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

Christopher T. Kelly, MD[1,2]; Carty Beaston[3]; JaNae Joyner, PhD, MHA[3]

[1]Wake Forest School of Medicine, Winston-Salem, NC
[2]Department of Internal Medicine, Atrium Health Wake Forest Baptist, Winston-Salem, NC
[3]Center for Experiential and Applied Learning, Wake Forest School of Medicine, Winston-Salem, NC

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. Professional internal medicine (IM) organizations support POCUS integration across the education continuum (UME, GME, CME).[1,2] 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 report the ultrasound simulator impact on IM resident POCUS training.

Design: 28 residents underwent 2-hour small group training sessions on a high fidelity ultrasound simulator (2 trainees with 1 instructor). The educational goals of these sessions included: 1) understanding probe selection and movements, 2) obtaining adequate views of the heart, inferior vena cava, and lungs, 3) recognizing commonly-encountered pathology 4) developing skills to teach POCUS to others. POCUS competency was assessed.

Outcomes: 28 residents completed and passed the ultrasound simulator training and competency assessment (Table 1). Twenty residents completed a post-session survey. Ninety percent strongly agreed or agreed the ultrasound simulator improved their clinical POCUS skills and their ability to teach POCUS. These 28 residents are performing more POCUS exams in the clinical setting compared to their resident counterparts who did not participate. Medical students rotating on the internal medicine clerkship started receiving more resident led POCUS instruction on the wards after these ultrasound simulator sessions were introduced into residency training.

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

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

References:

1. LoPresti, C. M., Jensen, T. P., Dversdal, R. K., & Astiz, D. J. (2019). Point-of-Care Ultrasound for Internal Medicine Residency Training: A Position Statement from the Alliance of Academic Internal Medicine. *The American Journal of Medicine*, *132*(11), 1356–1360.
2. Soni NJ, Schnobrich D, Benji K. Mathews, MD, Tierney DM, Trevor P. Jensen, MD, MS, Dancel R, Joel Cho, MD, RDMS, RDC, Renee K. Dversdal, MD, Gregory Mints, MD, Anjali Bhagra, MD, Kreegan Reierson, MD, Linda M. Kurian, MD, Gigi Y. Liu, MD, MSc, Candotti C, Brandon Boesch, DO, LoPresti CM, Joshua Lenchus, DO, Tanping Wong, MD, Gordon Johnson, MD, Anna M. Maw, MD, MS, Ricardo Franco-Sadud, MD, Lucas BP, Point-of-Care Ultrasound for Hospitalists: A Position Statement of the Society of Hospital Medicine. Published Online Only January 2, 2019. doi: 10.12788/jhm.3079

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_____)		
Ability to recognize and correctly identify the following Pathology:		
Plural effusion		
Empyema		
Pneumonia		
Pulmonary Edema		
Pericardial Effusion		
Cardiac Tamponade		
Type B Aortic Dissection		

Table 1: Competency assessment form used by the faculty instructor to evaluate each resident trainee's level of understanding and scanning skills throughout the ultrasound simulator POCUS training sessions.