has worked for two years on plans for an approach to graduate medical training. Graduate medical education in this country has been criticized for its inadequate funding, variation in quality, inadequate response to physician manpower needs, and the excessive use of foreign medical graduates. One possible solution may be to establish a system which is organized, controlled, and financed on a statewide basis; and the task force is pursuing the development of such a system.

8. Individuals responsible for medical student financial aid have developed a conference-call system to respond to requests for information. The question is analyzed, the data base agreed upon, and a uniform response given. Internal operating procedures have been improved as a result of working together and sharing ideas.

9. A two-year project has been funded by the National Fund for Medical Education to computerize student financial aid information systems at the four schools; it will provide accurate, uniform, current, and accessible data on the schools' financial aid programs and might provide a stepping stone to the creation of relevant and comprehensible state and federal legislation affecting student financial aid programs.

Conclusion

The Michigan Medical Schools Council of Deans was established to initiate innovative, creative communication channels among medical schools in Michigan through the medical deans and to encourage cooperative efforts in program areas and long-range planning. This is being accomplished. Future ideas and plans call for ways to share new audiovisual and other instructional programs; a coordinated program for continued medical education; and continued planning and coordination in areas of long-range planning, enrollment, facilities, and educational programs.

A Preliminary Examination Of the In-Training Evaluation Report

Ernest N. Skakun, Donald R. Wilson, M.D., William C. Taylor, M.B., Ch.B., and G. Ross Langley, M.D.

This is a report on a rating scale, the In-Training Evaluation Report (ITER), that is being used by the Royal College of Physicians and Surgeons of Canada in providing additional information about the competencies of candidates who are eligible to take the certifying examinations. Since the scale was developed to assess three categories of candidate performance, the purpose of the present study was to confirm whether the scale actually identifies these categories.

Report Content

Fourteen criteria grouped into three categories of patient assessment and care, professional attitudes, and technical areas constitute the ITER scale. Brief descriptions of the criteria appear in Table 1. The first category of patient assessment and care consists of six criteria, while the categories of professional attitudes and technical areas each has four criteria. The candidate is rated on a 10-point numeric scale for each of the 14 criteria. The 10 points are divided equally into five verbally descriptive gradations: unacceptable, poor, marginal, good, and excellent. A separate sheet describes the attributes characteristic of the unacceptable and excellent candidate for each of the 14 criteria. Raters are thus provided with benchmarks which describe the qualities of candidates who should be rated as unacceptable or excellent. The middle three gradations of poor, marginal, and good are not defined in terms of candidate qualities.

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Procedure

Examination committees varying in size from three to five members who participated in the training of the candidates completed the ITER for 545 candidates who were in their final year of residency in pediatrics, internal medicine, orthopedic surgery, urology, ophthalmology, obstetrics and gynecology, diagnostic radiology, or general surgery.

To confirm the hypothesis of the criteria groupings, that is, to determine whether the first six criteria are interrelated, whether the six criteria are related to a more global measure such as patient assessment and care, and whether similar statements could be made regarding the last eight criteria, a factor analysis of the intercorrelations of the 14 criteria was conducted. The correlation matrix was first subjected to an incomplete principal components analysis. Using the criteria of eigen-values greater than one and the Scree test (1), three dimensions were isolated. Because of the limitations of the principal components model (2), the correlation matrix was then subjected to an image factor analysis followed by a varimax rotation. Results of the image analysis appear in Table 1.

In order to provide an estimate of the internal consistency of the three subscales and the total ITER scale, coefficient alpha coefficients were computed. Coefficient alpha, a generalization of the Kuder-Richardson 20 formula, is used suitably in instances where the items are not scored dichotomously (3).

TABLE 1

ROTATED IMAGE FACTORS DEPICTING THE CLUSTERING OF THE 14 CRITERIA OF THE ITER SCALE*

Criteria	Factors†		
	I	II	III
Patient assessment and care			
1. History and physical examination	913	124	015
2. Clinical judgment and decision	217	674	266
3. Emergency care	312	430	260
4. Comprehensive continuing care	855	131	007
5. Laboratory utilization	873	088	−006
6. Records and reports	417	425	118
Professional attitudes			
7. Physician-patient relationships	093	799	153
8. Team relationships	051	781	130
9. Ethics and sense of responsibility	118	815	163
10. Self-assessment	056	704	187
Technical areas			
11. Surgical technique	−034	110	490
12. Other manual skills related to specialty	082	183	626
13. Use of equipment	−033	134	642
14. Supervisory skills	197	394	419

* Factors rotated by the normalized varimax criterion.

† Leading decimals omitted.

Results

In Table 1 if a loading of .40 or greater is regarded as of practical importance, the first dimension is defined by criteria 1, 4, 5, and 6. The second dimension is defined by criteria 7 to 10 inclusive as well as criteria 2, 3, and 6. The third dimension or factor is defined by criteria 11 to 14 of the scale. To some degree, the image analysis confirms the clustering of the 14 criteria into three subscales or factors. However, the first factor has some criteria which have more in common with the criteria defining the second factor than they do with the criteria defining the first factor. The third factor appears to be well defined by the last four criteria of the scale.

Coefficient alpha can be interpreted as an index of the homogeneity of the criteria in the ITER scale. Coefficients of .85, .90, and .73 were obtained for the six criteria pertaining to patient assessment and care, the four criteria related to professional attitudes, and the four criteria of technical areas respectively. A coefficient of .82 was obtained for the total scale of fourteen items.

Discussion

Preliminary experience with the ITER has suggested that it is a useful instrument which can be used to complement the process of assessing a candidate for certification.

An attempt at clarifying the structure of the ITER was conducted using image analysis as a means of clustering the criteria of the ITER. From this preliminary analysis it appears that the ITER assesses three categories of a candidate's performance. The first category needs further revision since criteria 2, 3, and 6 appear to have more in common with the criteria defining the second category. The second and third categories are defined more clearly and consistently than the first category and are more aligned with the structure intended in the preparation of the rating scale. Adequate reliability coefficients in terms of internal consistency and item homogeneity were obtained.

If the ITER scale is to be used for assessment of candidates in the future, several modifications are required. First, criteria 2, 4, and 6 have to be modified in order that their content is relevant to the first category of patient assessment and care. However, if these three criteria are more aligned with the second category of professional attitudes, additional criteria will have to be defined to enhance the first category. As has been noted, verbal descriptions of the unacceptable and excellent candidates are provided for each of the 14 criteria. Since the middle three gradations of poor, marginal, and good are not defined by verbal descriptions, it might be worthwhile to list the qualities of the marginal candidate in order to provide raters with additional information about the characteristics of candidates.

Future research with the ITER should involve a measure of inter-rater reliability since a committee of three to five members evaluates each candidate. Also it would be worthwhile to obtain ratings of the candidates by their fellow residents; comparing the ratings of the fellow residents with those of the committee might provide another dimension in the assessment of the candidates.

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Combined Surgery-Psychiatry Course: An Experimental Model

Laura Bleiweiss, Ph.D., Philip G. Mechanick, M.D., Julius A. Mackie, M.D., John H. Valentine, M.D., and Francis E. Rosato, M.D.

To provide for greater integration in the acquisition of psychological and clinical skills in medical education, an experimental interdepartmental course in clinical surgery and psychiatry was offered by the University of Pennsylvania School of Medicine in January 1972. The expressed intention of this dual approach was the expansion of diagnostic and management skills to include social and psychological factors, as they are encountered in an everyday clinical setting. This eight-week course, offered to students who had already completed the required core course in surgery, satisfied the requirements for the basic course in psychiatry and additionally provided credit as a clinical surgical elective. No formal surgical lectures were required, but students were provided with extensive surgical care experience, including outpatient office hours two afternoons per week with a staff surgeon, and were expected to be knowledgeable in the skills necessary to deal with total patient management. The students were divided into two teams, each numbering four or less and each with its own surgeon and surgical house staff. A psychiatrist alternated between the two teams on the three mornings each week that rounds were scheduled and during this time selected cases were discussed in depth.

