

1. Pediatric Emergency Care

Clinical Characteristics, Outcomes, and Interobserver Agreement of Point-of-Care Ultrasound Detected Mesenteric Adenitis in Nonsurgical Pediatric Abdominal Pain: A Retrospective Cohort Study

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Abstract

Objectives: Point-of-care ultrasound (PoCUS) in the emergency department (ED) may facilitate the diagnosis of nonsurgical sources of abdominal pain after surgical causes are excluded. Identifying mesenteric adenitis is a feasible PoCUS application due to its ease of use and speed. However, there are scant data regarding the diagnosis of mesenteric adenitis by PoCUS. The objective of this study was to describe the clinical characteristics, outcomes, and interobserver agreement of mesenteric adenitis identified on PoCUS in pediatric patients with nonsurgical abdominal pain.

Methods: This was a retrospective review at a tertiary-care, urban pediatric ED. All cases of mesenteric adenitis diagnosed on PoCUS from January 2018 to August 2022 were reviewed. Demographics and clinical data, including relevant outcomes, were recorded. All PoCUS videos were reviewed by a senior sonologist-physician for determination of mesenteric adenitis in children 21 years and younger with nonsurgical abdominal pain. Interobserver agreement by Cohen κ was calculated between experienced and novice physician sonologists blinded to diagnosis, who reviewed 77 six-second video clips for presence or absence of mesenteric adenitis.

Results: Thirty-three subjects were identified by PoCUS to have mesenteric adenitis in the setting of nonsurgical abdominal pain presenting to our ED. Most common indications for PoCUS were for suspected appendicitis, suspected intussusception, or undifferentiated abdominal pain. Forty-six percent of patients were male; median age was 9 years (interquartile range, 4-14 years). On 4-week clinical follow-up, 1 patient returned to our ED with a surgical abdomen. Cohen κ values were 0.83 (95% confidence interval, 0.70-0.97) between experienced

sonologist-physicians and 0.76 (95% confidence interval, 0.61-.90) between novice and experienced sonologist-physicians.

Conclusions: PoCUS can identify mesenteric adenitis, typically a diagnosis of exclusion, in pediatric patients with nonsurgical abdominal pain, both by novice and experienced physician-sonologists. Use of PoCUS may help ED clinicians identify a common cause of nonsurgical abdominal pain in children.

2. BMJ

EASIER trial (Erector-spinAe analgeSia for hepatopancreaticobiliary pain In the Emergency Room): a single-centre open-label cohort-based randomised controlled trial analysing the efficacy of the ultrasound-guided erector-spinae plane block compared with intravenous morphine in the treatment of acute hepatopancreaticobiliary pain in the emergency department

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Abstract

Background: Ultrasound-guided (USG) erector-spinae plane block (ESPB) may be better than intravenous opioids in treating acute hepatopancreaticobiliary (HPB) pain in the ED.

Methods: This open-label randomised controlled trial was conducted in the ED of a tertiary-care hospital between March and August 2023. All adult patients with severe HPB pain were recruited during times that a primary investigator was present. Unconsenting patients, numeric rating scale (NRS) ≤ 6 , age ≤ 18 and ≥ 80 years, pregnant, unstable or with allergies to local

anaesthetics or opioids were excluded. Patients in the intervention arm received bilateral USG ESPB with 0.2% ropivacaine at T7 level, by a trained ED consultant, and those in the control arm received 0.1 mg/kg intravenous morphine. Pain on a 10-point NRS was assessed by the investigators at presentation and at 1, 3, 5 and 10 hours after intervention by the treatment team, along with rescue analgesia requirements and patient satisfaction. Difference in NRS was analysed using analysis of co-variance (ANCOVA) and t-tests.

Results: 70 participants were enrolled, 35 in each arm. Mean age was 40.4 ± 13.2 years, mean NRS at presentation in the intervention arm was 8.0 ± 0.9 and 7.6 ± 0.6 in the control arm. NRS at 1 hour was significantly lower in the ESPB group (ANCOVA $p < 0.001$). At 1, 3, 5 and 10 hours, reduction of NRS in the intervention arm (7 ± 1.6 , 6.7 ± 1.9 , 6.6 ± 1.8 , 6.1 ± 1.9) was significantly greater than the control arm (4.4 ± 2 , 4.6 ± 1.8 , 3.7 ± 2.2 , 3.8 ± 1.8) (t-test, $p < 0.001$). Fewer patients receiving ESPB required rescue analgesia at 5 (t-test, $p = 0.031$) and 10 hours (t-test, $p = 0.04$). More patients were 'very satisfied' with ESPB compared with receiving only morphine at each time period ($p < 0.001$).

Conclusion: ESPB is a promising alternative to morphine in those with HPB pain.

3. BMC Medical Education

Improving lung point-of-care ultrasound (POCUS) training and accreditation - a multidisciplinary, multi-centre and multi-pronged approach to development and delivery using the action learning process

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Abstract

Background: Point-of-Care Ultrasound (POCUS) consists of a range of increasingly important imaging modalities across a variety of specialties. Despite a variety of accreditation pathways available in the UK, lung POCUS training remains difficult to deliver and accreditation rates remain suboptimal. We describe a multidisciplinary, multi-centre, and multi-pronged approach to lung POCUS education within a region.

