

Mid-level providers demonstrate proficiency in FAST after directed training

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Abstract

Introduction Focused Assessment with Sonography for Trauma (FAST) is commonly used to detect intra-peritoneal blood as part of the evaluation of trauma patients. In our level 1 trauma center, mid-level providers (MLPs) perform serial FAST exams on trauma patients. We describe our training approach and proficiency achieved.

Methods Subjects were MLPs with no previous training in FAST. The training consisted of hands-on training on live models, two on-line ultrasound (US) modules, and a video image review session. Participants were evaluated with pre-, post-, and 6-month follow-up video tests. Subsequently, they independently performed FAST exams which were reviewed by ED US faculty.

Results 11 MLPs participated, completing an average of 17 scans; 91% were technically adequate. Average scores were: pre-test 50.5% (31.7–68.3%), post-test 76.7% (65.9–87.8%), and 6-month test 77% (58.5–87.8%), for an initial improvement of 26.2% ($p < 0.001$) and a sustained improvement over the pre-test of 26.5% ($p = 0.011$) at 6 months.

Conclusion MLPs demonstrated proficiency in FAST after brief training.

Keywords Trauma · Ultrasound · Emergency department · Mid-level providers

Introduction

Focused Assessment with Sonography for Trauma (FAST) scanning is an ultrasonographic assessment for intraperitoneal blood that is part of the initial trauma workup and has shown to improve patient outcomes [1]. Serial FAST scanning is gaining acceptance in the United States [2]. Historically, this has been performed by physicians. With increasing involvement of mid-level providers (MLPs) in the care of trauma patients, we hypothesized that MLPs could learn to perform serial FAST scanning using established training.

Methods

The study took place at an academic level 1 trauma center with an annual volume of 39,000 patients. An emergency department observation unit (EDOU) is staffed by MLPs supervised by ED physicians. The EDOU accepts stable trauma patients who require observation for possible occult injuries. Such trauma patients receive serial abdominal exams, serial hematocrit testing, and reevaluation by the trauma team. As part of a quality improvement project, serial FAST exams were added to this trauma pathway. A training and credentialing program was developed to train the EDOU MLPs in this modality, adapting training utilized for physician providers. This study is a review of prospectively collected quality improvement data.

The EDOU and ED trauma service is staffed by 11 MLPs. None of the 11 MLPs had prior ultrasound training and all were involved in care of trauma patients in both the ED and EDOU. The 11 MLPs participating consisted of 10 physician assistants and one nurse practitioner.

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Two outcome measures were evaluated to establish competency, technical competency and interpretative ability. To evaluate technical proficiency, we required MLPs to complete independent FAST scans which were reviewed for adequacy either by real time or by review of electronic images and video clips. Because the frequency of positive FASTs was anticipated to be low, we utilized performance on a video test to evaluate the ability to identify positive scans. This test consisted of 41 multiple choice questions, the majority of which refer to US video images. By including a wide range of image quality, length and interpretative difficulty, the exam was intended to be fairly difficult. The questions required both the correct identification of the presence or absence of free fluid and its location. The tests administered were the same for the pre-training, post-training, and 6 month evaluations; participants were not provided with correct answers until they had completed all three exams.

Prior to training, the video pre-test was administered. After completion, MLPs completed on-line education modules on ultrasound physics and FAST exams (3rd Rock Ultrasound, LLC Module 2 Ultrasound Physics and Principles and Module 11 Trauma Ultrasound, <http://www.emergencyultrasound.com>).

After all MLPs had completed the on-line training and the ungraded quizzes, a 2-h hands-on session was conducted during which machine function and scanning techniques were taught. The training focused primarily on scanning of live models until each MLP demonstrated adequate ability to obtain the FAST images. A 1-h video review of FAST scans was then conducted.

After this training was completed, the MLPs were administered a post-test. MLPs then were asked to complete 20 independent FAST exams either directly supervised by ED US faculty or to submit still or video electronic images for review. A 6-month post-test was then administered, which ended the training portion of this project.

Paired samples *t* test was used to measure differences in the results of the pre- and post-training tests (SPSS v. 17.0). Results are reported with ranges of test score results and *p* values for the difference in pre- and post-training tests.

