AAMC-Teach the Teachers Ultrasound Workshop

Advances in Ultrasound Technology

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Advances in Ultrasound Technology

- Miniaturization of ultrasound systems
- Improved image quality
- Dynamic images
- Doppler capabilities
- Calculation packages
TIME magazine
The stethoscope of the 21st century may have arrived!
Strap Muscles of the Neck
Dynamic Maneuver of the Subscapularis
Celiac trunk
Splenic vein
L renal vein
Results – Faculty Assessment of Student Skills with Ultrasound

Overall student performance – 76%-100%
Mean score – 7.83 equates to ~87% correct
Negatively skewed distribution with 67% of students scoring in the 89th percentile

Results – Overall Experience and Satisfaction

1. Ultrasound education has enhanced my understanding of human anatomy
2. I plan to use portable ultrasound in my future clinical practice
3. I will benefit from continued ultrasound education throughout my 4 years of medical school
4. All medical schools should provide students with ultrasound education
5. My experience with ultrasound education was positive

Color Flow Doppler (CF)

- Fastest flow towards probe
- Slower flow towards probe
- Slower flow away from probe
- Fastest flow away from probe

Sampling gate
Pulsed Wave Doppler (PW)
1. Which ultrasound imaging window was used to obtain the image? *(video 6)*
   a) Apical window
   b) Subxiphoid window
   c) Parasternal long axis window
   d) Parasternal short axis window

2. The image reveals a thrombus which can be seen in which cardiac chamber? *(Video 6)*
   a) Left atrium
   b) Left ventricle
   c) Right atrium
   d) Right ventricle

3. Forward propagation of the thrombus will most likely result in *(video 6)*
   a) A myocardial infarction
   b) A pulmonary embolus
   c) A stroke
   d) Endocarditis
LVEDV / LVESV / EF / CO

Area = \pi r^2

Area = \pi (D/2)^2

TVI = \Sigma V_{0-z}
Integration of Ultrasound into MS4 Emergency Medicine Clerkship

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Background

Background: EM clerkships are often the only opportunity medical students have to spend a significant amount of time caring for patients in the ED. It is imperative that students gain exposure to as many of the various fields within EM as possible during their clerkship. If the exposure of medical students to ultrasound is left to the discretion of the supervising physicians, we feel that many students would complete a rotation in EM with limited skills and knowledge in ultrasound. The majority of medical students receive no formal training in ultrasound during medical school and we believe that the EM clerkship is an excellent opportunity to fill this educational gap.

Objective: Evaluate the usefulness and effectiveness of a focused ultrasound curriculum for medical students in an EM clerkship at a large, urban, academic medical center.

Methods

Design: Prospective cohort study of 4th year medical students doing an EM clerkship. As part of the clerkship requirements the students have a portion of the curriculum dedicated to the FAST exam and ultrasound-guided vascular access. At the end of the month they take a written test, and 1 month later they are given a survey via email regarding their ultrasound experience. EM residents also completed the test to serve as a comparison group.

Setting and Population: Urban ED in Detroit, Michigan, with an annual volume of approximately 85,000 patients. The period of data collection was July 2011 to December 2011

Data Analyses: All data analysis was done using SAS 9.2. Scores were integers ranging between 0 and 1.0. Descriptive statistics are given as count, mean, standard deviation, median, minimum, and maximum for each group. Due to non-Gaussian nature of the data and small group sizes, a Wilcoxon two-sample test was used to compare the distributions of scores between the groups.

Results

Table 1: Test Scores of Students and Residents

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean (SD)</th>
<th>Median (min, max)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>24</td>
<td>0.85 (0.13)</td>
<td>0.90 (0.60, 1.0)</td>
<td>0.021</td>
</tr>
<tr>
<td>Residents</td>
<td>20</td>
<td>0.76 (0.11)</td>
<td>0.80 (0.50, 0.90)</td>
<td></td>
</tr>
</tbody>
</table>

In Table 1, the distribution of scores was compared between the residents (controls) and the students (subjects). The mean and median scores of the student group were higher than those of the resident group. The difference in scores between the two groups is statistically significant (p=0.021).

Conclusion: Our data reveals that after completing an EM clerkship with time devoted to learning ultrasound for the FAST exam and vascular access, that 4th year medical students are able to perform better than EM residents on a written test. What remains to be determined is if their skills in image acquisition and in performance of ultrasound-guided vascular access also exceed those of EM residents.

Figure 1: Simulation Center

Figure 2: Sample Test Question

The arrow in the picture above points to what structure?

a) Liver  
b) Spleen  
c) Lung  
d) Diaphragm

Limitations and Conclusions

Limitations:

- Low participation rate for residents taking the test
- Many of students were Wayne State University students who have ultrasound training as part of the Year 1 and 2 curriculum
- July-December sample of students may introduce bias in favor of student performance on tests as a large percentage of the students were applying to Emergency Medicine residencies

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