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ABSTRACT

This report documents and describes ways of mobilizing change in medical schools which in the past 60 years have done little to correct repeatedly documented shortcomings. Much of the report is based on results of a 1990 survey that asked deans of 84 North American Medical Schools to describe how 18 recommended changes were being addressed and implemented at their schools. The report itself identifies 16 published recommendations from the 1980s that best reflect the recurring problems in medical students' education; documents whether and how medical schools are implementing the recommendations; reports perceptions as to barriers to and facilitators of improvement; and identifies actions most likely to improve the education of medical students. In addition the report presents insights into three areas: the schools' responses; the context in which medical students' education exists today; and the kinds of strategies that schools must adopt to foster positive change. Five sections discuss these issues by recommendation topic: (1) organization of the program and management of the curriculum; (2) faculty development; (3) evaluation of students' achievement; (4) educational strategies; and (5) information transmission and management. Included are a concluding statement, a summary of the often overlapping strategies, and a description of possible future developments. (Contains 28 references.) (JB)

SCME-TRI REPORT

EDUCATING MEDICAL STUDENTS

ASSESSING CHANGE IN MEDICAL EDUCATION

THE ROAD TO IMPLEMENTATION

AAMC
ASSOCIATION OF AMERICAN MEDICAL COLLEGES

ACME-TRI REPORT

EDUCATING MEDICAL STUDENTS

ASSESSING CHANGE IN MEDICAL EDUCATION ▪ THE ROAD TO IMPLEMENTATION

AAMC

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The Association of American Medical Colleges represents all 126 accredited U.S. medical colleges, the 16 Canadian medical schools, 91 academic and professional societies, 400 major teaching hospitals—including 74 Veterans Affairs centers—and the nation's medical students.

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The major part of the ACME-TRI project was carried out under the direction of Louis J. Kettel, M.D. The AAMC expresses its deepest gratitude to August G. Swanson, M.D., for completing the work Lou began.

Louis J. Kettel, M.D.

November 4, 1929-November 5, 1991

The ACME-TRI project was the idea of Louis J. Kettel, former Vice President for the Division of Academic Affairs of the Association of American Medical Colleges. It was Lou's desire to identify the barriers to change facing medical schools as they attempt to respond to the numerous calls for reforms in medical students' education, and to articulate and promote strategies to help schools make the changes that are possible.

Lou's sudden death prevented him from completing the project. It is our hope that this report will honor his memory.

THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

EXPRESSES ITS DEEPEST APPRECIATION TO

THE CHARLES E. CULPEPER FOUNDATION

FOR ITS GENEROUS SUPPORT OF THIS PROJECT

ASSESSING CHANGE IN MEDICAL EDUCATION —
THE ROAD TO IMPLEMENTATION

OVERVIEW

This report documents—and describes ways of changing—a disturbing reality: over the last 60 years, most medical schools have done little to correct the major shortcomings in the ways they educate their students, even though these deficiencies have been documented repeatedly.[1-11]

The report's title, *Educating Medical Students: Assessing Change in Medical Education—The Road to Implementation* (ACME-TRI), reflects its main contributions, which are unlike those of previous reports on the status of medical students' education:

- It identifies the recurring problems in medical students' education that have been reported from the 1930s through the mid-1980s.
- It documents, through responses to the 1990 ACME-TRI survey, that most medical schools have not solved these recurring problems.
- It summarizes the schools' views of the barriers to solving these problems, recognizing that faculty members have done what they can within the wider barriers engendered by aspects of the medical education and health care cultures. In brief, the specific barriers reported are
    - faculty members' inertia;
    - lack of leadership;
    - lack of oversight for the educational program;
    - limited resources and no defined budget for medical students'education; and
    - the perception that there is no evidence that implementing changes will make the necessary improvements.

- The report identifies strategies to assist schools in overcoming or minimizing the barriers they have identified, so that they can provide a sounder and more complete education to medical students.
- And last, but most important, it provides a map for action by medical schools and national organizations, like the Association of American Medical Colleges (AAMC), to implement the strategies identified.

As its title suggests, the ACME-TRI project embodies at least two phases. The first is "assessing change in medical education"; the second is "the road to implementation." This report presents the information gathered during the first of these phases, which is now complete, and, in its concluding section, the report describes the second, future phase in a blueprint for action by medical schools and national organizations.

The report should be read in the context of ongoing efforts at many medical schools to change the way they educate their students. It is written to be a living document, one that must have a life beyond the printed page and that engenders action by all those concerned with medical students' education. It is not enough to reiterate the problems that have been widely reported since 1932, nor to remind schools that their efforts to change have not been very successful. The strategies identified are specific and include approaches for implementing change. The report concludes by describing future developments envisioned for the implementation phase of the project.

We believe that the ACME-TRI report serves as an important beginning for the many crucial changes in medical students' education that have always been possible and that are still possible, even in today's climate of tight budgets and a changing health care environment. These changes must be made so that medical students' education can take its rightful place in academic medicine alongside research, residents' training, and patient care.

August G. Swanson, principal investigator, and M. Brownell Anderson, project director, and members of the Report Writing Committee:

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BACKGROUND

Improving the professional education of physicians has concerned the leaders of academic medicine since the late nineteenth century. The Association of American Medical Colleges (AAMC) was founded to encourage such improvement and has pursued it energetically. In 1932, the final report of an AAMC commission on medical education, directed by Willard Rappleye, M.D., reviewed all aspects of medical students' education and recommended improvements in many of them.[1]

The 1932 report is a background against which to judge how much change has occurred in medical students' education since that time. Anyone reading the report's observations and recommendations for change written so long ago is compelled to wonder whether these statements were not, in fact, made in 1992. As an example, consider the following:

> The present concept aims to develop sound habits as well as methods of independent study and thought which will equip the student to continue his self-education throughout life. This can be brought about only by freeing medical education from some of its present rigidity, uniformity, and overcrowding and by articulating it more closely with the educational needs of the student.
>
> The medical course, partly because of the requirements for licensure, has been concerned more with the factual matter a student had memorized at the time of graduation than with the development of intellectual resourcefulness and sound habits and methods of study. Too great an emphasis has been placed on description and the memorizing of many details and facts which, though they are of little permanent significance, are of immediate value in passing the examination and in meeting the requirements of licensure to practice.

These and other equally timely observations and recommendations of the Report of the Commission on Medical Education are shown in the page margins throughout this report.

Since 1932, the AAMC and others have issued numerous studies, especially three important reports[2-4] published in the 1980s, that reconfirmed and reiterated the 1932 Commission on Medical Education's

findings and recommendations. These reports, plus the writings of several distinguished medical educators,[7-11] show that during the 60 years following the 1932 report, some medical schools implemented some of the recommendations. But most resisted change, and the education of medical students in the late 1980s was, for the most part, little changed from that in the 1920s.

Yet a consensus was developing that basic changes were needed. In 1983, Louis Harris and Associates surveyed the medical schools on behalf of the AAMC Project Panel on the General Professional Education of the Physician. The survey revealed agreement that more emphasis was needed on developing students' problem-solving skills and faculty members' teaching effectiveness. Opinions gathered in a second Louis Harris survey[6] in 1989 suggested that the climate in the late 1980s was ripe for change and that medical educators were aware of and concerned about the need to change the traditions constraining improvement in the education of medical students.

Has this readiness for change been translated into actions in the 1990s? Have the recommendations of the 1980s and before begun at last to bear fruit? Or do barriers still prevent schools from making the changes that academic medicine's leaders have acknowledged are needed?

The opportunity to answer these questions—that is, to find out whether and how medical schools in the early 1990s are acting upon the recommendations of the 1980s—was provided through support from the Charles E. Culpeper Foundation. The leaders of the AAMC agreed that the 1980s recommendations were timely and that a project to assess how its medical school constituents have—or have not—been responding to them was essential if significant improvement in medical students' education is to be accomplished in this century.

The project, called ACME-TRI, for Assessing Change in Medical Education—The Road to Implementation, was guided by an advisory group of medical school deans, faculty members, nationally recognized medical educators, a medical resident, and a medical student.

THE ACME-TRI SURVEY

A major component of the ACME-TRI project was a 1990 survey of North American medical schools. The centerpiece of the survey instrument was a group of 18 recommendations selected from more than 200 found in three major 1980s reports on medical students' education.[2-4] These 18 recommendations were chosen for the survey because they best summarized the recurring problems in medical students' education.

The 18 recommendations were aggregated into 12 topics for the survey instrument, which was sent to the deans of the 143 allopathic medical schools in the United States and Canada.

The deans were asked to respond to the following statements for each of the 12 topics:

- Describe how the recommendation was incorporated or will be incorporated.
- What constraints and what opportunities helped or will help to shape the institutional response?
- What were, or are anticipated to be, the major difficulties encountered in implementing the change?

Although the deans were not asked directly which recommendations they thought were unimportant or wrong, their responses often made it clear which ones they did and did not believe were worth implementing. Their responses are summarized in the five sections of this report.

Eighty-four schools responded to the survey, describing the approaches they are taking to address the recommendations. These approaches are presented in this report. The responses range from single words or phrases to paragraphs that provide extensive detail about the planning process, the implementation, and the outcome of a school's appoach to each recommendation. The lack of detail or the lack of any response at all to a recommendation is often as telling as the responses with extensive detail.

Not all of the schools answered all the questions about each recommendation, which is why, in this report, the numbers of schools that responded to different aspects of a recommendation sometimes are different from the total number of schools that responded. But the schools provided more than enough information to clearly delineate the barriers they are facing and the strategies they are using as they attempt to create change in their medical students' education programs. These barriers and strategies are summarized in this report.

WRITING AND ORGANIZATION OF THIS REPORT

The writing of this report was guided by a committee whose collective experience and expertise in medical education provided a rich basis from which to interpret the schools' information. This experience and information enable the report to go beyond making suggestions for change. Instead:

- It identifies 16 published recommendations from the 1980s[2-4] that best reflect the recurring problems in medical students' education. These are 16 of the 18 recommendations that were used in the survey instrument. The other two were not included in this report because they elicited so few responses. (One was about having faculty members serve as mentors for medical students; the other was about establishing centers for information management.)
- It documents, through responses to the project's 1990 survey, whether and how medical schools are implementing the 16 recommendations.
- It reports what the faculty members and administrators of the responding schools believe to be the barriers to and facilitators of improvement.
- And finally, it identifies actions most likely to improve the education of medical students.

In addition, the report presents insights into three areas: the schools' responses, especially what these show about the environment in

which change occurs; the context in which medical students' education exists today; and the kinds of strategies that schools must adopt to foster positive change.

The contents of the 16 recommendations that organize this report are interwoven and sometimes overlapping and so they were combined into 11 of the 12 topic areas that were used for the survey instrument. The twelfth topic (which was about establishing centers for information management) was excluded because there were too few responses. The remaining 11 topics have been organized into the five sections that make up the body of this report, as follows:

SECTION ONE: ORGANIZATION OF THE PROGRAM AND MANAGEMENT OF THE CURRICULUM

Centralize decision making and resource allocation for the medical students' education program

Clarify institutional goals and instructional priorities

SECTION TWO: FACULTY DEVELOPMENT

Make the teaching of medical students important

Develop the skills of those responsible for clinical instruction

Encourage faculty members to teach outside their disciplines

SECTION THREE: EVALUATION OF STUDENTS' ACHIEVEMENT

Assess all major objectives

Formally assess clinical skills

SECTION FOUR: EDUCATIONAL STRATEGIES

Specify what students should learn and the skills and attitudes they should develop

Foster self-directed learning and lifelong learning skills

SECTION FIVE: INFORMATION TRANSMISSION AND MANAGEMENT

Decrease the use of lectures

Develop information management skills

The report ends with a concluding statement, a summary of the often overlapping strategies presented in the five sections, and a description of some of the future developments envisioned for the implementation phase of the ACME-TRI project.

