Abstract:
Pediatric emergency medicine (PEM) physicians are increasingly adopting the use of point-of-care ultrasound (POCUS) to integrate focused bedside ultrasonography with clinical examination to care for pediatric patients. It is expected that PEM fellowship trainees will receive substantive POCUS education, yet there exist wide variations in training experience between institutions based on availability of faculty with expertise in POCUS and the lack of a standard curriculum or national consensus on competency standards. It is essential for trainees to understand the requirements and opportunities for POCUS training in PEM. The following document outlines common questions that PEM trainees or fellowship applicants may wish to consider.

Keywords:
point of care ultrasound; emergency ultrasound; pediatric emergency medicine; emergency medicine; emergency department; credentialing

Point-Of-Care Ultrasound in Pediatric Emergency Medicine: What Do Fellows Need to Know?

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1522-8401

Point-of-care ultrasound (POCUS) or emergency ultrasound (EUS) is the use of bedside ultrasound to answer focused questions in conjunction with clinical examination.[1,2] It includes the acquisition, interpretation, and integration of imaging findings into patient management in real time. It is performed by physicians across multiple specialties, including pediatric emergency medicine (PEM), and can be used to direct resuscitation, rule-in diagnoses, assist with procedures, and identify patients who need further diagnostic imaging evaluation.

It is important for PEM fellows in training to receive adequate POCUS instruction in a variety of applications and to understand specific requirements for competency in their practice setting. Point-of-care ultrasound education is now an American Board of Pediatrics (ABP) and American Board of Emergency Medicine (ABEM) requirement for PEM fellowship programs, and the American Academy of Pediatrics (AAP) recently issued a technical report and policy statement regarding POCUS by PEM physicians.[3,4]

At present, PEM fellows encounter a wide variety of training experiences and differential opportunities for learning POCUS skills. Some institutions lack PEM physicians with training in POCUS, and fellows receive education from emergency medicine (EM) physicians during adult emergency or trauma rotations or as elective training outside their department. Other institutions employ PEM faculty who have completed formal EUS fellowship training and have expertise in ultrasound education, administration, and research. Programs with faculty experts in PEM POCUS often have ultrasound didactics as part of the PEM fellowship curriculum as well as dedicated introductory and advanced ultrasound rotations.

In general, POCUS training rotations take place in the emergency department (ED) with the EM/PEM physician as the POCUS instructor. Few institutions offer a POCUS rotation incorporating collaboration between multiple departments including PEM, radiology, cardiology, and obstetrics-gynecology. Any approach to POCUS training should allow the PEM fellow to train alongside EM/PEM faculty experts and learn how to integrate POCUS within a busy clinical practice.

Although current POCUS educational experiences for PEM trainees vary by location and institution, there is a national expectation that fellows receive substantive POCUS training as part of their education. Current fellows and those considering PEM fellowship should be aware of emerging opportunities and requirements. Some commonly asked questions about POCUS and PEM are outlined below.

HOW MANY PEM PROGRAMS ARE USING POCUS?

A 2006 survey of PEM fellowships found that 65% of programs provided some POCUS training for fellows.[5] However, only 28% of programs had a dedicated ultrasound machine. General EM physicians provided the bulk of education and training for PEM fellows, and only 15 programs had an established 2- to 4-week formal ultrasound rotation.

Two years later, a study to determine use of POCUS in the pediatric ED found that 96% of respondents had a dedicated ultrasound machine.[6] However, only 61% used bedside ultrasound to augment clinical management. Nearly 80% provided some training to PEM fellows, but only 34% had established a standard curriculum. Again, most fellows received training from general EM physicians and during adult ED rotations.

By 2011, 95% of surveyed PEM fellowship programs endorsed the use of POCUS in their ED.[7] Nearly 90% provided some training for PEM fellows, and 70% had a formal ultrasound rotation, typically 4 weeks in duration. Five institutions had a pediatric-focused 1-year EUS fellowship available at that time.

HOW IS POCUS DIFFERENT IN EM VS PEM?

Emergency medicine physicians adopted POCUS years before PEM physicians and have had more time to expand its use and build an evidence-based practice. In 1990, the American College of Emergency Physicians (ACEP) published a position statement supporting the performance of EUS by appropriately trained EM physicians.[8] Within 5 years, the first model curriculum for training in EUS had been published.[9] The ACEP established the first comprehensive, specialty-specific guidelines for EUS in 2001[1] and revised and expanded those guidelines in 2008.[2] Also in 2008, the Council of Emergency Medicine Residency Directors outlined the minimum EUS skill set for graduating residents.[10] The Accreditation Council for Graduate Medical Education (ACGME) and the ABEM consider "focused ultrasound for the diagnostic evaluation of emergency medical conditions and diagnoses, resuscitation of the acutely ill or injured patient, and procedural guidance" as competencies that must be achieved for all EM residency graduates.[11,12]

In addition, the core applications based on common presenting illnesses differ between EM and PEM. Core applications for EM include the following: trauma, intrauterine pregnancy, abdominal aortic aneurysm, cardiac, biliary, urinary tract, deep vein thrombosis, soft tissue/musculoskeletal, thoracic, ocular, and procedural guidance.[2] Core applications for PEM have been suggested, based on expert recommendations, but there exists no national consensus or evidence-based standard at present. In 2013, PEM physicians with expertise in POCUS and fellow education created the first and only proposed educational guidelines for PEM fellow training in ultrasound.[13] These guidelines suggested applications that are potentially relevant to pediatric patients in the ED but acknowledged that the role of POCUS in PEM is still evolving and were not able to offer guidelines regarding minimum skill set for determining competency in PEM fellows or faculty.

WHAT ARE APPLICATIONS THAT A PEM FELLOW IN TRAINING MIGHT LEARN?

The 2013 PEM fellow consensus educational guidelines[13] considered applications under the