

Comparison of Temporal Variations in Ultrasound Training in Four Novice Groups

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Objectives

To compare and assess the integration of ultrasound in four different groups at different time intervals and placement in the curriculum.

Introduction

Point of care ultrasound (POCUS) is a rapidly growing and powerful tool utilized by a wide array of healthcare professionals. Despite ultrasound's technological advancements and improved patient outcomes in diagnostic and procedural medicine, medical schools and healthcare professional schools have been slow to incorporate US training into their curricula.

In a 2014 survey of all US medical schools, 27.7% reported having an integrated ultrasound curriculum at any point in the four-year medical education. The overwhelming barriers to implementing an US curriculum were funding (52.9%) and a lack of time in their existing curriculum (50.0%). While an institution may not have the resources, foresight or room in their existing curriculum to incorporate ultrasound, there may be alternative course structures that similarly or equally benefit the students. For instance, a shorter "crash-course" in ultrasound may produce similar results as a longer, integrated course. We hypothesized that incorporation of an ultrasound curriculum at any time interval and placement would be beneficial to the students.

Methodology

- 16 hours of identical US training at varying timing and placement were compared between four groups: first-year medical students (M1s), fourth-year medical students (M4s), second-year physician assistants (PAs), and standardized patients (SPs).
- All four groups received an identical US curriculum spread out over different time periods.
- Quantitative assessment was made with a pre- and post-course test that evaluated US basic knowledge, US physics, image recognition and acquisition, US anatomy and pathology, and basic US machine functionality. Scores were analyzed using a student's t-test.
- Qualitative assessment of the course's utility and perceived educational value were evaluated from voluntary, anonymous surveys provided at the end of all four courses.

Comparison of the Four Curriculums

Cohort	Curriculum length	Description
First-year Medical Students	Semester-long (18 weeks)	<ul style="list-style-type: none"> • US curriculum was integrated into the semester-long Human Anatomy course. • Course included didactic and hands-on sessions of six regionally-based modules that followed the anatomy course throughout the Fall semester
Fourth-year Medical Students	4 weeks	<ul style="list-style-type: none"> • Participated in the Successful Transition to Effective Practice (STEP) course in the 2015 Spring semester, which was designed to apply their current medical knowledge to the role of an intern. • 22 M4 students participated in this optional four-week elective where basic US principles were integrated throughout the course.
Physician Assistants	4 days	<ul style="list-style-type: none"> • 51 second-year PAs participated in a voluntary, four-day US course that was provided at the end of their didactic year.
Standardized Patients	2 days	<ul style="list-style-type: none"> • 16 SPs participated in two full days of US training.

Course Evaluations

- The post-course evaluations indicated a high participant satisfaction and recognition of the importance of incorporating ultrasound into the healthcare education.
- The M1 post-course survey results were the following with similar results found in the M4, PA and SP groups:

Question asked	Number of Responses	
	YES	NO
US enhanced the human anatomy course	142	7
US enhanced my medical education	148	1
I would like more US training throughout my medical education	143	5

Discussion and Conclusions

- Regardless of the placement and timing of a 16-hour US curriculum, students were able to achieve the same level of knowledge comprehension.
- This may allow future medical and healthcare professional schools to easily introduce US to their students with a shorter, "crash-course" such as was introduced to our SPs and PAs instead of implementing a time-intensive, integrated curriculum.
- While this study focused on knowledge acquisition, future directions should look at retention of knowledge and skill competence.
- Overall students felt like this was a valuable learning experience; many of which asked to have more sessions.

Results

- There was some variation in the pre-course test scores, however, similar scores were achieved on the post-course test scores.
- The average post-course scores were 70.9% for the M1s (p-value<0.001), 71% for the fourth years (p-value<0.0001), 70% for the PAs (p-value<0.001), and 64% for the SPs (p-value<0.0001), with all four groups showing a statistically significant improvement from their pre- to post-test scores.