SECTION ONE

ORGANIZATION OF THE PROGRAM AND MANAGEMENT OF THE CURRICULUM

CENTRALIZE DECISION MAKING AND RESOURCE ALLOCATION FOR THE MEDICAL STUDENTS' EDUCATION PROGRAM

Spirit of the Recommendation

In North American universities the faculty members traditionally have the authority and responsibility for determining what will be taught and how it will be taught. On the assumption that faculty members are the best judges of what students need to learn, the faculty of each discipline or professional school is accorded the right to establish the curriculum for its students. When the responsible faculty is small and the discipline has a narrow base, its members can design and implement an educational program independently, needing almost no administrative structure or university involvement. But, in the case of the education of medical students, especially in recent years, the great breadth of knowledge in the disciplines requires that priorities be set by the school. The three reports from the 1980s [2-4] recommend that setting priorities should be a corporate process, not done parochially, discipline by discipline. An overarching, transdepartmental administrative structure is required to define educational policies; set institutional goals and objectives; define the concepts, knowledge, skills and behaviors to be learned; and foster the development of educational methods and evaluation strategies.

Information about the degree of development of such an administrative structure at each school was sought by asking the schools to provide information about how they have responded to the following recommendations: *

> Centralize control of the curriculum. Create at each medical school an appropriate central unit that has authority to plan, organize, monitor, evaluate, and continuously revise the curriculum. Give the unit significant status and the power to act.

* In several cases, more than one of the three reports contained virtually the same recommendation. The recommendations quoted here and throughout this report were chosen for expressiveness and completeness.

The Commission has believed from the beginning that an emphasis on educational principles in medical training and licensure can be secured only by modifying the point of view and broadening the interests of those responsible for medical education and licensure, not by recommendations, statistics, new regulations, further legislation, or manipulation of the curriculum.

1932, AAMC RAPPELEYE COMMISSION

Specifically and visibly fund it from appropriate sources, including clinical practice monies.
Adapting Clinical Education to the Needs of Today and Tomorrow. Josiah H. Macy, Jr. Foundation, 1988

Medical school deans should identify and designate an interdisciplinary and interdepartmental organization of faculty members to formulate a coherent and comprehensive educational program for medical students and to select the instructional and evaluation methods to be used. Drawing on the faculty resources of all departments, this group should have the responsibility and the authority to plan, implement and supervise an integrated program of general professional education. The educational plan should be subject to oversight and approval by the general faculty.
General Professional Education of the Physician. AAMC, 1984

The educational program for medical students should have a defined budget that provides the resources needed for its conduct. Expenditures from this budget should be distinctly related to the educational programs as are other funds restricted to specific purposes, such as research or research training.
General Professional Education of the Physician. AAMC, 1984

Approaches to Implementation

Only 34 of the 84 schools that responded to the survey provided information about their responses to these three recommendations.

- Twenty schools (about 60%) have moved to implement this set of recommendations to some degree.
- Fifteen have established a position in the office of the dean; this person is responsible for planning and managing the medical students' education program.
- At ten schools the incumbent serves as the chair of the committees that determine policy and curriculum for medical students' education. Four schools established the position during the past decade. The degree to which the content of the program and the methods of learning and evaluation are determined by a central administration was not well described in the responses.

- According to the responses, the deans of eight schools that have not yet developed a central administrative structure have appointed curriculum evaluation committees to study the medical education program and recommend improvements.

The schools that have not established a central administrative structure for their medical education program rely on the judgments of the faculties of each basic science discipline and clinical specialty to determine the knowledge and skills that medical students should acquire. A curriculum committee with representatives from each discipline and specialty has the authority to determine the fraction of students' scheduled time that will be allocated to each area of study.

None of the responding schools reported that it had been able to establish a defined budget for the education of medical students.

Constraints and Difficulties

The schools reported that the major constraint to establishing a central administrative structure with the authority to plan and manage the medical education program is the unwillingness of the faculties of basic science and clinical departments to relinquish what is viewed as their right to determine independently the knowledge and skills, in their respective disciplines, that medical students should acquire. This privilege is defended even when department chairs acknowledge that medical students' education is not a principal priority for their departments, which, because of associated revenues and the importance of providing recognition for faculty members in their disciplines, are more concerned with excellence in regard to graduate students, residents, research, and patient care. Also, the lack of time and resources to plan an integrated, coherent program is frequently invoked as a reason for not developing a centrally administered program. Further, resistance to a change in the administration of the medical education program is stiffened by proposals to redistribute funds and provide a defined budget for medical students' education.

...the almost frantic attempt to put into the medical course teaching all phases of scientific and medical knowledge, and the tenacity with which traditional features of teaching are retained have been responsible for great rigidity, overcrowding, and a lack of proper balance in the training.

1932, AAMC RAPPELEYE COMMISSION

Insights Gained

The fact that only 34 schools provided information about how they had responded to the three recommendations may indicate that the other schools considered these recommendations to be unpopular or too difficult to implement.

The responses suggest that the budget for the educational program has two components. One is the salary for faculty; the other is the money allocated for services that support the teaching of medical students (e.g., library, computers, labs). Customary budgeting policies provide institutional funds to departments to support their faculty members. It can be assumed that these funds are provided in part as compensation for faculty and staff members' involvement in medical students' education, but an explicit definition of their purpose is lacking, and the amounts that are applied to the students' education are not known.

It is clear from the responses that were received that the authority of the faculties of the various departments over course content and instructional methods is still deeply rooted.

Unfortunately, the responses—and lack of responses—seem to indicate that matters have not changed much since 1984, when the GPEP report observed that

> despite frequent assertions that the general professional education of medical students is the basic mission of medical schools, it often occupies last place in the competition for faculty time and attention. Graduate students, residents, research, and patient care are accorded higher priorities. [3]

This statement has never been denied or challenged. Nevertheless, the successes of individual faculty members must be distinguished from the failings of the *institution*. Indeed, there are many faculty members who have devoted their time, energies, and careers to teaching the knowledge, skills, and attitudes necessary to become a physician. Often this is done without regard for promotion and is frequently in conflict with the institution's culture.

Necessary Strategies for Change

The type of change recommended here involves organizational structure and the allocation of financial resources. Implementation will necessarily be gradual. Following are approaches for which assistance from the AAMC or other national organizations is available; these include a variety of interventions to be used by schools in implementing change.

- Accurately estimating the fraction of institutional funds that departments are using for medical students' education must be a first step in changing budgeting policies and developing a defined budget for the medical students' education program.
- Integrated and coordinated education programs for medical students will be possible only if medical schools develop the organizational and financing structures to support such programs. To do this most efficiently, deans and their faculties must learn how integrated, coherent, and coordinated education programs for medical students can be developed and administered in today's complex academic medical centers. Although the number of such programs is small, sufficient examples exist to demonstrate their feasibility.
- The AAMC, working with schools that have developed such programs, should establish workshops to assist its other constituents to develop the administrative and financial management systems that are needed. The management workshops that the AAMC provides for newly appointed deans should include sessions on revising medical students' education.
- A new management workshop must be developed to marry the administrative, political, and financial issues all deans address with the educational program issues all deans should address.
- Following the workshops, staff of the AAMC or consultants to the AAMC should help lead follow-up activities at the institution to make sure the goals of the institutional team are incorporated into the institutional mission.
- The Group on Educational Affairs (GEA) of the AAMC should develop strategies and complementary programs at both the regional and national levels to assist administrators and faculty members to implement a more centralized educational program. These strategies should include approaches to achieving the cooperation and consent of a school's governance system. At the

regional level, the GEA should bring together its members from schools that are attempting to improve their students' education; this would encourage schools to share ideas and approaches to change.

- There must be a specific budget for an academic medical center's program for medical students' education. Determining the fraction of general revenue funds that departments apply to students' education will be a first step. Because many faculty members do not realize that they are compensated for their participation in the education of medical students, specifying the proportion of general revenues that support their involvement in their students' education will help them and the administration see the importance of that involvement. Specifying revenues also will require alterations in the nonspecific allocation of these funds to departments and divisions so that a school's education program for medical students will clearly be identified as a distinct responsibility of the school's faculty.

- Pressure to have central management of medical students' education will increase. For example, in 1991, the Liaison Committee for Medical Education (LCME) added an accreditation standard that requires central curriculum responsibility and accountability. The requirement states:

"The program's faculty is responsible for the design, implementation, and evaluation of the curriculum. There must be integrated institutional responsibility for the design and management of a coherent and coordinated curriculum. The chief academic officer must have sufficient available resources and authority provided by the institution to fulfill this responsibility." [12]

To fulfill this requirement, all schools will have to designate a "chief academic officer" and give the person holding that position the required resources and authority. If strictly interpreted, this standard will require schools to centralize their programs in the ways recommended in the 1980s reports.

CLARIFY INSTITUTIONAL GOALS AND INSTRUCTIONAL PRIORITIES

Too much of the clinical teaching is from the standpoint of the specialist and on rare diseases. Insufficient attention is given to the ordinary needs of most patients.

1932, AAMC RAPPELEYE COMMISSION

Spirit of the Recommendation

Effective management of the curriculum is dependent on clear institutional goals and priorities. To learn to what degree schools have established institutional goals and priorities, the survey asked the schools to provide information about how they were responding to the following recommendation:

> We recommend that medical schools undertake systematic efforts to clarify institutional goals and subsequently establish instructional priorities.
> *The New Biology and Medical Education*. Josiah H. Macy, Jr. Foundation, 1983

Without a clear, mutually accepted set of goals and institutional priorities, the most carefully planned organizational structure will not promote a coherent educational program. Most department faculties believe they have established priorities and goals; each school has a mission statement that appears either in the school catalog or in the LCME self-study documents. However, the survey responses show *there is a lack of institutional clarity and commitment regarding the education of medical students*. The responses underscore the fact that few schools have established *unique* institutional goals or instructional priorities for medical students' education.

Approaches to Implementation

Seventy-four schools provided information about their responses to this recommendation, but the responses of many of the schools focused more on making changes in the curriculum and less on clarifying institutional goals and establishing priorities. This suggests that changes do not flow from some higher sense of purpose, but rather from more specific needs to rectify perceived problems. Few schools have actually established educational objectives for their curricula.

- The majority of the respondents have appointed a task force or committee to review the curriculum and make recommendations about needed institutional goals and priorities. In addition to the

task forces and committees, many schools use a faculty retreat to both introduce and discuss the need to establish goals and priorities.

- At 32 of the schools, reports from task forces and committees have led to a restructuring of the schools' curriculum committees.
- Twenty-eight schools have used a faculty retreat to develop consensus, establish institutional priorities, and introduce results of reports from task forces.
- Following the review of institutional goals, five schools established offices of medical education or a position for an associate dean for academic affairs/medical education.
- Nineteen schools rely on ongoing activities of an existing curriculum committee to continually review and, occasionally, revise the current set of goals and priorities.
- For all schools that have addressed the recommendation, the involvement and support of the dean is viewed as a critical component to the success of their efforts.

Constraints and Difficulties

In most schools' responses to the survey questions about this recommendation, the efforts to clarify institutional goals and to set priorities were interpreted as the need to modify the curriculum and change teaching methodologies rather than to undertake a broad new look at the schools' educational mission. The schools indicated that the principal constraints facing these broader efforts are faculty members' resistance to suggested changes because they perceive no evidence that change is either necessary or beneficial. In the words of several responses, "If it isn't broken, why fix it?" Competing with questions about the value of clarifying educational priorities are the demands on faculty members to increase research and patient care services and associated revenues.

- For those schools where efforts have been made to clarify institutional goals and establish priorities, the difficulty of involving everyone and giving faculty members ownership was frequently cited as a constraint that must be overcome.
- Four schools mentioned the lack of an office or person with responsibility for central coordination of the medical education program as a difficulty in addressing the recommendation.

Insights Gained

Eighteen schools reported that self-study in preparation for LCME site visits is an impetus for addressing the recommendation. For eight schools, faculty awareness of change in other medical schools prompted their decision to address what is being taught in the medical school curriculum.

