A cautionary tale: a comparison of condensed teaching strategies to develop hand-held cardiac ultrasound skills in internal medicine residents

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Background

Advances in ultrasound technology have allowed for hand-held cardiac ultrasound (HHCU) units that fit into a physician's lab coat. Recently, studies to educate both medical students and internal medicine residents have shown promising results.[1]

The optimal duration and methodology for teaching HHCU skills has not been established. Our objective was to assess the effectiveness of two condensed educational programs occurring over a single clinical rotation to teach internal medicine residents diagnostic and technical skills of HHCU.

Methods

24 INTERNAL MEDICINE RESIDENTS — JUNE 2013 - MAY 2014

PROSPECTIVE

RANDOMIZED

CONVENTIONAL WARD-BASED	TECHNOLOGY-DRIVEN
4 TEACHING SESSIONS (1 HOUR EACH)	**4 TEACHING SESSIONS (1 HOUR EACH)**
1 SESSION SONOGRAPHER LEAD	ALL SESSIONS used *Vimedex Trainer*
3 SESSIONS WERE PEER-TO-PEER	ACCESS TO ONLINE-MODULES
	ACCESS TO iPAD BOOKS
	4 SESSIONS PEER-TO-PEER

i. Baseline characteristics

ii. Pre-teaching ability

a. Acquisition

b. Interpretation

iii. Post-teaching

a. Acquisition

b. Interpretation

FIGURE 1. Data collected during the pre-teaching and post-teaching period

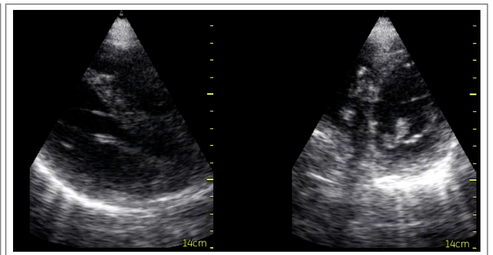

FIGURE 2. *Above,* examples of hand-held ultrasound images. *Below,* a sample of question style used to assess diagnostic skill.

Results

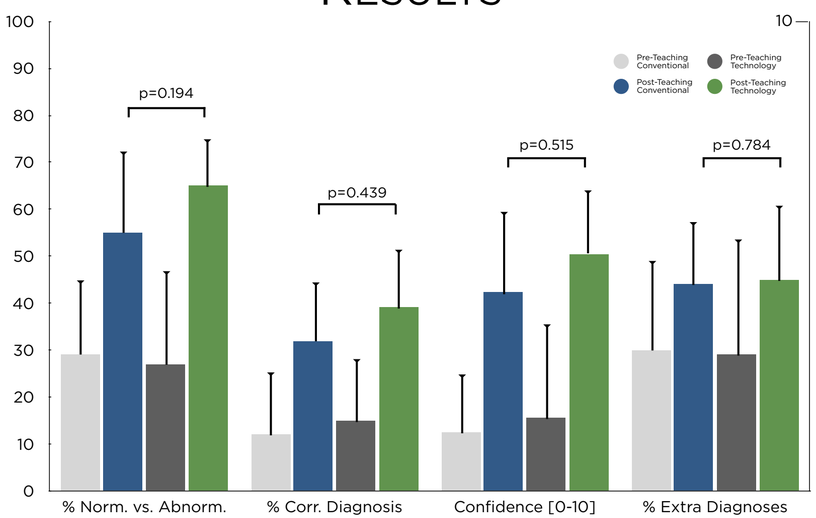

FIGURE 3. A comparison between the conventional and technology teaching groups with regards to: ability to differentiate normal from abnormal, making a singular correct diagnosis, overall confidence, and the false-positive rate.

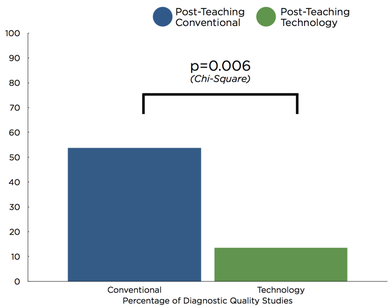

FIGURE 4. The percentage of residents in the conventional and technology group that demonstrated 'diagnostic quality' ultrasound images post-teaching.

	Conventional (% relative increase)	Technology (% relative increase)
Pre-to-Post Normal - Abnormal	87%	137%
Pre-to-Post Correct Diagnosis	156%	169%
Pre-to-Post Confidence	240%	226%
Pre-to-Post Extra Diagnoses	46%	56%

FIGURE 5. The percentage change pre and post-teaching in each category of assessment: differentiation normal from abnormal, making a correct diagnosis, confidence, and false positive rate.

Conclusions

Our findings suggest that HHCU performance and interpretation skills improve following both a conventional ward-based or technology-driven approach.

More importantly, our study emphasizes the limitations of simulation-based teaching of HHCU skills since acquisition skill was superior following conventional ward-based teaching compared to the technology group.

Lastly, we detected a significant increase in the false positive rate following both teaching programs. This suggests that a short duration of training may not be sufficient for HHCU to be performed in a safe and appropriate manner.

Reference

1. Cawthorn TR, Nickel C, O'Reilly M, et al. Development and evaluation of methodologies for teaching focused cardiac ultrasound skills to medical students. Journal of the American Society of Echocardiography : official publication of the American Society of Echocardiography 2014;27:302-9.