

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Point of Care Ultrasound for Assessment of Patients with Suspected or Known Chronic Heart Failure in Emergency Departments: Clinical Utility and Cost-Effectiveness

Service Line: Rapid Response Service
Version: 1.0
Publication Date: August 27, 2019
Report Length: 9 Pages

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Cite As: *Point of Care Ultrasound for Assessment of Patients with Suspected or Known Chronic Heart Failure in Emergency Departments: Clinical Utility and Cost-Effectiveness*. Ottawa: CADTH; 2019 Aug. (CADTH rapid response report: summary of abstracts).

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Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

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Research Questions

1. What is the clinical utility of point of care ultrasound for the assessment of patients with suspected or known chronic heart failure in the emergency department?
2. What is the cost-effectiveness of point of care ultrasound for the assessment of patients with suspected or known chronic heart failure in the emergency department?

Key Findings

Three non-randomized studies were identified regarding the clinical utility of point of care ultrasound for the assessment of patients with suspected or known chronic heart failure in the emergency department. No relevant economic evaluations were identified regarding the cost-effectiveness of point of care ultrasound for the assessment of patients with chronic heart failure in the emergency department.

Methods

A limited literature search was conducted by an information specialist on key resources including Medline, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were point-of-care ultrasounds and heart failure. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and August 15, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adult patients presenting to emergency departments with suspected (e.g. presents with dyspnea) or known chronic heart failure or pericardial effusion
Intervention	Point of care ultrasound (POCUS) in the emergency department (also known as focused cardiac ultrasound, bedside ultrasound, emergency ultrasound, pocket-sized ultrasound)
Comparator	Q1-2: Ultrasound performed in the radiology ward (also known as radiology-performed ultrasound) No ultrasound/ POCUS
Outcomes	Q1: Clinical utility (safety, resuscitation length, frequency of intervention [e.g., intubation, drugs/medicine such epinephrine], return of spontaneous circulation (ROSC), length of stay, survival, time till transfer from ED, harms/benefits, accuracy of clinical assessment) Q2: Cost-effectiveness
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

Three non-randomized studies¹⁻³ were identified regarding the clinical utility of point of care ultrasound for the assessment of patients with suspected or known chronic heart failure in the emergency department. No relevant health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, or economic evaluations were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Three non-randomized studies¹⁻³ were identified regarding the clinical utility of point of care ultrasound (POCUS) for the assessment of patients with suspected or known chronic heart failure in the emergency department. The authors of the first non-randomized study¹ found that POCUS was effective in identifying pericardial effusions, facilitating appropriate treatment and leading to earlier pericardiocentesis and decreased length of hospital stay. The authors of the second non-randomized study² found that when physicians were trained on the use of POCUS and implemented it within their practice, they were able to accurately identify pericardial effusion, leading to a higher level of confidence in their ultrasound findings, and changes in patient management. The authors of the third non-randomized study³ evaluated the use of pocket-sized focused echocardiography and found that it may be useful to allow for prompt diagnosis of cardiac issues such as heart failure, leading to earlier initiation of therapy.

References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

1. Alpert EA, Amit U, Guranda L, et al. Emergency department point-of-care ultrasonography improves time to pericardiocentesis for clinically significant effusions. *Clin Exp Emerg Med.* 2017 Sep;4(3):128-132.
[PubMed: PM29026885](#)

2. Shah SP, Shah SP, Fils-Aime R, et al. Focused cardiopulmonary ultrasound for assessment of dyspnea in a resource-limited setting. *Crit Ultrasound J*. 2016 Dec;8(1):7.

[PubMed: PM27260349](#)

Focused Cardiac Ultrasound

3. Mancuso FJ, Siqueira VN, Moises VA, et al. Focused cardiac ultrasound using a pocket-size device in the emergency room. *Arq Bras Cardiol*. 2014 Dec;103(6):530-537.