In order to monitor the effectiveness of the substitution of this course for the traditional four-week basic psychiatry course, the written examination employed in the regular psychiatry course was administered after four weeks and again after eight weeks to all of the surgery-psychiatry students. Their results satisfactorily equaled those of the students who were taking

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the general psychiatry course, with improvement indicated at the eight-week testing. Problem areas and areas of psychiatric knowledge found to be deficient from the first examination were emphasized in the remaining four weeks. In addition to this testing a written patient evaluation for the purpose of assessing both psychiatric and physical examination skills was required of each student. No formal testing was done with respect to surgical skills.

Content

The extension of the traditional training model to allow for interdepartmental didactic efforts opened the way for questions previously unstated or unexplored by both students and faculty. Issues dealt with in the context of total patient care included the following: financial aspects of patient care, intrastaff and interstaff relations (nurse and doctor, surgeon and anesthetist, physician and consultant), the care and management of elderly patients, the psychological components of organic disease, patient privacy and the whole realm of patients' rights, coping mechanisms to handle disease, and the very pertinent area of patient-manifested fears related to operations and staff treatment.

Early in the course, the students expressed the fear of possible inadequate exposure to psychiatry. This was quickly dispelled as they repeatedly observed the utilization of psychiatric skills in daily clinical practice; in fact, they felt their psychiatry learning here might be more pertinent to their future courses as opposed to the more limited traditional approaches to psychiatry that emphasize abnormal behavioral disease in an isolated specialized setting.

Student Interviews

Further evaluation of the course was provided through in-depth interviews conducted with the course participants by the sociological observer (LD) at the end of the eight-week period. Students spoke positively and with enthusiasm, indicating fulfillment of their original expectations for an innovated course emphasizing the humanistic approach to medicine. Their positive attitude toward their increased opportunity to deal personally with all aspects of patient care was heightened by the combined prospective. They attached great value to the willingness to move psychiatry from its segregated position related to abnormalities in human behavior toward an integrated approach useful for the prospective doctor in all areas of his training in organic disease management. There was an increased understanding of the role of the surgeon beyond that of the technical task which he fulfills, toward the comprehension of the broad range of problems in total patient care which the surgeon handles. The final consensus of the students was complete approval of the combined approach and the expressed wish for its continuation, both in surgery and in other areas.

While success can be attributed to factors which included a high faculty to student ratio, extended time commitment, and a vested interest in the new effort, the questions of reproducibility, continued manpower avaliability, and the long-range effective usefulness of such a course remain.

Education of Foreign Medical Graduates For Practice in Sweden

Hjordis M. Foy, M.D., Ph.D.

Lately, several American journals have published papers and letters discussing the impact of substantial immigration of foreign medical graduates (FMGs) into the United States (1–4). These physicians consist of a heterogenous group whose depth of medical knowledge and practical training varies widely with the curricula and training opportunities offered in their countries of origin. Unfamiliarity with the spoken American language is a common handicap. The influx of FMGs has been looked on disapprovingly by those concerned with the quality of medical care, since FMGs generally do not perform as well as their American-educated colleagues on the various qualifying examinations. The high failure rate in the examination of the Educational Council for Foreign Medical Graduates has been of special concern. On the other hand, even those FMGs who win out over a variety of stumbling blocks and receive state licensure and specialty board certification sometimes are viewed as second-rate citizens in the medical community.

Background

Foreign medical graduates entering the United States for the first time are often thrown into hospital work without preparation other than the passing of the ECFMG test. Sweden has had a substantial migration of foreign medical graduates. In contrast to the United States, Swedish licensing authorities have approached the problem of unequal or inadequate education and competence by establishing a systematic schooling for the newcomers. During a visit to Sweden in the summer of 1974, the author gathered information on the procedures and experiences of foreign medical graduates.

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It is estimated that approximately 10 percent of all those licensed in Sweden are foreign graduates. Some years ago this immigration was encouraged because of the shortage of physicians. The present immigration is dominated by European graduates; many come from the neighboring Scandinavian countries, but physicians from Asia have also been accepted in small numbers. Swedish medical students, forced to seek medical education abroad because of limited admissions to Swedish medical schools, return to practice in their native country and must be considered "foreign educated" as well.

Program

The FMG in Sweden must first seek an immigration visa and have his medical credentials examined by a board for FMGs, an agency under a government department similar to the U.S. Department of Health, Education, and Welfare. This may be the greatest hurdle since immigration has been curtailed lately, a situation brought about by a change in the economic climate. Political refugees, many from Eastern Europe, are given special consideration. Once the FMG is accepted, he is guided through a series of courses.

A major obstacle for most foreigners is the Swedish language. A four-month special language course aimed at and tailored to the needs of physicians and allied health professionals is given each fall at Uppsala University. After the candidate passes a language test, the minimum requirement for acceptance is a one-month course in Swedish medical law and statutes. In addition, he may be directed to take one of three paths for further training according to his past experience. These consist of either a clinical apprenticeship, a three-month continued education course or a five-month course.

The easiest route is laid out for physicians

who were thoroughly trained and established specialists in their native country. Such persons are referred to the corresponding-type clinic in Sweden to serve for six months under supervision with pay. Thereafter, their supervisors make a recommendation regarding licensure or additional educational needs to the board for foreign physicians which makes the final evaluation.

Physicians who are recent graduates from medical schools in their own countries are usually required to take additional training before licensure. After such a graduate passes the language course he is given a test consisting of 100 multiple-choice questions in internal medicine (20), surgery (20), psychiatry (20), pediatrics (19), obstetrics-gynecology (7), and otolaryngology (7). Note that clinical knowledge is stressed, and there are no questions regarding basic science. Depending on the test scores obtained, the candidate is referred either to a three-month or a five-month continuous medical education course.

The courses are given at Orebro Hospital, a regional hospital with clinics for all specialties, located in central Sweden. Some of the teaching is directed at familiarizing the FMG with the Swedish medical referral system, format of the hospital records, and names of instruments and drugs.

Course Content

Clinical teaching consists of lectures in internal medicine, surgery, pediatrics and gynecology, otolaryngology, and ophthalmology. The five-month course also includes psychiatry. Clinical conferences are given three times a week in a variety of clinical subjects with active participation by the students. Clinical instructors demonstrate such techniques as those used in surgery and respiratory instrumentation. Ambulatory care is taught in lectures as well as demonstrated in the clinics. The chief of service gives teaching rounds at least once a week.

The five-month course differs from the three-month course in that it includes a longer clerkship and more lecture hours. Both programs include mandatory study of Swedish law, statutes, and the medical care system.

Evaluation and Additional Training

A final test is given on completion of these courses. It was estimated that over the last 10 years probably 95 percent were successful. It is permissible to try three times. All courses are given free of charge, but the candidates may have to borrow money for their subsistence during their schooling. Loans are backed by government funds.

Passing this test qualifies the foreign medical graduate to continue on tracks laid out for Swedish medical school graduates. For all Swedish graduates an apprenticeship of 21 months of general training is required. This consists of a rotation of six months each in surgery, internal medicine, and ambulatory care and three months on a psychiatric service. During this period, the salary is currently approximately $1,000 per month. To qualify as a specialist, additional three and a half to four and a half years of training are required.

The Swedish authorities are currently engaged in a program evaluation of procedures and course offerings.

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EDITORIAL

The Medical Staff Organization Vis-à-Vis the Faculty Organization

In terms of the ownership, organization, and identity of their clinical base for teaching, that is, their "university hospitals," academic medical centers in the United States can be divided into two broad categories of nearly equal numbers. First, there are those centers where the university itself owns and operates the principal clinical base or university hospital. Second, there are centers where the teaching hospital is owned by governmental units or agencies or by community or religious groups. These two categories of academic medical centers are now facing somewhat different problems with respect to the actions or development of a formal medical staff organization or with respect to the elements and accountability of the governing board. (This latter issue was discussed in an editorial in the July issue of this *Journal*.)

I wish to draw particular attention to the problems existing in the first group with respect to the dyadic identity of the physician faculty members involved. In the past, by virtue of the university ownership of the hospital, there has been less need to clarify role responsibilities of the same person acting as a member of the organized academic community or faculty versus his functioning as a physician member of the organized medical staff of a university hospital (or another clinical collective, such as a group practice, for example, Mayo Clinic).

