Validation of a Web-Based Curriculum for Resident Education in Orthopedic Surgery ☆

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BACKGROUND: The Orthopedic In-Training Examination is an annual standardized examination with multiple-choice questions focused on application of orthopedic surgery core knowledge and principles. The outcome of this test can be used to both predict how residents are progressing in their orthopedic knowledge as well as assess their likelihood to pass the Orthopedic Board Examinations, that is the American Boards of Orthopedic Surgery Part 1, following completion of residency. Preparation for the examination can be difficult, as residents commonly have limited study time to review the vast amounts of available published literature. The objective of our study is to evaluate the effectiveness of the Orthopaedic In Training Examination (OITE) scores and the participants' perceived utility of the curriculum for OITE preparation.

METHODS: Residents from 5 US Orthopedic residencies (4 M.D. and 1 D.O.) were included in a pilot program of the Orthobullets PASS curriculum in the academic year 2013 to 2014. Only residents enrolled in the PASS curriculum who completed both the 2013 and 2014 OITEs were included in the final analysis ($n = 71$). We used the OITE 2013 and 2014 rank postgraduate year (RPGY) reported scores to assess for efficacy of the PASS curriculum, as the RPGY score provides postgraduate year-of-training matched analysis to control for expected increased levels of knowledge with subsequent retesting.

RESULTS: While OITE scores incrementally increased for the group as a whole ($n = 71$, RPGY mean improvement = +2.5%, $p = 0.406$), the junior resident subgroup (postgraduate year 1-2) produced a statistically significant increase in scores ($n = 28$, RPGY mean increase = 10.1%, $p = 0.0260$). Nearly 90% (38/42) of curriculum participants surveyed reported a preference to complete a similar review curriculum for future OITE preparation. The participants completing greater than 150 PASS questions ($n = 57$) were analyzed for OITE predictive capacity of the PASS curriculum. Pearson analysis with PASS questions percent answered correctly and 2014 OITE raw score (independent and dependent variables, respectively) suggests moderate correlation of the variables ($R = 0.682$, $p < 0.05$).

CONCLUSION: We propose that the Orthobullets PASS curriculum is a useful tool for OITE preparation, especially for junior residents, with a focus on achieving competency for a broad fund of orthopedic knowledge, whereas mastery of these topics would be better suited through using complementary sources. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEYWORDS: orthopedic surgery, web-based curriculum, in-training examination, resident self-assessment

COMPETENCIES: Medical Knowledge

INTRODUCTION

The Orthopedic In-Training Examination is an annual standardized examination administered to all US orthopedic residents with multiple-choice questions focused on application of orthopedic surgery core knowledge and principles.

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The purpose of the examination is to provide an objective assessment of a resident's gross fund of orthopedic knowledge, reporting results regarding both the overall testing population, and a level-of-training matched analysis (rank postgraduate year ["RPGY"]). The outcome of this test can be used to both predict how residents are progressing in their orthopedic knowledge as well as assess their likelihood to pass the Orthopedic Board Examinations, that is, the American Boards of Orthopaedic Surgery Part 1, following completion of residency.[1-3]

Our study evaluates the utility and efficacy of a new web-based curriculum designed for orthopedic residents—PASS curriculum. Preparation for the examination can be difficult, as residents commonly have limited study time to review the vast amounts of available published literature. The Orthobullets PASS curriculum provides access to daily comprehensive reading curriculum and optional timed subject quizzes and mock examinations. The curriculum used scheduled monthly quizzes in office of intramural training and education (OITE) format with the intended purpose of assisting residents' identify their progression and deficiencies in orthopedic knowledge, as well as facilitate program directors in identifying at-risk residents for poor performance on the OITE, and thus more importantly, failure risk for residents preparing to take American Board of Orthopaedic Surgery (ABOS) Part 1.

The objective of our study is to evaluate the effectiveness of the Orthobullets PASS curriculum on improving OITE scores and the participants' perceived utility of the curriculum for OITE preparation. We compared residents' OITE performance from both the year before (2013) and year of the Orthobullets PASS curriculum (2014) to assess the comparative effectiveness of the new curriculum technique over conventional examination preparation techniques. We additionally compared residents' PASS curriculum and OITE performance to evaluate the PASS curriculum for predictive capabilities regarding future OITE performance. Additionally, we surveyed the residents to understand how participants using the Orthobullets PASS curriculum used the resource, perceived the efficacy of the resource, and their likelihood to use the curriculum again.

DESIGN

Residents from 5 US orthopedic residencies (4 M.D. and 1 D.O.) were included in a pilot program of the Orthobullets PASS curriculum in the academic year 2013 to 2014. Residency programs integrated the PASS curriculum into their core OITE preparation curriculae and received complementary access to the PASS curriculum for their participation in pilot testing. Residents were required to participate in the PASS curriculum's monthly multiple-choice tests designed to reflect similar material previously presented on the OITE. Although program directors were made aware of participants' results, no consequences for poor performance or noncompliance were reported. Results of PASS curriculum monthly quizzes were provided for analysis by the Orthobullets editorial team. Program directors from the 5 institutions submitted their programs' OITE results from the 2013 to 2014 years. Once each resident's OITE and Orthobullets PASS program data were correlated for statistical analysis, identifying information was deleted for confidentiality. Only residents enrolled in the PASS curriculum who completed both the 2013 and 2014 OITEs were included in the final analysis. All residents participating in the PASS program from the 5 institutions were asked to complete a brief survey about their OITE study preparation and their perceived utility of the Orthobullets PASS curriculum for OITE preparation. The Northwestern University Institutional Research Board approved the study. Neither the participating programs nor the authors were compensated for the utilization of the PASS curriculum or publication of this article.

Statistics

Correlated OITE and PASS data for 71 residents were available for statistical analysis. We used the OITE 2013 and 2014 RPGY reported scores to assess for efficacy of the PASS curriculum, as the RPGY score provides postgraduate year (PGY) year-of-training matched analysis to control for expected increased levels of knowledge at subsequent retesting. Subgroup analysis was performed to determine the effect of the PASS curriculum for junior resident (PGY 1 and 2 at the time of the 2013 OITE) versus senior resident (PGY 3 and 4 at the time of the 2013 OITE) and individual PGY subgroups. Paired *t*-tests were performed for overall and subgroup analyses as participant's OITE scores allow for matched pair analysis and 2-tailed p-values were reported. Pearson correlations were performed for the PASS curriculum performance to determine predictive relationships with performance on the 2014 OITE.

RESULTS

An overall ($n = 71$) RPGY score increase of 2.5% ($p = 0.406$) was seen after participation in the PASS curriculum, with raw scores on average increasing from 163 to 176 (maximum score of 275). On subgroup analysis, the junior resident subgroup ($n = 28$, PGY 1 and 2 at the time of the 2013 OITE) demonstrated significant improvements in OITE performance, with raw score increases from 139 to 164 and an average 10.1% improvement in RPGY score ($p = 0.0259$). The senior resident subgroup ($n = 43$, PGY 3 and 4 at the time of the 2013 OITE) demonstrated an average raw score improvement from 178 to 183an average of 2.4% decrease of their RPGY score on the 2014 OITE, which lacked statistical significance ($p = 0.5445$). The