

Approved October 2014

***Point-of-Care Ultrasonography by
Pediatric Emergency Medicine
Physicians***

*Joint Statement by the American College of Emergency Physicians (ACEP),
the American Academy of Pediatrics (AAP),
the Society of Academic Emergency Medicine (SAEM) and
World Interactive Network Focused on Critical Ultrasound (WINFOCUS)*

Approved by the ACEP
Board of Directors
October 2014; the American
Academy of Pediatrics
January 2015; the Society of
Academic Emergency
Medicine February 2015; and
the World Interactive Network
Focused on Critical
Ultrasound February 2015

ABSTRACT. Point-of-care ultrasonography is increasingly being used to facilitate accurate and timely diagnoses and to guide procedures. It is important for pediatric emergency medicine physicians caring for patients in the emergency department to receive adequate and continued point-of-care ultrasonography training for those indications used in their practice setting. Emergency departments should have credentialing and quality assurance programs. Pediatric emergency medicine fellowships should provide appropriate training to physician trainees. Hospitals should provide privileges to physicians who demonstrate competency in point-of-care ultrasonography. Ongoing research will provide the necessary measures to define the optimal training and competency assessment standards. Requirements for credentialing and hospital privileges will vary and will be specific to individual departments and hospitals.

Key words: ultrasound, ultrasonography, point of care, emergency department, imaging.

ABBREVIATIONS: US, ultrasonography; ED, emergency department; ACEP, American College of Emergency Physicians; PEM, pediatric emergency medicine; CT, computed tomography.

Point-of-care ultrasonography (US) is a focused ultrasonography performed and interpreted at the patient's bedside by a health care provider in conjunction with his/her clinical examination. Point-of-care US can expedite clinical decision making, direct follow-up diagnostic imaging, aid in procedural guidance and improve patient satisfaction.¹⁻⁶ Point-of-care US is focused to answer specific yes/no questions in real-time. The point-of-care US examination has important qualities as an imaging modality. There is no need to transport a patient outside of the emergency department (ED), examinations can be performed at all hours, examinations may be

repeated, and there is no ionizing radiation exposure. Moreover, it may help direct further evaluation so as to avoid unnecessary and costly testing.

Clinician-performed US has been used and accepted since the 1960s, when obstetricians and cardiologists first adopted the technology. Use of US by those specialists is endorsed by various professional radiology organizations.^{7,8} At present, nonphysician providers, such as nurses and prehospital care workers, are also using point-of-care US as a part of their practice.⁹⁻¹⁷

HISTORY OF EMERGENCY PHYSICIAN POINT-OF-CARE ULTRASONOGRAPHY

In 1990, the American College of Emergency Physicians (ACEP) published a position statement supporting the performance of US by appropriately trained emergency physicians.¹⁸ The next year, the Society of Academic Emergency Medicine endorsed that statement and called for a training curriculum, which Mateer and colleagues published in 1994.¹⁹ By 1996, the published emergency medicine core content included point-of-care US for residency graduates.²⁰ With the passage of the American Medical Association Resolution 802 and policy H-230.960 in 1999 “recommending hospital [privileging] committees recognize specialty-specific guidelines for US credentialing decisions,”^{21,22} emergency physicians were given full responsibility for developing the guidelines of their field. By 2001, the Accreditation Council for Graduate Medical Education mandated that all emergency medicine residents attain competency in the use of point-of-care US, and the ACEP published the first emergency ultrasonography guidelines.²³ In 2008, the ACEP published an update to the original guidelines,²⁴ thereby establishing the most comprehensive specialty-specific training and practice to date.²⁵ Subsequently, the Society of Academic Emergency Medicine, the Council of Emergency Medicine Residency Directors, and the American Institute of Ultrasound in Medicine officially recognized that document.^{26, 27} Currently, guidelines from the Council of Emergency Medicine Residency Directors consensus documents from 2009 and 2012 are a mainstay for residency education.^{26, 28} In addition, competency assessment tools for the evaluation of emergency medicine residents are being considered.²⁶

POINT-OF-CARE ULTRASONOGRAPHY IN PEDIATRIC EMERGENCY MEDICINE

More recently, pediatric emergency medicine (PEM) physicians have been using point-of-care US for patient care. According to a survey from 2011, 95% of EDs with a pediatric emergency medicine fellowship program utilize point-of-care US in some manner, and 88% of programs provide training in point-of-care US for their fellows.²⁹ This is a dramatic increase, as only 57% of programs reported the use of point-of-care US in 2006 and only 65% at that time incorporated training for their fellows.³⁰ Despite the growing use of point-of-care US by pediatric emergency physicians, there have been no published guidelines specific to pediatric emergency providers. The indications set forth in existing policy statements are written for emergency physicians who predominantly care for adult patients.