It is probably fair to say that heretofore medical centers in which the educational mission was the reason for establishing a hospital, and hence where the university owned the hospital, have approached responsibility for patient care in a different and less single-minded or primary way than has been true of those centers in which the hospital and medical staff had at least originally a primary mission of patient care. Whether that was true or not, it is apparent that now because of a number of factors the issue of medical staff organization vis-à-vis faculty organization has become of increasing concern in academic medical centers.

Factors which are now acting to focus attention and force action are those which call to account the aggregate effectiveness of the clinical faculty acting as the medical staff of the academic medical center. These include the utilization review process; the increasing pressure for conformity from the Joint Commission on Accreditation of Hospitals; the center's accountability to the public for service (highlighted by such occasions as when a certificate of need application is denied or postponed); the dependence of the medical staff on income from service to patients (and hence on the effectiveness of the center in providing care vis-à-vis competing services); the need to organize the clinical system of services (and the physician providers of that service) in such a way that income from services provided by residents can be maximized; and the erosion of the sovereign immunity of the university medical center and staff with respect to malpractice claims.

There is at present great diversity among academic medical centers as to the degree of separateness or independence between the faculty organization and the medical staff organization. In this respect, it seems that if we insist on beginning in unity and following traditional forms, we are likely to end in division; whereas if we will begin acknowledging the separate missions and the organizational implications of the separate accountability of those missions, we may be able to achieve a functional melding under new arrangements. (These "new arrangements" are likely to be quite new indeed as academic medical centers or regional networks are evolving in ways that have moved them to the periphery of universities if not actually outside their governance.)

In the academic medical center a formal medical staff organization may be seen as something of a threat. It is a threat to the concept of a full-time faculty. It may pose

problems to the established academic hierarchy of decision-making, of budget requests, and of power with respect to deans and department chairmen. It stands athwart efforts of faculty unionization. It establishes a new and for the most part unwelcome bureaucratic structure and pecking order. To understand the implications of this, one needs only to reflect on what happens when the chairman of the department of surgery is notified that his surgical privileges are withdrawn because of incompleted charts in the record room. Nonetheless, this is a logical extension of trends of the past decades, and more and more academic medical centers are moving toward increasingly formal medical staff organizations increasingly distant from the faculty organization.

It is perhaps time to acknowledge that the idea of a full-time clinical faculty has been seriously impeding the clarification of understandings and restructuring of arrangements required for the continued vigor and effectiveness of the academic medical center. This is so because that idea has served to prevent the formal organization for the provision of patient care which is the counterpart to the organization for effective instruction of students, that is, the faculty. Because of the nature of their work, clinicians are only part-time faculty members since part of the time they must carry out their contractual responsibilities to individual patients. To do this well and responsibly in this day, they must be part of a formally organized medical staff.

RICHARD M. MAGRAW, M.D.
Member
Editorial Board

DATAGRAM

Women Physicians on U.S. Medical School Faculties

The participation of women in medicine and medical education is a subject of substantial interest to medical school faculty, administration, and students as well as to physicians generally and to society as a whole. In response to changing attitudes and societal pressures, the numbers of women entering and graduating from medical schools have rapidly increased in recent years. Those in medical school administration and government, however, as well as members of the public, have had great difficulty in assessing the numbers of women who might potentially be recruited for faculty positions, because of the lack of necessary data to determine qualifications on a realistic basis and because the rapid changes in distribution by sex of graduating classes in recent years have skewed the age-sex distribution of physicians. Since many kinds of qualifications considered by medical schools are related to maturation and thus to age, the use of aggregate numbers of men and women M.D.s cannot be satisfactorily employed as a basis for assessing the potential faculty pool.

As an alternative approach, numbers of men and women serving as U.S. medical school faculty in 1975* were distributed by the year of

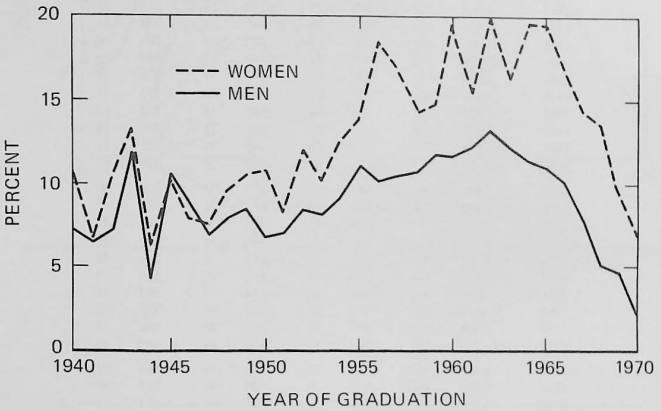

FIGURE 1
Proportions of men and women U.S. medical graduates (classes of 1940–1970) on U.S. medical school faculties in 1975 (full- and part-time, all ranks).

The work on which this Datagram is based was supported in part by the Bureau of Health Manpower, Department of Health, Education, and Welfare (DHEW), under contract number 231-75-0007. However, any conclusions and/or recommendations expressed do not necessarily represent the views of the Bureau of Health Manpower, the National Institutes of Health, or the DHEW.

* These data are derived from the AAMC Faculty Roster master file as of May 1975. In order to relate the numbers to graduation statistics, foreign trained physicians have been excluded. Non-salaried faculty members have also been excluded.

TABLE 1

TOTAL U.S. GRADUATES, 1940–1970, AND NUMBERS OF THESE GRADUATES ON U.S. MEDICAL SCHOOL FACULTIES IN 1975

Year	Total U.S. M.D. Graduates		Graduates of Respective Classes on U.S. Medical School Faculties, 1975					
			Full- and Part-time, All Ranks		Full-time Only, All Ranks		Full-time Professors, Associate and Assistant Professors	
	Men	Women	Men	Women	Men	Women	Men	Women
1940	4,844	253	344	27	278	27	245	21
1941	4,995	280	326	19	265	14	237	11
1942	4,884	279	354	29	292	24	266	19
1943	4,982	241	583	32	499	23	449	16
1944	9,812	491	429	31	372	23	320	19
1945	4,874	262	516	27	425	25	365	21
1946	5,584	242	496	19	417	14	355	13
1947	6,047	342	423	26	361	22	318	18
1948	5,151	392	414	38	362	31	325	21
1949	4,482	612	380	65	314	50	278	40
1950	4,958	595	342	64	293	47	260	40
1951	5,667	468	396	39	342	31	296	23
1952	5,729	351	488	42	422	35	382	32
1953	6,305	363	520	37	456	32	402	28
1954	6,501	360	598	45	505	36	461	32
1955	6,632	345	729	48	630	39	564	35
1956	6,505	340	654	63	564	53	503	46
1957	6,466	330	678	56	574	46	525	40
1958	6,506	355	705	51	619	45	550	37
1959	6,490	370	766	55	656	44	590	38
1960	6,676	405	784	80	672	66	580	57
1961	6,640	354	813	55	703	47	619	36
1962	6,777	391	897	78	777	65	674	51
1963	6,860	405	847	66	736	53	636	35
1964	6,887	449	784	88	662	73	560	57
1965	6,906	503	758	98	679	87	536	57
1966	7,050	524	712	87	633	65	439	42
1967	7,160	583	556	84	504	70	344	41
1968	7,332	641	369	87	332	76	202	35
1969	7,452	607	341	60	308	48	124	14
1970	7,667	700	172	48	153	41	42	9

their graduation, and these numbers were related to the numbers of men and women graduating in each year, as listed in various issues of the education numbers of the *Journal of the American Medical Association*, 1948–1971.

The striking result is that a greater proportion of the women than of the men for every class since 1940 except those of 1945 and 1946 are now serving on faculties. The data are presented in Table 1 and depicted graphically in Figure 1.

