

INTRODUCTION

Point-Of-care ultrasound has slowly increased as a ubiquitous piece of technology with introduction of more handheld devices. However, with any technology comes its pitfalls and needed understanding of where it is best suited. While some use cases can be quite clear such as in the case of aiding venous or arterial access, use of POCUS to aid diagnostics is not so. It may often be seen as an adjunct to current standards as data around its diagnostic ability is further complicated by varying training and user error.

PURPOSE

- To identify key articles that review point of care ultrasound research using meta analysis and systematic reviews
- Understand where POCUS can be best utilized based on current trends
- Utilize this information for the development of physician training to bring better standardization of skill development.

METHODS

- Search was done through Pubmed database
- Search terms included ultrasound MESH with sensitivity and specificity
- Search was limited to 2017-2023 as POCUS research has been more pronounced past 2010, and even more so with the introduction of competing devices.
- Articles were further restricted with only those including meta analysis.
- Resulted in 1710 articles
- 10 articles were selected for the primary data table, however there may be more that are applicable before 2017.

RESULTS

FIGURE 1:

Ultrasound Objective	Notes	Sensitivity	Specificity
Acute Pulmonary Edema	8 studies included from 4 databases	97% (95% CI: 0.96-0.98%)	98% (95% CI: 0.97-0.99)
Pediatric Abscess vs Cellulitis	POCUS outperforms PE alone	90% (95% CI: 0.82-0.95)	80% (95% CI: 0.72-0.86)
Child Pneumonia	POCUS compared to chest radiography 22 studies with 2470 patients	95% (95% CI: 0.94 to 0.96)	90% (95% CI: 0.87 to 0.92)
Giant Cell arteritis	Characteristic US findings, halo sign, for GCA Increasing sensitivity and specificity	91.6%	95.8%
Long Bone Fractures	30 studies, 3506 subjects 1 st set for pediatric forearm fractures. 2 nd set for adult ankle fractures.	93.1% (95% CI: 0.872-0.964) 89.5% (95% CI: 0.77-0.956)	92.9% (95% CI: 0.866-0.964) 94.2% (95% CI: 0.86-0.977)
Carpal tunnel syndrome	19 studies, 3131 samples	77.6% (95% CI: 0.716-0.836)	86.8% (95% CI: 0.789-0.948)
Gout	13 studies Double contour sign, presences of tophi and snowstorm sign.	80% (95% CI: 0.76-0.83)	83% (95% CI: 0.79-0.86)
Optic Nerve Edema	71 studies, however only 35 with low bias. 1 st set with TBI, 2 nd set without.	97% (95% CI: 0.92-0.99) 92% (95% CI: 0.86-0.96)	86% (95% CI: 0.74-0.93) 86% (95% CI: 0.77-0.92)
Placenta accreta	266 studies included No statistical difference compared to MRI	83.3% (95% CI: 0.776-0.878)	83.4% (95% CI: 0.746-0.897)
SBO	11 studies Limited Pediatric populations	92.4% (95% CI: 0.89 -0.947)	96.6% (95% CI: 0.88-0.99)

DISCUSSION

- As POCUS continues to develop, further research with larger comparative studies must be done to find value additive areas for POCUS.
- Training for POCUS is widely variable for physicians. While there are baseline techniques many learn depending on specialty, the evolving field will require adjustments to best take advantage of this technology. Concentration of training into areas and diagnoses as indicated within these literature reviews will provide the highest clinical benefit.
- Integrating POCUS as a standard diagnostic step in areas such as congestive heart failure, pneumonia, pulmonary edema, and others have shown to improve sensitivities.
- Pooled sensitivities and specificities may result in higher values, thereby skewing these results. However, previous studies, particularly in GCA noted how meta analysis papers have improved throughout the years. This may be due to improved training and accessibility of the technology, not the byproduct of pooling. This may not be applicable to all pathologies.
- While diagnostic odds ratios were not listed for all of these papers, the ones that were included values included large ranges. Notably child pneumonia DOR was 137 (95% CI: 60 to 313). In this case, the DOR was still well above 1, indicating strong diagnostic usefulness.
- As POCUS continues to be more accessible, physicians will need to well versed in it's use cases. It may be particularly helpful to reduce usage of other imaging modalities or when they are not accessible.

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