Methods: A survey was conducted in a region. From these results, bottlenecks were identified for improvement. We utilised key stages in an established accreditation pathway, and the Action Learning process. Analysing participant feedback, consensus amongst the team, regional educational needs, and leveraging the expertise within the faculty, we implemented several solutions which were multidisciplinary, multi-centre, and multi-pronged. We also set up a database across several accreditation pathways to facilitate supervision and assessment of rotational trainees.

Results: Utilising the Action Learning process, we implemented several improvements at elements of the lung ultrasound accreditation pathways. An initial regional survey identified key barriers to accreditation: lack of courses (52%), lack of mentors (93%), and difficulty arranging directly supervised scans (73%). A multidisciplinary team of trainers was assembled. Regular courses were organised and altered based on feedback and anecdotal educational needs within the region. Courses were set up to also facilitate continuing professional development and exchange of knowledge and ideas amongst trainers. The barrier of supervision was removed through the organisation of regular supervision sessions, facilitating up to fifty scans per half day per trainer. We collected feedback from courses and optimised them. Remote mentoring platforms were utilised to encourage asynchronous supervision. A database of trainers was collated to facilitate triggered assessments. These approaches promoted a conducive environment and a commitment to learning. Repeat survey results support this.

Conclusion: Lung ultrasound accreditation remains a complex educational training pathway. Utilising an education framework, recruiting a multidisciplinary team, ensuring a multi-pronged approach, and fostering a commitment to learning can improve accreditation success

4. Int J Emerg Med

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Emergency medicine residents' learning curve in diagnosing deep vein thrombosis with 3-point venous point-of-care ultrasound

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Abstract

Background: Many cases of deep vein thrombosis (DVT) are diagnosed in the emergency department, and abbreviated lower extremity venous point-of-care ultrasound (POCUS) has already shown an accuracy comparable to that of specialists. This study aimed to identify the learning curve necessary for emergency medicine (EM) residents to achieve expertise-level accuracy in diagnosing DVT through a 3-point lower extremity venous POCUS.

Methods: This prospective study was conducted at an emergency department between May 2021 and October 2022. Four EM residents underwent a one-hour POCUS training session and performed DVT assessments in participants with DVT symptoms or confirmed pulmonary embolism. POCUS was performed at three proximal lower extremity sites to evaluate the thrombi presence and vein compressibility, with results validated by specialized radiology ultrasound. Cumulative sum (CUSUM) and the Bush and Mosteller models were used to analyze the learning curve, while generalized estimating equations were used to identify factors affecting diagnostic accuracy.

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Results: 91 POCUS scans were conducted in 49 patients, resulting in 22% DVT confirmed by specialized venous ultrasound. In the CUSUM analysis, all four EM residents attained a 90% success rate at the common femoral vein, whereas only half achieved this rate when all three sites were considered. According to Bush and Mosteller models, 13-18 cases are required to attain 90-95% diagnostic accuracy. After 10-16 cases, the examination time for each resident decreased, and a 20% increase in examiner confidence was linked to a 2.506-fold increase in the DVT diagnosis accuracy.

Conclusion: EM residents generally required 13-18 cases for 90-95% DVT diagnostic accuracy, but proficiency varied among individuals, particularly requiring more cases for regions outside the common femoral vein.

5. Pediatr Emerg Care

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The Current State of Advanced Pediatric Emergency Medicine Point-of-Care Ultrasound (POCUS) Training: Exploring Recent POCUS Fellowship Application Trends and Alternate Training Models

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Abstract

Objectives: This study aims to assess the current state of advanced pediatric emergency medicine (PEM) point-of-care ultrasound (POCUS) training in North America, including trends in dedicated PEM POCUS fellowships and alternative advanced POCUS training pathways, to better guide future educational efforts within the field.

Methods: We identified and surveyed 22 PEM POCUS fellowship directors across the United States and Canada regarding PEM POCUS fellowship application trends, potential barriers to pursuing additional POCUS training, and novel training models that meet the needs of the PEM POCUS workforce.

Results: The past 5 years have seen a growth in both PEM POCUS fellowship program number and trainee positions available, with a general impression by fellowship directors of a high demand for faculty who have these training credentials. However, there was a discordant drop in fellowship applicants and corresponding match rate in 2022, the cause of which is not clear. A number of programs are offering alternative advanced training options including combined PEM/POCUS fellowships and POCUS tracks within PEM fellowship.

Conclusion: As POCUS use within PEM evolves, a growing number of advanced training options are being developed. Understanding the motivations and barriers for pursuing advanced POCUS training can help to shape these options going forward, to ensure the experience incorporated within each model meets the needs of trainees, the needs of PEM divisions, and the future needs of our field.

6. Scand J Trauma Resusc Emerg Med

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Implementation of a point-of-care ultrasound archiving system and governance framework in a UK physician-paramedic staffed helicopter emergency medical service

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Abstract

Introduction: There has been a rapid expansion in the use of point-of-care ultrasonography (POCUS) by emergency medical services (EMS). However, less than a third of UK EMS utilise imaging archiving for POCUS, and fewer review saved images as part of a clinical governance structure. This paper describes the implementation of a novel image archiving system and a robust clinical governance framework in our UK physician-paramedic staffed helicopter emergency medical service (HEMS).