MINIMIZING RADIATION EXPOSURE

One of the appealing aspects of US is its inherent safety. It relies on sound waves and not x-rays to generate images. In many instances, computed tomography (CT) imaging or radiography are the optimal diagnostic modalities in the evaluation of the pediatric patient; however, there is an increasingly large body of literature emphasizing and delineating the risks of ionizing radiation, particularly from CT.³¹⁻⁴⁴ Pediatric patients are particularly sensitive to ionizing radiation, given the larger organ-specific dosing they receive with each study, the increased susceptibility of these organs to radiation-induced cancer, and the increased lifespan over which children may develop radiation-induced cancers.³⁴ In response to this risk, several national campaigns have been initiated to reduce the use of unnecessary CT imaging in pediatric patients. These include efforts by the Society for Pediatric Radiology,⁴⁵ the National Council on Radiation Protection and Measurements,⁴⁶ the Food and Drug Administration,⁴⁷ and the National Cancer Institute.⁴⁸ In summary, when imaging is indicated, practitioners should attempt to optimize the use of nonradiating diagnostic modalities, such as US.

INDICATIONS FOR POINT-OF-CARE ULTRASONOGRAPHY

Pediatric emergency medicine physicians can use point-of-care US as a diagnostic or procedural adjunct in the evaluation of patients in the ED. Diagnostic applications are those that assist in diagnosis and inform medical decision-making. Procedural applications may be “US-assisted” or “static,” or “US-guided,” also referred to as “dynamic.” Static US is defined as using US prior to the procedure, identifying anatomic structures, and determining the ideal circumstances for the procedure to be performed. The procedure itself is performed without the use of US. In contrast, in dynamic US, the US and procedure are performed simultaneously.

Clinical applications will be practice-specific and based on the patient population, incidence of disease, and the availability of resources, such as 24-hour attending radiologist coverage, availability of US technicians, and distance/transfer times to facilities that can provide US imaging. ED leaders should determine which point-of-care US examinations will be most useful to their practice environments. Physicians would then apply for institutional privileges in those specific areas. There will be a natural transition period for physicians who did not receive point-of-care US education as part of their graduate medical training. Therefore, the indications for which clinicians use point-of-care US will evolve over time as the education is disseminated throughout the PEM community. Finally, clinicians should be aware that point-of-care US is better used as a “rule-in” and not a “rule-out” diagnostic modality. The absence of an abnormal finding should not indicate a normal examination. For example, nonvisualization of an intussusception with high clinical concern must prompt further evaluation. Likewise, when findings other than those sought to “rule in” a diagnosis are encountered, a more complete imaging evaluation is warranted.

**POINT-OF-CARE ULTRASONOGRAPHY TRAINING,
CREDENTIALING, AND PRIVILEGING**

Prior to implementing a program in the ED, departmental leaders should identify a core group of individuals with expertise in point-of-care US. This group is responsible for educating faculty and trainees as well as managing administrative tasks, such as outlining credentialing pathways and performing quality assurance image reviews. Standardized and universally accepted criteria for what designates a point-of-care expert are likely to evolve over time as advanced training programs are established. In departments or divisions without point-of care US-trained individuals, departmental leadership should consider sending an individual or group of individuals with interest to receive additional training in point-of-care US. Alternatively, an expert from another department (eg, general emergency medicine, radiology) may assume these responsibilities and work collaboratively with ED leaders.

