

INTRODUCTION

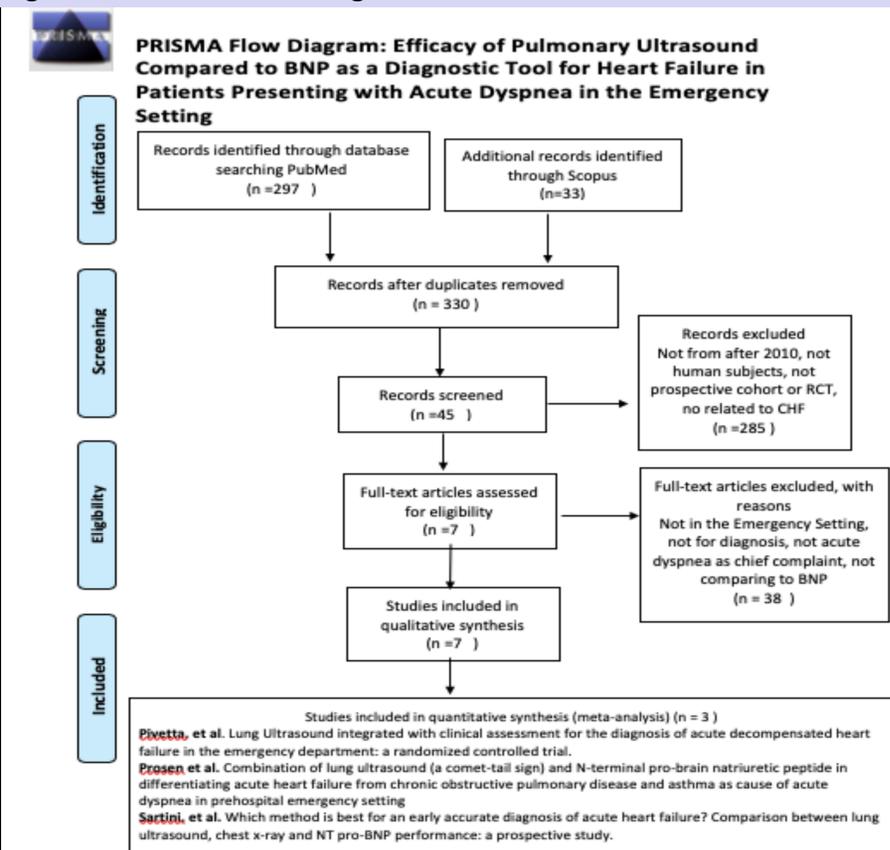
- Congestive heart failure (CHF) affects 5.7 million adults in the US. The CDC estimates that it will cost \$30.7 billion dollars to treat. ¹
- Diagnosis is made based on history, labwork, chest X-Ray and physical exam. N-Terminal pro Brain Natriuretic Peptide (NT-proBNP) is a serum marker that represents ventricular stretch and is used to aid in the diagnosis of CHF. This marker is often elevated in other disease processes, making it not specific to the diagnosis of CHF. ²
- Pulmonary ultrasound is a diagnostic tool that is non-invasive, readily available and easy to learn. It is performed by scanning four thoracic zones on either side of the thorax for the presence of diffuse lung B-lines. Also known as “comet tail artifacts” they appear as hyperechoic, vertical lines and indicate pulmonary edema.
- Lung ultrasound is considered positive for pulmonary edema when two adjacent thoracic zones contain three or more B lines per zone. Studies show the presence of B-lines on lung ultrasound is an excellent predictor of heart failure and improves the specificity and the accuracy of the diagnosis when compared to NT-proBNP. ²

CLINICAL QUESTION

Does the presence of B-lines on pulmonary ultrasound improve specificity and therefore the accuracy of the diagnosis of heart failure when compared to the use of NT-proBNP?

METHODS

Figure 1: PRISMA Flow Diagram



RESULTS

	Study #1: Pivetta, et al ³	Study #2: Prosen, et al ⁴	Study #3: Sartini, et al ⁵
Objective	Compare diagnostic accuracy of lung ultrasound vs. CXR and NT-proBNP in the correct diagnosis of dyspneic patients with CHF	Study the diagnostic accuracy of bedside lung ultrasound and NT-proBNP in the differentiation of CHF related dyspnea from other pulmonary related dyspnea	Compare the performance of chest X-ray, NT-proBNP and lung ultrasound in identification of acute heart failure in dyspneic patients.
Study Design	Randomized control trial	Prospective cohort	Prospective blinded observational
Sample	n=532	n=218	n=255
Journal	European Journal of Heart Failure	Critical Care Journal	Internal and Emergency Medicine
Conclusion	Lung ultrasound showed higher sensitivity and specificity for diagnosis of CHF.	Ultrasound alone proved to be more accurate in the accurate diagnosis of ADHF, with higher sensitivity and specificity.	The study found that lung ultrasound was more specific for diagnosis of heart failure.
Ultrasound Specificity	95.2%	95%	88%
Limitations	No standardized guidelines used for diagnosis of CHF	Performed pre-hospital, however medical doctors were on ambulances.	Some patients treated with diuretics, limiting sample size. Did not use Volpicelli defined thorax quadrants.