Methods: A retrospective database review was conducted of all patients attended by East Anglian Air Ambulance (EAAA) between the introduction of a new POCUS device and image archiving system on 1 December 2020 to 31 January 2024. All patients with recorded POCUS examinations were included. Images from POCUS examinations at EAAA are archived on a cloud-based server, and retrospectively reviewed within 24 h by an EAAA POCUS supervisor. Image quality is graded using a 5-point Likert-type scale, agreement between reviewer and clinician is recorded and feedback is provided on scanning technique. T-tests were used to assess the difference in image quality between physicians and paramedics. Inter-rater reliability between reviewers and clinicians was assessed using Cohen's kappa (κ).

Results: During the study period, 5913 patients were attended by EAAA. Of these, 1097 patients had POCUS images recorded. The prevalence of POCUS during the study period was 18.6%. 1061 patient examinations underwent quality assurance (96.7%). The most common POCUS examination was echocardiography (60%), predominantly during cardiac arrest. The primary scanning clinician was a paramedic in 25.4% of POCUS examinations. Across all examination types; image quality was not significantly different between physicians and paramedics and agreement between reviewers and clinicians was strong ($\kappa > 0.85$).

Conclusions: In this service evaluation study, we have described outcomes following the introduction of a new POCUS device, image archiving system and governance framework in our

HEMS. Paramedics were the primary scanning clinician in a quarter of scans, with image quality comparable to physicians. Almost all scans underwent quality assurance and inter-rater reliability was strong between clinicians and reviewers. Further research is required to investigate the diagnostic accuracy of POCUS and to demonstrate the effect of utilising prehospital POCUS to refine diagnosis on clinical outcomes.

7. **Pediatr Emerg Care**

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Accuracy of Pediatric Interventricular Septal Thickness Measurement Obtained Via Point-of-Care Ultrasound: A Prospective Study

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Abstract

Background: Hypertrophic cardiomyopathy is a genetic, life-threatening cardiovascular disease that often goes unidentified in pediatric patients. Patients are often asymptomatic and neither history or physical examination are reliable to detect the disease. The only reliable method to diagnose hypertrophic cardiomyopathy is with echocardiography to look at interventricular septal thickness. Emerging literature has shown that cardiac point-of-care ultrasound (POCUS) performed by pediatric emergency medicine (PEM) physicians is as effective and accurate compared with cardiac echocardiography performed by pediatric cardiologists.

Objective: The objective of the study was to determine the diagnostic accuracy of POCUS performed by ultrasound-trained PEM physicians in measuring the interventricular septum end diastole (IVSd) thickness in the pediatric emergency department.

Methods: We conducted a prospective, single-center, observational, diagnostic accuracy study to examine the diagnostic accuracy of POCUS in measuring IVSd thickness in pediatric patients who presented to the pediatric emergency department with symptoms that prompted a cardiac POCUS. Cardiac POCUS findings were interpreted by a PEM physician at the bedside and retrospectively by a pediatric cardiologist. Diagnostic concordance of the measurements obtained by the PEM physician and cardiologist was assessed.

Results: Forty-eight patients were enrolled. Median patient age was 13.4 years. There was excellent diagnostic agreement on the measurement of the IVSd thickness between PEM physicians and the pediatric cardiologist (81.25% of cases; 39/48). Disagreement was seen in 18.75% of the cases (9/48). The mean error of disagreement was -0.32, with a 95% confidence interval of -0.37 to -0.28. Overall, the mean error of both agreement and disagreement was -0.046, with 95% confidence interval of -0.08 to -0.01 and P value of 0.008.

Conclusions: Point-of-care ultrasound performed by ultrasound-trained PEM physicians to measure pediatric IVSd thickness has a high diagnostic accuracy with excellent agreement with a pediatric cardiologist.

8. CJEM

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A POCUS-first pathway to streamline care for children with suspected ileocolic intussusception

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Abstract in [English](#), French

Objectives: As point-of-care ultrasound (POCUS) has emerged as a valuable tool for intussusception screening, this quality improvement study aimed to implement a "POCUS-first" pathway in a Pediatric Emergency Department (ED) to streamline workflow and expedite care for children with suspected intussusception.

Methods: This was a prospective analysis of children diagnosed with ileocolic intussusception in a Pediatric ED between June 2022 and June 2023. The study compared the "POCUS-first" cohort with the group receiving only radiology-performed ultrasound. Key outcomes included physician initial assessment to radiology-performed US time and physician initial assessment to reduction time. Continuous improvement efforts incorporated pediatric emergency medicine physician training, education, and pathway dissemination through plan-do-study-act cycles.

Results: The study included 29 patients in the "POCUS-first" pathway group and 70 patients in the non-POCUS group. The "POCUS-first" pathway demonstrated a significantly shorter physician initial assessment to reduction time compared to the non-POCUS group (170.7 min vs. 240.6 min, $p = 0.02$). Among non-transferred patients, the "POCUS-first" group also had a significantly shorter emergency department length of stay (386 min vs. 544 min, $p = 0.047$).

