

Paramedic-performed Prehospital Tele-Ultrasound: A Powerful Technology or an Impractical Endeavor? A Literature Review

First Author: Rachel Shi

Classification: Medical student

Additional Authors: Colton Amaral, Dr. Javier Rosario MD

Affiliations: University of Central Florida College of Medicine

Research Type: Research Abstract

IRB Approval or Exemption: Exemption (literature review)

Mailing Address of First Author: 2941 Siesta View Drive
Kissimmee, FL, 34744

Email Address of First Author: rachel.shi@knights.ucf.edu

Official submission to the FCEP Emergency Medicine Research Competition at Symposium by the Sea 2022

Symposium by the Sea 2022

EM Research Abstract Submission

Title: Paramedic-performed Prehospital Tele-Ultrasound: A Powerful Technology or an Impractical Endeavor? A Literature Review

Study objectives: Point-of-care ultrasound has found many applications in prehospital settings as an early diagnostic tool for acute trauma care, respiratory distress, and other time-sensitive critical conditions. Prehospital non-physician providers sometimes have limited diagnostic tools available, and only few paramedics have had training in ultrasound (US). With the rise of advanced communication technology, ultrasound with remote assistance (tele-ultrasound) may have potential to improve accessibility of US for prehospital patients who need it. While an enticing idea in theory, the feasibility, complexity, and training of this method is currently unexplored. A literature review was conducted to analyze existing evidence from the past decade on paramedic-performed prehospital tele-ultrasound and discuss quality of evidence, methodologies, and if relevant, the feasibility of this modality.

Methods: A systematic article search was conducted in the MEDLINE, EMBASE, and Cochrane databases for articles during the period 1/1/2010-12/31/2021, using search terms with variations of “ultrasound”, “tele-ultrasound”, “paramedic”, “emergency”, “sonography”, and “prehospital.” A qualitative synthesis of data was performed, examining the methodology, image quality, time to obtain images, and amount of training.

Results: A total of 10 articles met inclusion criteria, and analysis revealed three major methodologies in paramedic prehospital tele-ultrasound research: 1) a paramedic attaches a tele-echography robot that is remotely controlled by a physician who conducts the exam, 2) a paramedic performs the scan and is “telementored” in real-time by an US expert in another location, and 3) a paramedic performs the scan which is transmitted in real-time to a receiving US expert for interpretation. The level of US exposure in the paramedics ranged from minimal (20 minutes or less) to 12 hours of training. Scans were conducted on healthy volunteers (4/10 articles), patients (3/10), or clinical models (2/10). Clinical indications studied included respiratory distress and free intraperitoneal fluid from blunt trauma. One study found US teleguidance to be an effective tool to train paramedics in confirmation of endotracheal tube placement. Another study surveyed paramedic perspectives on tele-ultrasound and found the technology was viewed optimistically, but the measurable benefits for patients and urban areas was questioned. Despite the variability in study designs and questions and the level of US exposure in the paramedics, all except one study recommended further exploration of tele-ultrasound.

Conclusions: Research on prehospital tele-ultrasound performed by paramedics is a nascent field with potential to improve US accessibility and patient care, but additional studies are needed to address technological challenges and determine feasibility.