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REVIEW ARTICLE

A retrospective and prospective look at medical education in the United States: trends shaping anatomical sciences education

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Abstract

During the last decade of the 20th century and the first decade of the 21st century, curricular reform has been a popular theme. In fact, reform on the current scale has not occurred since the early 1900s, when Abraham Flexner released his landmark report 'Medical Education in the United States and Canada'. His report, suggesting major changes in how physicians were educated, became the norm and few changes occurred until the last quarter of the 20th century. During this period increased demands on medical school curriculums due to the explosion of knowledge in biomedical sciences and the pressure to add additional clinical experiences increased the momentum for curriculum reform. In 1984 an Association of American Medical Colleges (AAMC) report, 'Physicians for the Twenty-First Century: The Report of the Panel on the General Professional Education of the Physician (GPEP) and College Preparation for Medicine', discussed many items related to reforming medical education including the value of integration, increased use of active learning formats, more self-directed learning, improved communication skills and increased problem-solving activities. This was followed by a report released in 1993 entitled 'Educating Medical Students: Assessing Change in Medical Education – The Road to Implementation' (ACME-TRI), which identified educational problems by surveying medical school deans, suggested ways to deal with these issues and presented a plan of action. Recently, the Carnegie Foundation for the Advancement of Teaching released 'Education Physicians: A Call for Reform of Medical School and Residency' with additional suggestions. At this point the question that might be asked is – Where is all this going and how is it going to affect anatomy education?

Key words: anatomical sciences education; curriculum reform; history of American medical education; medical education.

Introduction

Curricular reform! For the academic, these two words can bridge the full range of human emotions. It can be a time of excitement or a time of great fear and apprehension. It is viewed by some as a curse and by others as a time of great opportunity. It all depends on your point of view.

At this time, and for most of the 21st century, medical education in the United States has been in a state of change. For the anatomist, this has generally meant a course restructuring/remodeling to meet the changing demands/philosophy of a medical school curriculum committee. But before looking at the current trends shaping medical education and education in the anatomical sciences, it might be worth glancing over our shoulders to see what has shaped medical school curriculums over the past 100 years.

Pre-Flexner

Prior to the publication of the Flexner report in 1910 (Flexner, 1910) medical education in the United States was anything but uniform. It suffered from a lack of common standards, the absence of any type of certification that needed to be obtained prior to being able to see and treat patients, and, in general, there was no type of postgraduate or resident training required or occurring (Ludmerer, 1999).

Additionally, there were too many medical schools, many had been established for purely commercial motives, and

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the medical schools that existed had weak and varied admission standards. For example, some required a college degree, some only a high school diploma and some only equivalent activities and training with no formal degree or diploma. Finally, there were significant disparities in what was being taught at the various medical schools with no curricular uniformity. In fact, many schools followed an apprenticeship model.

In the early 1900s, the American Medical Association (AMA) and the Association of American Medical Colleges (AAMC) had concerns about the current situation and felt that something needed to be done. It was at this point that they turned to the Carnegie Foundation and asked this group to undertake a detailed study of the status of medical education in the United States. The Carnegie Foundation agreed to pursue such a study and chose Abraham Flexner to lead their study.

Abraham Flexner

Abraham Flexner was an educator who, after graduating from Johns Hopkins University at 19, returned to Louisville (Kentucky) and founded a school to test ideas about education which included small classes, personal attention and hands-on teaching. His school was very successful and its graduates attracted much interest from leading colleges.

Years later Flexner did graduate studies at Harvard University and in Berlin which greatly influenced his thinking. In 1908 he published his first book, *The American College* (Flexner, 1908), which was critical of American higher education and caught the attention of the president of the Carnegie Foundation, Henry Pritchett. Impressed by this young education scholar, Pritchett asked Flexner to lead the foundations study of American medical education.

Flexner report

Flexner's report, *Medical Education in the United States and Canada*, was released in 1910 and had profound effects on the education of physicians (Flexner, 1910). His basic conclusions were that medical schools with a university-based curricular design provided the best approach, that the curriculum at Johns Hopkins University School of Medicine should serve as a standard, and that, in general, medical schools should have strong educational programs and high-quality standards.