Conclusions: Implementation of a "POCUS-first" pathway for managing ileocolic intussusception led to notable improvements in process efficiency. The shorter physician initial assessment to reduction time highlights the potential for expedited decision-making and intervention. These study findings support the potential of this pathway to optimize the management and outcomes of children with ileocolic intussusception.

9. Pediatr Qual Saf.

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Improving Turnaround Time of Transabdominal Pelvic Ultrasounds with Ovarian Doppler in a Pediatric Emergency Department

ABSTRACT

INTRODUCTION: Adnexal torsion is an emergent surgical condition. Transabdominal pelvic ultrasound (US) with ovarian Doppler is used to diagnose adnexal torsion and requires a sufficient bladder volume. Reduce the turnaround time for US by 25% in girls 8-18 years of age who present to the emergency department (ED) for 24 months.

METHODS: Our baseline period was from January 2020 to June 2021, and the intervention period was from July 2021 to June 2023. Patients 8-18 years old who required an US in the ED were included. There are two key drivers: early identification of US readiness and expeditious bladder filling. Interventions were (1) bladder volume screening; (2) utilization of bladder volume nomogram to identify US readiness; (3) epic order panels; and (4) rapid intravenous fluid method. The primary outcome was US turnaround time. Secondary outcomes were percentage of patients requiring invasive interventions to fill the bladder and patients with an US study duration of ≤ 45 minutes. The percent of patients screened by bladder scan was used as a process measure. Balancing measures used episodes of fluid overload and ED length of stay.

RESULTS: Turnaround time for USs improved from 112.4 to 101.6 minutes. The percentage of patients who had successful USs without invasive bladder filling improved from 32.1% to 42.6%. Bladder volume screening using a bladder scan increased from 40.3% to 82.9%. The successful first-pass US completion rate improved from 77% to 90% consistently.

CONCLUSIONS: Through quality improvement methodology, we have identified pelvic US readiness earlier, eliminated some invasive bladder-filling measures, and implemented a rapid fluid protocol. We have sustained these successful results for 2 years. This study can be generalized to any ED with similar patients.

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10. Pediatr Qual Saf.

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Exploring the Feasibility of At-Home Lung Ultra-Portable Ultrasound: Parent-Performed Pediatric Lung Imaging

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Abstract

Objective: To determine if caregivers would be able to successfully perform in home lung ultrasounds on their children without direct supervision after undergoing a basic tutorial that would allow for expert interpretation.

Methods: A prospective exploratory single-center cohort study was conducted on patients (0-18 years) presenting to a pediatric emergency department with a respiratory complaint or COVID-related illness. Caregivers underwent a brief hands-on session and were instructed to scan the lungs daily for 7 days. Images were assessed using a modified POCUS IQ score. Descriptive statistics were used to describe the data and bivariate analysis was used to compare groups.

Results: Eighteen patients were enrolled; the average age of the parent scanner was 31.9 years and 78% were female. Of all participants, 77.8% scanned on day one. Parents were able to successfully perform some part of the daily scan session for an average of 3.8 out of 7 days. The average POCUS IQ score overall was 6.7 (out of 12).

Conclusion: Our study demonstrates the feasibility and acceptability of caregiver ability to obtain adequate lung ultrasound images, at home under no guidance, using the Butterfly iQ probe. Further studies are needed to investigate the accessibility of ultra-portable ultrasound and the ability to integrate with the at-home hospital model, specifically in the pediatric population.

11. Pediatr Emerg Care

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Test Characteristics of Cardiac Point-of-Care Ultrasound in Children With Preexisting Cardiac Conditions

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Abstract

Objective: The aim of the study is to assess diagnostic performance of cardiac point-of-care ultrasound (POCUS) performed by pediatric emergency medicine (PEM) physicians in children with preexisting cardiac disease.

Methods: We evaluated the use of cardiac POCUS performed by PEM physicians among a convenience sample of children with preexisting cardiac disease presenting to a tertiary care pediatric ED. We assessed patient characteristics and the indication for POCUS. The test characteristics of the sonologist interpretation for the assessment of both pericardial effusion as well as left ventricular systolic dysfunction were compared with expert POCUS review by PEM physicians with POCUS fellowship training.

Results: A total of 104 children with preexisting cardiac disease underwent cardiac POCUS examinations between July 2015 and December 2017. Among children with preexisting cardiac disease, structural defects were present in 72%, acquired conditions in 22%, and arrhythmias in 13% of patients. Cardiac POCUS was most frequently obtained because of chest pain (55%), dyspnea (18%), tachycardia (17%), and syncope (10%). Cardiac POCUS interpretation compared

with expert review had a sensitivity of 100% (95% confidence interval [CI], 85.7-100) for pericardial effusion and 100% (95% CI, 71.5-100) for left ventricular systolic dysfunction; specificity was 97.5% (95% CI, 91.3.1-99.7) for pericardial effusion and 98.9% (95% CI, 93.8-99.8) for left ventricular systolic dysfunction.

Conclusions: Cardiac POCUS demonstrates good sensitivity and specificity in diagnosing pericardial effusion and left ventricular systolic dysfunction in children with preexisting cardiac conditions when technically adequate studies are obtained. These findings support future studies of cardiac POCUS in children with preexisting cardiac conditions presenting to the ED.

