Supplement to: The role of ultrasound in physician-provided prehospital critical care: a systematic review

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Content

Search Strings

Pubmed
("Emergency Medical Services"[Mesh] OR "Emergency Medical Services" OR prehospital OR pre-hospital OR out-of-hospital OR "out of hospital") AND ([ultraso*[tiab] OR sonograph*[tiab] OR echocardiograph*[tiab])
Limited to 2012-2017

Cochrane
#1 MeSH descriptor: [Emergency Medical Services] explode all trees
#2 "Emergency Medical Services"
#3 prehospital OR pre-hospital OR out-of-hospital OR "out-of-hospital"
#4 ultraso* or sonograph* or echocardiograph*
(#1 OR #2 OR #3) AND #4
Limited to 2012-2017

EMBASE:
#1 'emergency health service'/exp OR 'emergency care'/exp OR prehospital OR 'pre-hospital' OR 'out-of-hospital'
#2 'ultraso*' OR 'sonograph*' OR 'echocardiograph*'
#1 AND #2
Limited to 2012-2017

Supplementary Table 1. Studies excluded based on full-text

Number	Study	Cause
1	Brun et al., 2013. The value of prehospital echocardiography in shock management[1]	Case report
2	Callerova et al, 2015. TRACE: A new protocol for ultrasound examination during out-of-hospital cardiac arrest[2]	Conference abstract
3	Castellani et al., 2012. Telementoring: Ultrasound training and research[3]	Conference abstract
4	Grmec et al., 2012. Sonographic B-Line, NT-proBNP and pressure of end-tidal CO2 (petCO2) in diagnosis of acute heart failure in prehospital emergency setting[4]	Conference abstract
5	Hanlin et al., 2016. Airway ultrasound for the confirmation of endotracheal tube placement in military flight medic trainees[5]	Conference abstract
6	Jones et al., 2014. The effect of thoracic ultrasound for the detection of pneumothorax on medical decisionmaking in trauma patients in the out-of-hospital setting[6]	Conference abstract
7	Kamp et al., 2012. Ultrasound enhanced prehospital thrombolysis using microbubbles in patients with acute ST elevation myocardial infarction[7]	Conference abstract
8	Knapp et al., 2015. Quality and accuracy of fast exams performed by ems providers in the outof-hospital setting[8]	Conference abstract
9	Knap et et al., 2012. Emergency medical services focused assessment with sonography in trauma and cardiac ultrasound in cardiac arrest: The training phase[9]	Conference asbstract
10	Lahham et al., 2015. Prehospital assessment with ultrasound in emergencies-pause II[10]	Conference abstract
11	Lema et al., 2014. Ultrasound identification of successful endotracheal tube placement by paramedics and residents[11]	Conference abstract
12	Lyon et al., 2012 Is there a role for pre-hospital chest ultrasound in trauma patients?[12]	Conference abstract
13	Ogedegbe et al., 2012. A novel portable telesonography system for out-of-hospital trauma care[13]	Conference abstract
14	Schlachetzki et al., 2014. Pre-hospital thrombolysis - Is the ultrasound diagnosis of occlusion enough?[14]	Conference abstract
15	Skulec et al., 2015. TRACE: A new protocol for ultrasound examination during out-of-hospital cardiac arrest[15]	Conference abstract
16	Vitto et al., 2015. Implementation of a flight medical crew ultrasound training program[16]	Conference abstract
17	Schlachetzki et al., 2012. Transcranial ultrasound from diagnosis to early stroke treatment: part 2: prehospital neurosonography in patients with acute stroke: the Regensburg stroke mobile project[17]	Cohort included in other publication with more clinical data (Herzberg et al., 2014)
18	Atkinsion et al., 2014. Coming of age: emergency point of care ultrasonography in Canada[18]	Editorial
19	Lien, 2014. Emergency ultrasound[19]	Editorial
20	Brun et al., 2014. Ultrasound evaluation of the nasogastric tube position in prehospital[20]	Non-english
21	Weilbach et al., 2017. Introduction of Prehospital Emergency Ultrasound into an Emergency Medical Service Area[21]	Non-english
22	Brandt et al., 2016. The use of ultrasound to identify veins for peripheral venous access in morbidly obese patients[22]	Not prehospital
23	Breitkreutz et al., 2013. Thorax, trachea, and lung ultrasonography in emergency and critical care medicine: Assessment of an objective structured training concept[23]	Not prehospital
24	Cazes et al., 2013. Emergency ultrasound: A prospective study on sufficient adequate training for military doctors[24]	Not prehospital
25	Chaudery et al., 2016. Can contrast-enhanced ultrasonography improve Zone III REBOA placement for prehospital care?[25]	Not prehospital
26	Jang et al., 2012. Sonographic assessment of jugular venous distension and B-type natriuretic peptide levels in patients with dyspnoea[26]	Not prehospital
27	Jang et al., 2012. The technical errors of physicians learning to perform focused assessment with sonography in trauma[27]	Not prehospital
28	Kim et al., 2016. Can serial focussed echocardiographic evaluation in life support (FEEL) predict resuscitation outcome or termination of resuscitation (TOR)? A pilot study[28]	Not prehospital
29	Lee et al., 2015. Combined ECG, echocardiographic, and biomarker criteria for diagnosing acute myocardial infarction in out-of-hospital cardiac arrest patients[29]	Not prehospital
30	Ozkan et al., 2015. Stethoscope versus point-of-care ultrasound in the differential diagnosis of dyspnea: a randomized trial[30]	Not prehospital
31	Slikkerveer et al., 2012. Ultrasound enhanced prehospital thrombolysis using microbubbles infusion in patients with acute ST elevation myocardial infarction: pilot of the Sonolysis study[31]	Not prehospital
32	Ogedegbe et at., 2012. Development and evaluation of a novel, real time mobile telesonography system in management of patients with abdominal trauma: Study protocol[32]	Study protocol
33	Hong et al., 2012. Detecting prehospital hemoperitoneum remotely through fast and 3 g network: A simulation study[33]	Simulation study, no patients included
34	Kirkpatrick et al., 2016. Remote just-in-time telementored trauma ultrasound: a double-factorial randomized controlled trial examining fluid detection and remote knobology control through an ultrasound graphic user interface display[34]	Simulation study, no patients included
35	Lyon et al., 2012. M-mode ultrasound for the detection of pneumothorax during helicopter transport[35]	Simulation study, no patients included
36	Lyon et al., 2012. Ultrasound detection of the sliding lung sign by prehospital critical care providers[36]	Simulation study, no patients included
37	McBeth et al., 2013. Help is in your pocket: the potential accuracy of smartphone- and laptop-based remotely guided resuscitative telesonography[37]	Simulation study, no patients included
38	Song et al., 2013. Clinical applicability of real-time, prehospital image transmission for FAST (Focused Assessment with Sonography for Trauma)[38]	Simulation study, no patients included