It is often said that part-time faculty positions in medical schools are more frequently occupied by women than by men. AAMC data on part-time appointments confirm this hypothesis, but there are still greater proportions of women in full-time status than of men from

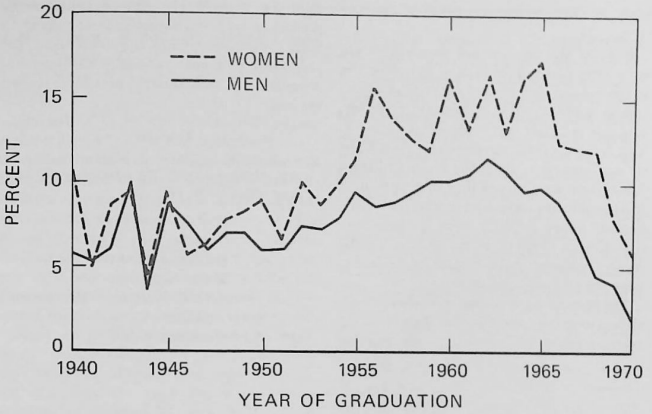

FIGURE 2

Proportions of men and women U.S. medical graduates (classes of 1940–1970) on U.S. medical school faculties in 1975 (full-time only, all ranks).

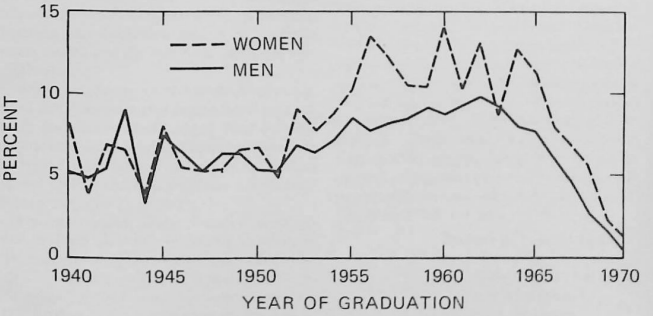

FIGURE 3

Proportions of men and women U.S. medical graduates (classes of 1940–1970) on U.S. medical school faculties in 1975 (full-time professors, associate and assistant professors).

most of the graduating classes since 1940 (Figure 2).

It could also be surmised that women are more often found in the rank of instructor and in the adjunct and clinical ranks than in the regular academic ranks of assistant professor, associate professor, and professor. To test this hypothesis, data were developed for these regular academic ranks alone. As shown in Figure 3, relatively more women than men from most M.D. graduating classes are serving on today's medical school faculties, even if one limits consideration to full-time salaried faculty in the regular academic ranks of assistant professor, associate professor, and professor.

The proportions of women in medical school classes have been rapidly increasing in recent years, reaching 22.2 percent of the entering class for 1974–75 (1). Consequently, if the proportion of women graduates appointed to faculty positions remains at current levels, the proportion of women in faculty positions will increase very substantially in the next two decades.

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BOOK REVIEW

A Half-Century of American Medical Education. VERNON W. LIPPARD. New York: Josiah Macy, Jr. Foundation, 1975. 134 pp., $7.50

The half century from 1920 to 1970 was an eventful period in American medical education; to present a concise, critical, and relatively complete review of it is a formidable achievement for which appreciation is due Dr. Lippard and the Josiah Macy, Jr. Foundation. The period covered is well chosen, for 1920 or thereabouts represented the beginning of an era; 1970 may well represent the beginning of another. Although the Flexner report was released in 1910 and Johns Hopkins ostensibly inaugurated its experiment in full-time medicine in 1914, it was not until after World War I that the impact of these events began to be felt. By that time the great hegira of medical faculties to Europe, by way of the Army affiliated hospital units, had brought vision-broadening contacts, and the soil was ripe for change.

Under the influence of the General Education Board and its successor organization, the Rockefeller Foundation, old medical schools were rejuvenated and new ones established. Experiments with curricula were encouraged; preclinical faculties were strengthened; many schools appointed a nucleus of full-time clinical teachers; and whole new departments, such as public health and the history of medicine, were established.

With the coming of the Great Depression, third party payments for medical care began to enter the picture which, among other developments, eventually sparked a reorientation of the internal relationships between the medical school and its teaching hospitals, a movement still in progress.

Perhaps Lippard's most valuable contribution in this book is the perspective he brings to the role played by nationally minded individuals and organizations in the evolution of medical education in the period under discussion. The Flexner report was sparked by the American Medical Association. Citizen-philanthropists then entered the picture—the Rockefellers, Carnegie, the Harknesses (the Commonwealth Fund), Macy, John and Mary R. Markle, the Mellons, Sloan, Kellogg, Hartford, and Kresge—each acting on wise professional advice. Through thoughtfully placed gifts they influenced every phase of medical education, including the initial impetus for research.

Later, national organizations with broad professional bases became increasingly influential. Foremost among these was the Association of American Medical Colleges, which, with its forum for discussion, teaching institutes, and attention to educational costs, had a major impact. Acting with the Council of Medical Education of the American Medical Association and other national organizations, it promoted testing services for admission to medical schools, licensure examinations for foreign medical graduates, higher standards for house officer training, and the objectives of the National Board of Medical Examiners. Two developments of major importance to medical education came out of World War II: the massive governmental support of medical research and integration of veterans' hospitals into the educational process.

These movements and events are described in lean, spare prose that makes this little book informative and a pleasure to read. There is a useful index. In a restrained epilogue, the author notes some current trends in medical education and by implication questions whether many of the objectives so consistently pursued for half a century will now be lost sight of in the desire to achieve wider fields of competence. Certainly, he suggests, the broader curriculum coupled with continuing scientific advances will require more science preparation for the practice of medicine, not less.

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LETTERS TO THE EDITOR

Faculty Unionization

Fox and Blackburn (March issue of this *Journal*) report that medical school faculty members with the lowest income are simultaneously least dissatisfied with their salary and most in favor of collective bargaining. Those who earn the most are most dissatisfied with their income and least in favor of unionization. Fox and Blackburn term this observation an irony and a paradox. They conclude that those who favor collective bargaining do so for reasons other than money. One might point out the easily understood correlations between low level of income and desire for collective bargaining, and the reverse, and conclude that the data related to satisfaction with income are unreliable; however, my primary reason for writing is to suggest a different irony and paradox.

If the data described above are to be accepted, one conclusion should surely be that what appear to be logical assumptions require testing by reliable research to determine their validity. Fox and Blackburn state that for a medical school to avoid faculty unionization the single most important task is to strengthen the lines of communication between department chairmen and their faculty members. They recommend that departmental status for medical and surgical specialties currently subsumed under multispecialty departments of medicine and surgery would permit fuller faculty participation. Both are logical hypotheses; the irony and the paradox is that, in the same paper which disproves one logical hypothesis, Fox and Blackburn present as a statement and a recommendation these two additional hypotheses, unsupported by evidence, as if they were fact.

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Medical Ethics

It is helpful to have a professional philosopher, such as Thomas Wallenmaier, look at "medical ethics" (January issue of this *Journal*). He wisely aids in clearing confusion between that new catchword, "bioethics," and the older term, "medical ethics."

Yet, philosophers (who have neglected medical ethics far too long) should not assume that those of us who are concerned about the subject are unfamiliar with ethics in a broad philosophical way. Some of us have been trying to teach ethical theories to health professionals for decades. My own *Percival's Medical Ethics*, which fell flat as a mud pie when it appeared in 1927, is now about to come out in a second edition, with amplified ethical analysis, thanks to the booming interest in the field.

It's true that many physicians who talk and write glibly about ethics are not well informed about the intricacies of ethical theories. However, neither are philosophers usually well informed about the intricacies of medical practice. Let's get together.

Many medical school teachers who are jumping on the bandwagon of medical ethics seem to think the subject can readily be taught by case-by-case methods, as law is handled in law schools. However, in law there is usually solid grounding in theory before getting into practical cases. Unfortunately, medical school teachers interested in ethical problems of medicine tend to neglect the many ethical theories which may apply.

One may describe several dozen well formulated ethical theories which have evolved over the centuries. Which ones apply in some actual case? Take a classical kidney transplant. The recipient is motivated hedonistically, wanting to go on living; the donor is motivated idealistically, wanting to do something for someone else, even at self-sacrifice; the surgical team is motivated pragmatically, wanting the operation to succeed; the hospital administration is motivated in a utilitarian manner, wanting the greatest good for the greatest number. What should be done to assure goodwill and acceptance of whatever may transpire? Perhaps getting together in advance and talking it over carefully might help. The case analysis, after the eventual death of the recipient, is a sort of ethical postmortem.

