Incorporating Ultrasound Simulator Sessions into Residency Point-of-Care Ultrasound Training

Wake Forest® School of Medicine

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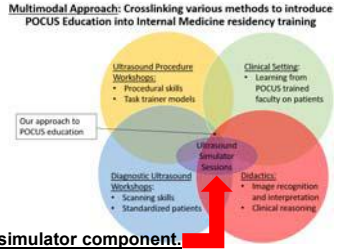
OBJECTIVE/PURPOSE OF INNOVATION

- To augment Point-of-Care Ultrasound (POCUS) training utilizing simulator technology to create a controlled and engaging experience.

BACKGROUND

- POCUS is evolving into a necessary multi-disciplinary clinical skill.
- POCUS integration is needed across the education continuum (UME, GME, CME).
- The Wake Forest School of Medicine IM residency developed a **multimodal POCUS curriculum** that includes didactics, modules, workshops, ultrasound simulators, and supervised clinical scanning.

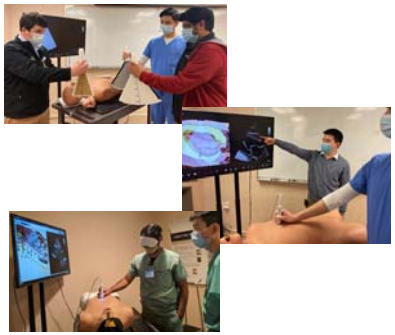


- Here, we focus on the **ultrasound simulator component.**

DESIGN

- Participants: 28 IM residents who were part of an advanced ultrasound training pathway
- **2-hour small group training sessions** on a **high fidelity ultrasound simulator** (**1 instructor** with **2 trainees**).

Educational Goals of Session
1) Understand probe selection, beam slice, and probe movement.
2) Confidently obtain adequate views of the heart, IVC, and lungs.
3) Recognize commonly encountered pathology.
4) Learn skills for teaching POCUS to others.



- Competency is assessed by the instructor throughout the session.

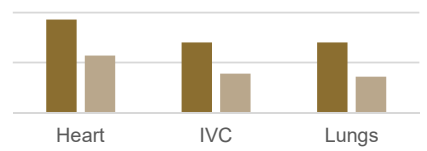
The Resident demonstrated the following competencies during their Vimedix ultrasound simulator POCUS training session.	Yes	No
Understands various probes and proper probe selection - Linear vs. Phased Array vs. Curvilinear		
Understands probe movements - Fanning, Sweeping - Rocking, Sliding - Rotation (clockwise, counter-clockwise)		
Obtains an adequate parasternal long axis view		
Obtains an adequate parasternal short axis view - level of papillary muscle - level of mitral valve - level of aortic valve		
Obtains an adequate apical 4 chamber view		
Obtains an adequate subcostal/subxiphoid view		
Obtains an adequate view of the IVC in long axis		
Able to differentiate IVC from aorta		
Obtains adequate views of the lungs - recognize lung sliding - recognize A lines		
Understands the algorithmic approach to lung ultrasound		
Demonstrates ability to obtain views (blindfold exercise)		
Can perform a cardiac, IVC, and lung POCUS exam in under 5 minutes (time_____)		
Can correctly identify the following Pathology:		
Plural effusion		
Empyema		
Pneumonia (focal B lines presentation + consolidation)		
Pulmonary Edema (diffuse B lines)		
Pericardial Effusion		
Cardiac Tamponade		
Type B Aortic Dissection		

OUTCOMES

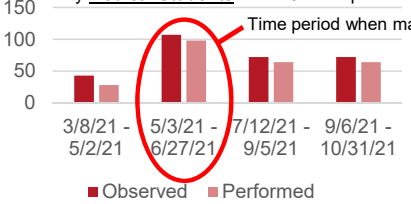
- 28 residents completed the ultrasound simulator training.
- All 28 successfully passed the competency assessment.
- 12 of the 28 residents completed a post-session survey 3 months later.
- 90% agreed or strongly agreed the ultrasound simulator training session improved their clinical POCUS skills and their ability to teach POCUS.

IM resident participants are performing more POCUS exams in the clinical setting compared to residents who did not participate in sessions.

Comparing Number of Clinical POCUS Exams (July - December 2021)



Observed and Performed POCUS Exams by **Medical Students** on IM Clerkship



Time period when majority of resident simulation sessions took place.

Med students are getting more resident led POCUS teaching and exposure on the wards after residents participated in ultrasound simulator training sessions.

CONCLUSIONS AND LESSONS LEARNED

- Encouraged use of POCUS and frequent repetition through various training modalities is an essential part of our learning theory.
- Training using an ultrasound simulator fosters fundamental POCUS concepts and cultivates psychomotor and cognitive skills.
- Ultrasound simulators allow pathology recognition in a risk-free environment.
- Simulators offer reproducible teaching, practice, and evaluation opportunities.

FEASIBILITY AND GENERALIZABILITY

- Ultrasound is a commonly used diagnostic tool across medical disciplines.
- Utilizing ultrasound simulation technology to augment POCUS training in the clinical, didactic, and workshop setting is generalizable to all medical fields across the education continuum.
- Institutional access to an ultrasound simulator influences feasibility.

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