Supplementary Table 2. SIGN 50 checklist of cohort studies included in the review

			Study							
		In a well conducted cohort study….	Aichinger, 2012	Chin, 2013	Ketelaars, 2013	ODochartaigh, 2017	Reed, 2017	Roline, 2013	Rooney, 2016	Strnad, 2016
Internal Validity	1.1	The study addresses an appropriate and clearly focused question	○	○	○	○	○	○	○	○
	1.2	The two groups being studied are selected from source populations that are comparable in all respects other that the factor under investigation	○	○	○	○	○	○	○	○
	1.3	The study indicates how many of the people asked to take part did so, in each of the groups being studied	○	○	○	○	○	○	○	○
	1.4	The likelihood that some eligible subjects might have the outcome at the time of enrollment is assessed and taken into account in the analysis	○	○	○	○	○	○	○	○
	1.5	What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed	Total 0	Total 0	○	○	Total 13	Total 0	Total 80	I/C 14/0
	1.6	Comparison is made between full participants and those lost to follow up, by exposure status	○	○	○	○	○	○	○	○
	1.7	The outcomes are clearly defined	○	○	○	○	○	○	○	○
	1.8	The assessment of outcome is made blind to exposure status	○	○	○	○	○	○	○	○
	1.9	Where blinding not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome	○	○	○	○	○	○	○	○
	1.10	The measure of assessment of exposure is reliable	○	○	○	○	○	○	○	○
	1.11	Evidence of other sources is used to demonstrate that the method of outcome assessment is valid and reliable	○	○	○	○	○	○	○	○
	1.12	Exposure level or prognostic factor is assessed more than once	○	○	○	○	○	○	○	○
	1.13	The main potential confounders are identified and taken into account in the design and analysis	○	○	○	○	○	○	○	○
	1.14	Confidence intervals are provided	○	○	○	○	○	○	○	○
Overall	2.1	How well was the study done to minimise the risk of bias or confounding?	+	0	+	0	+	+	+	0
	2.2	There is a clear evidence of an association between exposure and outcome	○	○	○	○	○	○	○	○
	2.3	Are the results of this study directly applicable to the patient group targeted?	○	○	○	○	○	○	○	○