12. Ann Emerg Med

. 2024 Mar;83(3):198-207.

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Diagnostic Accuracy of Point-of-Care Ultrasound Versus Radiographic Imaging for Pediatric Distal Forearm Fractures: A Randomized Controlled Trial

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Free article

Abstract

Study objective: In patients aged 5 to 15 years with a clinically nondeformed distal forearm injury presenting to the emergency department (ED), we examined whether point-of-care

ultrasound or radiographic imaging had better diagnostic accuracy, with the reference diagnosis determined by an expert panel review.

Methods: This multicenter, open-label, diagnostic randomized controlled trial was conducted in South East Queensland, Australia. Eligible patients were randomized to receive initial imaging through point-of-care ultrasound performed by an ED clinician or radiograph. Images were defined as "no," "buckle," or "other" fracture by the treating clinician. The primary outcome was the diagnostic accuracy of the treating clinician's interpretation compared against the reference standard diagnosis, which was determined retrospectively by an expert panel consisting of an emergency physician, pediatric radiologist, and pediatric orthopedic surgeon, who reviewed all imaging and follow-up.

Results: Two-hundred and seventy participants were enrolled, with 135 randomized to each initial imaging modality. There were 132 (97.8%) and 112 (83.0%) correctly diagnosed participants by ED clinicians in the point-of-care ultrasound and radiograph groups, respectively (absolute difference [AD]=14.8%; 95% confidence interval [CI] 8.0% to 21.6%; $P<.001$). Point-of-care ultrasound had better accuracy for participants with "buckle" fractures (AD=18.5%; 95% CI 7.1% to 29.8%) and "other" fractures (AD=17.1%; 95% CI 2.7% to 31.6%). No clinically important fractures were missed in either group.

Conclusion: In children and adolescents presenting to the ED with a clinically nondeformed distal forearm injury, clinician-performed (acquired and interpreted) point-of-care ultrasound more accurately identified the correct diagnosis than clinician-interpreted radiographic imaging.

13. Am J Emerg Med

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Association of outcomes in point-of-care lung ultrasound for bronchiolitis in the pediatric emergency department

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Abstract

Background: Acute bronchiolitis (AB) is the most common lower respiratory tract infection in infants. Objective scoring tools and plain film radiography have limited application, thus diagnosis is clinical. The role of point-of-care lung ultrasound (LUS) is not well established.

Objective: We sought to characterize LUS findings in infants presenting to the pediatric ED diagnosed with AB, and to identify associations between LUS and respiratory support (RS) at 12 and 24 h, maximum RS during hospitalization, disposition, and hospital length of stay (LOS).

Methods: Infants ≤ 12 months presenting to the ED and diagnosed with AB were enrolled. LUS was performed at the bedside by a physician. Lungs were divided into 12 segments and scanned, then scored and summated (min. 0, max. 36) in real time accordingly: 0 - A lines with < 3 B lines per lung segment. 1 - ≥ 3 B lines per lung segment, but not consolidated. 2 - consolidated B lines, but no subpleural consolidation. 3 - subpleural consolidation with any findings scoring 1 or 2. Chart review was performed for all patients after discharge. RS was categorized accordingly: RS (room air), low RS (wall O₂ or heated high flow nasal cannula < 1 L/kg), and high RS (heated high flow nasal cannula ≥ 1 L/kg or positive pressure).

Results: 82 subjects were enrolled. Regarding disposition, the mean (SD) LUS scores were: discharged 1.18 (1.33); admitted to the floor 4.34 (3.62); and admitted to the ICU was 10.84 (6.54). For RS, the mean (SD) LUS scores at 12 h were: no RS 1.56 (1.93), low RS 4.34 (3.51), and high RS 11.94 (6.17). At 24 h: no RS 2.11 (2.35), low RS 4.91 (3.86), and high RS 12.64 (6.48). Maximum RS: no RS 1.22 (1.31), low RS 4.11 (3.61), and high RS 10.45 (6.16). Mean differences for all dispositions and RS time points were statistically significant ($p < 0.05$, CI $> 95\%$). The mean

(SD) hospital LOS was 84.5 h (SD 62.9). The Pearson correlation coefficient (r) comparing LOS and LUS was 0.489 ($p < 0.0001$).

Conclusion: Higher LUS scores for AB were associated with increased respiratory support, longer LOS, and more acute disposition. The use of bedside LUS in the ED may assist the clinician in the management and disposition of patient's diagnosed with AB.

14. Pediatr Emerg Care

. 2023 Sep 1;39(9):728-733.

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Point-of-Care Ultrasound for the Diagnosis of Pediatric Foreign Body Ingestion: A Narrative Review and Illustrative Case Report

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Abstract

Purpose: Foreign body ingestion (FBI) is a frequent concern in emergency departments. Clinical guidelines recommend performing plain x-rays as the primary modality of diagnosis. Although point-of-care ultrasound (PoCUS) has increasingly been integrated into the daily practice of emergency medicine, it has been poorly investigated in the diagnostic approach for FBI. This review aims to highlight the current state of PoCUS use for pediatric FBI. The following research question was considered in this narrative review: Is PoCUS useful for FBI management?

