

FOCUS: EDUCATION — CAREER ADVICE

Medical Students as Medical Educators: Opportunities for Skill Development in the Absence of Formal Training Programs

Michael J. Peluso, MPhil^{a*} and Janet P. Hafler, EdD^b

^a*Class of 2012, Yale School of Medicine, New Haven, Connecticut;* ^b*Assistant Dean for Educational Scholarship, Yale School of Medicine, New Haven Connecticut*

All physicians, at some point in their career, are responsible for the education of their peers and junior colleagues. Although medical students are expected to develop clinical and research skills in preparation for residency, it is becoming clear that a student should also be expected to develop abilities as a teacher. A handful of institutions have student-as-teacher programs to train medical students in education, but most students graduate from medical school without formal training in this area. When such a program does not exist, medical students can gain experience in education through participation in peer teaching, course design, educational committees, and medical education scholarship. In doing so, they attain important skills in the development, implementation, and evaluation of educational programs. These skills will serve them in their capacity as medical educators as they advance in their careers and gain increasing teaching responsibility as residents, fellows, and attending physicians.

The primary objective of medical education is to prepare students to become successful practitioners of clinical medicine. Medical students follow a trajectory of coursework and clinical experiences in the classroom and on the wards. Through these experiences, they come to recognize that a key component of their careers as physi-

cians will be the responsibility for teaching colleagues at various skill levels, including medical students, residents, fellows, and attending physicians.

Surveys have indicated that students are enthusiastic about their role in education and look forward to teaching as residents [1]. The Liaison Committee on

*To whom all correspondence should be addressed: Michael J. Peluso, Yale School of Medicine, 367 Cedar Street, New Haven CT 06510; E-mail: michael.peluso@yale.edu.

†Abbreviations: AAMC, Association of American Medical Colleges; ACGME, Accreditation Council for Graduate Medical Education; LCME, Liaison Committee on Medical Education; NEGEA, Northeastern Group on Educational Affairs; SAT, Student-as-teacher program.

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Medical Education (LCME†) specifies that residents must be prepared to teach and evaluate medical students [2], and a correlation between perceived teaching ability and clinical competence has been demonstrated [3]. Many institutions have established clinician-educator tracks for attending physicians with a primary interest in teaching and more recently have emphasized the quality of teaching in hiring and promotion [4].

Despite the importance of preparation for their career-long role as teachers [5], most students do not receive formal training in this area. A small number of schools offer training programs for students interested in teaching, often referred to as student-as-teacher (SAT) programs [6]. But when a formal SAT program does not exist, it may be unclear how students should demonstrate interest and develop skills in medical education. This article addresses how medical students can prepare themselves to teach and become scholarly in medical education in the absence of formal training programs.

SKILL DEVELOPMENT IN MEDICAL EDUCATION

Medical school curricula are designed to help students develop the knowledge and skills that will prepare them for advanced training during residency [7]. These include taking a patient's history, performing physical examination maneuvers, and executing routine procedures such as drawing blood, suturing lacerations, and inserting a Foley catheter.

In addition, it is expected that all medical students will appreciate the utility of the scientific method [7]. Academic institutions provide time, funding, and mentorship for scientific research, and it is typical for students to graduate with several research experiences and publications [8].

In contrast, it is unclear whether a graduating medical student should be expected to have developed any skills in the area of education during his or her training. In its guidelines for medical schools, the Association of American Medical Colleges (AAMC) does not specify any requirements

for the exposure of medical students to their role as teachers [7], although the Accreditation Council for Graduate Medical Education (ACGME) does assert that residents should participate in the education of medical students, residents, and other healthcare professionals [9]. It is not clear when these skills should be developed, but evidence suggests that early teaching opportunities can help students better appreciate the role of physicians as teachers [10], and it has been argued that formal education initiatives should be part of the training of all physicians beginning at the medical student level [5]. Since even junior residents are engaged in educational activities with medical students, it may be reasonable to expect students to develop a core set of educational skills during medical school.

A framework regarding competencies for medical teachers previously has been described [11] and includes a variety of teaching domains. Table 1 suggests a set of competencies for medical students, based on these domains and the addition of a final domain: scholarship. These suggestions can be viewed in the context of specific objectives for formal medical education training programs [5]. Each competency represents a skill that will prove vital in the medical student's educational activities as a senior student, resident, or attending physician.

Development, Organization, and Execution

The first three areas in which students should develop skills involve planning and executing an educational activity. A student teacher should be able to identify the goals of the activity and state the objectives that should be achieved through participation. These objectives can be used by the learners to review and test their knowledge and by the teacher to evaluate the success of the activity. The student teacher should identify the appropriate format for the activity based upon the target audience and available resources. In planning content, the student teacher should reflect on the limitations of his or her own knowledge and supplement it accordingly. The student teacher also may

Table 1. Suggested competencies for training in medical education in the absence of a formal student-as-teacher program.