In general, few schools have actually established institutional goals and fewer still have considered establishing instructional priorities for educating their medical students. Only one school stated that it had prescribed objectives (expressed as educational outcomes) for the graduating seniors and that these objectives were agreed upon by all faculty members. In most cases, the institutional goals are so broad that they admit a variety of interpretations and cannot promote change.

Inasmuch as medical education is primarily concerned with the qualification and preparation of students to practice medicine, it is highly important that the training be permeated with an understanding of the larger social and economic problems and trends with which medicine must deal, and which are likely to influence the form and opportunities of practice in the future.

1932, AAMC RAPPLEYE COMMISSION

Necessary Strategies for Change

- The AAMC can promote faculty awareness of change in other medical schools through more communication with teaching faculty and through workshops. The AAMC should establish a database, accessible to all medical schools, that contains a comprehensive collection of educational innovations and approaches being used to implement curriculum change. This could serve as a clearinghouse for rapid identification and distribution of useful methodologies.
- Medical schools should develop a system for both peer and student evaluation of both instruction and the curriculum. This will serve several functions. On a symbolic level, it says to all concerned that all participants in the educational process are accountable for the quality of the process. At the substantive level, it provides useful information about what is working and what is not.
- The AAMC, working with the deans of the medical schools, should define a set of goals against which schools can assess their objectives. Each dean should consider requesting the school's faculty members to write, in 20 words or fewer, their *understanding* of the mission of the school. This exercise can serve as the point of departure for a discussion about establishing a school's unique institutional goals, emphasizing the importance of the educational program at the school, and ultimately, establishing instructional priorities.

SECTION TWO

FACULTY DEVELOPMENT

MAKE THE TEACHING OF MEDICAL STUDENTS IMPORTANT

Spirit of the Recommendation

A medical school must place the teaching of medical students on at least the same level of esteem traditionally awarded research and patient care and must expect the same level of excellence of its teachers as it does of its investigators. These issues and the ways in which the surveyed schools responded to them are explored in this section. Stress is given to the need for faculty members to become more involved in medical students' education, and the need for schools unstintingly to devote time and resources to improving the teaching skills of their faculty members. Even more important, deans and chairs must enhance the position of the teacher in the medical school.

The degree to which North American schools have made teaching medical students a priority was assessed by asking schools how, or if, they had responded to the following recommendation:

> Experience indicates that the commitment to education of deans and departmental chairmen greatly influences the behavior of faculty members in their institutions and their departments. By their own attitudes and actions, deans and departmental chairmen should elevate the status of the general professional education of medical students to assure faculty members that their contributions to this endeavor will receive appropriate recognition.
> *General Professional Education of the Physician.* AAMC, 1984

Approaches to Implementation

Fifty-five of the 84 schools that participated in the ACME-TRI survey responded to this statement.

Most of the responses centered on including faculty members' teaching of medical students and their educational accomplishments (e.g., authoring software; serving as course or clerkship directors) as factors in promotion and tenure decisions.

Medicine must be learned by the student, for only a fraction of it can be taught by the faculty. The latter make the essential contributions of guidance, inspiration, and leadership in learning. The student and the teacher, not the curriculum, are the crucial elements in the educational program.

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- Six schools routinely include faculty members' educational accomplishments in promotion and tenure decisions.
- Thirteen schools have made a special effort during the past decade to include educational accomplishments in promotion and tenure decisions.
- Three schools use students' and faculty members' peer evaluations in promotion and tenure decisions.
- Five schools use "educational dossiers" to document teaching and educational research accomplishments.
- Five schools award prizes to faculty members for teaching accomplishments.
- Two schools benefit from state government policies to provide awards for outstanding teachers.
- Five schools have proposals under consideration to include teaching along with research and patient care activities in promotion and tenure decisions.

Of those 13 schools that have made an effort to heighten attention paid to educational accomplishments, none was specific about the degree of success it has achieved or about the criteria it used for educational accomplishments. While the schools reported that they are giving more attention to educational accomplishments, three schools commented that although such achievements are said to be considered, they carry far less weight than research accomplishments.

Constraints and Difficulties

Schools reported that their efforts to increase the emphasis placed on teaching medical students were constrained by the lack of a clear measure of outcome. Teaching does not generate revenue or publications and does not compete with either of these in promotion and tenure decisions.

- Nine schools reported an attitude among faculty members that an emphasis on teaching would weaken scholarly research, since research would no longer be considered the primary reason for advancement.
- At five schools, although educational accomplishments are supposed to be a factor in promotion, research accomplishments are given more weight.

- Five schools found that gaining approval for an alternate career track for clinician educators was slow and difficult.
- One school stated that a parallel track for "nonclinician teachers" would be resisted and not approved.
- Five schools requested the delineation of better methods to measure and document faculty members' educational accomplishments.
- Four schools cited insufficient funds as a constraint to providing proper recognition for educational accomplishments.

Insights Gained

The schools' responses to the survey indicate that during the past decade some schools have devoted attention to increasing the importance of teaching. Most of the schools that acknowledge that more attention should be paid to the teaching activities of faculty members have added teaching accomplishments to the criteria for promotion and tenure decisions. However, they reported that this approach has not accomplished much toward elevating the status of teaching. One important reason for this is that no matter what official changes may be made in favor of teaching, many faculty members maintain that research accomplishments must be the primary reason for advancement. This opinion is a product of the university ethos, the so-called culture of the institutions, and it is reinforced by the way faculty members are paid and promoted. In addition, many faculty members believe that there are inadequate criteria to evaluate and insufficient measures to document teaching efforts.

A 1987 study indicated that clinician-educator tracks, usually without tenure, have been established at 61 schools.[13] While this type of effort to increase the emphasis on educational accomplishments is important, the effort is directed exclusively at the *clinical* faculty members, not at the basic science faculty. Even the one school that rewarded basic science teaching efforts indicated that a career track for "nonclinician teachers" would be resisted.

Necessary Strategies for Change

Academic recognition must be provided for faculty members engaged in the education of medical students. Promotion and tenure should be as

accessible to those faculty members who devote a significant portion of their time and intellectual energy to teaching medical students as they are to those principally engaged in research. Administrative mechanisms to document teaching accomplishments are needed.

- The AAMC's Council of Deans and Council of Academic Societies, working with the Group on Educational Affairs, should elaborate the necessary criteria and methods for this documentation.
- An *educator* track with tenure for both basic science and clinical faculty members would reward excellence in teaching and establish a career pathway for those pursuing excellence in that area.
- Medical-discipline-based forums should be created on the national level, and those that exist should be encouraged to provide support for faculty members interested in teaching, publishing educational research, organizing forums for the presentation of invited papers and reviews, and exchanging educational materials (for example, software, patient cases, new teaching approaches).
- The development of advanced methods and m· terials for medical education can be stimulated through grants from both the public and private sectors. These should include grants for developing computer software and for establishing alternative curricula.
- The AAMC should expand its efforts to assist faculty members in developing and sharing educational materials. An AAMC-sponsored consortium for sharing and documenting the use of educational materials developed at individual schools should be established.

DEVELOP THE SKILLS OF THOSE RESPONSIBLE FOR CLINICAL INSTRUCTION

Spirit of the Recommendation

A second area of faculty development recommended by all three of the major reports in the 1980s[2-4] was the need to improve the skills of faculty members responsible for teaching clinical skills to medical students. The

recommendation to which the schools were asked to respond addresses not only the need for faculty to develop adequate teaching skills, but also the need for schools to allow faculty the necessary time to teach and supervise medical students.

The degree to which schools are providing faculty members with the skills necessary for clinical instruction is evident in the responses to the following recommendation:

> Those responsible for the clinical education of medical students should have adequate preparation and the necessary time to guide and supervise medical students during their clinical clerkship.
> *General Professional Education of the Physician.* AAMC, 1984

If clinical teaching is to attract and hold teachers of the caliber and ability which it requires, and provide a corps of younger instructors from which the senior members of the staff may be recruited, there must be a fuller recognition of the freedom and dignity which such work should command.

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Approaches to Implementation

Fifty-three schools provided responses concerning their efforts to implement this recommendation.

- Three schools offered no institutional response, but said they recognize the need to address the recommendation.
- Twelve schools hold regular workshops for faculty members from their own institution and other schools.
- Thirteen schools use direct funding from the dean's office and reduced clinical responsibilities to support clinical teaching.
- Fifteen schools have hired professional educators to address the problems that have thus far prevented adequate faculty development activities.
- Four schools reported that clerkship directors meet regularly to discuss educational issues and teaching problems they face in the clerkships.
- Five schools include teaching accomplishments in promotion and tenure guidelines.
- Two schools review the experiences that students have in the ambulatory care setting and have created an evaluation form that corresponds to the objectives of the ambulatory care experience. The schools indicated that the movement of clinical teaching into the ambulatory care setting was what stimulated them to implement the recommendation in this way.

Teachers of clinical medicine should not be subject to any restrictions or regulations beyond those imposed upon teachers in other fields of academic work so far as their university relationships are concerned.

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Constraints and Difficulties

Faculty members' perceptions that teaching is not recognized in promotion and tenure, and the competing demands on faculty members' time for research and patient care, were the major constraints identified by the 53 schools that provided responses to this topic in the survey.

- Sixteen schools reported that the competing demands on faculty members to generate patient care revenue and do research are major constraints in attempting to increase the emphasis on clinical instruction.
- Eight schools identified the perceived lack of recognition for teaching and subsequent lack of reward for teaching as the major constraints to implementing the recommendation.
- Four schools stated that having no mechanism for oversight of the teaching done at affiliate sites was a difficulty in assessing the contributions of clinical teachers.
- Nine of the responding schools commented that faculty members' unwillingness to recognize a need to improve their clinical teaching skills created a barrier to increasing the attention paid to clinical instruction.

Insights Gained

While faculty development programs to improve clinical instruction are offered frequently, they are not well attended by clinical faculty members. Although the presence of professional educators facilitates faculty development efforts in clinical instruction, the responses indicate that faculty members often ignore programs to improve their teaching effectiveness. The responses also show that faculty members do not always avail themselves of opportunities to attend workshops, especially when the workshops are offered at their own institution.

It is notable that only two schools mentioned the role of residents as clinical instructors, even though residents are responsible for a vast majority of medical students' clinical education. [14]

None of the schools reported that they allow faculty members to be relieved of clinic and/or research duties to devote themselves exclusively to teaching. Certainly, one measure of an institution's willingness

to recognize and reward the educational accomplishments of its faculty members is to provide "protected time" for them to carry out their teaching responsibilities.

Even at those schools with a defined budget for clinical instructors, the demands on faculty members to provide revenue from patient care compete with and frequently take precedence over the pressures on them to improve their clinical instruction.

Necessary Strategies for Change

- Clinical disciplines that provide required rotations for medical students should assign a faculty member and a senior resident at each site to assume responsiblity for the medical students' educational program. These new responsibilities should be distinct from those related to clinical service activities. Senior residents and junior faculty members who assume these responsibilities should be especially prepared by attending teaching institutes and workshops.
- Principal teaching faculty should not be expected to support themselves from income derived exclusively from their clinical services. Their financial support should reflect the importance of teaching at the school.

ENCOURAGE FACULTY MEMBERS TO TEACH OUTSIDE THEIR DISCIPLINES

Spirit of the Recommendation

As schools begin to improve the ways medical students are educated, the role of the faculty member is likely to change from that of being solely an "information transferer" to also being a facilitator of learning. In this process, faculty members would move beyond their single-discipline-oriented approach to the educational program and serve as resources and mentors to students. As more education occurs in the ambulatory care setting and as more emphasis is placed on the *continuum* of medical education through interdisciplinary courses, faculty members must develop the skills needed to participate more widely in the educational program for medical students.