The health professions might do well by adopting Aristotle's "harmony ethic" as their guiding ethical theory. Aristotle's father was a distinguished physician, and Aristotle's "Nichomachean Ethics" could well have been written in tribute to his father's way of life. It is significant that ethical ideas of long ago may still be pertinent today.

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Learning Environment

The final year of medical school usually consists of intense clinical experiences. Generally, the teaching format is master/apprentice with the student watching and copying the doctor's approach or actively participating in patient care. After varying periods of time, the student is assumed to have learned a body of facts pertinent to the specialty as well as upgraded his examination and diagnostic skills. While the experiences of senior medical students can be fairly well described by class schedules and course syllabi (as above), much less is known about medical education from the point of view of the student.

A study described here was sponsored by Dwan Family Fund, the University of Minnesota Center for Research in Human Learning, and The Consulting Group on Instructional Design. It represents an attempt to describe from the perspective of the student the learning environment of fourth-year medical students in an elective in pediatric cardiology.

During the pediatric cardiology elective at the University of Minnesota Medical School, students progress from a basic knowledge of the heart and general cardiology to an understanding of the foundations of diagnosis in pediatric cardiology. Their educational opportunities during the six-week elective are lectures, clinics, rounds, and conferences. The number of students is small enough in any one group to enable an in-depth analysis of their activities. In addition, the students' entering knowledge of the subject matter area is fairly well described by the content of the second-year cardiovascular course.

Research on the learning environment of clinical programs in medicine can generally be divided into two categories: (*a*) studies which have examined the distribution of student time in clinical activities, such as those of Schumacher, "An Analysis of Student Clinical Activities," reported in the March 1968 issue of this *Journal*, and Garrard, Lorents, and Chilgren, "Student Allocation of Time in a Semi-optional Medical Curriculum," in the June 1972 issue of this *Journal*, and (*b*) studies which have attempted to document the overall environment of a medical school, such as those of Rothman and Ayoade, "The Development of a Learning Environment: A Questionnaire for Use in Curriculum Evaluation," in the October 1970 issue of this *Journal*, Hutchins, "The 1960 Medical School Graduate: His Perception of His Faculty, Peers, and Environment," April 1961, and Rosenberg, "Student's Perceptions and Concerns During Their First Year in Medical School," March 1971. Three methods of data collection have been used in those studies which probe distribution of time by students. The first of these methods involves making direct observations of subjects during several time periods (hours, days, weeks). The results of this method are generally reliable if the observer is an expert in the area for which he is observing. This method was used by Schumacher to determine the distribution of time for final year medical students. A second method, that of mechanical random access, was used by Lorents, "Faculty Activity Analysis and Planning Models in Higher Education," Ph.D. dissertation, University of Minnesota, 1971, to probe distribution of faculty time. Small monitors carried by each subject are programmed to beep randomly. At each signal, subjects log their activity. This method, which was adopted by Garrard and colleagues for probing the use of time of second-year medical students, overcomes any bias subjects have for recording nonfunctional activities (for example, personal time). A third method of studying distribution of time and effort in a learning environment is self-reporting. In this method, students log their activities according to a predetermined schedule.

Each of these methods has disadvantages. The first two are costly and thus limited to a few subjects. In addition, the observational method frequently intrudes on the instructional program. The third is sometimes weakened by

lack of memory if probes are not taken often enough but is less expensive and can be more widely applied than the others. Lorents compared the mechanical method and the self-report method for distribution of time spent in various activities by business school faculty. With the exception of one category (administrative matters) which was underestimated on the self-report, the self-report was as reliable as the mechanical method. The self-report method was chosen for the present study based upon the desire to give students a maximum opportunity to express their reactions to the Minnesota program and on the assumption that Lorents' findings would hold for students reporting their activities in a medical school environment.

Three self-report instruments were designed to record students' interactions with faculty and instructional opportunities in the Minnesota program: an event log, a student diary, and an effective checklist. Data were collected during the first quarter of the 1973–74 school year. Five students were available as subjects.

Using an observational approach, Schumacher found that patient interaction accounted for 13 percent of the medical student's time, faculty interaction for 13 percent of his time, and mechanical record-keeping for 19 percent of his time. Laboratory activities accounted for the bulk of the students' time in Schumacher's sample. In the present study, using self-report data, patient interaction accounted for 11 percent of student's time, faculty interaction accounted for 18 percent of his time, and mechanical record-keeping accounted for 11 percent of his time. Listening to faculty during rounds, conferences, and lectures accounted for over 50 percent of the student's time.

Rounds were rated as the best experience more than 20 percent of the time by three of the five students. Clinic was rated above that level by three of the five students. During a typical week, a student went on rounds once or twice a day, attended clinic three or four days, had lectures three times, went to three conferences, and attended an EKG reading. Thus, the high frequency for rating of the clinic experience as "best" indicates it was a particularly good experience for students.

Costs of data collection using a self-report method are less than costs of either observational or mechanical methods. A variety of self-report instruments such as those developed for the present study allow the researcher to probe many facets of a single instructional program without burdening the subjects or interfering unnecessarily with their daily routine. Moreover, the richness of data obtained by the self-report method makes it more easily assimilated into the faculty decision-making process.

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The teaching of behavioural sciences in the family medicine residency programs in Canada and in the United States. Williams JI, et al. **Soc Sci Med 8(11-12):565-74, Dec 74**

[Examinations in surgical residency (author's transl)] Käufer C. **Langenbecks Arch Chir 337:473-6, 1974 (Ger)**

MEDICAL EDUCATION IN OTHER COUNTRIES

Medical education in Greece. Harrell GT.

Ann Intern Med 82(2):278-9, Feb 75

The British Occupational Hygiene Society. Comments on the training and manpower needs for pollution control. **Ann Occup Hyg 16(4):341-3, Dec 73**

The education of a Chinese surgeon. Roth RB. **Arch Surg 110(3):350-1, Mar 75**

Canadian doctors have acted responsibly in confronting their several dilemmas. Stephenson B. **Can Med Assoc J 112(2):208, 211-4, 25 Jan 75**

Social science and medical education in Britain: a sociologic analysis of their relationship. Jefferys M. **Int J Health Serv 4(3):549-63, Summer 74**

New Zealand Council for Postgraduate Medical Education: Recommendations to the Minsiter of Health on the development of medical education in New Zealand. Brinkman GL. **NZ Med J 80(529):508-9, 11 Dec 74**

Undergraduate education in social and preventive medicine at the University of Rhodesia. Ross WF. **S Afr Med J 49(2):44-6, 11 Jan 75**

Postgraduate training amd qualification in community medicine in South Africa. Spencer IWF. **S Afr Med J 49(2):35-43, 11 Jan 75**

[Problems of ideological education within the frame of the czech medical society] Spaček B. **Cas Lek Cesk 113(52):1586-9, 27 Dec 74 (Cze)**

[Information and advanced medical education for radiologists at the Agfa-Gaevert-Technical institute] Borcke E, et al. **Roentgenpraxis 27(12):281-6, Dec 74 (Ger)**

[Notes from the 23rd Congress on Continuing Medical Education in Berlin] Müller-Plettenberg D. **Ther Ggw 114(1):108, 110, 112-4 passim, Jan 75 (Ger)**

MINORITY GROUPS, SEX AND AGE FACTORS

Emotional problems of residents in psychiatry. Russell AT, et al. **Am J Psychiatry 132(3):263-7, Mar 75**

Women too often on the fringes. Woodside NB. **Ann Intern Med 82(3):418-20, Mar 75**

The Harry Bakwin Memorial Lectures (New York University School of Medicine). Nemir RL. **J Am Med Wom Assoc 30(2):87-8, Feb 75**

The Howard-Tulane challenge. A medical education reinfrocement and enrichemnt program. Epps AC. **J Natl Med Assoc 67(1):55-60, Jan 75**

Graduate medical education. Fenninger LD, et al. **JAMA 231 Suppl:34-62, 1975**

PREMEDICAL EDUCATION

Does biochemistry belong in the medical or the premedical curriculum? Sable HZ. **J Med Educ 50(3):296-8, Mar 75**

