

Evaluating a Self-Directed Asynchronous Curriculum for Point-of-Care Ultrasound (POCUS) Training

Meghana Arza, Abby Renner, Abigale Verchick, Dr. David Redden, Dr. Tommy Lindsey

Edward Via College of Osteopathic Medicine (VCOM) - Carolinas



Abstract: Ultrasound curricula are increasingly integrated into undergraduate medical education to enhance student preparation for clinical rotations, though the design and implementation of such programs vary widely. This study evaluated the feasibility and effectiveness of a self-directed, asynchronous ultrasound (US) curriculum for second-year medical students through video instruction, individual practice with US probes, and in-person training. Students were assessed on their ability to identify and measure a breast mass and crown-rump length using ultrasound, with results showing they consistently performed the technical steps correctly but tended to underestimate measurements. The study suggests asynchronous ultrasound training can effectively teach core ultrasound skills, though further research is needed to improve measurement accuracy and model consistency.

Conclusion

Successes: An asynchronous ultrasound curriculum may be an effective means of teaching students' technical steps in conducting an ultrasound. It was clear that students were passionate about taking the time to work through the curriculum, which was reflected in their ability to replicate the proper ultrasound techniques.

Limitations/Challenges: There was significant variability between each session when measuring the models. Factors such as model compressibility, ultrasound depth variation, and model changes likely contributed to measurement inaccuracies. Further research is needed to determine the effectiveness of an asynchronous POCUS curriculum in teaching students to measure a breast mass or crown-rump length.

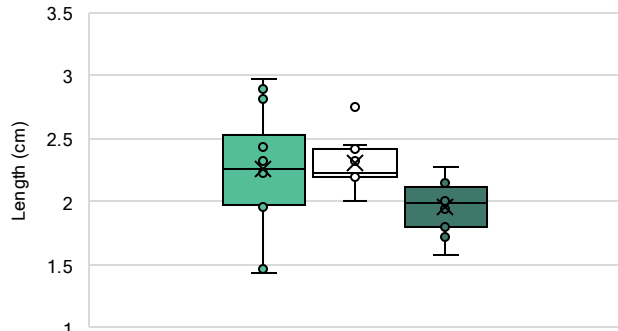
Conclusions: This research may aid in the development of ultrasound curricula for medical students and internal medicine residents. Additionally, it could be expanded with the construction and revision of the ultrasound models used in this study in order to have more consistent, accurate results for students to test their abilities.

References

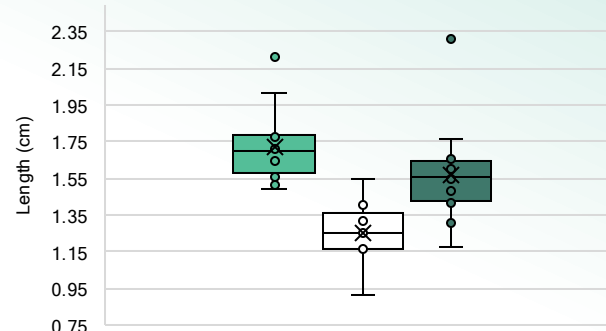
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Results

Estimated Breast Mass Length By Session

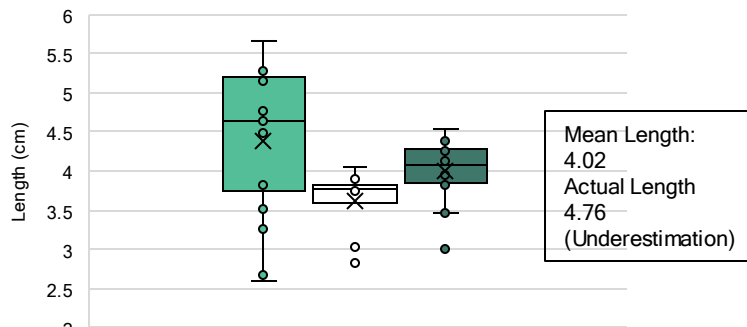


Estimated Breast Mass Width By Session



Mean Length x Width: 2.16 x 1.57; Actual Length x Width: 1.65 x 1.46 (Underestimation)

Estimated Crown Rump Length By Session



Mean Length:
4.02
Actual Length
4.76
(Underestimation)

■ Session 1 (n=16) □ Session 2 (n=9) ■ Session 3 (n=14)

Variable	Skills Check-Off			
	Breast Mass		Crown Rump Length	
	Performed Skill Appropriately (n=39)	Percent	Performed Skill Appropriately (n=39)	Percent
Correct Setting	38	0.97	38	0.97
Applied Gel	39	1.00	39	1.00
Correct Orientation	39	1.00	38	0.97
Adjust Depth	39	1.00	38	0.97
Rocking Technique	39	1.00	39	1.00
Fanning Technique	39	1.00	39	1.00
Correct Identification	38	0.97	39	1.00
Measured Lesion	39	1.00	39	1.00
Stored Settings	23	1.00	39	1.00

Rationale: While ultrasound curricula have become more prominent in medical education, there is variation in the curriculum design, composition, and implementation process.¹⁻³ Some studies use written assessments to measure students' understanding via free response or multiple-choice questions, however very few test students' hands-on skills.⁴⁻⁵

Objective: Using a longitudinal model testing quantitative and qualitative factors, this study aims to increase undergraduate medical students' knowledge and proficiency in ultrasound techniques by evaluating students with anatomically-based ultrasound models to demonstrate their ability to accurately identify and measure various pathologies.

Methods