Legend

Yes	○
Can't say	○
No	○
Not reported	○

Quality rating

High quality	++
Acceptable	+
Unacceptable	0

Does not apply	○

Supplementary Table 3. SIGN 50 checklist of controlled studies included in the review

			Study										
		In a well conducted controlled study….	Bobbia, 2015	Botker, 2017	Brun, 2014	Krogh, 2016	Bhat, 2015	Booth, 2015	Brun, 2014	Paddock, 2015	Press, 2013	Quick, 2016	Yates, 2017
Internal Validity	1.1	The study addresses an appropriate and clearly focused question	○	○	○	○	○	○	○	○	○	○	○
	1.2	The assignment of subjects to treatment groups is randomized	○	○	○	○	○	○	○	○	○	○	○
	1.3	*An adequate concealment method is used*	○	○	○	○	○	○	○	○	○	○	○
	1.4	The design keeps subjects and investigators 'blind' about treatment allocation	○	○	○	○	○	○	○	○	○	○	○
	1.5	The treatment and control groups are similar at the start of the trial	○	○	○	○	○	○	○	○	○	○	○
	1.6	The only difference between groups is the treatment under investigation	○	○	○	○	○	○	○	○	○	○	○
	1.7	All relevant outcomes are measured in a standard, valid and reliable way	○	○	○	○	○	○	○	○	○	○	○
	1.8	What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?	0%	Total 10%	○	Total 34%	Total 2%	Total 9%	○	0%	Total 3%	Total 22%	Total 48%
	1.9	*All the subjects are analyzed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)*	○	○	○	○	○	○	○	○	○	○	○
	1.10	Where the study is carried out at more than one site, results are comparable for all sites	○	○	○	○	○	○	○	○	○	○	○
Overall	2.1	How well was the study done to minimize bias?	+	+	-	+	+	-	0	+	+	+	-
	2.2	It seems certain that the overall effect is due to the study association	○	○	○	○	○	○	○	○	○	○	○
	2.3	The results are directly applicable to the patients targeted	○	○	○	○	○	○	○	○	○	○	○

Legend

Yes	○
Can't say	○
No	○
Not reported	○
Does not apply	○

Quality rating

High quality	++
Acceptable	+
Low quality	-
Unacceptable	0

Supplementary Table 4. SIGN 50 checklist of diagnostic accuracy studies included in the review

			Study							
		In a well conducted diagnostic accuracy study….	Herzberg, 2014	Laursen, 2016	Charron, 2015	Chenaita, 2012	Neesse, 2012	Zadel, 2015	Press, 2014	West, 2014
Patient selection	1.1	A consecutive sequence or random selection of patients is enrolled	○	●	●	○	○	○	●	○
	1.2	Case – control methods are not used	○	○	○	○	○	○	○	○
	1.3	Inappropriate exclusions are avoided	●	○	○	○	○	●	●	○
	1.4	The included patients and settings match the key question	○	○	○	○	○	○	○	●
Index test	2.1	The index test results are interpreted without knowledge of the results of the reference standard	○	○	○	○	○	●	○	○
	2.2	If a threshold is used, it is pre-specified	○	○	○	●	○	○	○	○
	2.3	The index test, its conduct, and its interpretation is similar to that used in practice with the target population of the guideline	○	○	○	○	○	○	○	○
Reference standard	3.1	The reference standard is likely to correctly identify the target condition	○	○	○	○	○	○	○	○
	3.2	Reference standard results are interpreted without knowledge of the results of the index test	○	○	○	○	○	●	○	○
	3.3	The target condition as defined by the reference standard matches that found in the target population of the guideline	○	○	○	○	○	○	○	○
Flow & timing	4.1	There is an appropriate interval between the index test and reference standard	○	○	○	○	○	○	○	○
	4.2	All patients receive the same reference standard	●	○	○	○	●	○	●	○
	4.3	All patients recruited into the study are included in the analysis	●	○	○	○	○	○	○	●
Overall	2.1	How well was the study done to minimize bias?	0	+	+	+	+	0	+	0
	2.2	What is the applicability of this study to the target population	○	○	○	○	○	○	○	○

Legend

Yes	○
Can't say	○
No	○
Not reported	○
Does not apply	○

Quality rating

High quality	++
Acceptable	+
Unacceptable	0

Applicability

Directly applicable	○
Some indirectness	○

Supplementary references

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