From these conclusions, Flexner made the following recommendations: (i) medical schools should be affiliated with universities; (ii) admission standards should be raised; (iii) sciences are fundamental to medicine and this premise should be reflected in training; (iv) an academic model of education and training should be followed; (v) medical schools should strive for higher quality faculty and better learning environments/facilities; and (vi) clinical training should be structured and have specific goals and objectives.

The impact of these changes over the following years and decades was remarkable and led to the system that remained intact in most American medical schools throughout the 20th century. Programs involved in the education of physicians had high standards for admission, usually requiring a college degree with science requirements, and an expanded science-based curriculum. This curriculum of 2 years of basic sciences with laboratory experience followed by 2 years of clinical training, as recommended in Flexner's report (Flexner, 1910), remained unchanged at most medical schools until the last quarter of the 20th century.

Last quarter of 20th century

Entering the last quarter of the 20th century, medical education in the United States began to have growing pains related to increased demands on curricular time. A major impetus for this was an explosion of knowledge in the biomedical sciences and everyone wanted time in front of the medical students. There was also a growing interest in increasing the integration in the early years of medical school between the basic sciences and clinical application. Finally, teaching methods began to sift and consider educational methods related more to how people learn versus how we teach (National Research Council, 2000). So, with change on the horizon two reports appeared in the 1980s and one in the 1990s that may have started the curricular reform movement.

AMA report

In 1982 the Council on Medical Education of the American Medical Association released a report entitled 'Future Directions for Medical Education' (American Medical Association, 1982). Its 35 recommendations covered everything including admission to, education in and training during medical school, postgraduate and specialty training, the function of specialty boards, licensure and continuing medical education, and foreign medical graduates. And while not directly related to curricular reform in medical education, this report got people thinking.

GPEP report

A more significant report related to curricular reform appeared 2 years later in 1984. That is when the GPEP report, or as it is more properly called *Physicians for the Twenty-First Century: The Report of the Panel on the General Professional Education of the Physician (GPEP) and College Preparation for Medicine*, made its appearance. This report was released by the AAMC and provided the next bit of guidance for medical education in the United States (AAMC, 1984).

Its two conclusions/recommendations were that it was important to recognize the value of improving integration

in the teaching of the biological sciences in medical education and it recommended the use of active learning formats that promote self-directed learning and problem solving. Looking back, the impact of the GPEP Report may be debatable, but it did continue to stoke the fires of curricular reform.

ACME-TRI report

Moving into the last decade of the 20th century, what may be the most significant report of this era was prepared and released. It was entitled '*Educating Medical Students: Assessing Change in Medical Education – The Road to Implementation*' (ACME-TRI Report, 1993) and is significant in that it identified problems and the barriers to solving these problems through a survey of medical school deans, suggested ways to deal with these issues or at least decrease their impact, and presented a plan of action that involved all interested parties.

Entering the 21st century

During the first decade of the 21st century two reports emerged that continue to stimulate discussions regarding how physicians are trained. One focused on premedical education, while the second dealt with education in medical schools.

AAMC-HHMI report

There was concern by faculty teaching premedical students that current course requirements for students interested in entering medical schools and the medical school entrance examination (MCAT) might not be putting these students in the best position to be successful learners as they begin the study of medicine.

With this in mind, the AAMC and the Howard Hughes Medical Institute asked a group of physicians, scientists, and science educators from large and small colleges, universities, and medical schools to identify competencies that graduating students should master prior to entering medical school and additional competencies that medical students should demonstrate as they progress towards graduation from medical school. The hope of a shift towards a competency-based education, as suggested by this group, was to replace hours as the driving force in the curriculum with learning (AAMC-HHMI, 2009; Anderson, 2010; Dalley, 2010; Darda, 2010).

Carnegie report

At nearly the same time, the Carnegie Foundation for the Advancement of Teaching initiated a series of comparative investigations entitled 'Preparation for the Professions' that would explore how clergy, lawyers, engineers, nurses and physicians are educated. The study examining physician education, *Educating Physicians: A Call for Reform of Medical School and Residency*, was released in the spring of 2010 and calls for significant changes not only in the programs that educate physicians but also in the overall approach to the profession (Cooke et al. 2010).

