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Undergraduate Clinical Teaching in Orthopedic Surgery: A Randomized Control Trial Comparing the Effect of Case-Based Teaching and Bedside Teaching on Musculoskeletal OSCE Performance

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INTRODUCTION: Musculoskeletal (MSK) complaints are the second most common reason for a hospital outpatient appointment in the US, and account for 19.5% of general practice consultations. Previous studies have shown that passive teaching in medical school does not imbue students with an adequate degree of confidence in MSK evaluation. The aim of this study was to conduct a randomized control trial to compare the effect of the gold standard small group tutorial of bedside teaching against case-based teaching (CBT) in relation to orthopedic surgery in medical students.

METHODS: All third-year medical students at our institution were invited to participate in a randomized control trial comparing CBT and bedside tutorials in relation to MSK. The primary outcome was student performance in an Objective Structured Clinical Examination (OSCE). Participants were randomized into 2 groups, receiving either a bedside tutorial or a case-based tutorial. Participants were then assigned self-directed learning before undergoing a final OSCE assessment. Student feedback was attained through a poststudy questionnaire.

RESULTS: Complete data was acquired for 96 study participants ($n = 45$ CBT; $n = 51$ bedside tutorial). The results of a linear regression model used to assess differences in the final OSCE scores, adjusting for the baseline OSCE score, gender, age, previous problem-based learning exposure and whether English was their first language or not showed no evidence of a difference between the bedside teaching group and the CBT group (mean difference: 0.34; 95% confidence interval: −3.79 to 4.47; $p = 0.872$). Almost all (95%) of the study participants felt that CBT was an important component in their learning.

CONCLUSION: There was no difference in OSCE performance between groups. The introduction of CBT before clinical placement in medical school could accentuate the clinical skills of students before transition into the apprenticeship model of clinical attachment. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: case-based, bedside, musculoskeletal, skills, student

COMPETENCIES: Medical Knowledge, Practice-Based Learning and Improvement, Professionalism

INTRODUCTION

Musculoskeletal (MSK) diseases represent a varied group of pathologies that affect a diverse population demographic, the spectrum of conditions ranges from the acute trauma to biomechanical degenerative disease such as osteoarthritis and rheumatic inflammatory conditions.[1] These pathologies are a major cause of disability around the world,[2] and indeed have huge economic repercussions, with an estimated cost in the US of 7.4% of GDP secondary to both direct health care costs and lost wages and decreased productivity.[3]

Priorities for health care have long focused on communicable diseases.[4] Improvements in this regard have led to a

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huge increase in life expectancy across the globe, and with this increase in the older population demographic comes an increase in degenerative disease.[5] A change in focus is thus required when training future medical professionals. Insufficient time in medical education pertaining to teaching MSK clinical skills has been widely documented.[6-8] Pinney and Regan[6] looked at the 16 medical schools across Canada and found the time devoted to MSK education to be 2.26% of teaching time (range: 0.61%-4.81%). In 2003, DiCaprio et al.[7] conducted a review of the Association of American Medical Colleges data and he reported less than half (41.8%) of medical schools had an MSK teaching block in their preclinical years and only 20.5% had a required clinical rotation. In some centers the total average time given to teaching MSK physical exams across the whole medical school curriculum is as low as 4-7 hours, often divided into 3-5 hours of small group teaching and 1-2 hours of large group teaching.[8] With the low volume of teaching it is perhaps inevitable that basic competencies in newly qualified doctors is below par, Freedman and Bernstein[9] finding that 82% fail basic competency exams in MSK.

In improving medical education pertaining to orthopedic pathologies, we need to examine the effectiveness of teaching modalities. Passive teaching alone during the clinical years is inadequate in enhancing learner's confidence in MSK evaluation.[10] Interactive teaching is preferred by students and aids in long-term learning.[11]

There are numerous benefits to the traditional form of clinical bedside teaching such as the demonstration of communication skills; the appreciation of positive findings on physical exam; teaching of humanistic aspects of clinical medicine; and the opportunity for students to exhibit professional behavior.[12] However, despite its potential benefits, the level of bedside teaching received by students has diminished from forming 75% of clinical teaching delivered in the early 1970s[13] to between 15% and 25% at present.[12]

Case-based teaching (CBT) is a form of small group teaching that promotes structured discussion between students, led by a trained tutor with clinical experience in the field. Students and facilitators or tutors are both responsible for closure of the cardinal learning points, providing the learner with a structured approach to clinical problem solving.[14]

Given the aforementioned reduction in the quantity of bedside teaching received by medical students, we sought to investigate whether CBT could act as a useful adjunct to bedside teaching in undergraduate clinical orthopedic teaching. Therefore this study aims to conduct a randomized control trial to compare CBT against the more traditional clinical teaching at the bedside in third-year medical students of a 5-year medical course, for both clinical skills attainment and student feedback.

METHODS

Ethical approval for this parallel randomized control trial was granted by the institutional research ethics committee. The study design was developed and reported in line with the Consolidated Standards of Reporting Trials.[15]

Participants and Recruitment

The study was conducted with medical students in their third year in our institution. All third-year students were invited to participate. There were no exclusion criteria. These students have a mandatory 2-week clinical rotation in orthopedic surgery during a 16-week semester, with the majority (70%) rotating through a dedicated elective orthopedic hospital in 1 week blocks. The study was performed in this hospital and all other students not attending this hospital (30%) were invited to participate during their reading week. At this stage of their medical training, students transition from the preclinical years to the clinical years of the curriculum. Before commencing their clinical rotations during this semester, students receive a block of didactic lectures covering the MSK curriculum delivered by consultant orthopedic surgeons and clinical lecturers totaling 25 hours of teaching. The physical examination skills required for MSK evaluation are demonstrated to students during this period and the presentations given are available to them on the student web portal.

Interventions: Bedside Teaching and CBT Groups

Following randomization participants underwent an initial observed Objective Structured Clinical Examination (OSCE) on day 1 of their orthopedic rotation. This comprises 2 stations, a 5-minute history station and a 5-minute physical examination station, evaluating their clinical performance on a patient with hip osteoarthritis. The purpose of this assessment was to gage the level of clinical skills and knowledge possessed by participants and to provide a starting point to which the final OSCE performance can be compared against. Following initial assessment participants were given their allocated tutorial.

There were 2 intervention groups. Group 1 received a bedside tutorial where history taking was demonstrated to the students on a real patient by a tutor followed by a physical exam. History taking involved the ascertaining of salient points from the patient's history, which were explored and then discussed with the group. The physical examination component involved the demonstration of the examination of the patient's hip, the eliciting of positive findings and providing the participants the opportunity to elicit said findings themselves. Group 2 received a CBT session in the classroom with a tutor and the steps involved