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Methods: A literature search was conducted to identify articles reporting PoCUS use for the management of FBI. All articles were assessed for quality by 2 reviewers.

Main results: The 14 selected articles reported 52 FBI cases in which PoCUS successfully identified and located the ingested FB. Point-of-care ultrasound was used either as the primary imaging technique or after positive or negative x-ray findings. In 5 cases (9.6%), PoCUS was the only modality used for the diagnosis. Of these cases, 3 (60%) underwent a successful procedure to remove the FB and 2 (40%) received conservative treatment without complications.

Conclusions: This review suggests that PoCUS might be a reliable modality for the initial management of FBI. PoCUS can locate, identify, and evaluate the size of the FB in a wide range of materials and gastrointestinal locations. Point-of-care ultrasound could eventually become the go-to modality in the case of radiolucent FB, thus avoiding the use of radiation. Further studies are nevertheless required to validate PoCUS use for FBI management.

15. Eur Heart J Digit Health.

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Artificial intelligence-based classification of echocardiographic views

ABSTRACT

AIMS: Augmenting echocardiography with artificial intelligence would allow for automated assessment of routine parameters and identification of disease patterns not easily recognized otherwise. View classification is an essential first step before deep learning can be applied to the echocardiogram.

METHODS AND RESULTS: We trained two- and three-dimensional convolutional neural networks (CNNs) using transthoracic echocardiographic (TTE) studies obtained from 909 patients to classify nine view categories (10 269 videos). Transthoracic echocardiographic studies from 229 patients were used in internal validation (2582 videos). Convolutional neural networks were tested on 100 patients with comprehensive TTE studies (where the two examples chosen by CNNs as most likely to represent a view were evaluated) and 408 patients with five view categories obtained via point-of-care ultrasound (POCUS). The overall accuracy of the two-dimensional CNN was 96.8%, and the averaged area under the curve (AUC) was 0.997 on the comprehensive TTE testing set; these numbers were 98.4% and 0.998, respectively, on the POCUS set. For the three-dimensional CNN, the accuracy and AUC were 96.3% and 0.998 for full TTE studies and 95.0% and 0.996 on POCUS videos, respectively. The positive predictive value, which defined correctly identified predicted views, was higher with two-dimensional rather than three-dimensional networks, exceeding 93% in apical, short-axis aortic valve, and parasternal long-axis left ventricle views.

CONCLUSION: An automated view classifier utilizing CNNs was able to classify cardiac views obtained using TTE and POCUS with high accuracy. The view classifier will facilitate the application of deep learning to echocardiography.

16. World Neurosurg.

2024 May 3:S1878-8750(24)00716-2. doi: 10.1016/j.wneu.2024.04.142. Online ahead of print.

The Effect of Hydrocephalus on the Optic Nerve in the Presence of Intracranial Mass

ABSTRACT

OBJECTIVE: The measurement of optic nerve sheath diameter is a noninvasive, practical, and economical method used to identify increased intracranial pressure. The purpose of this study is to detect the preoperative and postoperative changes in optic nerve sheath diameter in patients with intracranial mass, to correlate these changes with optic nerve diameter variations, and to evaluate the impact of hydrocephalus on these alterations.

MATERIAL AND METHOD: This study was conducted with patients who presented to our clinic with complaints of intracranial mass, were decided for surgery, and underwent surgical procedures.

FINDINGS: The optic nerve and optic nerve sheath diameter measurement values were different preoperatively and postoperatively, with a significant decrease in the optic nerve sheath diameter in all groups in postoperative measurements, while the optic nerve diameter significantly increased.

CONCLUSIONS: Although there was no significant difference between the effects of hydrocephalus and intracranial mass-related increase in intracranial pressure on the optic nerve and optic nerve sheath, it was observed that hydrocephalus increased intracranial pressure when considering the Evans ratio. It has been determined that as ventricular dilatation increases, so does intracranial pressure, which leads to an increase in the diameter of the optic nerve sheath, resulting in papilledema and thinning of the optic nerve. These findings indicate the importance of early cerebrospinal fluid diversion and monitoring optic nerve sheath diameter in the management.

17. J Clin Ultrasound.

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Finding Waldo: Sonographic systematic approach to localize the appendix in children

pubmed: pediatric appendicit... by Rayan A Ahyad / May 30, 2024 at 4:16 PM

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ABSTRACT

OBJECTIVES: To describe a systematic scanning approach using anatomical landmarks followed by an assessment of radiology trainees' ability to identify the normal appendix in healthy children.

METHODS: Uncontrolled pre and post study assessing radiology residents' sonographic skills in detecting the normal appendix in healthy children. Initial questionnaire for the trainees' demographics, perceptions and experiences in detecting the appendix with ultrasound in children followed by a precourse test on healthy volunteers. Hands-on training was conducted by describing a systematic sonographic approach to identify the appendix using anatomical landmarks, and then a postcourse test was carried out. The primary outcome was unprompted ability to identify the appendix. Subjective self-scoring of confidence was also recorded.

