

500+

LUS EXAMS

2 yrs

STUDY PERIOD

NOEMS

NEW ORLEANS EMS

Sept '23

PROGRAM START

Sept '25

PROGRAM END

Background

Acute dyspnea is among the most common prehospital presentations. Differentiating acute heart failure (AHF) from primary pulmonary pathology in the field remains a persistent challenge — resulting in delayed therapy and diagnostic uncertainty at emergency department (ED) handoff.

Prehospital lung ultrasound (LUS) by paramedics is a practical, evidence-based tool for identifying AHF and evaluating acute dyspnea in the prehospital setting.

Building on a published pilot study demonstrating feasibility, we implemented structured training to integrate LUS into routine prehospital care across NOEMS.

Russell et al. Academic Emergency Medicine, 2024.

Objective

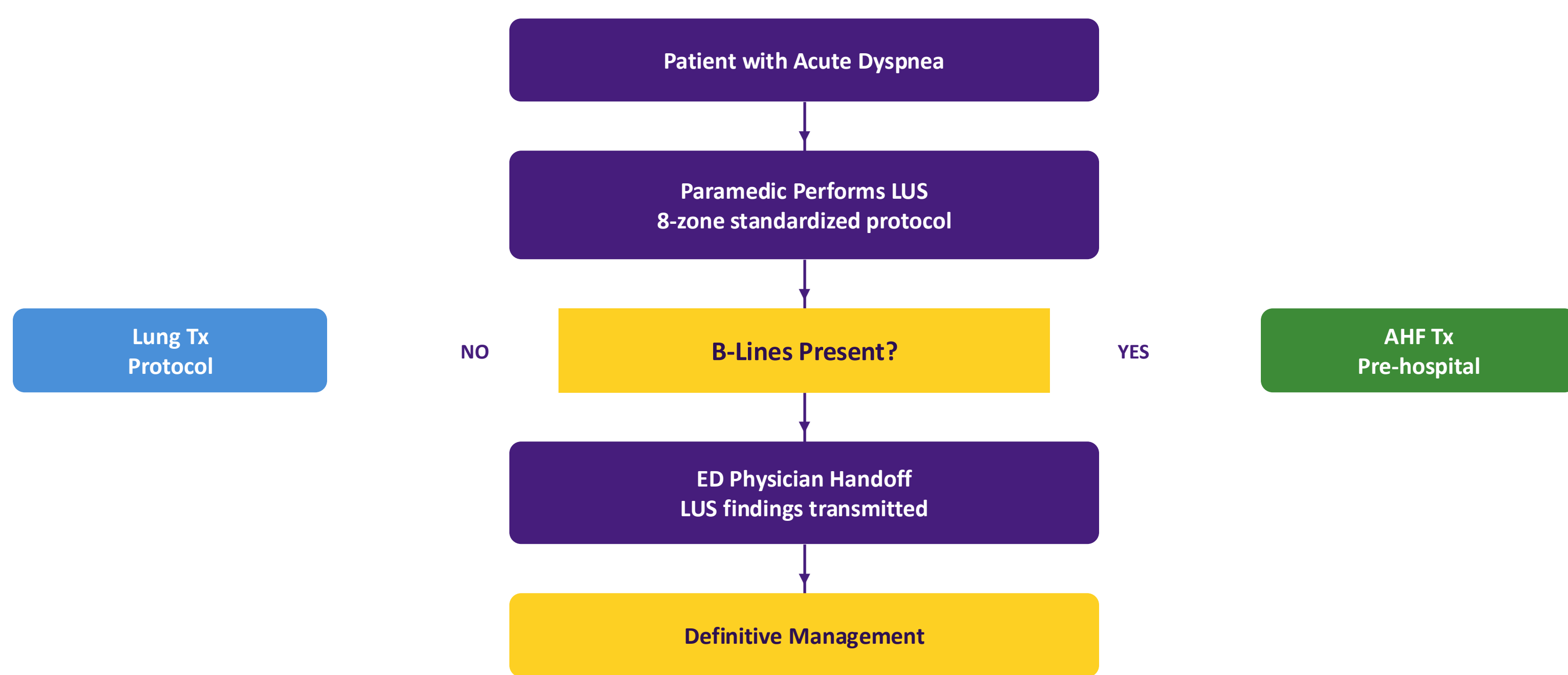
Evaluate whether paramedic-performed LUS integrated into routine EMS practice improves:

- Prehospital diagnostic accuracy for acute dyspnea
- Time to heart failure-directed therapy before hospital arrival
- Diagnostic information quality at ED handoff
- Downstream hospital outcomes

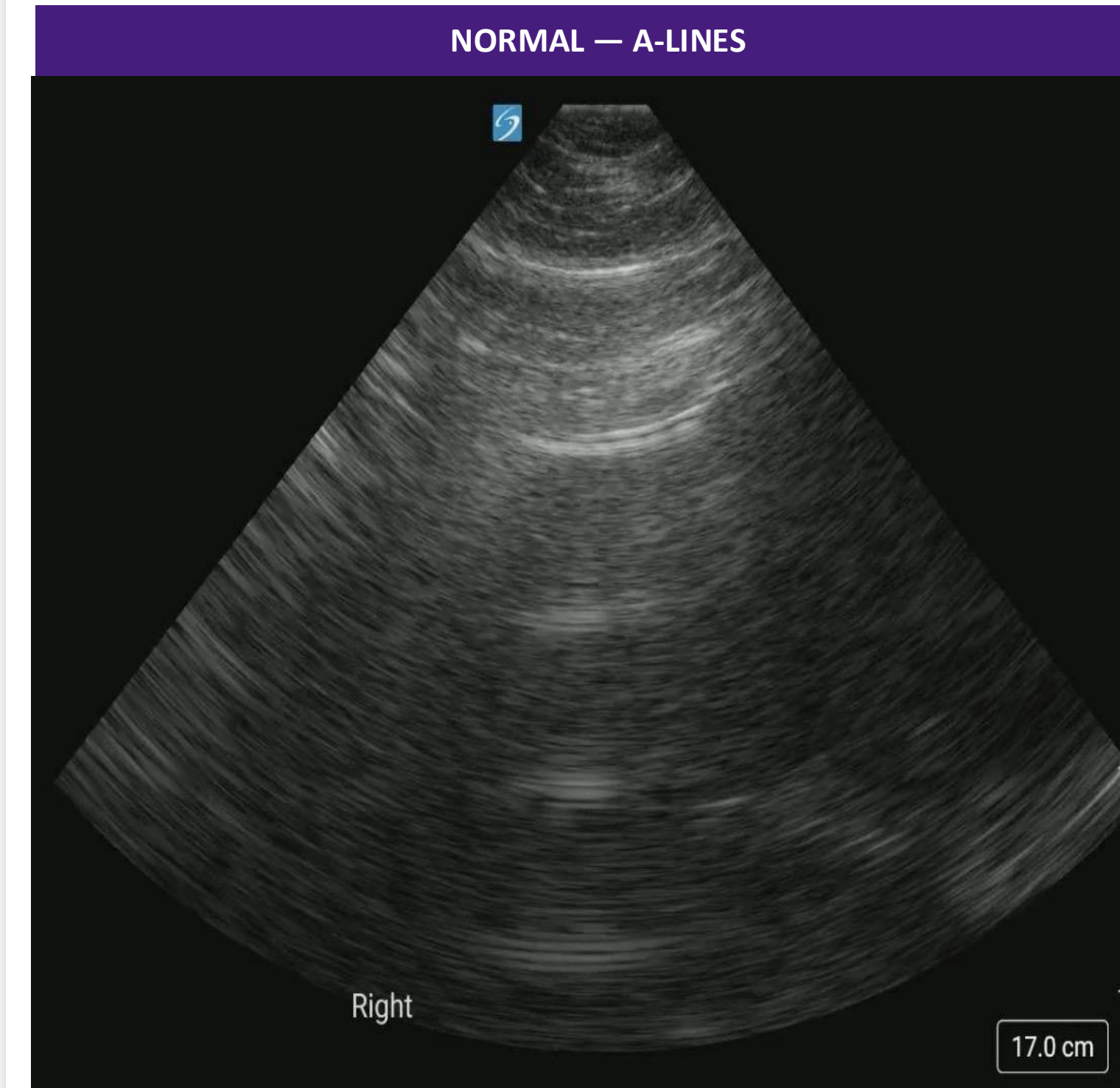
Methods

- 1 Standardized Protocol:** 8-zone lung imaging with B-line detection and pleural assessment for all acute dyspnea calls.
- 2 Focused Training:** POCUS training program supervised by ultrasound-trained emergency physicians.
- 3 System Rollout:** Integrated into routine care across New Orleans Emergency Medical Services.
- 4 Data Collection:** Prospective documentation of LUS findings, clinical impressions, and patient outcomes — Sept 2023 to Sept 2025.