[Letter: Physiology at school] Pretorius PJ. **S Afr Med J 49(3):68, 18 Jan 75 (Afr)**

[The subexternal: clinical experience of premedical student] Ramírez Rivera J, et al. **Bol Asoc Med PR 65(8):194-6, Aug 73 (Spa)**

PHILOSOPHY

Editorial: The humanization of medicine. King LS. **JAMA 231(7):738-9, 17 Feb 75**

Letter: Dilemmas and solutions. Washburn TC. **JAMA 231(10):1026, 10 Mar 75**

Integrating ethics into the medical curriculum: one school's progress report. Brody H, et al. **Mich Med 74(6):111-2, 115-7, Feb 75**

Impediments to research in hospitals. Peart WS. **Proc R Soc Med 67(12 Part 2):1285-7, Dec 74**

SCHOOLS

Family planning in rural areas. 2. Florida: a university-based mobile medical team. Held B. **Fam Plann Perspect 2(3):32-4, Jun 70**

The Harry Bakwin Memorial Lectures (New York University School of Medicine). Nemir RL.
J Am Med Wom Assoc 30(2):87-8, Feb 75

U.S. medical student enrollment, 1970-71 through 1974-75. Dube WF. **J Med Educ 50(3):303-6, Mar 75**

Area Health Education Centers: what are they and where are they going? Milke LH, et al.
J Med Educ 50(3):242-51, Mar 75

Editorial: Unplanned obsolescence. Leymaster GR.
JAMA 231 Suppl:97-8, 1975

Continuing medical education at the University of Maryland: a perspective. **Md State Med J 23(10):59-61, Oct 74**

[School of advanced experience] Vanina LV, et al.
Akush Ginekol (Mosk) (6):60-1, Jun 74 (Rus)

SPECIALISM

Editorial: Accreditation for schools/programs for nurse anesthetists. **AANA J 43(1):4-6, Feb 75**

Training of medical and dental students in mental retardation. Oster J. **Acta Paediatr Scand [Suppl] 246:1-37, 1974**

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Diffuse training programs. Burch GE. **Am Heart J 89(4):541-2, Apr 75**

Training and organization for pathology in Britain. The role of chemical pathologists. Baron DN.
Am J Clin Pathol 63(2):269-75, Feb 75

Teaching pelvic examination to second-year medical students using programmed patients. Johnson GH, et al. **Am J Obstet Gynecol 121(5):714-7, 1 Mar 75**

Educational methodology in an obstetric and gynecologic medical school curriculum: a comparison of self-instructional with traditional methods. Munsick RA. **Am J Obstet Gynecol 121(7):900-6, 1 Apr 75**

Career decisions in the early postresidency years. Cavanaugh JL Jr. **Am J Psychiatry 132(3):277-80, Mar 75**

The affective experience of residency training in community psychiatry. Cotton PG, et al.
Am J Psychiatry 132(3):267-70, Mar 75

Controversies in psychiatric education: a survey of residents' attitudes. Gredon JF, et al.
Am J Psychiatry 132(3):270-4, Mar 75

The future educational needs of psychiatrists. Grinker RR Sr. **Am J Psychiatry 132(3):259-62, Mar 75**

Attitudes of psychiatric residents toward the necessity of internship. Karasu TB, et al. **Am J Psychiatry 132(3):274-7, Mar 75**

Emotional problems of residents in psychiatry. Russell AT, et al. **Am J Psychiatry 132(3):263-7, Mar 75**

Recertification of psychiatrists: the time to act is now. Small SM. **Am J Psychiatry 132(3):291-2, Mar 75**

A curriculum for the teaching of pain and apprehension control at the University of Pittsburgh. Scherf RR.
Anesth Prog 21(6):172-3, Nov-Dec 74

Editorial: Anesthesiology and quality in the science and art of anesthesiology. Greene NM. **Anesthesiology 42(2):117-20, Feb 75**

The British Occupational Hygiene Society. Comments on the training and manpower needs for pollution control. **Ann Occup Hyg 16(4):341-3, Dec 73**

Supervision of the initial interview. A study of two methods. Stein SP, et al. **Arch Gen Psychiatry 32(2):285-8, Feb 75**

Letter: Current practices of the American Board of Psychiatry and Neurology. Swift TR. **Arch Neurol 32(1):65-8, Jan 75**

The education of a Chinese surgeon. Roth RB.
Arch Surg 110(3):350-1, Mar 75

Letter: 'An unnecessary hazard in dentistry'. Parbrook GD. **Br Dent J 138(2):44-5, 21 Jan 75**

Attitudes regarding drug-abuse and the drug abuser: effect of the first-year of the psychiatry residency. Gertler R, et al. **Br J Addict 69(4):371-4, Dec 74**

A. Clifford Morson O.B.E., F.R.C.S. **Br Med J 1(5951):216, 25 Jan 75**

Letter: Quality evaluation in histopathology. Owen DA, et al. **Br Med J 1(5950):149-50, 18 Jan 75**

The family doctor in Canada. II. Entering academia. Woods D. **Can Med Assoc J 112(2):234-6, 25 Jan 75**

Pediatric resident staff follow-up, 1958 to 1972: their present place of practice and activities. Young MD. **Can Med Assoc J 112(4):479-81, 22 Feb 75**

Surgical oncology: the role in cancer control today. Schweitzer RJ. **Cancer 35(3):592-5, Mar 75**

Accuracy and its relationship to experience in the interpretation of chest radiographs. Herman PG, et al. **Invest Radiol 10(1):62-7, Jan-Feb 75**

The relevance of diagnosis to the epidemiology and teaching of psychiatry. Kelleher MJ. **Ir J Med Sci 144(2):49-54, Feb 75**

Goals of medical student psychiatric education. Bowden CL, et al. **J Med Educ 50(3):257-63, Mar 75**

The use of pedagogic drama in psychiatric education. Byrd GJ, et al. **J Med Educ 50(3):299-300, Mar 75**

The development of cognitive knowledge in clinical clerkships. Levine HG, et al. **J Med Educ 50(3):271-6, Mar 75**

Letter: More opinions on the dual degree. Bear SE.
J Oral Surg 33(3):168, Mar 75

A group task for general-practitioner trainees: planning a group practice. Ainsworth G, et al.
J R Coll Gen Pract 23(135):723-9, Oct 73

The social work externship. Smith DM.
J R Coll Gen Pract 23(135):692-6, Oct 73

Correlating student attitudes with performance in assessing instructional programs. Brown TC, et al.
J Reprod Med 12(3):121-3, Mar 74

The practical and potential contributions of immunology to the problems of developing countries. Humphrey JH. **J Trop Med Hyg 77(12):282-6, Dec 74**

Graduate education in public health. **JAMA 231 Suppl:95-6, 1975**

25 questions in general medicine. **Med Times 103(3):183,185-6,198, Mar 75**

26 questions on preventive medicine and public health. Penalver RA. **Med Times 103(3):176-8,180, Mar 75**

The placement service of the North Carolina Society of Anesthesiologists. Patterson JF Jr. **NC Med J 36(2):92-6, Feb 75**

Creativity in action: strengthening medical-surgical nursing. No. 16-1538. Tychsen E. **NLN Publ :131-41, 1975**

Vocational training for general practice. Gibson PL.
NZ Med J 80(528):455-8, 27 Nov 74

Where health is patriotism. Visit of New Zealand medical delegation to China: 20 August-9 September 1974. Biddlestone HJ. **NZ Med J 80(529):509-16, 11 Dec 74**

Letter from Buenos Aires gynecology and obstetrics in Argentina. Ahumada JC, et al.
Obstet Gynecol Surv 29(4):239-43, Apr 74

Estimating the market for an extended MPH program. Mullen PD, et al. **Public Health Rep 90(1):62-6, Jan-Feb 75**

Undergraduate education in social and preventive medicine at the University of Rhodesia. Ross WF. **S Afr Med J 49(2):44-6, 11 Jan 75**

The paediatrician and the child. Snyman HW.
S Afr Med J 49(7):209-10, 15 Feb 75

[Duties of orthopedists in the historical provinces (Bohemia and Moravia) in the nearest future] Pavlansky. **Acta Chir Orthop Traumatol Cech 41(1):1-3, Feb 74 (Cze)**

