Point-of-Care Ultrasonography by Pediatric Emergency Physicians

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WORLD INTERACTIVE NETWORK FOCUSED ON CRITICAL ULTRASOUND

POLICY STATEMENT
Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Point-of-Care Ultrasonography by Pediatric Emergency Physicians

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

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

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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 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. As more physicians are trained and more research is completed, there should be one national standard for credentialing and privileging in point-of-care ultrasonography for pediatric emergency physicians.

INTRODUCTION

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 decisionmaking, direct follow-up diagnostic imaging, aid in procedural guidance and improve patient satisfaction.[1-6] Point-of-care US is designed 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 out-of-hospital care workers, are also using point-of-care US as a part of their practice.[9-17]

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.[18-31] 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 life span over which children may develop radiation-induced cancers.[21] 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,[32] the National Council on Radiation Protection and Measurements,[33] the Food and Drug Administration,[34] and the National Cancer Institute.[35] 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 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 decisionmaking. 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 pediatric emergency 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.[36] Consensus education guidelines and a model curriculum were recently published.[37] 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.[38]

Prior to performing a point-of-care US examination for medical decisionmaking, pediatric emergency physicians must demonstrate application-specific competency. During this "training" phase, the point-of-care US expert should review all US examinations in 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 decisionmaking or billing purposes, 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.[39] 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.[40] 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.[40] Because point-of-care US is a relatively new technology for pediatric emergency 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, pediatric emergency 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.[5,41-104] Additionally, pediatric emergency physicians should consider collaboration with radiologists and expert sonographers when implementing point-of-care US into their ED.

POINT-OF-CARE ULTRASONOGRAPHY DOCUMENTATION

Once pediatric emergency 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.[105] 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 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, implementing quality improvement activities, 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.
5. Standardized, universally accepted criteria for what defines point-of-care US expertise should be developed in the near future by national organizations such as the American Academy of Pediatrics, Society for Emergency Medicine, and/or ACEP.

SUMMARY

There is an increasing demand for pediatric emergency 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 pediatric emergency physicians.

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