Domain	Competency	Corresponding Experience			
		Peer Teaching	Course Design	Review Committee	National Meetings
Development	Identify the objectives of an educational activity	+/-	+	+	-
	Choose the format of an educational activity	+/-	+	-	-
	Design the content of an educational activity	+/-	+	-	-
Organization	Plan the logistics of an activity or program	+/-	+	-	-
Execution	Deliver the content of an educational activity	+	+/-	-	-
Coaching	Serve as a mentor for student participants	+	+	-	-
Assessment	Give feedback regarding the learner's performance	+/-	+	-	-
Evaluation	Receive feedback on performance as teacher	+/-	+	+/-	-
	Provide feedback to faculty as a student	-	-	+	-
Scholarship	Engage in a form of educational scholarship	+/-	+/-	+/-	+

"+" suggests that the student is likely to develop the competency through completion of the corresponding experience, "-" suggests that the student is unlikely to develop the competency, "+/-" suggests that the student may or may not develop the competency based on the specific nature of an individual experience.

be required to coordinate the logistics of the activity, such as preparing educational materials and navigating the administrative relationships associated with being an educator. Finally, the student teacher should implement the activity so as to gain experience in teaching the content that he or she has developed. In doing so, one should ensure that he or she has sufficiently explored each of the objectives established at the outset.

Coaching, Assessment, and Evaluation

The next three areas of skill development involve interaction with the learners in the context of the activity. A student teacher should engage the learners by directing the

activity toward their knowledge and interests. He or she should determine an appropriate way of assessing participants, give constructive and specific feedback, and direct them toward appropriate resources for further development. Finally, a student teacher should learn to implement a method of evaluating the activity and make modifications accordingly. This can occur verbally in feedback sessions or through thoughtfully constructed surveys.

Scholarship

Educational scholarship is defined as an educational activity that has been evaluated, made public, and might serve as a platform for others to build upon. The student teacher

should be encouraged to engage with and participate in the broader community of medical education scholarship by making his or her work known within and, if appropriate, outside his or her institution. One should also understand the significance of his or her work within the context of medical education scholarship. The establishment of faculty mentors will be crucial to these experiences, especially when a formal training program does not exist.

OPPORTUNITIES FOR SKILL DEVELOPMENT

Even when formal SAT programs do not exist, there are a variety of ways that medical students can train themselves to develop basic competencies within these domains. These include peer teaching, course design, review committee membership, and attendance at medical education meetings.

Peer and Near-Peer Teaching

Peer teaching refers to an educational relationship in which the teacher and learner are at a similar educational level. Near-peer teaching is used to describe situations in which the teacher has significantly more (2 to 5 years) training than the learner. The success of these relationships is thought to be due to the recent experience of and more effective communication by the student teacher [12]. Additional motivation comes from the opportunity to reinforce the teacher's own knowledge and develop teaching skills in the process [13].

Many institutions offer opportunities for students to serve in an educational capacity through peer and near-peer teaching. While a fourth-year student may be relatively inexperienced compared to faculty, such a student has already developed knowledge and skills that would not be expected of a second-year student. Commonly, experienced medical students can assume the role of tutors in student-led programs [14,15] or teaching assistants [16] in subject areas like Anatomy [17,18,19] and Physical Diagnosis [20,21]. At Yale School of Medicine, near-peers work in teams at a local free clinic, with the "se-

nior" team member (usually a third- or fourth-year student) assuming the role of the medical resident and the "junior" team member (usually a first- or second-year student) assuming the role of a more senior student [22]. This structure provides an opportunity for students to experience the patient care and educational roles that they will formally assume in the near future.

Peer and near-peer teaching opportunities are valuable in allowing students to develop educational sessions, organize tutoring programs, or provide discrete teaching boluses to a more junior trainee. However, they are limited by the confines of a pre-existing curriculum and minimal control over the timing, format, and content of the teaching activities. Peer teaching provides the student with the opportunity to practice educational skills in a real setting.

Participation in Course Design

Some medical schools allow dedicated students to advise the institution on the design of the basic science or clinical curriculum [16,23]. On a rare occasion, a student may have the opportunity to demonstrate greater responsibility by developing a course in collaboration with faculty [24,25]. These unique opportunities require initiative on the part of the student, an interested faculty course director, and a receptive medical school administration. Student-designed courses can take the form of revisions or additions to the existing core curriculum or the creation of new elective courses. While they can be designed and organized by students, they may also provide the opportunity for students to peer teach within them.

Core Course Design

Designing or revising a course that is a component of the formal medical school curriculum can be uniquely challenging as a student. It first requires the recognition of a gap in the curriculum or an assessment that provides evidence that a course needs revising. A medical student who has completed a portion of the curriculum can provide insight into the intricate connections between components within that curriculum.

Different levels of training come with specific advantages in core course design. For example, in the design of a first-year core course, a second-year student may benefit from his proximity to the content and better understanding of the first-year knowledge base. However, a fourth-year student might be able to provide a clinical perspective that can enhance the content and delivery of the course material. With adequate faculty support, both students have the capacity to participate in the design of excellent core courses.

