CAT Topic: Can paramedics easily be trained to use pre-hospital ultrasound for trauma assessment?

Clinical Scenario

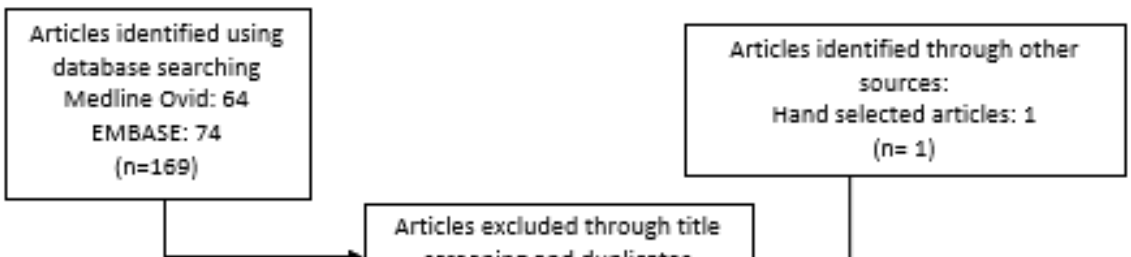
You are called code 1 to motor vehicle accident (MVA) where it is car vs. tree. On arrival you find a patient has self-extricated from a vehicle that is wrapped around a tree and appears to be ALOC. You find that patient has lacerations over their body, and you find out they were going around 70km/h before the tree. They are now complaining of severe pain in their abdomen and clutching themselves and very disorientated. You call HARU for backup assess internal bleeding using a focussed assessment with sonography for trauma (FAST) scan.

PICO (Population- Intervention- Comparison- Outcome) Question

The FAST scan is used to detect free fluid in the peritoneal cavity to assess injuries quickly for needing surgical intervention. This is crucial in the prehospital setting particularly for mass-casualty incidents (MCIs) as this can give paramedics the ability to effectively triage patients and can change the outcome for these patients. Specialty officers carry these sonograph machines in different services but can the general paramedic population on road be easily trained to incorporate these machines into their practice?

Search Strategy

Keywords used in the search for both Medline Ovid and EMBASE, (paramedic or prehospital or out-of-hospital or ems) AND (ultrasound) AND training



Relevant Papers:

Author, Date	Population: Sample characteristics	Design	Outcome	Results	Strengths & Limitations
West, B., Cusser, A., Etengof, S., Landsgaard, H, 2014	Ten paramedics with at least one-year field experience were trained with an ultrasound (US) machine two weeks prior to testing. Five peritoneal dialysis patients with instilled dialysis fluid with five control patients were placed in a room in a random order with paramedics performing FAST scans on each patient	Randomised control trial	In this simulated study paramedics had issues with performing the FAST scan with a high degree of accuracy. They were more inclined to determine a patient as positive, limiting the chance of false negatives.	The accuracy of the paramedics to diagnose was 60% with no correlation between time taken and accuracy. There was a false positive result of 59% and a false negative of 41%. Overall, the sensitivity of the FAST scan was 67% and the specificity was 56%.	(+) Waited two weeks between training and testing to attempt to simulate real-world training (-) Small sample group (-) Learned FAST scan quickly but did not perform with a high degree of accuracy (-) Didn't discuss any previous US use

					(-) Simulated study may not reflect accurately field work
Krough, C., Steinmetz, J., Rudolp, S., Hesselfeldt, R., Lippert, F., Berlac, P., Rasmussen, L, 2016.	Forty physicians from the mobile emergency care units (MECU) composed of both paramedics and consultant anaesthesiologist Participant's US skills were tested before and after receiving a four-hour hands-on US training course. Primary outcome was US performance	Prospective Study	Found significant improvements in the ability to perform US exams among physicians working in the prehospital setting after completing a training course.	Comparing the results of the E-learning pre and post learning showed significantly higher post test scores 37.5 (SD: 10.0) vs. 51.3 (SD: 5.9) Participants demonstrated significant improvements in total score (17.5 vs. 15.2) and in all of the	(-) Lack of control group without training (-) 43% of participants were not included in the study which can lead to selection bias (-) Classroom-based study may not reflect field work accurately (-) Combines paramedic and

	assessed by the total score of the mOSAUS scale.			assessments of the mOAUS scale. The largest improvements were found in 'systematic examination' and identification of pathologies.	anaesthesiologist data (+) Short training course lead to significant improvements in prehospital paramedic's US knowledge (+) large sample size (+) Significant findings
Weilbach, C., Kobiella, A., Rahe-Meyer, N., Johanning, K, 2017.	14 rural emergency physicians were trained in both FAST and FEEL examinations followed by training in the rapid	Prospective study	Emergency US is the only procedure that enables diagnoses to be made quickly and with a high degree of	A total of 35 patients out of 1343 callouts had a FAST examination performed on them. The most common diagnosis was	(-) Did not assess level of skill before training commenced (-) Did not assess the knowledge of

