Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Can EMS learn to use Portable Ultrasound?

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Clinical Scenario: You are dispatched to the scene of a roll over MVC. One patient, complaining of substernal chest pain. No deformities noted but the patient in severe pain with associated SOB. During rapid body exam, it is difficult to hear both lung sounds and heart sounds due to surrounding noises. You gather your portable ultrasound to rule in/out Cardiac Tamponade. Pneumothorax, and Tension pneumothorax.

PICO (Population – Intervention – Comparison – Outcome) Question:
P- Paramedics, and paramedic students
I- Teaching paramedics on the use of portable ultrasound with a pre and post test and 1 hour course
C- none
O- Significant increase in effective identification of ultrasound imaging.

Search Strategy:
((((paramedic OR EMT OR "pre-hospital" OR "pre hospital" OR EMS OR "emergency medical services" OR EMS))) AND (("thoracic trauma" OR "chest trauma" OR "cardiac tamponade" OR "cardiac arrest" OR pneumothorax OR "tension pneumothorax"))) AND (("portable ultrasound" OR US OR ultrasound OR echocardiogram))

Search Outcome:
190 studies were found.

Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Rein Ketalaars, MD, Nico Hoogerworf, MD, PHD, and Gert Jan Scheffer, MD, PHD January 07.2012	2572 patients using 326 portable US exams of the chest performed on 281 patients	Retrospective study Level II	Treatment plans changed in 60(21%) patients.	The physicians stated that treatment decisions changed in 60 cases (21%) due to information obtained by the US examination. In 9 of 60 patients, the physician decided to stop all treatment based on the US imaging of the heart. The strategy towards administering intravascular fluids changed in 6 patients. In total, 24 chest tubes were inserted. The decision to insert a chest tube or, on the other hand, to refrain from inserting one changed in 13 cases. Of the 15 false-negative US examinations for pneumothorax, no decision to insert a chest tube before(or after) US was made.	Real Patients, Large scale study over 4 years. Missing data with asystole and termination of cpr. Only 1 treatment change was allowed per exam. Couldn't confirm if treatment changes were accurate.
Sundeep R. Bhat, MD, David A. Johnson, MD, Jessica E. Pierog, DO, MS, Brita E. Zaia, MD, Sarah R. Williams, MD, and Laleh Gharahbaghian, MD July 14th 2015	57 prehospital providers consisting of 19 EMT-B students, 16 EMT-P students, 18 certified EMT-B providers, and 4 certified EMT-paramedics	A prospective, observational study of certified emergency medical technicians (EMT-B) and EMT-paramedics (EMT-P) as well as students	The authors were looking to see if Paramedics with no to very little knowledge of point-of-care ultrasound were able to identify common images seen with certain medical	There was a significant improvement for all subjects between the pre- and post-tests with a mean pre-test score of 65.2%±12.7% and a mean immediate post-test score of 91.1%±7.9% (95% CI [22%–30%], p<0.001).	The main flaw for this study was that there was no actual implementation on actual patients. IT was also a rather small study consisting of only 57 paramedics, some of

		enrolled in prehospital training programs within two counties in California. This was a Level II study.	conditions.	Scores significantly improved for all three individual pathologies as shown in Figure 1. The mean pre-test overall score for cardiac standstill was 92.1%±15.1% with a mean immediate post-test score increase to 98.6%±5.6% (95% CI [11%–23%], p=0.003). The mean score for pericardial effusion improved from 57.9%±26.3% pre-test to 84.6%±21.5% immediate post-test (95% CI [35%–19%], p<0.001) and the mean score for pneumothorax increased from 55.5%±20.9% pre-test to 90.6%±9.82% (95% CI [29%–41%], p<0.001) immediate post-test. Among the certified EMS providers (N=22), scores showed significant increases in mean score pre-test (63.9%±16.6%) to immediate post-test (93.4%±6.5%, 95% CI [22%–37%], p<0.001). Among these providers, scores for	which, were students. That being said, the results of the testing tend to speak for themselves in that, with very minimal training the enrolled paramedics were quite able in learning and identifying common ultrasound images. I trust this study and believe that the use of pre-hospital point-of-care US warrants further research.

				identification of pneumothorax and pericardial effusion showed significant increases after subjects received the focused lecture. There was no significant change for identification of cardiac standstill: pre-test score 90.9%±18.1% and post-test score 98.9%±5.3% (CI [−17%–6.9%], p=0.069) (	

Comments: Even though this study isn't exactly what I was looking for, I do believe that it is a good contrast to my first study that involved physicians using point-of-care US in a pre-hospital setting. There were promising results with its use but I wondered if paramedics were able to effectively learn how to use portable ultrasounds. This study, I believe, proves that true.

Consider: I would not change practice because I can't directly apply this study to my current practice.

Clinical Bottom Line: We need more in-depth studies to confirm the efficacy of point-of-care US in EMS. With the very minimal current research, it still appears to be a promising and helpful tool.

References:

Rein Ketalaars, MD, Nico Hoogerworf, MD, PHD, and Gert Jan Scheffer, MD, PHD
Sundeep R. Bhat, MD, David A. Johnson, MD, Jessica E. Pierog, DO, MS, Brita E. Zaia, MD, Sarah R. Williams, MD, and Laleh Gharahbaghian, MD