The educational impact of a formalized RUSH (Rapid Ultrasound in Shock) protocol in emergency medicine residency ultrasound training

INTRODUCTION

Point-of-care ultrasound for undifferentiated hypotension is an important tool for Emergency Physicians. The RUSH Exam outlines a systematic approach to hypotension and an approach to the type and cause of shock. An educational model using RUSH was developed for Emergency Medicine (EM) residents. This study evaluated the module in a simulated setting on the following endpoints: improvement in image acquisition, interpretation, speed, and subjective comfort level.

- Among Emergency Residents with basic ultrasound training
- I will training in RUSH using 8 hour didactic and small group sessions
- C Compared to basic ultrasound skills acquired in residency
- O Result in improved image acquisition, interpretation, speed, and subjective comfort level

METHODS

Ethics board approval was obtained for this before and after simulation study. Residents in the FRCPC-EM/CCFP-EM Programs from July 2014 to July 2015 were eligible. Participants were excluded if they were unable to complete all portions of the module or if they did not consent. All residents received the same level of point-of-care ultrasound (POCUS) introductory training prior to implementation of the RUSH intervention. The 8-hour intervention included RUSH didactic and hands-on small group sessions. Testing before and after the intervention was performed with the SonoSim LiveScan training platform using megacode scenarios. Two evaluators scored the accuracy of image acquisition, image interpretation, and time to scan completion. Before and after surveys assessed resident comfort level with performing ultrasound on a patient in shock, and basing decisions on findings. Statistical analysis was performed using McNemar’s test for image acquisition and interpretation, paired T test for time, and Bahpker test for the questionnaire.

RESULTS

Sixteen EM residents were enrolled (11 junior and 5 senior). Improvement was observed in IVC image acquisition and interpretation, B-lines, lung sliding, cardiac apical and parasternal long axis, and DVT (p<0.05). Comfort level of performing ultrasound and basing decisions on the findings was increased (p<0.0001). Image acquisition speed increased among junior residents p <0.02. This was not performed using McNemar’s test for time, speed, and subject level among EM residents using ultrasound in critically ill patients.

CONCLUSIONS

We observed improvement in IVC image acquisition and interpretation, B-lines, lung sliding, cardiac apical and parasternal long axis interpretation, and DVT assessment. Subjective comfort level with performing and interpreting ultrasound in shock improved. Speed was improved in the junior resident group.

Categories without improvement generally had good baseline performance, likely reflecting the baseline training of the group, including speed in the senior group.

Limitations included a small sample size, lack of standardization in the evaluation tool and questionnaires, and a potential learning curve using the simulator. Further, although all residents were brought up to the same baseline core POCUS training, senior residents have experience and competence that probably affected the ability to detect measurable improvement. Evaluation bias was minimized by having two evaluators.

In summary, a RUSH Exam educational module improved image acquisition, interpretation, speed, and comfort level among EM residents using ultrasound in critically ill patients.