	assessment. Over a 12-month period, the operational and biometric data and the protocols of FEEL and FAST examinations were recorded and evaluated.		accuracy in emergency situations in and out of hospital. Study shows that the introduction of an US program in an ambulance service is possible with sufficient training and betters the outcome for patients.	polytrauma (22.2%) followed by isolated blunt force trauma (8.3%). The time to complete the FAST scan was less than 60 seconds for 80.6% of the examinations and 19.4% of the patients requires 60-120s. The working diagnosis was changed in 27.8% of the patients after FAST exam	the US equipment after training (-) FAST evaluation criteria did not mention specificity or sensitivity (+) Field testing over a long period of time providing a larger sample size (+) Listed all variables relevant to the decision to use sonography or not

Press, G., Miller, S., Hassan, Blankenship, R., Junco, D., Camp, E., Holcomb, J, 2013	33 aeromedical prehospital providers (APPs) for a level 1 trauma centre took a 25-question computer test to assess baseline knowledge. APPs were trained for 2 months which included lectures, hands-on course, scanning sessions in the ED and internet modules.	Prospective study	Implementing a multifaceted EFAST training program for the prehospital setting is feasible. Significant improvements were found in the overall and subset testing scores suggesting that the test instrument was sufficiently sensitive to capture knowledge gained from the training.	No APP passed the pre-test with 28 out of 33 passing the post test with a mean score of 78%. The overall pre and post test means showed significant improvements.	(-) Controlled setting for training may not translate to field work (+) Assessed level of skill prior to testing (+) Educated APPs using a variety of modalities (+) Significant findings (-) Training over a 2-month period doesn't reflect how easily it can be taught

Bhat, S., Johnson, D., Pierog, J., Zaia, B., Williams, S., Gharahbaghian, L, 2015.	57 prehospital providers with a mean age of 26 consisting of 19 EMT-B students, 16 EMT-P students, 18 EMT-B providers and 4 certified EMT-paramedics	Prospective, observational study	It is feasible to educate prehospital emergency providers so that they can accurately identify images of pericardial effusion, cardiac standstill and pneumothorax after a focused lecture.	There was a significant improvement for all subjects with a mean pre-test score of 65.2%±12.7% and a mean post test score of 91.1%±7.9%. Scores improved for all three pathologies (cardiac standstill, pericardial effusion and pneumothorax) All subjects reported confidence in	(-) only used four qualified EMT paramedics (-) Did not assess FAST examination however can data collected can still be relevant for trauma (-) Results do not show that paramedics ability to retain US skills and confidence (-) Convenience sample of participants

				using US in the prehospital setting. Prior to the test 96% of the participants reported low to no confidence with US interpretation.	(-) Analysis combined all data together may be easier to educate depending on the type qualification of the individual (-) Controlled setting in the ED may not reflect prehospital use (+) Significant findings

Comments

- Majority of articles are in a controlled setting and the relevance of the data may be different to a distracting mass casualty incident (MCI).

- Majority of articles reported significant findings between pre and post test scores assessing mainly image quality, confidence in using the equipment and identification of pathologies
- There is a lack of standardised training curriculum through the different ambulance services

Consider

From the relevant articles it does show that paramedics are able to be trained in using point of care ultrasound (POCUS) and therefore a change in practice is recommended. There are minimal consequences of the use of this examination other than false negatives which may impact patient's outcome and its shown to be a quick examination from the articles. Early diagnosis in the prehospital setting is crucial in order to effectively triage and transport to appropriate hospitals. Due to the operator dependency of this equipment a level of education and training is required before this change in practice should occur. The articles assessed showed that a four-hour hands-on training course to be significantly effective as a minimal amount of training for paramedics before implementing this examination in the field.

Clinical Bottom Line

Paramedics can be easily trained to use a POCUS machine as part of their trauma assessment. It should be recommended that regular updates/ trainings also be implemented to reduce the incidences of false negatives and effectively triage MCI patients.

References

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West, B., Cusser, A., Etengoff, S., Landsgaard, H., & LaBond, V. (2014). The use of FAST scan by paramedics in mass-casualty incidents: a simulation study. *Prehospital & Disaster Medicine, 29*(6), 576-579. doi:https://dx.doi.org/10.1017/S1049023X14001204