Point-of-care US training varies depending on the practitioner's prior education and practice environment. Until now, most PEM physicians have received little or no point-of-care US instruction as part of their training. It is important that PEM fellowship programs provide adequate training including measurements of competency for trainees. Point-of-care US education is now an American Board of Pediatrics requirement for Pediatric Emergency Medicine fellowship programs.⁴⁹ Consensus education guidelines and a model curriculum were recently published.⁵⁰ There are 2 training pathways for physicians: a "training-based" pathway for current trainees, and a "practice-based" pathway for faculty without prior experience. The details of such pathways are outlined in the accompanying technical report.⁵¹

Prior to performing a point-of-care US examination for medical decision-making, PEM physicians must demonstrate application-specific competency. During this "training" phase, the point-of-care US expert should review all US examinations within a timely manner. Practitioners can receive relevant feedback regarding their examinations. In addition, novice practitioners should be supervised at the bedside in order to ensure that the examinations are being performed correctly. Examination reviews and bedside supervision may be performed by a department or division "expert" or by another physician already credentialed to perform US for that indication. These educational scans should not be utilized for medical decision-making and this should be clearly communicated to patients and their families.

Given that a point-of-care US examination is intended to be a focused examination, training requirements necessarily differ from those set forth by other specialty organizations, such as the American College of Radiology and other specialty organizations. A similar distinction was made in the 2002 training guidelines adopted by the American Society of Echocardiography, which outlined basic training requirements for

anesthesiologists performing perioperative echocardiography, which differed from the more rigorous training needed for more consultative cardiology-performed echocardiography.⁵² Competency and subsequent credentialing within a division or department may be achieved after performing a specified number, or range, of accurately performed and interpreted point-of-care US examinations. With the lack of robust data supporting a specified number of examinations per indication, some guidelines suggest 25 to 50 examinations needed to achieve competency.²⁵ However, physicians should not interpret this recommendation as a “one-size-fits-all” approach, as examinations vary in difficulty and, therefore, may require more experience to establish competency. In addition, the number of examinations performed may not always best define competency. As point-of-care US incorporates both cognitive and psychomotor components, individual physicians may gain competency at varying rates that may be independent of a predetermined numerical goal and better assessed through simulation, observed structured clinical examinations, or direct observation during clinical shifts.

Hospital privileging committees should provide an opportunity for privileging in specific pediatric point-of-care US examinations. Written requirements for privileging should be delineated. Building on the recommendations set forth by the ACEP, when a physician applies for appointment or reappointment to the medical staff and for clinical privileges, the process should include assessment of current competency by the point-of-care US director.²⁵ Because point-of-care US is a relatively new technology for PEM physicians, some specialists and hospital privileging committees may not be familiar with the precedent already set forth for point-of-care US and the benefits to patient care. Therefore, PEM physicians should educate those who are unfamiliar with its use, citing the established literature attesting to emergency physicians’ ability to accurately perform and interpret point-of-care US examinations.^{5, 53-116} Additionally, emergency PEM physicians should consider collaboration with radiologists and expert sonographers when implementing point-of-care US into their ED.

POINT-OF-CARE ULTRASONOGRAPHY DOCUMENTATION

Once PEM physicians are credentialed to perform point-of-care US for a particular application, they can integrate the point-of-care US examination into patient care. Details of the point-of-care US examination must be documented at the time of performance in the medical record. Specifically, documentation should include the indication for the examination, structures/organs identified, and the interpretation.¹¹⁷ If the study is inadequate, this should also be noted. Images should be archived, ideally electronically, and entered as part of the electronic health record, for ease of retrieval and review.

RECOMMENDATIONS

1. Pediatric emergency medicine physicians should be familiar with the definition and application of point-of-care US and the utility for patients in the ED.

2. Pediatric emergency physicians who integrate point-of-care US in their patient care should be competent in point-of-care examinations that are specific and relevant to their clinical environment.
3. For EDs with a pediatric emergency medicine point-of-care US program, there must be a process in place for educating and assessing practitioner skill, maintaining quality assurance, and acquiring and maintaining hospital privileges.
4. Pediatric emergency medicine fellowship programs should have a structured point-of-care US education curriculum and competency assessment for fellows in training.

SUMMARY

There is an increasing demand for PEM physicians to become adept in point-of-care US. Mounting evidence supports the benefits to pediatric patients. This policy statement and accompanying technical report have been developed to define a structured and safe program for the integration and implementation of point-of-care US by PEM physicians.

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The guidance in this statement does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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FINANCIAL DISCLOSURE: None disclosed

POTENTIAL CONFLICT OF INTEREST: None disclosed

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