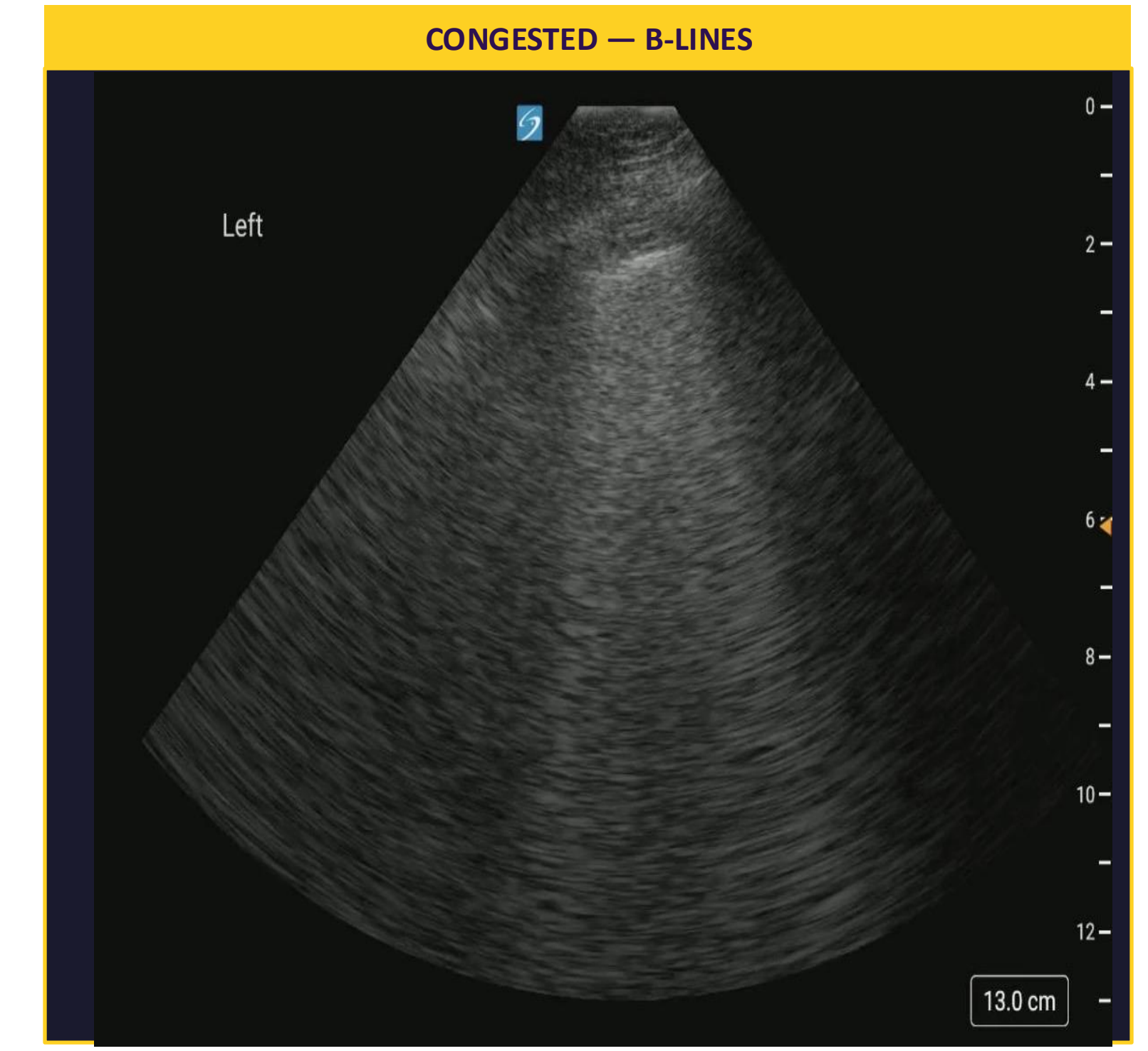
Clinical Pathway



B-Line Detection: Clinical Ultrasound Images



Horizontal reverberation lines parallel to pleural line. Air-filled alveoli → no B-lines. Rules out pulmonary edema.



Vertical comet-tail artifacts to screen edge. ≥ 3 per zone = interstitial edema. Confirms AHF profile (B-profile).

Key Findings

- ✓ Paramedics reliably identified pulmonary congestion via B-line detection across >500 prehospital encounters in a diverse urban EMS population
- ✓ Earlier recognition of AHF enabled initiation of heart failure-directed therapy prior to hospital arrival, reducing time to definitive management
- ✓ ED physicians received actionable diagnostic LUS data at handoff, improving confidence and accelerating clinical workup on ED arrival
- ✓ The 2-year rollout demonstrated consistent performance and system scalability across the NOEMS service area

Conclusions

- Diagnostic Accuracy:** Paramedic-performed LUS reliably distinguishes AHF from pulmonary etiologies in the prehospital setting.
- Time-Sensitive Treatment:** Pre-arrival AHF identification enables targeted therapy — directly reducing time to definitive management.
- Care Continuity:** Structured LUS data at ED handoff provides physicians with actionable information on patient arrival.
- Scalable Model:** With focused training and standardized protocols, paramedic LUS integrates successfully into urban EMS at scale.

Statistics: B-Line Detection

Cohort Overview

507	Total LUS Encounters
493	Valid B-Line Readings
29	Trained Paramedics
59 yrs	Mean Patient Age (range 6–95)
24 mo	Study Duration (Sept '23–Sept '25)

Diagnostic Performance

46.9%	B-line detection rate (231/493 encounters)