[PubMed: PM25590933](#)

Economic Evaluations

No literature identified.

Appendix — Further Information

Previous CADTH Reports

4. Portable Ultrasound Devices in the Pre-Hospital Setting: A Review of Clinical and Cost-Effectiveness and Guidelines. (*CADTH Rapid response report: summary with critical appraisal*). Ottawa (ON): CADTH; 2015: <https://www.cadth.ca/portable-ultrasound-devices-pre-hospital-setting> Accessed 2019 August 23.

Systematic Reviews – Alternative Population

5. Al Deeb M, Barbic S, Featherstone R, et al. Point-of-care ultrasonography for the diagnosis of acute cardiogenic pulmonary edema in patients presenting with acute dyspnea: a systematic review and meta-analysis. *Acad Emerg Med*. 2014 Aug;21(8):843-852.
[PubMed: PM25176151](#)

Randomized Controlled Trial

Alternative Comparator

6. Pivetta E, Goffi A, Nazerian P, et al. Lung ultrasound integrated with clinical assessment for the diagnosis of acute decompensated heart failure in the emergency department: a randomized controlled trial. *Eur J Heart Fail*. 2019 Jun;21(6):754-766.
[PubMed: PM30690825](#)

Population Unspecified

7. Andersen GN, Graven T, Skjetne K, et al. Diagnostic influence of routine point-of-care pocket-size ultrasound examinations performed by medical residents. *J Ultrasound Med*. 2015 Apr;34(4):627-636.
[PubMed: PM25792578](#)
8. Parashar SK, Jain V. Pocket carried ultrasound: its usefulness in clinical practice--a pilot study. *Indian Heart J*. 2011 Mar-Apr;63(2):185-189.
[PubMed: PM22734367](#)

Non-Randomized Studies

Diagnostic Accuracy

9. Bekgoz B, Kilicaslan I, Bildik F, et al. BLUE protocol ultrasonography in Emergency Department patients presenting with acute dyspnea. *Am J Emerg Med*. 2019 Feb 20.
[PubMed: PM30819579](#)
10. Dehbozorgi A, Eslami Nejad S, Mousavi-Roknabadi RS, et al. Lung and cardiac ultrasound (LuCUS) protocol in diagnosing acute heart failure in patients with acute dyspnea. *Am J Emerg Med*. 2019 Feb 26.
[PubMed: PM30833043](#)

11. Farsi D, Hajsadeghi S, Hajjghanbari MJ, et al. Focused cardiac ultrasound (FOCUS) by emergency medicine residents in patients with suspected cardiovascular diseases. *J Ultrasound*. 2017 May;20(2):133-138.
[PubMed: PM28593003](#)
12. Papanagnou D, Secko M, Gullett J, et al. Clinician-Performed Bedside Ultrasound in Improving Diagnostic Accuracy in Patients Presenting to the ED with Acute Dyspnea. *West J Emerg Med*. 2017 Apr;18(3):382-389.
[PubMed: PM28435488](#)
13. Chiem AT, Chan CH, Ander DS, et al. Comparison of expert and novice sonographers' performance in focused lung ultrasonography in dyspnea (FLUID) to diagnose patients with acute heart failure syndrome. *Acad Emerg Med*. 2015 May;22(5):564-573.
[PubMed: PM25903470](#)
14. Testuz A, Muller H, Keller PF, et al. Diagnostic accuracy of pocket-size handheld echocardiographs used by cardiologists in the acute care setting. *Eur Heart J Cardiovasc Imaging*. 2013 Jan;14(1):38-42.
[PubMed: PM22535657](#)
15. Kajimoto K, Madeen K, Nakayama T, et al. Rapid evaluation by lung-cardiac-inferior vena cava (LCI) integrated ultrasound for differentiating heart failure from pulmonary disease as the cause of acute dyspnea in the emergency setting. *Cardiovasc Ultrasound*. 2012 Dec 04;10(1):49.
[PubMed: PM23210515](#)
16. Unluer EE, Bayata S, Postaci N, et al. Limited bedside echocardiography by emergency physicians for diagnosis of diastolic heart failure. *Emerg Med J*. 2012 Apr;29(4):280-283.
[PubMed: PM21441267](#)
17. Longjohn M, Wan J, Joshi V, Pershad J. Point-of-care echocardiography by pediatric emergency physicians. *Pediatr Emerg Care*. 2011 Aug;27(8):693-696.
[PubMed: PM21811201](#)

