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Making waves in practical learning: using POCUS to improve medical student understanding of anatomical features

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Abstract

Background: As the utilization of Point-of-care Ultrasound (POCUS) continues to rise, it becomes more crucial that students have early exposure to ultrasound and become familiar with interpreting anatomical landmarks. Studies have shown that POCUS use, alongside physical exam and clinical decision making, decreases physician errors significantly, with one study demonstrating a decrease of almost 40% of missed cardiac findings and increases diagnostic accuracy(1). Early exposure to POCUS provides foundational knowledge upon which students can continue to build history taking and physical exam skills, as it provides a new way to envision patients' presentations(2,3). Ultrasound education also solidifies didactic lectures by allowing students to dynamically manipulate their visual field similar to cadaveric specimens with the added benefit of live feedback from patients.

The objective of this work was to determine whether introduction of focused ultrasound use improved medical student understanding of anatomy, function, physical exam, pathology, and interest in ultrasound-based education in the pre-clinical medical school curriculum.

Methods: The research team led a one-hour POCUS workshops on shoulder evaluation and cardiac evaluation among approximately 20 first year MD students on the OHSU campus after their completion of didactic curriculum in the corresponding anatomy. This involved an introductory lesson on ultrasound and small group learning with hands-on, ultrasound-based exams. Small groups were facilitated by faculty mentors and medical students with prior ultrasound training. Participants were surveyed before and after the course to evaluate pre- and post-knowledge of anatomy, physical exam, palpation points, ultrasound familiarity and experience, and ultrasound interest for future practice.

Results and Discussion: For the shoulder workshop, learners reported that the use of ultrasound resulted in a great deal of improvement in understanding of physical exam maneuvers of the shoulder (76.19%), shoulder anatomy (66%), and palpable landmarks of the shoulder (85.71%). Pre-test responses indicated that 4.35% of participants felt somewhat or extremely comfortable using ultrasound, while post-test responses increased to 91.31%. There was a notable increase in learners' confidence in shoulder ultrasound image identification and a modest improvement in knowledge of the muscles involved in exam maneuvers, indicating the summative value of anatomy and ultrasound education. Of note, most learners expressed an intention to incorporate ultrasound in their future practice, implying the value learners place on ultrasound far outweighs the number of curriculum hours dedicated to it.

For the cardiac workshop, learners reported that the use of ultrasound resulted in a moderate to great deal of improvement in understanding of cardiac imaging (100%), cardiac anatomy (94.7%), and palpable landmarks of the chest (100%). Pre-test responses indicated that 20% of participants felt somewhat or extremely comfortable using ultrasound, while post-test responses increased to 75%. There was a significant increase in learners' abilities to identify cardiac ultrasound views and link important assessment concepts to them, and a modest improvement in ability to identify structures. Of note, most learners expressed intention to incorporate ultrasound in their future practice. These results indicate the summative value of learning anatomy and ultrasound education together and imply that learners value ultrasound both in medical training and for prospective careers.

Conclusion: This ultrasound workshop demonstrated successful integration of POCUS with learning anatomy, physical examination, and palpable landmarks. Ultrasound education provides an effective strategy for developing foundational knowledge and skills in pre-clerkship medical students, and can expand understanding of complex structures. With increased comfort and skills developed in early medical learners, ultrasound use and proficiency is feasible and can directly improve patient care through real-time assessment, pushing the boundaries of classic medical student understanding of a complete physical assessment and allowing learners the opportunity to visualize the mechanical functions of the body.

References

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