Regardless of the student teacher's training level, several concepts apply in the design of a core course. The student teacher must identify the student, faculty, and administrative stakeholders and consider how the content will fit in with the overall curriculum. The format of the course should be used to optimize the delivery of the content. A student may be uniquely qualified in this area, as he or she will likely be able to match the format and content of the course with the expectations of the learners, making use of new resources and technologies previously unavailable to students or unused by faculty. The student teacher can construct learning objectives that will guide both the teachers and learners in the course, in addition to negotiating the administrative responsibilities of producing course materials designed with the students in mind. Finally, the student-designed course should have a built-in element of evaluation, in which the designer can receive feedback regarding its strengths and weaknesses.

Elective Course Design

While opportunities for students to design a core course are rare, opportunities to undertake the design of an elective may be more frequent. There are several important differences between the design of core and elective courses.

First, electives may have a broader target audience and therefore a wider variety of stakeholders. For example, the Global Health Seminar at the Yale health professional schools includes students and faculty from the schools of public health and nurs-

ing in addition to medical students, residents, and physician associates. Designing a course for multidisciplinary stakeholders requires an understanding of their divergent backgrounds, interests, and educational goals.

Second, an elective can be more dynamic than a core course, allowing for experimentation and innovation that may not be possible under the restrictions of the formal curriculum. The Global Health Seminar at Yale has undergone multiple iterations over the last 5 years, and while the overall objectives have remained the same, the way in which those objectives are met has involved major variations of format and content. This flexibility is part of what makes a student-led elective course such a valuable tool for the development of educational skills.

Third, the success of elective courses is contingent upon student interest. While organizing an elective for even just a year can be a valuable experience for a medical student, a student teacher should endeavor to develop a program that is sustainable. This comes with added organizational challenges as student teachers work to secure funding and faculty support that will "formalize" the course and guarantee its sustainability, while still maintaining an element of autonomy in determining content. The balance between innovation and institutionalization can be difficult to achieve.

Review/Advisory Committee Membership

Medical schools have committees that evaluate the components of the curriculum, address student concerns, provide feedback to the faculty, and develop plans for further curricular development. Membership on these committees may be open to students in addition to faculty. Participation can grant the student broad exposure to the basics of medical education, curriculum design, and especially curriculum evaluation, as students may be given the responsibility to review the course format, content, or feedback and present it to faculty during a meeting. At times, students may be asked to provide recommendations for improvement to faculty

during these meetings. Providing constructive feedback in a public setting is a useful skill for a student to develop during medical school and can indeed serve him or her well on the wards as both a student and instructor.

In serving on a review committee, a student can become familiar with important institutional, AAMC, ACGME, and LCME guidelines, as well as the administrative and logistical factors associated with organizing and implementing an educational program. Participation can instill an enthusiasm for medical education through exposure to faculty who themselves have made education an important component of their careers. It can also help students identify areas of interest within education and form relationships with faculty mentors. Most importantly, it provides an opportunity to directly improve the quality of medical education at the home institution.

Participation in National Meetings

There are a number of medical education meetings that occur annually throughout the United States. In March 2011, the Northeastern Group on Educational Affairs (NEGEA) for the first time opened its registration to students with an interest in medical education [26]. The conference featured a student track that involved participation in the plenary sessions of the conference but also featured student-specific workshops, including the opportunity to meet with the conference keynote speakers. Students presented their educational research alongside faculty at the poster session and those not presenting were assigned to faculty reviewers who instructed them on how to evaluate medical education posters.

Participation in national meetings can be a valuable way of learning about the field of medical education. It affords students the opportunity to present original scholarship, network with faculty from different institutions, and learn about projects implemented elsewhere that might be applicable at their home institution. Most importantly, these conferences provide an interface between students and the medical education community.

Skill Development in Context: Recognizing an Educational Opportunity

This article provides a list of skills that medical students can develop as they look forward to their role as medical educators. However, it is unlikely that a student will become a good teacher by treating these requirements as a checklist.

Instead, these skills should be viewed in the context of the dynamic educational environment of medical school and the healthcare system, which takes many different forms: in the classroom with lectures and small group sessions and on the wards in patient encounters, rounds, and informal interactions with the clinical team. One of the most useful skills that a medical student can develop during his training is the ability to identify a “teachable moment” — the type of situation in which an educational interaction can be valuable to a student. Once this has occurred, the above skills can be used to develop and execute an educational activity within its context.

CONCLUSIONS

All medical students, at some point in their career, will be responsible for the education of their peers and junior colleagues. Medical students are expected to develop skills in clinical medicine and research to serve them in their capacity as senior students, residents, attending physicians, or physician-scientists. We encourage medical students to develop competencies in medical education as well. While many institutions offer teaching opportunities in some form to medical students, only a few have structured SAT training programs designed to impart the knowledge and skills required of a medical educator. However, even where such programs do not exist, medical students who wish to demonstrate interest in and receive exposure to medical education can do so in a variety of ways, including peer or near-peer teaching, core or elective course design, participation on review committees, and attendance at national meetings. These experiences may differ significantly in terms of expectations and responsibility, but each

represents a valuable opportunity for a student to develop the knowledge, attitudes, and skills that will serve him or her in a career as a medical educator.

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