RESULTS: A three-hour hands-on workshop was conducted. Sixteen radiology trainees participated and were randomly distributed to four stations, each with different ultrasound machines and healthy volunteers. Fifteen had a precourse assessment, and 12 completed the postcourse assessment. Before the course, 3/15 (20%) identified the appendix, while 10/12 (83%) identified the appendix afterward. After the course, participants perceived finding the appendix easier than before. There was no statistically significant difference in the participants' perceived confidence in detecting the appendix.

CONCLUSIONS: With the described scanning technique, most of the participants were able to identify the normal appendix after receiving short hands-on training. This highlights the importance of targeted training of radiology trainees and nonradiologists.

18. Pediatr Emerg Care

. 2023 Aug 1;39(8):623-628.

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Point-of-Care Ultrasound for the Diagnosis of Pediatric Testicular Torsion: A Retrospective Case Series Analysis

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Affiliations expand

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DOI: 10.1097/PEC.0000000000002863

Abstract

Objectives: Acute testicular torsion is a surgical emergency that warrants prompt treatment. The diagnosis is typically confirmed by ultrasonography interpreted by a radiologist (RADUS); however, in this study, we describe the clinical course of 23 patients for whom point-of-care ultrasound (POCUS) was performed by pediatric emergency medicine physicians during the initial assessment for testicular torsion in the pediatric emergency department (PED).

Methods: A retrospective case series analysis of patients aged 0 to 18 years who were diagnosed with acute testicular torsion after undergoing scrotal POCUS through our PED.

Results: Between June 2015 and December 2020, 155 boys received an International Classification of Diseases-9 code of Torsion of Testis after presenting to our PED. Seventy-three patients were imaged preoperatively, of which 50 (68.5%) were diagnosed via RADUS alone. Twenty-three patients (31.5%) underwent POCUS (median age 14.1 years [interquartile range {IQR}: 11.4-15.9 years]), of which 14 (60.9%) were imaged by POCUS alone, whereas the remaining 9 patients (39.1%) underwent POCUS before RADUS. Thirteen of the 23 patients (56.5%) who underwent POCUS had intraoperative findings consistent with acute testicular torsion, whereas another 3 patients (13.0%) required manual detorsion in the PED before orchiopexy. Six patients required orchiectomy. All patients for which POCUS findings were suggestive of acute testicular torsion were correctly classified. The median length of stay from time to admission to orchiopexy for those who received RADUS only versus POCUS only was 184 minutes (IQR: 136-255), and 121 minutes (IQR: 80-202), respectively (P = 0.036). Among

the patients who experienced POCUS, the median length of stay for those who underwent RADUS in addition to POCUS compared with those who underwent POCUS alone was 202 minutes (IQR: 136-338.4) (P = 0.031).

Conclusions: Point-of-care ultrasound performed by pediatric emergency medicine physicians can be used to expedite surgical management and streamline the management of pediatric patients suspected of acute testicular torsion.

19. Pediatr Emerg Care

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Ultrasound Investigation of the Fifth Intercostal Space Landmark for Chest Tube Thoracostomy Site Selection in Pediatric Patients

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DOI: 10.1097/PEC.0000000000003207

Abstract

Objectives: Chest tube thoracostomy site selection is typically chosen through landmark identification of the fifth intercostal space (ICS). Using point-of-care ultrasound (POCUS), studies have shown this site to be potentially unsafe in many adults; however, no study has evaluated this in children. The primary aim of this study was to evaluate the safety of the fifth ICS for pediatric chest tube placement, with the secondary aim to identify patient factors that correlate with an unsafe fifth ICS.

Methods: This was an observational study using POCUS to evaluate the safety of the fifth ICS for chest tube thoracostomy placement using a convenience sample of pediatric emergency department patients. Safety was defined as the absence of the diaphragm appearing within or above the fifth ICS during either tidal or maximal respiration. Univariate and multivariable analyses were used to identify patient factors that correlated with an unsafe fifth ICS.

Results: Among all patients, 10.3% (95% confidence interval [CI] 6.45-16.1) of diaphragm measurements crossed into or above the fifth ICS during tidal respiration and 27.2% (95% CI 19.0-37.3) during maximal respiration. The diaphragm crossed the fifth ICS more frequently on the right when compared with the left, with an overall rate of 45.0% (95% CI 36.1-54.3) of right diaphragms crossing during maximal respiration. In both univariate and multivariate analyses, a 1-kg/m² increase in body mass index was associated with an increase of 10% or more in the odds of crossing during both tidal and maximal respiration (P = 0.003 or less).

Conclusions: A significant number of pediatric patients have diaphragms that cross into or above the fifth ICS, suggesting that placement of a chest tube thoracostomy at this site would pose a significant complication risk. POCUS can quickly and accurately identify these unsafe sites, and we recommend it be used before pediatric chest tube thoracostomy.

20. Pediatr Emerg Care

. 2024 Mar 1;40(3):239-242.

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Qualitative Point-of-Care Ultrasound Enema Management for Constipation

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Abstract

We discuss 10 cases where the qualitative evaluation of hard stool in the rectum with point-of-care ultrasound helped guide enema administration in a pediatric emergency department. Point-of-care ultrasound findings were especially valuable in cases where the presenting symptoms were undifferentiated, a language barrier was present, or the guardian and child denied that constipation was an active problem. When sodium phosphate enema administration was done in the pediatric emergency department, evacuation of the rectal stool burden was observed in most cases before final disposition.

