Results of a Near-Peer Musculoskeletal Medicine Curriculum for Senior Medical Students Interested in Orthopedic Surgery

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INTRODUCTION: It has been previously demonstrated that medical students do not achieve an adequate musculoskeletal knowledge base on graduation from American medical schools. Several curriculums have been developed to address this measured deficit. Students entering orthopedic surgery residencies have a better musculoskeletal knowledge foundation than their peers but still fail to achieve an acceptable level of proficiency on graduation from medical school.

METHODS: Fourth-year medical students participating in senior elective rotations in orthopedic surgery over a 2-year period were given a series of lectures developed and presented by post graduate year 3 orthopedic surgery residents. Students completed a validated musculoskeletal competency examination and a survey following the conclusion of their experience, evaluating the effect of this curriculum.

RESULTS: A total of 71 students over 2 years participated in the near-peer curriculum, with all students completing the validated test. The mean score for the students was 83.6%. Of the 71 students, 60 (84.5%) scored more than the previously published passing rate of 73.1%. There was no correlation identified with the mean test scores and the number of previous orthopedic surgery rotations. From the survey, 96% of the students rated the near-peer curriculum as appropriate for their level, whereas 75% noted that their own medical school's musculoskeletal curriculum was too advanced for their level of training.

CONCLUSION: A series of lectures was developed by midlevel orthopedic residents for students interested in pursuing a career in orthopedic surgery. After participation in the curriculum, students scored 30–percentage points higher than a previously published test. This study demonstrates that a resident-initiated, near-peer curriculum increases the fundamental knowledge level of students entering orthopedic surgery. An added benefit appeared to be the skills obtained by the residents who created and delivered the lecture series. (J Surg 71:734-737. © 2014 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: education, musculoskeletal medicine, near-peer teaching, orthopaedic surgery, medical students

COMPETENCIES: Medical Knowledge, Interpersonal and Communication Skills, Practice-Based Learning and Improvement

INTRODUCTION

Patients with musculoskeletal problems constitute a large proportion of emergency room and primary care physician office visits. An appreciation of the knowledge deficit of most American medical school graduates has prompted many medical schools to increase focus on musculoskeletal disease.[1-3] Much of this focus has been toward those students entering primary care fields.[4-6] A clinical competency examination developed and validated by Freedman and Bernstein[7] has been used to determine an acceptable level of musculoskeletal knowledge for undergraduate medical students. Overall, incoming first-year residents scored dramatically lower than minimum passing scores, as determined by both orthopedic surgery and internal medicine residency program directors. Third- and fourth-year medical students who were interested in a career in orthopedic surgery significantly outperformed other students; however, even their scores only reached minimal levels of proficiency set forth by orthopedic surgery program directors and barely exceeded the expectations from internal medicine program directors.[8]

To make the orthopedic surgery elective experience more productive, a group of midlevel orthopedic surgery residents developed a curriculum for senior medical students participating in the elective rotation. The objective was to develop a curriculum that would better prepare the rotating students to maximize their clinical experience. This program replaced formal subspecialty introductory lectures previously given

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by faculty that students perceived as being too complex. The orthopedic residents desired to expose the medical students to basic principles and provide a foundation for the students to take better advantage of the ongoing didactic curriculum. Using the near-peer teaching method, the orthopedic residents sought to prepare an educational series that, being focused on fundamental concepts, would be less intimidating and better received by the interested medical students.

METHODS

All senior medical students participating in elective rotations on orthopedic surgery at University Medical Center over a 2-year period were invited to attend a series of eaely-morning resident-provided introductory lectures. Students included both University and visiting medical students ($n = 71$). All of the participating students were actively applying for a residency position in orthopedic surgery. All students began and finished their respective month-long rotation on the same dates, so all could be present for the identical series of lectures. Students were excused from all other clinical responsibilities to ensure attendance. The lectures began before the days' operating room or outpatient clinic start times. The lecture series repeated itself on a month-long cycle, guaranteeing that all students were exposed to the same material.

During this 2-year period, a group of midlevel orthopedic surgery residents created a 4-lecture curriculum that was developed and delivered by these interested residents. The lectures were focused on basic concepts and themes of orthopedic surgery, including (1) assessment of musculoskeletal injuries in the emergency department; (2) assessment of patients in the trauma setting; (3) evaluation of extremity and spine radiographs; (4) specialized clinical evaluations, i.e., ankle-brachial index, measurement of extremity compartment pressures; (5) orthopedic emergencies, e.g., compartment syndrome, open fractures, and septic arthritis; and (6) basic pain and acute spinal injuries. It was thought that having residents teach this material would have a less intimidating feel, be explained at a level more appropriate for medical students, and offer an opportunity for informal discussion with age-appropriate mentors.

On the final day of the rotation, students were given an anonymous survey and validated musculoskeletal competency examination[7] by the Department of Orthopaedic Surgery's program coordinator. No questions that would help identify students were included on the survey, with the exception being the month in which the student rotated. This survey and test were then collected by the coordinator and kept in her office until the completion of rotating students for the year to maintain anonymity. Questions on the survey queried the appropriateness of the resident lectures in terms of the students' level of training as well as their home medical school's musculoskeletal curriculum.

The musculoskeletal competency examination was graded using the previously published answer key.[7] A third-year medical student who did not participate in the curriculum graded all of the examinations for consistency.

RESULTS

Demographics

All 71 students that participated in the curriculum completed portions of the survey and test. All of the students (100%) completed the validated musculoskeletal competency examination, whereas 63 students (89%) completed the entire survey. A total of 59 students (83%) volunteered the number of previous orthopedic surgery clerkships. In terms of the number of previous orthopedic surgery rotations, 22 students had completed 1 previous clerkship, 14 students completed 2 rotations, 18 students finished 3 clerkships, 4 students had participated in 4 previous rotations, and 1 student had taken 5 orthopedic surgery electives.

Survey Data

Of the 63 students, 61 (96%) responded that the orthopedic surgery fundamental lecture series was "perfect for level of training." On the contrary, only 26% of students (18/70) felt that their home medical school's orthopedic curriculum was "perfect for level of training." Of the 70 respondents, 53 students (75%) noted that their home medical school's orthopedic curriculum was too advanced for their level of training. Of the 63 students, 60 (95%) noted that the resident-delivered lectures were "excellent."

Musculoskeletal Competency Examination

The mean score on the musculoskeletal competency examination[7] was 81.6%, with a standard deviation of 9.5%. The median score for this group was 83%. Questions that received the highest overall scores included treatment of compartment syndrome, carpal tunnel syndrome, newborn screening for congenital dislocation of the hip, and differential diagnosis for "snuffbox" tenderness. Questions that students received the lowest score include spine (low back pain workup and herniated disc), bone malignancies, and metabolic bone disease (osteoporosis compared with osteomalacia). There does not appear to be a correlation between the mean test scores with the number of orthopedic surgery rotations ($R^2 = 0.087$) (Fig. 1).

DISCUSSION

The overall inadequacy of musculoskeletal education in American medical schools has been well described in several investigations.[1,4,5,9] In response to these valuable insights, many American medical schools are expanding their focus on common musculoskeletal disease. This expanded fund of