Schools were asked to indicate how they were responding to the following recommendation:

> Medical schools should establish programs to assist members of the faculty to expand their teaching capabilities beyond their specialized fields to encompass as much of the full range of the general professional education of students as is possible. The Association of American Medical Colleges should facilitate the development of these programs.
> *General Professional Education of the Physician.* AAMC, 1984

Approaches to Implementation

Responses to this recommendation were provided by 52 schools. As the following summary indicates, few of the responses spoke directly to the recommendation:

- Twenty-six schools have a faculty development program to encourage faculty members to develop their teaching skills.
- Seven schools are planning a structured program of faculty development.
- Eleven schools have no faculty development program and no plans to develop one.
- Four schools use a faculty retreat for improving their faculty members' teaching skills.
- Two schools have introduced a series of seminars for faculty that include curriculum issues and teaching skills.
- Fifteen schools employ professional educators who have the responsibility to increase the attention paid to faculty development activities; seven of these positions were established within the last five years.
- Several of the schools expressed the need for faculty to understand the importance of medical students' *general professional education* and their role in providing it.

Constraints and Difficulties

- Seventeen schools reported that the lack of faculty members' interest in programs to improve their teaching skills is the major constraint to encouraging faculty development activities.

- Some faculty members are reluctant to admit they need assistance to improve their teaching and that they can be helped by skilled colleagues and professional educators. Two schools reported their major barrier to be faculty members' reluctance to consider broadening their teaching beyond their disciplines and their insecurity about such a venture. Anecdotal evidence suggests that this may be more widespread than reported.
- Eight schools cited as a major barrier the continuing conflict between the need to generate revenue through research and/or patient care and the lack of rewards for teaching.
- Six schools identified the lack of staff time or the absence of a professional person devoted to faculty development as a barrier.
- Fifteen schools reported that limited funding has inhibited the development of a program to broaden faculty members' skills. These 15 schools cited difficulty in providing sustained support for a program, and thus they could not develop an effective one.

At the present time it is probably true that mastery of the clinical subjects and ability to teach are not sufficiently considered in the selection of the personnel of some faculties, and little attention is paid to the preparation of medical teachers in the art of teaching. The great emphasis in selection is placed upon ability and interest in, or willingness to do, research, in which outstanding ability is rare. Too much emphasis is placed upon this single requirement, important as it is.

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Insights Gained

The responses to the recommendation that faculty be encouraged to teach in courses outside their disciplines were revealing in their brevity and direction. The responses indicate little sympathy for this recommendation. Few of the responses actually focused on the recommendation; instead they spoke to a broader issue of general faculty development, not to the specifics of the recommendation.

The schools' responses to the recommendation show that sustained programs to improve faculty members' ability to teach exist at some schools but not at others. Most of those that have been developed are hampered by a lack of reliable funding. The system of faculty rewards and recognition does not provide a clear incentive for faculty members to participate in structured programs. The demands on faculty members' time for research and patient care, coupled with the lack of incentive to teach, and sometimes a lack of respect for or knowledge of educational research and methods, means that many faculty members do not or cannot take advantage of teaching-skills development programs at their own institutions.

The responsibilities for the care and treatment of patients in the hospital and clinics introduce features unknown in other university fields, and place heavy demands upon the clinical teachers, in addition to those which the university position imposes.

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The pervasive lack of shared objectives for the education of medical students, the frequent lack (or preceived lack) of information about specific innovations, a lack of understanding of the meaning and crucial importance of fostering a general professional education, and the lack of importance placed on teaching at most medical schools discourage many faculty members from improving their teaching skills, much less broadening their teaching.

Necessary Strategies for Change

Despite the constraints and barriers to change reported by the schools, there are actions that faculty members can take to effect changes. In many cases, the most important barrier is that faculty members either do not recognize this possibility or, if they do, they see insufficient incentives to take the necessary actions.

- Schools must create meaningful cross-disciplinary teaching opportunities to encourage faculty members to assume educational responsibilities beyond their specialized area of practice or research. Equally important, faculty members must participate in cross-disciplinary examinations of students.

  An example of a specific approach to achieve this is problem-based learning. Problem-based learning is a method of teaching around case problems (see section four) in which the role of the faculty member is one of resource person rather than expert. This approach to teaching fosters interdisciplinary teaching and stimulates faculty members to become involved in teaching subjects outside their respective disciplines or specialties.

- The AAMC should work with medical schools experienced in developing problem-based cases to establish a central resource of such cases to promote sharing among disciplines and among schools.

SECTION THREE

EVALUATION OF STUDENTS' ACHIEVEMENT

ASSESS ALL MAJOR OBJECTIVES

Spirit of the Recommendation

In discussions about assessing medical students' achievements, it is often said that assessments define the curriculum.[15] The reports of the 1980s concluded that medical schools must analyze how they assess their students' performance to discover the goals and priorities of their educational system. What qualities and achievements does the system value and reward? To what extent are the aims, objectives, and ideals of the medical profession understood, valued, and sought by the students? The answers to these questions are to be found in what the system requires students to do to survive and prosper. The two topics covered in this section are fundamental to all aspects of an education program for medical students; they provide major challenges to medical school faculties. The first topic is explained well in the following recommendation:

> We recommend that faculty review their educational goals to ascertain that both the content and methods of evaluation are compatible with these goals. To attain congruence a variety of testing techniques should be used: tests of problem-solving skills, in addition to factual recall; tests of noncognitive educational outcomes, such as proficiency in performing procedures, in addition to written tests addressing cognitive outcomes; tests, oral and written, that require students to generate original responses, rather than select responses from a given list.
> *The New Biology and Medical Education.* Josiah H. Macy, Jr. Foundation, 1983

Approaches to Implementation

Sixty-five schools provided information about how they had implemented the goals of this recommendation.

- Eight schools have reviewed the congruence between the contents of their programs and their methods of evaluating their programs.

- One school has established exit objectives that the students must meet in order to graduate.
- One school focuses its review of educational objectives on the content of the basic science courses only.
- Four schools have formed committees to explore the existing evaluation system and make recommendations for change.
- Four schools have not acted on any aspect of the recommendation.
- Twelve schools are in the process of defining their approaches to the recommendation.
- Twenty-three schools have implemented one or more of the assessment methods suggested by the recommendation. They gave little indication that the assessment methods used (see following list) were related to stated objectives of the programs in which these methods are used.
    - Six schools use a performance-based evaluation approach to assess clinical skills.
    - Two schools have a required comprehensive, performance-based examination that students must pass in order to graduate from medical school.
    - Fourteen schools use standardized patients to evaluate their students' clinical skills.
    - Ten schools use an Objective Structured Clinical Examination (OSCE) to assess students' clinical skills. Two of these ten schools are using OSCEs on a trial basis.
    - Six schools use oral examinations regularly in one or more of the required clinical clerkships.
    - Two schools have added essay examinations as one method to assess their students' clinical knowledge.
    - Two schools use computer-based examinations to assess students' progress in the clinical curriculum.

Several of the responses highlighted the variety of opportunities that had led the schools to take action in implementing the goals of the recommendation.

- Eight schools have established three regional consortia of schools to develop cases to examine students' clinical skills. (One of the consortia was funded by the Josiah Macy, Jr. Foundation).
- Seven schools report that change occurred because faculty were aware of the need to change the evaluation approaches that the schools were using.
- At two schools, faculty members' awareness of national efforts to emphasize better assessment techniques led the schools to analyze their approaches to assessment.
- Seven schools reported that the support of the dean, associate dean, and/or the office of medical education stimulated them to seek changes.
- For four schools, recent initiatives of the Liaison Committee on Medical Education (LCME) for faculty members to observe students working with patients were the impetus to address the goals of the recommendation.

Although medical students have been exposed to a period of college and university education, most of them are quite incapable of pursuing their medical training independently as graduate students in the strict sense of the word. Only after they have obtained some appreciation of the field of medical education can they be expected to have much of an idea about the relative values of individual courses or special fields of study.

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Constraints and Difficulties

The constraints that the 65 respondents identified (see the following list) can be summarized as lack of faculty time, lack of resources, lack of information, and lack of reliable, valid measures of performance.

- The majority of the responding schools (36) reported that lack of financial and human resources is the major constraint to assessing their programs' objectives.
- Fifteen schools reported that lack of faculty time to develop alternative approaches to evaluation (i.e., something other than multiple-choice examinations) was a constraint. Even those schools that reported they had implemented one or more alternative assessment methods cited lack of faculty time as a constraint.
- Six schools cited as a constraint the lack of faculty time to score exams other than paper-and-pencil multiple-choice exams.
- Six schools indicated that their faculty members were unfamiliar with educational evaluation theories and practice and therefore tended to rely on "tried-and-true" evaluation measures, even though these do not necessarily match the educational goals of their program.

Medical students should not be considered as students successively of physiology, anatomy, or biochemistry, but as students of medicine. The training in the medical sciences should not be considered as preliminary to advanced work in these respective sciences, but rather as an introduction and experience which establishes a foundation for medicine.

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- Eight schools reported that the lack of reliable, valid measures to assess students' abilities (other than written examinations) is a constraint to adopting newer approaches. This was true even for four of those schools that have developed OSCEs or other performance-based examinations. The "tried-and-true" evaluation measures most commonly used by the schools are a student's scores on the National Board of Medical Examiners (NBME) exams.
- Eight schools reported that the NBME test format is still dominant in their curriculum and that faculty members are reluctant to relinquish traditional testing methods that "prepare students for boards."

Insights Gained

In general, the responses suggest that medical school faculty are not comfortable with tests that stress students' memorization and recall, even though many schools still use these approaches because they believe they lack the time or resources to develop alternatives. Schools are using more kinds of assessment approaches; however, at all but one of the responding schools, these efforts center on assessing the students' *clinical skills*. There is little evidence that the schools are concerned about changing their approaches to assessing students' knowledge and understanding of medicine's basic sciences. However, at one school students had requested alternate approaches to evaluation in their basic science courses. When faculty members complied, they learned that they obtained more information about students' knowledge and skills when essay questions were included in exams. But, the respondent continued, "larger amounts of material can certainly be tested with multiple-choice questions."

Unfortunately, that respondent's opinion is a common one concerning medical students' evaluation, especially in the preclinical curriculum. It is true that multiple-choice examinations require less time to score. In fact, computers can be programmed to score them. But it is time-consuming to construct multiple-choice questions to assess knowledge beyond facts that are memorized. One school's response summed up the dilemma by stating that a major constraint is the *difficulty of developing excellent machine-scored items that test problem solving.*

Necessary Strategies for Change

Perhaps the best way to encourage faculty to see that there is a problem in medical students' education is to change the types of examinations used in medical schools from those that stress recognition or memorization of facts to those that assess the behaviors and skills important for physicians. It will never be known whether students have difficulties with problem solving or patient evaluation unless these skills are assessed.

- Current examination techniques that rely principally on students' abilities to recall memorized information should be complemented by examinations that assess students' problem-solving and patient-evaluation skills.[16-17] As faculty members become familiar with such examinations, they should gradually introduce them to replace multiple-choice testing, which is now the most common testing approach.
- The AAMC and the NBME could work together as a coordinating body and clearinghouse for the development and testing of new evaluation procedures. For example, a combined bank of problem-solving multiple choice questions could be generated in the various disciplines; other types of evaluation methods could be submitted for distribution to schools; multi-institutional trials of new evaluation methods could be conducted; and workshops on evaluation methods used in other settings (higher education, industry, government) could be conducted.
- Schools need to recognize that the evaluation of students depends on more than the type of assessment technique or form used. The entire *system* of evaluation needs to be considered: How is information passed from one course to the next? Is there a student committee with oversight and timely information about students' progress through all four years of medical school? Is there a mechanism for assuring the student has met all established criteria and is able to begin a residency program upon graduation?
- As a part of the evaluation system, faculty members must consider whether the information gained from evaluating a student will be used diagnostically, to help the student progress, or to obtain information about the student's present knowledge, to be reported to a third party (e.g., as a prerequisite for graduation).