Sensitivity: 65.7%	— correctly identified when present
Specificity: 93.8%	— correctly identified when absent
PPV: 91.7%	— positive call was truly positive
NPV: 72.6%	— negative call was truly negative
Overall Accuracy: 79.5%	— (n=132 reviewed encounters)

Clinical Correlation

75.0%	B-line rate in CHF patients (45/60)
43.0%	B-line rate in non-CHF patients (186/433)
US Interpretation Accuracy: 76.9% (100/130 reviewed cases). Sensitivity/specificity reflects paramedic B-line identification compared against physician-reviewed LUS findings.	

Future Directions

- Improved Patient Outcomes & Reduced Hospital Stay**
Prospective outcomes tracking will evaluate whether pre-arrival AHF identification translates to measurable reductions in hospital length of stay, ICU admissions, and 30-day readmission rates.
- Standardized Paramedic Certification & Competency**
Develop a formal POCUS certification pathway for paramedics in Louisiana, with competency-based milestones and simulation training.

- Expanded EMS Participation Across Louisiana**
Scale this model beyond NOEMS to additional Louisiana EMS agencies, particularly in underserved rural parishes where prehospital diagnostic capability is limited.
- EHR Integration & Real-Time Decision Support**
Integrate LUS findings directly into prehospital ePCR documentation and ED electronic health records for seamless data handoff.

References & Acknowledgments

- Russell et al. Prehospital LUS for Acute Dyspnea. Academic Emergency Medicine. 2024.
- Volpicelli G et al. Ultrasound patterns of pulmonary edema. Ann Transl Med. 2019;7(S1):S16.
- Lichtenstein DA, Mezière GA. The BLUE protocol. Chest. 2008;134(1):117-25.

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