[Round-table discussion on the subject of dissemination of surgical knowledge]
Langenbecks Arch Chir 337:469-91, 1974 (Ger)

[Experiences in the teaching of surgery at a medical school with a reformed curriculum (author's transl)] Borst HG. **Langenbecks Arch Chir 337:447-54, 1974 (Ger)**

[Organization of postgraduate training in surgery (author's transl)] Guthy E. **Langenbecks Arch Chir 337:469-71, 1974 (Ger)**

[Modern methods of learning in surgical training (author's transl)] Hamelmann H.
Langenbecks Arch Chir 337:459-61, 1974 (Ger)

[Examinations in surgical residency (author's transl)] Käufer C. **Langenbecks Arch Chir 337:473-6, 1974 (Ger)**

[Hierarchy and the right to issue directives in the further training of the surgical specialist (author's transl)] Klein P. **Langenbecks Arch Chir 337:479-84, 1974 (Ger)**

[Interdisciplinary cooperation and professional organizations (author's transl)] Müller-Osten W.
Langenbecks Arch Chir 337:811-5, 1974 (Ger)

[Innovations in instruction in surgical technique, from the student angle (author's transl)] Prömmel M.
Langenbecks Arch Chir 337:455-8, 1974 (Ger)

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Langenbecks Arch Chir 337:485-8, 1974 (Ger)

[Problems of multiple-choice questions in the german medical examination (author's transl)] Vogt-Moykopf I, et al. **Langenbecks Arch Chir 337:463-8, 1974 (Ger)**

[Information and advanced medical education for radiologists at the Agfa-Gaevert-Technical institute] Borcke E, et al. **Roentgenpraxis 27(12):281-6, Dec 74 (Ger)**

[The role of hypnosis in present-day obstetrics] Di Bernardo G. **Minerva Med 66(6):276-80, 27 Jan 75 (Ita)**

[Classification and retrieval of radiographic diagnostic material for the medical education (author's transl)] Murata H, et al. **Nippon Acta Radiol 34(4):267-75, 25 Apr 74 (Jpn)**

[Experience with the work of scientific student circles formed at the Department of Obstetrics and Gynecology] Novikov IuI, et al.
Akush Ginekol (Mosk) (6):62-3, Jun 74 (Rus)

[Improvement in the teaching of pathological anatomy] Serov VV. **Arkh Patol 36(2):3-8, 1974 (Rus)**

[Schematic drawings for the study of pathological anatomy (teaching aids for 3rd year students)] Zhuravleva TB, et al. **Arkh Patol 36(7):78-9, 1974 (Rus)**

[Raising the qualifications of neuropathologists] Petelin LS, et al. **Zh Nevropatol Psikhiatr 74(11):1746-9, 1974 (Rus)**

[Continued education in psychiatry] Nordquist UB, et al. **Tidskr Sver Sjukskot 42(4):16, 27 Feb 75 (Swe)**

TEACHING HOSPITALS

A year's experience with tuberculosis in a private urban teaching hospital in the postsanatorium era. MacGregor RR. **Am J Med 58(2):221-8, Feb 75**

Be careful when you lend a helping hand® Springer EW. **Hosp Top 52(8):64-5, Sep-Oct 74**

Editorial: Hospital planning in Leeds. **Lancet 1(7903):379, 15 Feb 75**

The teaching hospital and primary care. Closing down the clinics. Berarducci AA, et al. **N Engl J Med 292(12):615-20, 20 Mar 75**

Visceral viewpoints: Should the medical schools care? Some comments on family practice. Spiro HM.
N Engl J Med 292(15):792-4, 10 Apr 75

Impediments to research in hospitals. Peart WS.
Proc R Soc Med 67(12 Part 2):1285-7, Dec 74

Clinical experience of eclampsia at the University Teaching Hospital, Lusaka. An analysis of 50 cases. Mphahlele M. **S Afr Med J 49(3):82-4, 18 Jan 75**

[University hospitals and public health care centers] Visakorpi JK. **Duodecim 90(21):1408-11, 1974 (Fin)**

[Teaching hospital] Korczak J. **Schwest Rev 13(3):7-9, 15 Mar 75 (Ger)**

[Is a clinical lecture still current?] Baserga A.
Minerva Med 66(15):685-8, 28 Feb 75 (Ita)

[Emergency tests. The clinicopathological viewpoint: the standpoint of a clinical pathologist in a university hospital] Kono K. **Jpn J Clin Pathol 22(10):41, Oct 74 (Jpn)**

[Health activities at the Kanagawa Prefectural Children's Medical Center. Connecting the community with the medical center. 1] Yuzawa F.
Kango 28(10):68-74, Oct 74 (Jpn)

[The Clinic of Obstetrics and Gynecology of the Warsaw University during the siege of Warsaw in September 1939] Serini-Buiska M.
Arch Hist Med (Warsz) 30(2):297-306, 1967 (Pol)

[School of advanced experience] Vanina LV, et al.
Akush Ginekol (Mosk) (6):60-1, Jun 74 (Rus)

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U.S. medical student enrollment, 1970-71 through 1974-75. Dube WF. **J Med Educ 50(3):303-6, Mar 75**

Preventive mental health efforts for women medical students. Goldstein MZ. **J Med Educ 50(3):289-91, Mar 75**

Performance of medical students admitted via regular and admission-variance routes. Simon HJ, et al.
J Med Educ 50(3):237-41, Mar 75

Correlating student attitudes with performance in assessing instructional programs. Brown TC, et al.
J Reprod Med 12(3):121-3, Mar 74

Editorial: Attitude change in medical students.
Lancet 1(7901):262, 1 Feb 75

Editorial: Medical school® Medical student® Medical education® Truong VM. **Wis Med J 73(10):12, Oct 74**

[Experience with the work of scientific student circles formed at the Department of Obstetrics and Gynecology] Novikov IuI, et al.
Akush Ginekol (Mosk) (6):62-3, Jun 74 (Rus)

[Energy consumption and nutritional characteristics of 3rd year medical school students] Vinogradov PB.
Gig Sanit (1):109-10, Jan 75 (Rus)

[Student health and organization of medical services for medical students] Babichev VA, et al.
Zdravookhr Ross Fed (3):3-7, Mar 74 (Rus)

[Study of the state of health of the activists of the student work brigades] Efremov AF, et al.
Zdravookhr Ross Fed (2):10-2, Feb 74 (Rus)

TEACHING METHODS AND MATERIALS

Teaching pelvic examination to second-year medical students using programmed patients. Johnson GH, et al. **Am J Obstet Gynecol 121(5):714-7, 1 Mar 75**

Educational methodology in an obstetric and gynecologic medical school curriculum: a comparison of self-instructional with traditional methods. Munsick RA. **Am J Obstet Gynecol 121(7):900-6, 1 Apr 75**

Problems and errors in teaching cardiopulmonary resuscitation. Evers W, et al.
Anaesth Resusc Intensive Ther 2(2):183-7, Apr-Jun 74

Supervision of the initial interview. A study of two methods. Stein SP, et al. **Arch Gen Psychiatry 32(2):285-8, Feb 75**

Proceedings: The use of a programmed re-inforcement exercise in the teaching of embryology. Smith CJ.
J Anat 118(2):403, Nov 74

The use of pedagogic drama in psychiatric education. Byrd GJ, et al. **J Med Educ 50(3):299-300, Mar 75**

A model for teaching primary care in a rural health center. Putnam SM, et al. **J Med Educ 50(3):285-7, Mar 75**

Progress on self-learning in biostatistics. Stahl SM, et al. **J Med Educ 50(3):294-6, Mar 75**

Correlating student attitudes with performance in assessing instructional programs. Brown TC, et al.
J Reprod Med 12(3):121-3, Mar 74

Editorial: Tapping our resources. Mixter Jr G.
JAMA 231 Suppl:98, 1975

Simulation in instruction and evaluation in medicine. McGuire CH, et al. **WHO Public Health Pap (61):18-34, 1974**