- The AAMC should expand its efforts to introduce faculty members and deans to its workshop about evaluation systems.

FORMALLY ASSESS CLINICAL SKILLS

Spirit of the Recommendation

A reigning assumption, seldom questioned, is that it is not difficult to assess a student's clinical abilities. However, as the following recommendation highlights, assessing clinical skills is not a simple process; it is not just a matter of observing a student work up a patient or give a presentation at rounds. What criteria should schools use to assess clinical skills? What is the role and responsibility of the faculty member in assessing clinical skills? What system should schools have to ensure that students are evaluated consistently and fairly in various clinical sites? The following recommendations are concise statements of these issues:

> Medical faculties should develop procedures and incorporate explicit criteria for the systematic evaluation of students' clinical performance. These evaluations will provide a cumulative record of students' achievements as they progress through their clerkships. Faculty members should share timely evaluations with students; they should reinforce the strengths of their performance, identify any deficiencies, and plan strategies with them for needed improvement. These procedures should facilitate the recording of faculty members' impressions of the students' personal characteristics and attitudes.
> *General Professional Education of the Physician*. AAMC, 1984

> Require medical students to pass comprehensive performance-based clinical examinations.
> *Adapting Clinical Education to the Needs of Today and Tomorrow*. Josiah H. Macy, Jr. Foundation, 1988

Approaches to Implementation

Seventy-one schools provided information about how they were implementing the goals of this recommendation.

- Ten schools have implemented an Objective Structured Clinical Examination (OSCE). One of these schools indicated that the faculty members are so pleased with the OSCE approach that they may establish a comprehensive examination that students will be required to pass to graduate.
- Four schools have implemented a system that provides for regular feedback to the students on their progress.
- At six schools all required clerkships use the same evaluation form for students.
- Three schools have developed a list of clinical skills on which all students are to be evaluated. All departments have agreed upon the list and use it when designing evaluations.
- Five schools use a midcourse evaluation to provide feedback to students.
- Three schools reported that the clerkship directors meet regularly to discuss the students' progress and to identify problems.
- Eight schools are working on implementing the goals of the recommendation; one of those schools is in the process of developing criteria to evaluate clinical skills.

The present system of detailed subject examinations, which rely so largely upon memory and which are still popular in secondary schools and some colleges, tends to defeat the major purposes of the training, which are not the collection of facts, but the intelligent and discriminating use of knowledge which is applicable to a given problem.

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The responding schools identified a variety of circumstances that enabled them to begin the changes necessary to implement the recommendation.

- Four schools reported that a national workshop sponsored by the AAMC and one sponsored by the both the AAMC and the Josiah Macy, Jr. Foundation provided the impetus to begin.
- Five schools reported that the guiding force was the support of the dean and interested faculty members.
- Four schools were prompted to implement the goals of the recommendation because of proposed changes in their national licensing examinations (prepared by the NBME in the United States and by the Medical Council of Canada.) The changes proposed for the licensing examinations are to assess candidates' clinical skills using standardized patients and performance-based examinations.

Properly conducted examinations which are designed to test the student's knowledge and grasp of the principles of medicine are an indispensable method [illegible] to which more attention should be given

[illegible] COMMISSION

- At one school a department of medicine provides faculty time, free of clinical responsibilities, to organize and develop a clinical skills exam.

Constraints and Difficulties

As mentioned at the beginning of this section, assessing clinical skills is a challenge, and the constraints and difficulties reported by 72 of the 84 schools that participated in the ACME-TRI survey bear this out.

- Limited funding was the major constraint reported by 14 schools.
- The lack of faculty time to devote to teaching, and specifically to evaluation, was the second major constraint noted. Fourteen schools (five included in the group of 14 that cited limited funding) reported that lack of faculty time and/or interest were constraints to implementing the recommendation.

The responses from many of the schools made it clear that a difficult problem is that faculty members are reluctant to evaluate students' clinical skills.

- Six schools reported that the reluctance of faculty members to evaluate the clinical abilities of their students prevented them from implementing the recommendation. The responses indicate that some faculty members fear litigation from students for perceived unfair evaluations and thus are reluctant to apply their subjective judgment, even though they acknowledge that such judgment is crucial.
- Seven schools reported that standardizing clinical evaluation is a difficult and sensitive issue because departmental autonomy is threatened when a common, standard form is used. Faculty believe there are enough variations between disciplines to make it impossible for a single form to capture individual department needs.
- One school developed an assessment instrument to be adopted uniformly by all clinical disciplines; however, faculty members would not accept it.
- Related to the sensitivity of developing a single, standardized evaluation approach, some schools indicated that there is an inherent difficulty in having more than one clinical education site, because consistent evaluation is more difficult.

Insights Gained

It is worth noting that many of the responding schools gave the same response to both recommendations listed in this section, since many of the responses to the first recommendation were limited to the evaluation of *clinical skills*.

Faculty members' assessments of students' clinical skills are variable. Only ten schools reported using an OSCE to determine their students' achievements in clinical clerkships. Achievement of clinical skills is usually assessed in reports from residents about students' performance as clinical clerks. These assessments are narrow and based largely on students' participation as members of the clinical service team. Few schools apply the assessments needed to determine whether students have developed the clinical skills required to progress into their graduate medical education. The fact that there are at least six schools where a single clinical evaluation form is used suggests that these schools have definite criteria with which they will evaluate their students, though none of the responses was specific about that aspect of the recommendation.

Necessary Strategies for Change

Improving faculty members' ability to evaluate students' acquisition of clinical skills requires formal assessment programs. The OSCE is an example of such an assessment. It can be adapted to the requirements of each discipline at each school.

- The OSCE, in place at many schools, represents an alternative form of evaluation to assess students' knowledge and clinical skills. The AAMC should expand its efforts to introduce medical school deans to this type of assessment and provide national and regional opportunities for faculty members to experience alternatives to multiple-choice examinations.
- The current efforts of several schools to establish consortia to share information about and approaches to evaluation should be supported and encouraged through the dissemination of useful information and approaches by the AAMC and the foundations supporting the efforts.

- The AAMC, working with the schools, should develop a resource database or clearinghouse of available assessment techniques and should make this resource available to all medical schools.

SECTION FOUR

EDUCATIONAL STRATEGIES

SPECIFY WHAT STUDENTS SHOULD LEARN AND THE SKILLS AND ATTITUDES THEY SHOULD DEVELOP

Spirit of the Recommendation

Considerable experimentation with objectives-based (i.e., competency-based) systems for instruction has occurred during the past two decades. [18] A few medical schools now use this approach to organize their students' education program around learning expectations (objectives) that are communicated clearly to students before instruction and that are used as the basis for evaluating their students' performance. [19-20]

However, for most schools a mission statement constitutes the only indication of the curriculum's purpose, and the possible interpretations of the statement are so variable that the goals of each discipline's curriculum offerings differ widely. Thus, the overall curriculum is not consistent or coherent.

Faculty members should define and agree on the required competencies for graduating students and, in so doing, define the purpose of their medical students' education in terms that have a similar meaning for all students and faculty members in all disciplines and all specialties.

This is not a simple agenda. The degree to which schools currently can define the knowledge and skills that students should develop is reflected in the ways they reported they were responding to the following recommendations. The responses reveal that there is little agreement about what is required to educate a physician.

> Medical faculties should specify the clinical knowledge, skills, values, and attitudes that students should develop and acquire during their general professional education.
> *General Professional Education of the Physician.* AAMC, 1984

> In the general professional education of the physician medical faculties should emphasize the acquisition and development of skills, values, and attitudes by students at least to the same

extent that they do their acquisition of knowledge. To do this, medical faculties must limit the amount of factual information that students are expected to memorize.
General Professional Education of the Physician. AAMC, 1984

Approaches to Implementation

Fifty-nine of the 84 schools that participated in the ACME-TRI survey responded to these recommendations. In general, the schools have been only moderately successful in defining the knowledge, skills, values, and attitudes that are the foundations for their education programs for medical students.

- Twelve schools have requested faculty members to define the relevant concepts that the medical students should acquire from their courses or clerkships. The approaches they are using fall into three categories: restricting the definitions of relevant concepts to the basic science courses; performing a curriculum "audit" (review); and designing a computer database to monitor the curriculum content for the basic science courses.
- Nine schools have defined educational objectives for some of the courses in their education program.
- Sixteen schools reported that they have defined knowledge and skills goals for their medical education programs. Of those schools, two have adopted commencement objectives, that is, objectives that graduating students must meet.
- Two schools have implemented a problem-based approach to teaching in the basic science courses. The goals for the skills and knowledge to be acquired through these courses are defined by the cases used in the problem-based course.
- Six schools report that a process to define the knowledge and skills that students should acquire is under way, but these schools did not provide specific information about their educational goals or the approaches being used.
- Six schools provided examples of opportunities that had stimulated and assisted their efforts to specify what their students should learn. Four of these schools cited the development of an Objective Structured Clinical Examination (OSCE) as the impetus to define the knowledge and skills to be mastered by their graduates. The other two schools indicated that attempts to improve the clinical evaluation process at the school prompted the faculty members to define the necessary skills to be evaluated.

Constraints and Difficulties

Fifty-nine schools commented on the constraints and difficulties that were encountered.

- Eight did not report any constraints or difficulties.
- Twenty-one said that the major constraint to implementing these recommendations was faculty members' reluctance and/or lack of time to define their programs' knowledge and skills goals. Faculty members were reported to be reluctant because (1) they receive neither credit nor remuneration for efforts to define the skills and knowledge to be gained from their courses or clerkships; (2) they remain unconvinced of the need to define the curriculum. Most believe that their lectures make clear what needs to be learned; (3) schools lack sufficient professional staff with skills to help faculty members define objectives for the curriculum; and (4) there is insufficient time to devote to the process of defining knowledge and skills.
- Nine schools cited problems in identifying the "core" material for their medical students' education programs.
- Seven schools indicated that their use of students' scores on the National Board of Medical Examiners (NBME) examination was a constraint in defining objectives for their schools' medical education programs. At these schools the NBME exams define the knowledge and skills that their curricula should foster.
- Two schools reported that students resist attempts to define skills and knowledge objectives because they are concerned that these objectives would not reflect those found on the National Board of Medical Examiners (NBME) exams.
- Ten schools acknowledged that they are having trouble trying to limit the content of the education program to a manageable level and reduce lecture time. These schools reported difficulties in finding lecture time in the curriculum for the "additional" material they think would be required if necessary skills and knowledge were defined.
- A lack of leadership to plan a coherent curriculum was the constraint cited by five schools.
- Three schools found it difficult to convene faculty members in groups to discuss and define the necessary knowledge and skills for the education program.

Students should be made to realize from the beginning of their clinical studies that the diagnosis in a large majority of illnesses can be made on the basis of a searching history, a thorough physical examination, relatively simply laboratory determinations, and the thoughtful consideration of the problem presented.

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Unless the student is required from the beginning to study his patients carefully and in detail, he is liable to develop habits of superficial examination, treatment, and thinking which may be a serious handicap later.

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- For five schools, a lack of financial resources was a constraint.
- Six schools reported that they had specified the clinical knowledge, skills, values, and attitudes that their students should acquire, but that it was too early to tell if they will encounter difficulties.

Insights Gained

The responses indicate that schools have found it difficult to define the goals of their students' medical education program. Only two of the 59 responding schools reported that they have defined the skills and knowledge that students must acquire to graduate. The schools that reported that they were implementing the recommendations did not specify whether the skills and knowledge they had defined are consistent with the goals of the school's present education program and/or the mission of the institution. With one exception, the responses from the schools focus on defining the knowledge and skills objectives for specific aspects of the curriculum rather than defining these for the total medical students' educational program. In addition, faculty members cannot agree on what should constitute the core knowledge and skills of the medical students' education program.