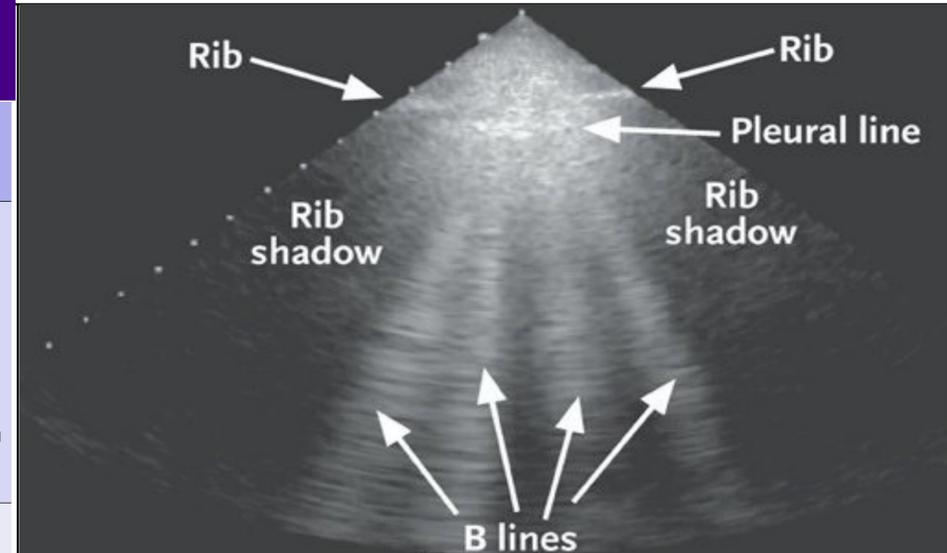


Figure 3: B lines or “comet-tail artifacts” on pulmonary ultrasound

CONCLUSIONS

- CHF is a growing cause of morbidity and mortality. Making the diagnosis quickly and accurately is imperative for positive outcomes. Lung ultrasound has proven to be an effective and highly specific test for diagnosis when compared to more standard aids such as the biomarker NT-proBNP.
- All three studies analyzed show that pulmonary ultrasound is a more specific at diagnosing heart failure than NT-proBNP. The presence of two adjacent thoracic zones containing three or more B lines per zone is highly specific for ruling in CHF.
- All three studies also show a higher positive likelihood ratio for pulmonary ultrasound compared to NT-proBNP which suggest it is a better diagnostic aid.
- We recommend the use of pulmonary ultrasound in patients with acute dyspnea of unclear cause to enhance the clinical diagnosis of heart failure and improve diagnostic accuracy.

ACKNOWLEDGEMENT

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Positive Likelihood Ratios of Ultrasound Vs NT-proBNP for Diagnosis of CHF

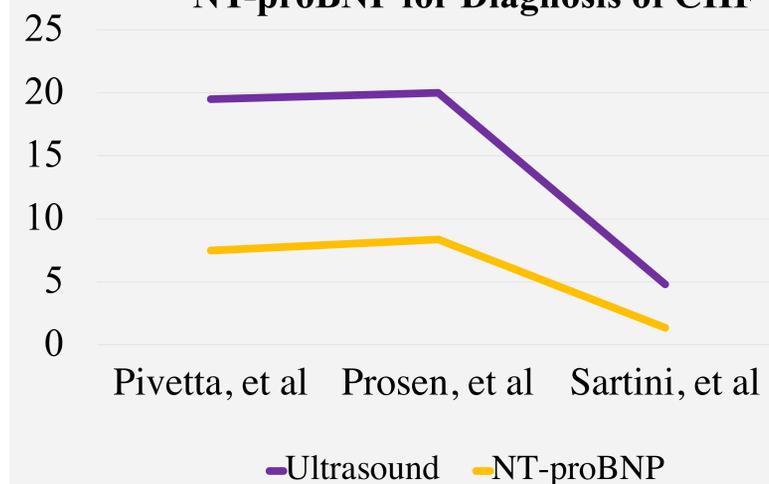


Figure 2: Ultrasound shows higher positive LR for diagnosis of CHF