Results

The average pre-training score was 50.5% (range 31.7–68.3%). Post-test score average after completing the training program was 76.7% (range 65.9–87.8%), demonstrating an improvement of 26.2% ($p < 0.001$). Seven participants completed a 6-month knowledge retention test. The average score was 77% (range 58.5–87.8%), demonstrating adequate retention when compared to the initial

post-test ($p = 0.925$) and an improvement of 26.5% over the pre-training test ($p = 0.011$).

After the initial training, the MLPs completed an average of 17 scans independently, 91% of which were considered technically adequate upon review. Technical adequacy included complete images obtained in all aspects of the FAST exam, and was determined through image review by the ED US faculty.

Discussion

Previous studies have shown that FAST scanning can be adequately taught to surgical interns, physicians in developing countries, and nurses [3–5]. FAST can quickly and reliably diagnose intraperitoneal free fluid [6]. Physician assistants can be taught to use ultrasound to look for pneumothorax and to place central venous catheters [7, 8]. While it is intuitive that non-physicians could be taught FAST with similar training methods, the different educational background in anatomy and pathology between MLPs and physicians raises question about this assumption. This is the first study to show that MLPs can be taught to perform FAST exams competently using similar brief educational methods.

In our institution, MLPs now perform follow-up FAST exams on trauma activation patients placed in the EDOU several hours after these patients have had a FAST performed by the trauma team as part of the initial trauma evaluation. The use of MLPs to perform serial FAST exam may allow improved detection of occult injury not detected in the initial trauma evaluation.

Further areas of training will need to include modalities that allow MLPs to gain experience with positive FAST exams. This may include more hands-on training with stable patient populations with positive scans (i.e. peritoneal dialysis patients, patients with ascites) and introduction of MLPs into the trauma bay with higher acuity patients more likely to have positive exams.

Limitations

This was a pilot study at one institution with a small group of MLPs. The MLPs knew they would be taking a follow-up test at 6 months, which means they may have studied beforehand and relearned material instead of retaining the skills.

While the goals set for the training included that all MLPs complete the series of three tests and accumulate 20 proctored scans, there was drop out of MLPs and not all scans were completed. This potentially impacts the results as more motivated providers may have been more likely to

be compliant with the training requirements and potentially perform better.

The clinical significance of the improvement in test scores is not established. Certainly, it is not surprising that scores improve when un-trained providers are introduced to new material and then re-tested. Our pilot study tests the assumption that, despite different educational background, MLPs can be introduced to FAST with training methods designed for physicians and assimilate that knowledge. Confirming this assumption helps validate our assumption that development of different or lengthier training methods are not required. Additionally, confidence in ultrasound ability has been shown to correlate with actual ability to perform and interpret the test [9]. We did evaluate the adequacy of actual scans performed by MLPs. This evaluation demonstrated a high level of technical proficiency.

Due to the small number of scans in this study and the low acuity patient selection bias, there were no positive scans. Thus, while the study evaluates for the adequacy of ultrasound images obtained, it does not allow determination of the ability of the MLPs to interpret positive scans. We used the video test as a surrogate for this ability. An adequate number of positive scans would be required to verify this.

On-going areas of assessment at our facility include comparison of scan adequacy between MLPs and physician providers by blinded observers. Areas of future research would include large enough studies to assess the accuracy of scan interpretation in a clinical environment, which will require a substantial number of positive scans.

Conclusion

MLPs demonstrated knowledge acquisition, retention and technical proficiency in the performance of the FAST after a brief, directed training. A larger study is needed to validate the results of this pilot study.

Acknowledgments The use of this EDOU QI data for research is approved by the Institutional Review Board as part of an on-going

EDOU quality improvement project. IRB approval was received on August 23, 2009. 3rd Rock Ultrasound (<http://www.emergencyultrasound.com>) allowed use of the on-line training modules without charge. General Electric (GE) provided ultrasound machines for the hands-on training component of this project without charge. This study is part of an on-going quality improvement grant for EDOU care provided by the University of Utah Medical Group (UUMG).

Conflict of interest The authors state that they have no conflict. None of the authors have any financial interest in any organization providing support for this study.

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