Faculty members' reluctance to define the knowledge and skills for their students' entire education program is the major barrier to implementing these recommendations. Their reluctance derives from the fact that doing so would probably reveal a need to change the program; the lack of recognition for faculty members' contributions to the teaching of medical students; and lack of resources and/or time for accomplishing this goal. With so many competing demands on faculty members' time and so little to guide their deliberations about what should constitute medical students' education, it is not surprising that the schools have faced difficulties in implementing these recommendations.

The responses to the recommendations indicate that there is a lack of institutional structure to foster oversight for the curriculum, and consequently faculty members and departments independently define their own curriculum agendas and goals.

Necessary Strategies for Change

- Schools must provide administrative mechanisms to permit cross-disciplinary consultation and concurrence about what should be included in medical students' education. At present, this rarely occurs except at schools where faculty members in several disciplines are engaged in teaching the basic sciences that pertain to each organ system. An organ-system-based curriculum has been adopted at only ten schools since it was introduced in 1950. The slow acceptance of this method substantiates the reluctance of most faculty members to devote time and energy to developing medical students' curricula.

- Describing the exit objectives that students must achieve in order to graduate is a strategy to bring about interdisciplinary discussion and action. These objectives can be formulated by having faculty members from each basic science and clinical discipline specifically describe the discipline's graduate objectives and then ask representatives from the other disciplines involved in medical students' education to review and criticize those objectives. If this process is appropriately managed and applied to program development, a coherent program of manageable dimensions can be evolved. Without such interdisciplinary cooperation and oversight, little will be accomplished.

- Faculty members should ask themselves whether they continue to believe in the specialty model. If they do, each department can still clarify its own objectives. If not, the stage will be set for an effort to establish more consolidated objectives for the entire program.

- Serious consideration should be given by the Liaison Committee for Medical Education (LCME) to prohibiting the use of licensure exam scores for a student's advancement in the curriculum. Similarly, the NBME should consider discontinuing its "subject exams," which schools can use as tests in their local curricula.

- One concrete approach is to organize brainstorming sessions among some faculty to devise a list of competencies organized into the areas of knowledge, skills, and values–attitudes. The list should be given to a group of faculty members to put in rank order; the process could be continued with other faculty members to develop consensus.

- The list of competencies just described could be used as a basis for interviewing residency directors and employers of physicians

in the different disciplines to determine what competencies they view as essential. One object would be to see the entire array of competencies that are perceived as important for physicians in each specialty and subspecialty and to note what the important differences in competencies are across the specialties. This process could serve as the focus for a consensus workshop and survey by the AAMC and could be reconvened periodically to respond to changing the health care needs of society.

FOSTER SELF-DIRECTED LEARNING AND LIFELONG LEARNING SKILLS

Spirit of the Recommendation

The physician practicing in the twenty-first century must have the skills to stay current with the constant changes in medical practice. Much of the science and technology that form the basis for medical practice that students are taught in medical school, especially during the first and second years, has changed in important ways by the time they complete their residencies, and this process will continue. The amount of information compressed into the four years of medical school cannot be memorized and later applied to the care of a human being. This concept is well stated in the following recommendation:

> To keep abreast of new scientific information and new technology, physicians continually need to acquire new knowledge and learn new skills. Therefore, a general professional education should prepare medical students to learn throughout their professional lives rather than simply mastering current information and techniques. Active, independent, self-directed learning requires among other qualities the ability to identify, formulate, and solve problems; to grasp and use basic concepts and principles; and to gather and assess data rigorously and critically. *General Professional Education of the Physician.* AAMC, 1984

Approaches to Implementation

Fifty-seven schools provided information about how they are meeting the goals of this recommendation.

- Twenty-one schools have incorporated a method called *problem-based learning* in one or more courses in their curriculum.

Problem-based learning can be defined best as the learning that results from the process of working toward the understanding or resolution of a problem. The problem is encountered first in the learning process and serves as a focus or stimulus for the application of problem-solving or reasoning skills, as well as for the search for or study of information or knowledge needed to understand the mechanisms responsible for the problem and how it might be resolved.[21]

The divided responsibility for the care of patients and the impersonal attitude so frequently taken toward patients in the hospital and clinics handicap the preparation of students for the assumption of individual responsibility required in practice, and for dealing with the emotional and psychological factors seen in many illnesses.

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- Two schools use problem-based tutorials as the predominant teaching strategy throughout the curricula for medical students.
- Three schools have a problem-based tutorial program for all courses, but it is limited to a segment of the class.
- One school uses problem-based tutorials to complement a required lecture series.
- Two schools reported that they offer an alternate, student-directed, independent study track for interested students.
- Three schools engage students in a research project and/or in required independent study as part of their curricula.
- Five schools have reduced required lecture time and increased unstructured time in the curriculum.
- One school has revised several courses to create time for a required "critical literature reading" element in the program.
- Three schools offer seminars on literature review and independent learning skills.
- One school has introduced a required course in the freshman year on how to use the medical school library.
- Eight schools have interpreted this recommendation as a need to increase computer-assisted instruction (CAI) in the curriculum. The emphasis in CAI is to have the student interact with a patient case presented through the medium of the computer screen. The student responds to case scenarios and questions posed by the computer program to diagnose and treat the simulated case.
- Five schools plan to incorporate the goals of the recommendation, but none of these plans has been approved or implemented yet.

The medical course can not produce a physician. It can only provide the opportunities for a student to secure an elementary knowledge of the medical sciences and their application to health problems, a training in the methods and spirit of scientific inquiry, and the inspiration and point of view which come from association with those who are devoting themselves to education, research, and practice.

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Constraints and Difficulties

Fifty-five schools reported that they had encountered the following constraints and difficulties when attempting to implement the goals of the recommendations: lack of facilities, resources, and faculty members' time; reluctance of faculty members to move from "tried- and-true" educational strategies to new technology; and insufficient training of faculty members to be facilitators rather than simply conveyers of information.

- Fourteen schools, many with significant problem-based components in the curriculum, cited the difficulty faculty members had in changing their role from one of being information providers to being learning facilitators as well.
- Two schools were unable to find adequate commercial software for CAI.
- One school cited faculty members' anxiety about being displaced by computers.
- Two schools reported they did not have adequate space for small-group instruction sessions.
- Eight schools reported that the demands on already overworked faculty members prohibited them from participating in and embracing a change to problem-based tutorial sessions.
- Resistance from faculty members who consider lectures the most efficient way to provide information was a barrier cited by 11 schools.
- Two schools reported that reducing lectures and scheduled hours was very difficult to accomplish.
- Six schools identified as a major barrier a lack of financial resources to develop the education program.
- In addition to faculty members' concerns, four schools noted that the students' apprehensions at directing their own learning and being held accountable for their learning presented major stumbling blocks.
- Two schools cited the requirement to pass the NBME Part I examination as a constraint to changing the curriculum.

Insights Gained

By far the majority of the responding schools focused on problem-based tutorial learning as the way to promote and teach students to be self-directed learners. Twenty-one of the 57 responding schools have moved or are moving to a self-directed, problem-based mode of teaching and learning in the medical school curriculum.[22]

The major constraints to further progress in this area continue to be that faculty members are generally unable or unwilling to abandon the role of being information providers only, and cling to the lecture method because it is the most efficient way for them to provide information. Even a school that reports having set objectives for graduating seniors stated it was difficult to convince faculty members not to go beyond the objectives in their lectures. The compelling belief that one is not teaching (and students will not learn) unless material is presented in lectures presents major barriers to students' acquiring lifelong learning skills.

There is continuing, but not universal, confidence in a specialization model of medical education that leaves the teaching of each domain to the faculty members who know it best. Accordingly, faculty members are hesitant and insecure about meeting their educational responsibilities in a new way and about becoming facilitators of the learning process rather than only transmitters of information to students, and they have little institutional support to do so.

This distinction, between being a facilitator of learning versus being solely a provider of information, is important, because to encourage lifelong, self-directed learning skills, the curriculum must become *student-centered*, not *faculty-directed*. Several schools equated self-directed learning with computer-assisted instruction or with the use of computers in literature search and retrieval.

Necessary Strategies for Change

- Faculty members' first goal should be to foster their students' lifelong learning by helping them develop their learning skills. Teaching students to memorize and recall information should be

a secondary goal. In this way, faculty members become students' mentors, guiding their learning rather than providing them information that they are expected to memorize and recall for tests.

- If there is to be significant improvement, faculty members must assume responsibility for educating medical students and must be prepared to accept training and criticism about their educational approaches. The AAMC should develop training programs that provide assistance in improving teaching skills and that are sufficiently challenging to capture the attention and willing participation of faculty members. Schools that genuinely desire to improve their education of medical students should devote resources to the education and training of their faculty members.
- Schools should make a service for computer-based literature searches available to students at low or minimal cost, along with training in the use of this resource.

SECTION FIVE

INFORMATION TRANSMISSION AND MANAGEMENT

DECREASE THE USE OF LECTURES

Spirit of the Recommendation

The curricula of North American medical schools continue to be densely packed with lectures as a way to transfer details of medical knowledge from the faculty member to students. In 1991-92, required lecture hours for first- and second-year courses ranged from a high of 1,226 to a low of 134.[23] Even though more medical educators are acknowledging that lectures should not necessarily be the primary mode of teaching preclinical courses, medical school catalogs and recent studies make it clear that many, if not most, faculty members remain devoted to lecturing and that other modes of education that encourage more independent, active learning are not nearly as widely used as they could be. These practices and beliefs were reflected in the responses that schools provided to the ACME-TRI survey's questions about the following two recommendations:

> Medical faculties should examine critically the number of lecture hours they now schedule and consider major reductions in this passive form of learning. In many schools, lectures could be reduced by one-third to one-half. The time made available by reducing lectures should not necessarily be replaced by other scheduled activities.
> *General Professional Education of the Physician*. AAMC, 1984

> Faculty members should foster the ability of students to learn independently, preparing them for careers in which they must ultimately take responsibility for the continuing growth and maintenance of their professional competence. Faculty members should always clearly state and communicate their goals for and expectations of students. They should, however, let students who have matured as learners increasingly find their own way of meeting those goals and expectations.
> *The New Biology and Medical Education*. Josiah H. Macy, Jr. Foundation, 1983

Approaches to Implementation

Fifty-eight schools out of the 84 that participated in the ACME-TRI survey responded. Essentially all of the responding schools are atempting to reduce actual lecture hours and some also are attempting to reduce the number of other required hours in the curriculum.

- Six schools reported that a curriculum revision has cut lecture hours by 15% or more.
- Seven schools reported that a curriculum revision has decreased lecture hours by 10% or more.
- Seven schools are in the process of a major curriculum change and are planning to reduce lecture time as part of that change.
- At 17 schools a decrease in scheduled time was mandated by a curriculum committee or the dean and supported by the medical school faculty.
- Four schools reported that a review of courses for content and redundancy has reduced scheduled lecture time.
- For three schools, adopting a problem-based tutorial program in the required curriculum resulted in a major reduction in lecture hours.
- Two schools have substituted small-group teaching for lectures in unspecified courses.
- Two schools reported that they had mandated a decrease in lecture hours in one or more courses; one school required some individual departments to reduce lecture hours.

Constraints and Difficulties

The responding schools frequently reported that faculty members resisted the reduction of lecture hours for a variety of reasons:

- Seventeen schools said that faculty members' support for lectures (because they believe that lectures are both the most effective and most efficient method to teach students) was so widespread that efforts to decrease them would be highly unlikely to succeed.
- At six schools, the faculty do not believe that students will learn what they should if left on their own.

- Concern about students' scores on the National Board of Medical Examiners (NBME) examinations was cited by six schools as a constraint to reducing lecture hours.
- Eight schools identified insufficient time and/or resources to train faculty members to lead small group tutorial sessions as a major constraint to introducing an alternative to lectures.
- Seven schools noted that faculty members are uncomfortable in small-group learning-teaching sessions and thus reluctant to reduce lectures.
- Six schools reported that faculty members believe that their status is linked to the number of hours their course is granted in the required curriculum and thus do not want to reduce contact time or lectures.
- Four schools commented that the lack of a central authority with responsibility for the medical students' education program is a constraint in attempting to reduce lectures.
- Two schools reported that a lack of physical space made it more difficult for them to reduce lecture time and to increase small-group learning activities.