Alternative Population

18. Buhumaid RE, St-Cyr Bourque J, Shokoohi H, et al. Integrating point-of-care ultrasound in the ED evaluation of patients presenting with chest pain and shortness of breath. *Am J Emerg Med*. 2019 Feb;37(2):298-303.
[PubMed: PM30413369](#)
19. Dwyer KH, Rempell JS, Stone MB. Diagnosing centrally located pulmonary embolisms in the emergency department using point-of-care ultrasound. *Am J Emerg Med*. 2018 Jul;36(7):1145-1150.
[PubMed: PM29174452](#)

20. Gaspari R, Weekes A, Adhikari S, et al. Emergency department point-of-care ultrasound in out-of-hospital and in-ED cardiac arrest. *Resuscitation*. 2016 Dec;109:33-39.
[PubMed: PM27693280](#)

Alternative Comparator

21. Glockner E, Christ M, Geier F, et al. Accuracy of Point-of-Care B-Line Lung Ultrasound in Comparison to NT-ProBNP for Screening Acute Heart failure. *Ultrasound Int Open*. 2016 Sep;2(3):E90-92.
[PubMed: PM27689182](#)
22. Ozkan B, Unluer EE, Akyol PY, et al. Stethoscope versus point-of-care ultrasound in the differential diagnosis of dyspnea: a randomized trial. *Eur J Emerg Med*. 2015 Dec;22(6):440-443.
[PubMed: PM25715019](#)
23. Liteplo AS, Marill KA, Villen T, et al. Emergency thoracic ultrasound in the differentiation of the etiology of shortness of breath (ETUDES): sonographic B-lines and N-terminal pro-brain-type natriuretic peptide in diagnosing congestive heart failure. *Acad Emerg Med*. 2009 Mar;16(3):201-210.
[PubMed: PM19183402](#)

Review Articles

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[PubMed: PM29422005](#)
25. Ceriani E, Cogliati C. Update on bedside ultrasound diagnosis of pericardial effusion. *Intern*. 2016 Apr;11(3):477-480.
[PubMed: PM26746413](#)
26. Gaskamp M, Blubaugh M, McCarthy LH, Scheid DC. Can Bedside Ultrasound Inferior Vena Cava Measurements Accurately Diagnose Congestive Heart failure in the Emergency Department? A Clin-IQ. *J Patient Cent Res Rev*. 2016 Fall-Winter;3(4):230-234.
[PubMed: PM27857946](#)
27. Ishizu T, Kawakami Y. [Utility of Ultrasonography in Point of Care for Cardiovascular Disease]. *Rinsho Byori*. 2015 Jun;63(6):709-716.
[PubMed: PM26548235](#)
28. Russell FM, Rutz M, Pang PS. Focused Ultrasound in the Emergency Department for Patients with Acute Heart failure. *Card Fail Rev*. 2015 Oct;1(2):83-86.
[PubMed: PM28785437](#)

29. Arntfield RT, Millington SJ. Point of care cardiac ultrasound applications in the emergency department and intensive care unit--a review. *Curr Cardiol Rev.* 2012 May;8(2):98-108.
[PubMed: PM22894759](#)
30. Doniger SJ. Bedside emergency cardiac ultrasound in children. *J Emerg Trauma Shock.* 2010 Jul;3(3):282-291.
[PubMed: PM20930974](#)