The report had three authors and visited 11 medical schools and teaching hospitals in the United States accredited by the Liaison Committee for Medical Education of the AAMC and three non-university teaching hospitals. They gathered information through interviews, focus groups and personal observations. Additionally, they conducted an extensive literature review on medical education and learning, and met with the leadership of numerous medical professional organizations.

At the conclusion of their study, the authors established four goals for medical education. First, there should be a standardization of learning outcomes (competency-based assessment) and individualization of the learning process (adjust to meet students' learning needs). Secondly, there needs to be integration of knowledge and clinical experience at all levels. Thirdly, physicians in training need to development habits of inquiry and innovation. Finally, professional identity formation should represent a major focus during medical education.

Where are we now?

Medical education in the United States has been in a period of curricular reform for the past 10–12 years and this situation will most likely continue for the next 5–10 years. When this event occurs at your institution, or if it has occurred, it can either be viewed as a 'curse' or 'an opportunity'. My suggestion is that it be viewed as an opportunity to be inventive and innovative. Look at what others have done and use your imagination.

The bottom line is that curricular reform is about change. Some of the current reasons for making changes, whether stated or unstated, are to reduce lecture hours, moving away from a teacher-centered approach towards a more student-centered approach, increase the time available for self-directed learning, reduce unnecessary redundancy between courses, provide less compartmentalized teaching and testing, and to promote topic integration. And while these are worthy goals, these types of changes challenge everyone involved.

The general trend that is being followed as medical schools make significant curricular changes has been to move from an educational program consisting of discipline-based courses to an integrated curriculum or a mixed curriculum (my term). The integrated curriculum typically moves through the various systems in the body, i.e. cardiovascular, reproductive, gastrointestinal, etc., and the anatomy, physiology, biochemistry, etc., related to that system is presented (Drake, 2007; Fishleder et al. 2007). In the mixed curriculum,

the academic year may begin with several short courses providing fundamental information related to anatomy, cell biology, physiology, etc., and then move to an integrated approach in the rest of the year and continue this approach in the second year (University of Pennsylvania website). Additionally, in either type of curricular approach, integrated or mixed, there will be some type of introduction to clinical medicine course/program throughout the academic year.

For the educator in the anatomical sciences, although these overall changes in the curriculum may appear to be aimed at decreasing the importance of anatomy in the curriculum, these reforms provide an excellent opportunity for vertical learning of the anatomical sciences (Drake, 2007). Make an effort to establish some type of unique educational activity in every aspect of the curriculum, where it is appropriate, including upper level clinical rotations. But always demonstrate how your contribution, an additional opportunity for students to reinforce their understanding of the anatomical sciences, has a positive impact on student learning, is a great example of vertical integration, and enhances their training as a future physician.

Course development/restructuring in the anatomical sciences

If you are a course director considering how to modify your program to fit into an integrated or mixed curriculum, it's important for you to remember the following four guiding principles. Presentation of material in the course should promote active rather than passive learning. The days of sitting through long and continuous hours of lecturing is gone, and, although lectures can still play an important role in education, evidence demonstrates that learning and retention are improved through the use of more interactive activities (Louw et al. 2009; Sugand et al. 2010; Zumwalt et al. 2010). The course being developed should make use of a variety of educational experiences. Use a multimodality approach (Korf et al. 2008; Finn & McLachlan, 2010; Lufler et al. 2010). People learn different ways (Fleming, 1995) and an approach that can help the visual learner, auditory learner and kinesthetic learner will pay the most dividends. Increase the focus on learning in context (Wilkerson et al. 2009). Incorporating a closer integration with clinical medicine throughout your course gives students a reason to learn (Pabst et al. 1986; Rizzolo et al. 2010). Learning should be longitudinal. Make every attempt to revisit material in each academic year. The amount of time you get is not as important as your presence in curricular activities (Rizzolo et al. 2010).

In conclusion, a note of caution that comes in the form of three basic principles of course development that must be remembered. The course being developed must match the overall curriculum and philosophy of education of the institution, it must be an approach that will work best for the group of faculty involved in the teaching, and it must be appropriate for the type of students that will participate in the program. Just because something works at one institution, does not mean it will work at your institution.

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