The present concept aims to develop sound habits as well as methods of independent study and thought which will equip the student to continue his self-education throughout life. This can be brought about only by freeing medical education from some of its present rigidity, uniformity, and overcrowding and by articulating it more closely with the educational needs of the student.

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Insights Gained

In general, there is a modest move toward both reducing lectures and freeing time for students. Although many schools report that faculty members often resist these reductions, the frequency with which modest reductions were reported indicates that the use of lectures is being monitored and controlled to some degree. In several instances the hours gained through reducing lectures are devoted to small-group tutorial sessions that use problem-based learning strategies.

Many schools have been unable to mount the training programs needed to make faculty members comfortable and skilled as small-group tutors. The impediments to training programs are a lack of finances and a lack of faculty members' time; the extra workload imposed by small-group teaching was mentioned frequently as well. Yet it is particularly important to train faculty members how to conduct small-group sessions, because this will ensure that the attempts by schools to replace

The chief criticisms of the training in the medical sciences are directed against the presentation too early of too many details, often of temporary, miscellaneous, and inconsequential value. . . and the artificial segregation of the subjects.

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lectures with small-group instruction do not result in merely perpetuating the lecture approach on a smaller scale. One of the most important outcomes of such training would be that when faculty members planned each of their courses, they would no longer automatically choose—or reject—the lecture as the method of instruction, but instead would consider it as only one of several possible approaches to help their students learn.

A number of schools reported that many students are reluctant to assume the responsibility for their own learning and prefer lectures with a complimentary "class note-taking system." This finding demonstrates that having students acquire skills as active learners will require considerable effort and increased dedication to this goal by faculty members.

Necessary Strategies for Change

- The AAMC, with significant assistance from several medical schools, has developed a prototype computer-based database of all North American medical school curricula and also a system that can be used by individual schools to analyze the content and redundancies of their curricula. This database should be made available to all schools, and sessions should be included at national and regional meetings to introduce faculty members to this method to help them reduce the overlaps in their presentations to students.
- The AAMC should continue to encourage schools to implement problem-based, small-group learning methods by expanding its Management Education Workshop program. This program should incorporate training for faculty who assume the responsibility of being small-group facilitators.
- Schools can consult the *GEA Directory of Presentations and Workshops* [24] to find those workshops that offer training in educational techniques that are alternatives to lectures.

DEVELOP INFORMATION MANAGEMENT SKILLS

Spirit of the Recommendation

Increasing attention has been given to the exponential explosion of medical knowledge, the limited ability of students to learn and retain material, the difficulty for practicing physicians to keep abreast of new developments and discoveries, and the challenge for both students and physicians to organize and synthesize knowledge and to locate facts. [25]

At the same time, medical schools are evolving new approaches to teaching that include problem-solving exercises, small-group teaching, and making students responsible for their learning. These innovative teaching methods have been aided by the application of computers to medical education. [26, 27]

To practice medicine in the twenty-first century, medical students educated in the twentieth century must be given a strong grounding in the use of computer technology to manage information, support patient care decisions, select treatments, and develop their abilities as lifelong learners.

Many schools recognize the need to include the field of computer technology in their required curricula, as evidenced by their approaches to implementing the following recommendation:

> We recommend that the basic science curriculum offer students instruction in clinical and scientific applications of information management and computer technology. This should include their use in the retrieval of biomedical literature, in biomedical research, in clinical decision making, and in practice management. In part this recommendation addresses the information overload problem that confronts not only medical students but practicing physicians throughout their careers.
> *The New Biology and Medical Education.* Josiah H. Macy, Jr. Foundation, 1983

Approaches to Implementation

Sixty-nine schools responded; almost all indicated that there is broad recognition at their institutions of the need to introduce students to computer technology and information management and that implementation in general has been successful.

- Thirty-one schools have either increased or added required instruction in computer use to their students' education program.
- Twenty-four schools have established a computer laboratory for students to use in the first- and second-year courses.
- Thirteen schools have a required course in the first year to introduce students to the basics of computer use such as word processing, literature searches and retrieval, and database management.
- Twenty-four schools cited the important role that their libraries and medical librarians play in both teaching their students to use computers and supporting computer use.
- Nine schools have established computer networks for bulletin board functions, electronic mail, and computer-assisted instruction.
- Eight schools have established departments or units devoted to staffing and supporting computers in their curricula.
- Six schools have introduced a unit on the use of computers into the required "introduction to clinical medicine" course.

Many of the schools provided examples of specific opportunities that encouraged the successful incorporation of computers in the medical students' education program.

- Sixteen schools cited external funding and/or hardware and computer software donated by commercial companies as the impetus for introducing required courses in the use of computers.
- For 13 schools the support of the dean's office, in terms of both funding and administrative support, was the key to the successful expansion of the role of computers in medical students' education.
- Seven schools noted the importance of the interest and enthusiasm of key faculty members in introducing computers into the medical students' education program.
- At six schools, staff in a department of medical education who have computer skills provided the opportunity to introduce and maintain computers in the curriculum.

- Four schools utilized an existing computer system installed for other purposes (e.g., hospital record keeping; maintaining data on students' grades) and expanded it to increase the amount of curriculum time devoted to the use of computers.
- Four schools that used a problem-based teaching method incorporated computers into the required curriculum.
- Three schools saw the information and communication problems that arose when medical students were being taught at more than one site as an opportunity to implement a computer system for database management, communication, and information retrieval for these students.

There has been a tendency in recent years to attempt to provide instruction in the medical course in the various special fields of practice. This has been responsible in part for the great overburdening of the curriculum and the confusion regarding the purpose of the basic training.

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Constraints and Difficulties

Sixty-seven schools reported various constraints and difficulties in implementing this recommendation.

The constraint cited most often was a lack of funds to purchase computer hardware and to support faculty to develop needed software.

- Twenty-nine schools said that a lack of sufficient funds to support computer use was the major constraint. This constraint was noted as a deterrent to progress, even by schools that had implemented the recommendation.
- Eighteen schools reported that most faculty members do not believe a computer course is important in the education of medical students and, therefore, are unwilling to integrate computers into their teaching efforts.
- Eleven schools commented that the lack of available time in the curriculum to introduce a new course is a major constraint in promoting computer literacy.
- Ten schools reported that they did not have enough space for computer facilities.
- Ten other schools cited a lack of appropriate software for computer-assisted instruction.
- The lack of faculty members' experience, both with the technology of computers and with using computers to teach, was a problem identified by nine schools.

- Seven schools found faculty members' resistance to new technologies to be a major constraint in attempting to expand the role of computers in students' education.
- Seven other schools reported that faculty members interested in developing new software to use in computer instruction did not have time to do so. In this regard, one school noted that devoting time to developing new software was not considered an activity that would help a faculty member get promotion and tenure.
- Six schools commented that the lack of a long-range plan to incorporate computers into their medical students' education program is a constraint to both the initial implementation and continuation of such a program.
- Six schools did not have enough professional staff to support faculty members' efforts to introduce computers into the curriculum.
- A constraint commented on by four schools was that students were uncomfortable with computers in the required curriculum.
- Three schools noted that there was a conflict between the use of computers for medical students' education and for research. The financial resources necessary to support computer use were provided to the research efforts rather than to the medical students' education program.
- Three schools commented that the rapid changes in computer technology presented a barrier.
- Two schools reported that the high cost of supporting on-line library databases made it difficult to expand the use of computers for data retrieval in the medical students' education program.

Insights Gained

The majority of the responding schools recognize the importance of the recommendation, and most have successfully implemented a program to address some components of the recommendation. Primarily, the successes have been in (1) providing a facility where students have access to computers and (2) in using computer technologies, such as interactive videodisc instruction and computer-assisted teaching, in required courses. There also has been considerable effort in providing students with skills to do on-line literature searches. The role of the

librarian as resource and teacher is evidenced throughout the responses. Only two schools indicated they have incorporated computerized medical decision making into the medical students' curriculum.

It is ironic that even though this recommendation is an attempt to provide students with the skills to manage the vast body of information they are exposed to, several schools cited *a lack of time in the curriculum* as the major constraint to implementing the recommendation's goals.

As shown by comments on previous recommendations in this report, it is clear that the support of the dean is an important factor in implementing the changes recommended here. The dean's support is critical in terms of providing funds for both computer hardware and software and for professional staff to support faculty members' efforts.

The responses underscore the need to provide faculty members interested in developing software the time and resources to pursue such endeavors without jeapordizing their opportunities for promotion and tenure. In addition, faculty members need to be given opportunities to learn about computer technologies and ways in which computers can be used to enhance their students' education.

The medical course, partly because of the requirements for licensure, has been concerned more with the factual matter a student had memorized at the time of graduation than with the development of intellectual resourcefulness and sound habits and methods of study. Too great an emphasis has been placed on description and the memorizing of many details and facts which, though they are of little permanent significance, are of immediate value in passing the examination and in meeting the requirements of licensure to practice.

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Necessary Strategies for Change

- A library of medical education software that has been critically reviewed should be established. The AVLINE model, which the AAMC developed for the National Library of Medicine in the 1970s, could be applied to reviewing and cataloguing software.
- At present there is insufficient grant support available for faculty members who are willing and capable of developing medical education software programs. The AAMC and its constituent institutions should strive to increase support both from the private and public sectors. Consortia of medical schools that share computer programs should be encouraged and funded.
- There must be facilities to train faculty members in the use of computers for medical education. Such training is as essential as training in new research techniques. Training programs should be integrated into national and regional workshops to introduce faculty members to computer technologies.

- Medical schools should require faculty members who are responsible for medical students' education to become skilled in the educational applications of computers.

- Medical schools should establish some organizational structure to promote the use of computers in medical education. This should be done in a manner appropriate to the goals that the school's faculty have established in this area.

- The AAMC should encourage dissemination and sharing of information about the Integrated Academic Information Management Systems (IAIMS) program among all medical schools.

  (In 1983 the National Library of Medicine initiated an award program to "provide assistance to medical centers and health science institutions for planning and development projects leading to the implementation of integrated academic information management systems." The IAIMS are institution-wide computer networks that connect and relate library systems with individual and institutional databases and information files, within and external to the institution, for patient care, research, education, and administration. Over 70 institutions have applied for IAIMS grants, and through FY 1991, 26 awards have been made to 16 institutions.)

- Faculty members should be aware of an AAMC report on the roles for the library in information management.[28] Although published in 1982, it is still a useful source of ideas and guidelines on this topic.

The Shared Responsibilities for Educational Reform

This report began by stating that over the last 60 years most medical schools have made little progress in correcting major shortcomings in their students' education. While the evidence—in this case the responses to the ACME-TRI survey—speaks for itself, it is important to place the basic assertions of this report in proper perspective, particularly the repeated statement that faculty members lack the time and school administrators lack the institutional resources to properly educate their students.

By any standard in higher education, the teaching loads of faculty members in medical schools are low and the schools' resources are ample. The major reason that faculty members think there is not enough time and administrators think there are not enough resources to devote to educational change is because the institutional priorities of the academic medicine culture do not give students' education a high priority. Thus there has been little "free energy" at medical schools to initiate and sustain innovation. The result has been the postponement of educational reform that is documented in this report.

However talented and well-meaning medical school faculty members are, they would be much more likely to make serious efforts to improve their teaching practices if they could work in an institutional climate that supports such efforts. Thus, the responsibility for reform belongs not only to the faculty members but to many others in the academic medicine community as well. Meaningful change can occur only when everyone who is responsible agrees that medical students' education is critically important and works together to improve it.

SUMMARY OF STRATEGIES

For the reader's convenience, here is a summary of the strategies to achieve educational change that are presented in the five sections of this report.