Principle into practice. Miller GE.
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Dynamics of a learning group. Perlmutter S.
WHO Public Health Pap (61):46-54, 1974
[Modern methods of learning in surgical training (author's transl)] Hamelmann H.
Langenbecks Arch Chir 337:459-61, 1974 (Ger)
[Is a clinical lecture still current?] Baserga A.
Minerva Med 66(15):685-8, 28 Feb 75 (Ita)
[Problems and experiences in the topic psychological formation of the physician] Canestrari R.
Minerva Med 65(90):4735-41, 15 Dec 74 (Ita)
[Improvement in the teaching of pathological anatomy] Serov VV. **Arkh Patol 36(2):3-8, 1974 (Rus)**
[Use of elements of programmed control of students' knowledge in the teaching of the history of medicine] Bolgarova OI, et al. **Zdravookhr Ross Fed (3):37-9, Mar 74 (Rus)**
[Teaching of medical statistics at the medical institute] Golovchinev IE. **Zdravookhr Ross Fed (2):33-7, Feb 74 (Rus)**
[Programmed control of the effectiveness of teaching of medical students] Puskina VG, et al.
Zdravookhr Ross Fed (3):32-7, Mar 74 (Rus)

UNDERGRADUATE EDUCATION

The decline in emphasis on basic medical sciences in medical school curricula. Visscher MB.
Ala J Med Sci 2(3):215-22, Jul 74
Teaching pelvic examination to second-year medical students using programmed patients. Johnson GH, et al. **Am J Obstet Gynecol 121(5):714-7, 1 Mar 75**
Training of medical students in computerized statistical analysis of cardiovascular-respiratory data after exercise. III. Summary of statistical significance. Thomson DM. **J Am Osteopath Assoc 74(6):559-61, Feb 75**
Proceedings: The use of a programmed re-inforcement exercise in the teaching of embryology. Smith CJ. **J Anat 118(2):403, Nov 74**
Proceedings: Studies on the relative merits of essay, multiple choice and viva voce examinations in Anatomy. Tutton PJ. **J Anat 118(2):403, Nov 74**
Goals of medical student psychiatric education. Bowden CL, et al. **J Med Educ 50(3):257-63, Mar 75**
A new type of facility in medical education: the Clinical Learning Center. Bryans AM, et al. **J Med Educ 50(3):277-84, Mar 75**
Preparing health science students for tomorrow's health care team. Fenley MD, et al. **J Med Educ 50(3):292-3, Mar 75**
The development of cognitive knowledge in clinical clerkships. Levine HG, et al. **J Med Educ 50(3):271-6, Mar 75**
A model for teaching primary care in a rural health center. Putnam SM, et al. **J Med Educ 50(3):285-7, Mar 75**
Does biochemistry belong in the medical or the premedical curriculum? Sable HZ. **J Med Educ 50(3):296-8, Mar 75**
Performance of medical students admitted via regular and admission-variance routes. Simon HJ, et al.
J Med Educ 50(3):237-41, Mar 75
Progress on self-learning in biostatistics. Stahl SM, et al. **J Med Educ 50(3):294-6, Mar 75**
The Howard-Tulane challenge. A medical education reinfrocement and enrichemnt program. Epps AC.
J Natl Med Assoc 67(1):55-60, Jan 75
The University of Maryland senior curriculum in ambulatory care--an evaluation of the first year 1970-71. Reed JW, et al. **Md State Med J 23(10):69-73, Oct 74**
Undergraduate education in social and preventive medicine at the University of Rhodesia. Ross WF. **S Afr Med J 49(2):44-6, 11 Jan 75**
[Schematic drawings for the study of pathological anatomy (teaching aids for 3rd year students)] Zhuravleva TB, et al. **Arkh Patol 36(7):78-9, 1974 (Rus)**
[Use of elements of programmed control of students' knowledge in the teaching of the history of medicine] Bolgarova OI, et al. **Zdravookhr Ross Fed (3):37-9, Mar 74 (Rus)**
[Social hygiene survey of students at the Dagestan Medical Institute] Golin IaI. **Zdravookhr Ross Fed (2):40-2, Feb 74 (Rus)**
[Teaching of medical statistics at the medical institute] Golovchinev IE. **Zdravookhr Ross Fed (2):33-7, Feb 74 (Rus)**
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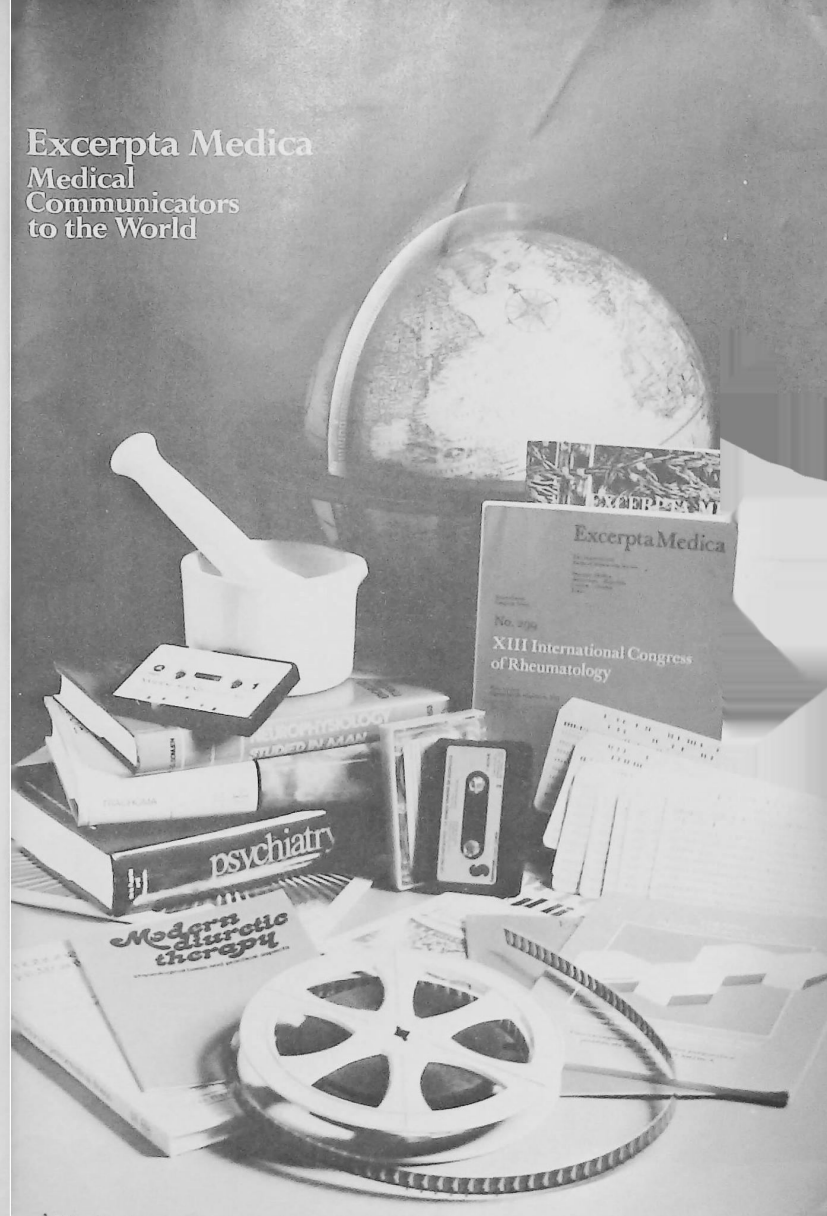

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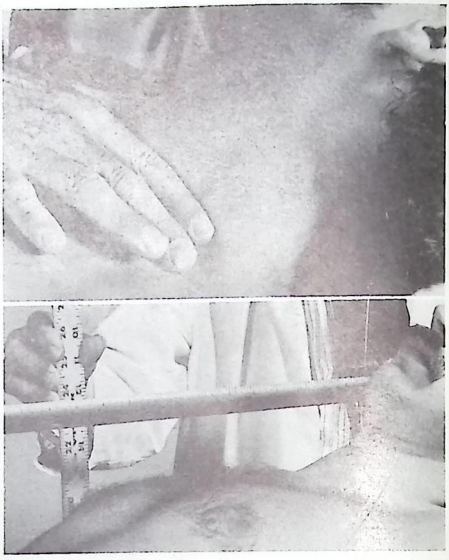

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