Evaluating the Role of a Simulated Ultrasound Training Tool for Medical Students and Residents on the Radiology Clerkship

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BACKGROUND

Ultrasound (US) is relatively inexpensive, widely available, and versatile for imaging visceral organs. However, US is a challenging modality to master and unfamiliar to many health care students and practitioners, who lack knowledge of technical parameters and skills for image interpretation.

Studies show that one of the most effective education adjuncts in ultrasound education is the use of simulation and phantoms.

We hypothesize that an integrated simulated ultrasound curriculum in medical schools would enhance understanding of imaging techniques and basic image interpretation.

METHODS

Medical students (MS) in the Diagnostic Radiology rotation and junior residents (R) were offered an US training curriculum using a simulation training tool (SonoSim). Pretests were completed to confirm eligibility (score <85%) and the US simulation tool was demonstrated by a radiology instructor.

Within 4 weeks, participants independently completed course modules and post-tests to evaluate practical knowledge and confidence levels. Comparative analysis of pre-test and post-test results was used to measure shifts in general score, sectional scores, and confidence levels. Additional analysis of prior US training and opinion of utility of US in medical practice was done.

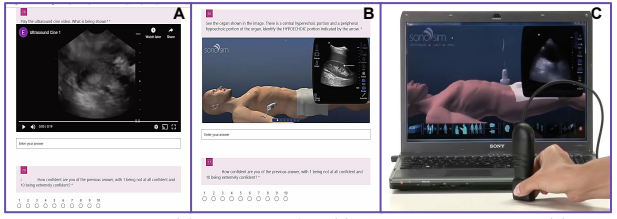


Fig 1. Electronic pre-test (A) and post-test form (B), and SonoSim device in use (C).

RESULTS

59 MS and 11 R completed pretests (N=70); 20 MS and 4 R (N=24) completed posttests. 80% of participants had prior classroom US instruction with variable practical and simulated experience. Prior to this training, 57% thought they understood the basics of US techniques but lacked knowledge about image interpretation, while 68% believed US is challenging to learn, requiring focused training including simulation.

Compared to the pre-test, there was an increase in the number of participants with correct answers to each question, increase in confidence, and a significant improvement in average scores on the post-test by 50% (P<0.001).

Pre-existing bias could impact change in knowledge and practical skills as only 70% of the cohort indicated clinicians need basic knowledge for review of US images. Gender, training level, and self-perceived ratings of SonoSim machine and mentor's abilities did not significantly influence outcome.

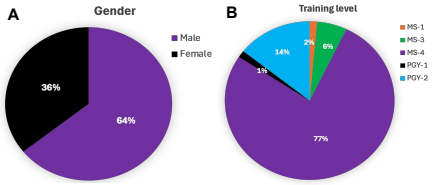


Fig 2. Demographics: Gender distribution (A), and training level (B) of medical students and residents participating.

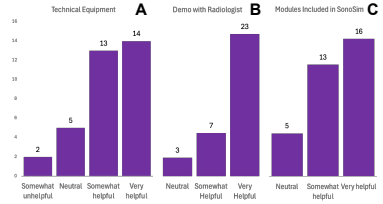


Fig 3. Medical trainee feedback on the value of (A) technical equipment, (B) demo with radiologist, and (C) modules included with SonoSim.

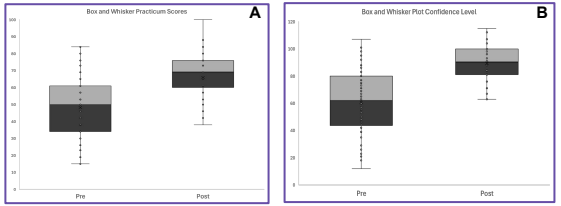


Fig 4. Box and whisker plots of pre-test and post-test practicum scores (A), as well as pre-test and post-test confidence level scores (B).

CONCLUSIONS

Ultrasound is a vital imaging resource in modern medicine. Medical school and residency training programs are increasingly integrating simulation training in preparation for direct patient care.

With limited US familiarity among medical trainees, our study shows that integrated focused US simulation training is beneficial for improvement in skills and confidence in basic image interpretation.

Simulation learning offers a safe mechanism to enhance knowledge. Our study confirms SonoSim is a valid tool for self-learning through simulation. Future initiatives can further integrate ultrasound curriculum in medical student training.

REFERENCES

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