This summary is in two parts: the first presents the strategies proposed for the schools. The second part summarizes specific strategies to be carried out by national organizations like the AAMC.

Strategies Proposed for the Schools

From Section One: Organization of the Program and Management of the Curriculum

- Integrated and coherent educational programs for medical students will be possible only if medical schools develop the organizational and financing structures to support such programs. To do this most effectively, deans and their faculties must learn how integrated, coherent, and coordinated education programs for medical students can be developed and administered in today's complex academic medical centers. Although the number of such programs is small, sufficient examples exist to demonstrate the feasibility of this model.

- A medical school must have a specific budget for its program for medical students' education. Determining the fraction of general revenue funds that departments apply to students' education will be a first step. Because many faculty members do not realize that they are compensated for their participation in the education of students, specifying the proportion of general revenues that support their involvement in their students' education will help them and the administration see the importance of that involvement. Specifying revenues also will require alterations in the nonspecific allocation of these funds to departments and divisions so that a school's education program for medical students will clearly be identified as a distinct responsibility of the school's faculty.

- Pressure to have central management of medical students' education will increase. For example, in 1991, the Liaison Committee for Medical Education added an accreditation standard that requires central curriculum responsibility and accountability. The requirement states:

  > The program's faculty is responsible for the design, implementation, and evaluation of the curriculum. There

design and management of a coherent and coordinated curriculum. The chief academic officer must have sufficient available resources and authority provided by the institution to fulfill this responsibility.[12]

To fulfill this requirement, all schools will have to designate a "chief academic officer" and give the person holding that position the required resources and authority. If strictly interpreted, this standard will require schools to centralize their programs in the ways recommended in the 1980s reports.

- Medical schools should develop a system for both peer and student evaluation of instruction and the curriculum. This will serve several functions. On a symbolic level, it says to all concerned that all participants in the educational process are accountable for the quality of the process. At the substantive level, it provides useful information about what is working and what is not.

From Section Two: Faculty Development

- Schools should establish an *educator* track with tenure for both basic science and clinical faculty members; this track would reward excellence in teaching and would establish a career pathway for those pursuing excellence in that area.

- Medical-discipline-based forums should be created on the national level, and those that exist should be encouraged to provide support for faculty members interested in teaching, publishing educational research, organizing forums for the presentation of invited papers and reviews, and exchanging educational materials (for example, software, patient cases, new teaching approaches).

- Clinical disciplines that provide required rotations for medical students should assign a faculty member and a senior resident at each site to assume responsiblity for the medical students' education program. These new responsibilities should be distinct from those related to clinical service activities.

  Senior residents and junior faculty who assume these responsibilities should be especially prepared by attending teaching institutes and workshops.

- Principal teaching faculty should not be expected to support themselves from income derived exclusively from their clinical

services. Their financial support should reflect the importance of their teaching.

- The development of advanced methods and materials for medical education can be stimulated through grants from both the public and private sectors. These should include grants for developing computer software and for establishing alternative curricula.

- Schools must create meaningful cross-disciplinary teaching opportunities to encourage faculty members to assume educational responsibilities beyond their specialized area of practice or research. Equally important, faculty must participate in cross-disciplinary examinations of students. An example of a specific approach to achieve this is problem-based learning. Problem-based learning is a method of teaching around case problems (see section four) in which the role of the faculty member is one of resource person rather than expert. This approach fosters interdisciplinary teaching and stimulates faculty members in the basic and clinical sciences to become involved in teaching subjects outside their respective disciplines or specialties.

From Section Three: Evaluation of Students' Achievement

- Current examination techniques that rely principally on students' abilities to recall memorized information should be complemented by examinations that assess students' problem-solving and patient-evaluation skills. As faculty members become familiar with such examinations, they should gradually introduce them to replace multiple-choice testing, which is now the most common testing approach.

- The Objective Structured Clinical Examination (OSCE) is an example of the kind of assessment method mentioned in the previous paragraph. It can be adapted to the requirements of each discipline at each school. The OSCE, in place at many schools, represents an alternative form of evaluation to assess students' knowledge and clinical skills and is an approach that all schools should implement.

From Section Four: Educational Strategies

- Faculty members must provide administrative mechanisms to permit cross-disciplinary consultation and agreement about what should be included in medical students' education. At present, this rarely occurs except at schools where faculty

members from several disciplines are engaged in teaching the basic sciences that pertain to each organ system.

- Describing the exit objectives that students must achieve in order to graduate can foster interdisciplinary discussion and action. These objectives can be formulated by having faculty members from each basic science and clinical discipline specifically describe the discipline's graduation objectives and then ask representatives from the other disciplines involved in medical students' education to review and criticize those objectives. If this process is appropriately managed and applied to program development, a coherent program of manageable dimensions can be evolved. Without such interdisciplinary cooperation and oversight, little will be accomplished.

- One concrete approach is to organize brainstorming sessions among some faculty to devise a list of competencies and classify them as knowledge, skills, or values-attitudes. The list should be given to a group of faculty members selected from both basic science and clinical disciplines to put in rank order; the process could be continued with other faculty members to develop consensus.

- The list of competencies just described could be used as a basis for interviewing residency directors and employers of physicians in the different disciplines to determine what competencies they view to be essential. One object would be to see the entire array of competencies that are perceived as important for physicians in each specialty and subspecialty and to note what the important differences in competencies are across the specialties. This process could serve as the focus for a consensus workshop and survey by the AAMC and could be reconvened periodically to respond to the changing health care needs of society.

- Faculty members' first goal should be to foster their students' lifelong learning by helping them develop their learning skills. Teaching students to memorize and recall information should be a secondary goal. In this way, faculty members become students' mentors, guiding their learning rather than providing information that students are expected to memorize and recall for tests.

- If there is to be significant improvement, faculty members must assume responsibility for educating medical students and must be prepared to accept training and criticism about their teaching.

- Schools should make a service for computer-based literature searches available to students at low or minimal cost and should train students how to use this resource.

- Schools can consult the *GEA Directory of Presentations and Workshops* to find those workshops that offer training in educational techniques that are alternatives to lectures.
- At present there is insufficient grant support available for faculty members who are willing and capable of developing medical education software programs. The AAMC and its constituent institutions should strive to increase support both from the private and public sectors. Consortia of medical schools that share computer programs should be encouraged and funded.
- There must be facilities to train faculty members in the use of computers for medical education. Such training is as essential as training in new research techniques. Training programs should be integrated into national and regional workshops to introduce faculty members to computer technologies.
- Medical schools should require faculty members who have responsibility for medical students' education to become skilled in the educational application of computers.
- Medical schools should establish some organizational structure to promote the use of computers in medical education.

Strategies for the AAMC and other National Organizations

Databases and Resources

- The Group on Educational Affairs (GEA) of the AAMC should develop strategies and complementary programs at both the regional and national levels to assist administrators and faculty in the implementation of more centralized educational programs at medical schools. These strategies should emphasize approaches to achieving the cooperation and consent of a school's governance system. At the regional level, the GEA should bring together its members from schools that are attempting to improve their students' education to encourage the members to share ideas and approaches to change.
- The AAMC should develop databases of information about the approaches medical schools are taking to improve their students' education program and should make these databases available

to medical schools as a first step in assisting them to implement the changes identified in this report.

- The AAMC also should develop a database that contains a comprehensive collection of educational innovations and approaches being used to implement curriculum change. This could foster rapid identification and distribution of useful methods.
- An AAMC-sponsored consortium for sharing and documenting the use of educational materials developed at individual schools should be established.
- The AAMC should work with medical schools experienced in developing problem-based cases to develop a central resource of such cases to promote sharing among disciplines and among schools.
- The AAMC and the NBME could work together as a coordinating body and clearinghouse for the development and testing of new evaluation procedures. For example, a combined bank of problem-solving multiple-choice questions could be generated in the various disciplines; other types of evaluation methods could be submitted for distribution to schools; multi-institutional trials of new evaluation methods could be conducted; and workshops on evaluation methods used in other settings (higher education, industry, government) could be conducted.
- The current efforts of several schools to establish consortia to share information and approaches to evaluation should be supported and encouraged through the dissemination of information by the AAMC and the foundations supporting those efforts.
- The AAMC, working with the schools, should develop a resource database or clearinghouse of available assessment techniques.
- The AAMC, with significant assistance from several medical schools, has developed a prototype computer-based database of the curricula of North American medical schools that can be used by individual schools to analyze and monitor the content of their curricula. This database should be made available to all schools, and sessions should be included at national and regional meetings to introduce faculty members to this database.

- A library of medical education software that has been critically reviewed should be established. The AVLINE model, which the AAMC developed for the National Library of Medicine in the 1970s, could be applied to reviewing and cataloging software.

Workshops and Collaborative Efforts

The following workshops and opportunities for faculty development should be established by the AAMC and other national organizations.

- Integrated and coordinated education programs for medical students will be possible only if medical schools develop the organizational and financial structures to support such pragrams. To do this most efficiently, deans and their faculties must learn how integrated, coherent, and coordinated education programs can be developed and administered in today's complex academic medical centers. Although the number of such programs is small, sufficient examples exist to demonstrate their feasibility.

  The AAMC, working with schools that have developed such programs, should establish workshops to assist its constituents to develop the administrative and financial management systems that are needed. The management workshops that the AAMC provides for newly appointed deans should include sessions on revising medical students' education.

- A new management workshop must be developed to marry the administrative, political, and financial issues that all deans address when they work to improve their education programs.

- The AAMC, working with the deans of the medical schools, should define a set of goals and objectives against which schools can assess their objectives. Each dean should consider requesting the school's faculty members to write, in 20 words or less, their *understanding* of the mission of the school. This exercise can serve as the point of departure for a discussion about establishing a school's unique institutional goals, emphasizing the importance of the education program at the school, and ultimately establishing instructional priorities.

- The AAMC's Council of Deans and Council of Academic Societies, working with the Group on Educational Affairs, should elaborate the necessary criteria and methods for documentation of faculty members' teaching accomplishments.

- The AAMC should expand its efforts to introduce faculty members and deans to its workshop about evaluation systems.
- The AAMC should expand its efforts to introduce medical school deans to the Objective Structured Clinical Examination (OSCE) assessment technique and to the comprehensive examinations developed at some medical schools, and should provide national and regional opportunities for faculty members to learn about alternatives to multiple-choice examinations.
- The AAMC should develop training programs that provide assistance in improving teaching skills and that are sufficiently challenging to capture the attention and willing participation of faculty members.
- The AAMC should continue to encourage schools to implement problem-based, small-group learning methods by expanding its Management Education Workshop program. This should incorporate training for faculty members who assume the responsibility of being small-group facilitators.
- At present there is insufficient grant support available for faculty members who are willing and capable of developing medical education software programs. The AAMC and its constituent institutions should strive to increase support both from private and public sectors. Consortia of medical schools that share computer programs and the cost program development should be encouraged.

Future Directions

This report represents the first step on the "road to implementation" of the strategies identified in this study. The next steps for implementation are summarized here.

- The AAMC will host a conference in December 1992 to reach consensus on the use of standardized patients in the teaching and assessment of clinical skills. Other goals are to define areas of uncertainty, explore differing viewpoints, and find the common ground for the use of standardized patients. The underlying aim is to develop a template for the useful application of standardized patients in clinical skills teaching and assessment.
- The database of medical school curricula, developed with several medical schools, will be tested during 1993. After careful review and refinement, the database will be made available to all medical schools for their individual use. A national database of medical school curricula will be developed at the AAMC and, ultimately, medical schools will have access to this database.
- The Group on Educational Affairs will expand its work with the AAMC's Council of Deans and Council of Academic Societies to provide educational workshops on topics of interest to deans and faculty members.
- The AAMC will continue to offer its workshops on student evaluation systems and problem-based learning. In addition, new workshops will be developed to introduce participants to the experience of facilitating small-group learning sessions.
- The AAMC will establish a task force of deans and faculty members to develop a set of goals for medical students' education against which schools can assess their goals.

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