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CURRICULAR REQUIREMENTS FOR
MUSCULOSKELETAL MEDICINE
IN AMERICAN MEDICAL SCHOOLS

BY MATTHEW R. DICAPRIO, MD, AARON COVEY, MD, AND JOSEPH BERNSTEIN, MD, MS

A fundamental knowledge of the musculoskeletal system and its disorders is necessary for most practicing physicians, regardless of their specialty. Disorders of the musculoskeletal system are the primary reason that individuals seek medical attention in the United States^{1,2}. Nonetheless, there is evidence that medical students are not well prepared in this area. Freedman and Bernstein³ administered a basic-competency examination comprising twenty-five questions on musculoskeletal medicine to a group of eighty-five recent medical school graduates. The examination was validated by 124 chairmen of orthopaedic departments, and a passing grade of 73.1% was set. With use of this criterion, 82% were found to have failed the examination. The examination was further validated by the directors of medical residency programs, and a comparable passing score was set⁴. Moreover, Clawson et al.⁵ surveyed 5487 second-year residents in United States allopathic and osteopathic residency programs and found that many considered themselves ill-prepared in the area of musculoskeletal medicine.

On the basis of these reports, it is reasonable to believe that medical students in the United States are not

receiving the instruction in musculoskeletal medicine that they need. We hypothesized that if preparation in musculoskeletal medicine is indeed inadequate, a lack of required curricular time devoted to these subjects may be the cause. Therefore, we assessed the extent to which American medical schools require either a preclinical course in musculoskeletal medicine or a clinical clerkship in a related field, namely, orthopaedic surgery, rheumatology, or physiatry (physical medicine and rehabilitation).

Materials and Methods

Curriculum data were obtained from the 122 medical schools in the continental United States and Hawaii. The American Association of Medical Colleges web site, www.aamc.org, provided links to the web sites of all medical schools in the United States. Data were obtained directly from curriculum information published on the web sites of 103 (84.4%) of the 122 medical schools. For the nineteen schools for which information on the Internet was not available or was inadequate, a telephone or e-mail inquiry to the appropriate medical school office was used to gather data.

A standardized means of data col-

lection was employed. For the preclinical curriculum, we determined simply whether a distinct course in musculoskeletal medicine was required. (Although it can be assumed that musculoskeletal topics would be covered as part of traditional basic-science courses such as anatomy, physiology, and pathology, the school was recorded as not requiring a preclinical course unless a distinct course in musculoskeletal medicine was listed.) For the clinical curriculum, we determined whether there were required clerkships in orthopaedics, rheumatology, or physical medicine and rehabilitation. The duration of the required musculoskeletal clerkship was recorded. We also assessed whether the clinical curriculum offered an optional or required subspecialty rotation in orthopaedic surgery within the required clinical clerkship in surgery.

Results

Fifty-one schools (41.8%) offered a required preclinical module or block of instruction focused on musculoskeletal medicine. Only twenty-five (20.5%) of the 122 schools had a required musculoskeletal clerkship during the clinical years (Table I). Fifty-seven schools, rep-

TABLE I The Number of Schools That Do or Do Not Require a Course in Musculoskeletal Medicine

	Clinical Course Required	No Clinical Course Required	Total
Required basic-science course	11	40	51
No required basic-science course	14	57	71
Total	25	97	122

representing nearly half of the sample, had no required instruction in musculoskeletal medicine whatsoever. Among the schools that required a clerkship, the average duration of the clerkship was 2.37 weeks, with a range of one to eight weeks (Table II). No school required a clinical clerkship in rheumatology, and only six schools required a clerkship in physical medicine and rehabilitation. Sixty-one schools (50%) required that their students take a surgical subspecialty rotation as part of the required clerkship in surgery. (These are so-called “selective” courses in that the student is required to rotate on a subspecialty service but retains the choice of which service to select. A “selective” resides conceptually somewhere between an elective course and a required one.) Orthopaedic surgery was uniformly among the surgical subspecialties from which students could choose. These rotations were typically two to four weeks in length.

Discussion

The prevalence of musculoskeletal problems among patients presenting to a typical primary-care physician has been estimated to range from 15% to 30%^{6,7}. Pediatricians and emergency department physicians also are called upon to care for patients with musculoskeletal disorders. All graduating medical students should therefore possess a basic competency in musculoskeletal medicine.

Our data showed that if preparation in musculoskeletal medicine is indeed inadequate (as the study by Freedman and Bernstein³ suggested), it may be because there is a lack of required instruction in musculoskeletal medicine among American medical schools. The results in the present study

imply that the poor examination performance in musculoskeletal medicine demonstrated by Freedman and Bernstein³ and the lack of confidence in this area detected by Clawson et al.⁵ are caused by a lack of preparation in medical school. Specifically, nearly half of American medical schools allow their students to graduate without having had any formal training—clinical or basic science—in musculoskeletal medicine. Fewer than half of the medical schools offer a distinct course in the preclinical years, and four of five do not require a clinical rotation. Such allocation of instructional time, we contend, is wrong.