21. Pediatr Emerg Care

. 2024 Feb 1;40(2):98-102.

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CATCH IT: The Effect of Bladder Ultrasound in Decreasing the Time to Collect a Clean-Catch Urine Sample in the Nontoilet-Trained Child: A Randomized Control Trial

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Abstract

Objectives: Clean-catch urine is essential in the investigation of an unwell child but can unfortunately be difficult to obtain in nontoilet-trained children. To this end, we compared the difference in time taken to collect clean-catch urine in nontoilet-trained children via the use of point-of-care ultrasound and traditional methods.

Methods: A single-center randomized controlled trial was conducted at an urban pediatric emergency department, recruiting 80 patients, of which 73 underwent data analyses. Participants were randomized to either the control arm, which consisted of the traditional "watch and wait" method of collecting a clean-catch sample, or to the intervention arm, which used point-of-care ultrasound to assess bladder volume and to stimulate the micturition reflex. The primary outcome measured was the mean time taken to collect a clean-catch urine sample.

Results: Eighty patients (ultrasound, n = 41; standard care, n = 39) underwent randomization using a random number generator. Seven patients were removed from final analysis due to loss to follow-up for various reasons. Seventy-three patients (ultrasound, n = 37; standard care, n = 36) underwent statistical analysis. The ultrasound group had a median time to clean-catch urine of 40 minutes (interquartile range, 52) and mean time of 52 minutes (standard deviation, 42), and the control group had a median time of 55 minutes (interquartile range, 81), and mean time of 82 minutes (standard deviation, 90). This reached statistical significance (1-tail t test, P = 0.033). The baseline characteristics were similar between both groups for sex and age distribution; however, the mean ages were significantly different (2-tail t test, P = 0.049) with 8.4 months in the control group, and 12.3 months in the ultrasound group.

Conclusions: We found that there was a statistically and clinically significant reduction in mean time taken to collect clean-catch urine in nontoilet-trained children using point-of-care ultrasound compared with the traditional watch and wait method.

22. Cureus

. 2024 Mar 18;16(3):e56397.

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Integrating Pre-test Probability and Point-of-Care Ultrasound (POCUS) in the Emergency Department (ED) Diagnosis of Small Bowel Obstruction (SBO)

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Abstract

Introduction

A computed tomography (CT) scan and point-of-care ultrasound (POCUS) are commonly employed for diagnosing small bowel obstructions (SBOs). Prior studies demonstrated that POCUS has 90-95% sensitivity and specificity compared with CT scanning, which is the gold standard. Unlike other imaging modalities (in which the ordering and performing clinician are not the same), POCUS-performing/interpreting sonologists must recognize the risk of confirmation bias in the POCUS application. Per Bayesian analysis, the likelihood of a diagnosis being true following a diagnostic test is based on the ordering clinician's pre-test probability and the test characteristics (sensitivity and specificity, from which positive and negative likelihood ratios can be calculated). Consequently, establishing pre-test probability is important in informing downstream diagnostic or therapeutic interventions, as pre-test probability influences post-test odds. Little research has been done on the role of POCUS sonologist's pre-test probability and actual POCUS results regarding SBO. This study assessed the role of POCUS, integrating pre-test probability and POCUS results to determine post-test odds.

Methods One hundred six patients were recruited on a convenience basis and underwent POCUS and CT between April 2017 and December 2022. All sonographers were credentialed in POCUS. POCUS sonologists' pre-test probabilities and POCUS and CT results were captured,

which were compared. Sensitivity, specificity, LR+, and LR- were calculated, and correlations were made between pre-test probability and POCUS and CT results.

Results POCUS exhibited a sensitivity of 92% and specificity of 90%, with a corresponding positive likelihood ratio (LR+) of 9.3 and a negative likelihood ratio (LR-) of 0.09 for diagnosing SBO. Among patients with a high pre-test probability of SBO, a negative ultrasound yielded post-test odds of 0.4%, whereas a positive POCUS yielded post-test odds of 39.6%. Among patients with a low pre-test probability, a negative POCUS resulted in post-test odds of 0%, while a positive POCUS led to post-test odds of 2.1%, yielding a number needed to scan (NNS) of ~50 to identify a patient with an SBO on CT.

Conclusion This study confirmed POCUS's sensitivity and specificity of ~90-95% and a corresponding LR+ of 9.2 and LR- of 0.9. Pre-test probability substantially affected post-test odds. Patients with a high pre-test probability and a positive POCUS had post-test odds of 39.6 and should have a confirmatory CT, while those with a negative POCUS have very low post-test odds and very likely will not benefit from CT. Patients with low pre-test probability and a positive POCUS have post-test odds of 2.1%, similar to the Wells Score and HEART score; such patients may not benefit from a CT, though clinicians should use their judgment/discretion. Patients with a low pre-test probability and a negative POCUS have post-test odds of 0% and should not have a CT. Among low pre-test probability patients, the NNS was ~50 to identify patients with an SBO on CT.