The distribution of curricular requirements in musculoskeletal medicine among American medical schools is similar to that of Canadian medical schools, as shown by Pinney and Regan⁶. In the sixteen Canadian schools, only 2.26% of the total curriculum time was devoted to musculoskeletal education. Further, fewer than one-third (five) of the sixteen Canadian schools provided mandatory exposure to musculoskeletal education in the clinical setting. Finally, seven of the sixteen program directors rated their university’s curriculum as inadequate overall in preparing students to deal with musculoskeletal problems.

The present study, one can speculate, is limited in certain respects. To

start, it is possible that extensive education in musculoskeletal medicine is interspersed in the curriculum without formal designation. For example, the course in anatomy may teach aspects of spine and extremity anatomy, a biochemistry course may include discussion of the skeletal proteins, and a pathology course may present the details of fracture-healing. Thus, the numerical representation of the curriculum’s hours may greatly underestimate the time devoted to musculoskeletal medicine. Nevertheless, we contend that it is reasonable to count only the explicit hours. For one reason, the enumeration of only explicit hours offers a basis for comparison. Furthermore, one could argue that topics that are introduced into the curriculum in fragmented fashion may not be mastered as well as those taught in unified courses. And, perhaps no less important, students themselves may fail to accord the proper respect—and study effort—to topics that are not explicitly presented as a coherent whole.

The number of hours that are devoted to a topic does not reflect the quality of the instruction: a school that offers more hours does not necessarily offer better teaching. On the other hand, it is clear that if there is no instructional time, the teaching cannot be excellent. Finally, we note that there are ample opportunities in the typical fourth year curriculum for

TABLE II Duration of Required Clinical Exposure to Musculoskeletal Medicine

No. of Weeks Required	No. of Schools
0	97
≤2	21
>2	4

students to take elective courses to remedy any deficits that they may perceive. Thus, the responsibility for the demonstrated lack of competence and confidence may be aptly shared with students as well.

It would be fair to consider the explicit limitations of the study. We did not measure any historical changes in the curriculum (that is, whether the time devoted to musculoskeletal medicine is more or less than that offered in the past), and we did not compare musculoskeletal medicine with any other subject. It may well be that other important subjects are also slighted. Still, to our view, it would be incorrect to argue that required instruction in musculoskeletal medicine cannot be offered because there are so many more deserving topics. The typical fourth year curriculum probably could accommodate more than one additional requirement.

Given the evidence that medical students are inadequately prepared and lack confidence in musculoskeletal topics, medical schools should increase their requirements in this area: those with no requirements might well add them, and schools with such courses

may want to increase their duration. This approach is not a panacea, of course. Persistent problems include the scarcity of accepted teaching materials and texts, the recruitment and retention of willing and able faculty, and the articulation (by specialty societies, licensing and testing organizations, or local medical school faculty) of standards of competence and strategies to meet them. Still, increasing the amount of curricular time dedicated to the topic of musculoskeletal medicine, even with the limitations at hand, is probably a worthwhile first step.

Matthew R. DiCaprio, MD
Aaron Covey, MD
Department of Orthopedic Surgery, Yale University, P.O. Box 208071, New Haven, CT 06520

Joseph Bernstein, MD, MS
Department of Orthopedic Surgery, University of Pennsylvania, 424 Stemmler Hall, Philadelphia, PA 19104-6081. E-mail address: orthodoc@post.harvard.edu

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References

1. **Praemer A, Furner S, Rice DP.** *Musculoskeletal conditions in the United States.* 2nd ed. Rosemont, IL: American Academy of Orthopaedic Surgeons; 1999.
2. **National Center for Health Statistics.** *National Ambulatory Medical Care Survey.* Washington, DC: United States Government Printing Office; 1995.
3. **Freedman KB, Bernstein J.** The adequacy of medical school education in musculoskeletal medicine. *J Bone Joint Surg Am.* 1998;80:1421-7.
4. **Freedman KB, Bernstein J.** Educational deficiencies in musculoskeletal medicine. *J Bone Joint Surg Am.* 2002;84:604-8.
5. **Clawson DK, Jackson DW, Ostergaard DJ.** It's past time to reform the musculoskeletal curriculum. *Acad Med.* 2001;76:709-10.
6. **Pinney SJ, Regan WD.** Educating medical students about musculoskeletal problems. Are community needs reflected in the curricula of Canadian medical schools? *J Bone Joint Surg Am.* 2001;83:1317-20.
7. **Rosenblatt RA, Cherkin DC, Schneeweiss R, Hart LG, Greenwald H, Kirkwood CR, Perkoff GT.** The structure and content of family practice: current status and future trends. *J Fam Pract.* 1982;15:681-722.