




Need of Point of Care Ultrasound Training in Pediatric Emergency Medicine Practice: A Wake-Up Call for the Low-Income Countries

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Abstract

POCUS is the acquisition, interpretation, and rapid clinical integration of ultrasonographic imaging performed by the treating physician at the patient's bedside. It is used in the field Emergency Medicine to assist in diagnosing and managing various clinical conditions ranging from undifferentiated shock, respiratory failure, and cardiac arrest, which have shown a positive impact on clinical decision-making, resulting in a decreased emergency department and hospital length of stay. POCUS is also a valuable diagnostic tool in managing pediatric patients for whom radiation exposure is a significant concern. It is used to aid in diagnosing and managing various pediatric medical and surgical emergencies. Despite the evident literature regarding the utility of POCUS in Pediatric Emergency Medicine (PEM) practice, there is a lack of specialized training for pediatric emergency physicians, especially in low-income countries. Therefore, this comment emphasizes the need for POCUS training in PEM.

Keywords

point of care, ultrasound, pediatrics, medical, education

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Background

A 5-year-old boy presented to the emergency department with a complaint of fever and cough for 5 days and lethargy for 1 day. Past medical and surgical history was not significant. On examination, his vitals were pulse: 190 beats/min, blood pressure: 80/40, respiratory rate: 40/min, temperature: 37°C, oxygen saturation: 96% on room air, capillary refill time: >5 seconds. Systemic examination was unremarkable. The on-call pediatric emergency physician treated the patient on the line of cardiogenic shock secondary to myocarditis due to the increased heart rate. The patient was given an intravenous (IV) fluid bolus of 5 ml/kg and IV furosemide at 1 mg/kg. Peripheral intravenous epinephrine was also started at 0.1 µg/kg/min, and IV antibiotics were also given. A high-flow nasal cannula was applied, and the patient was admitted to the intensive care unit.

Point of care ultrasound (POCUS) was performed by another emergency physician on-call as per the RUSH

(Rapid ultrasound in shock and hypotension) protocol. The inferior vena cava was less than 1.5 cm with more than 50% collapsibility, the left ventricle was hyperdynamic, B-lines were absent in the lungs, and there was no free intraperitoneal or pericardial fluid. After performing POCUS, the impression of septic shock was made, and the patient was given three boluses of IV crystalloids with 20 ml/kg. The patient hemodynamic status started improving, and within an hour, he started making good urine output. Later, his vasopressor requirement was decreased, the high-flow nasal cannula was removed, and the child was shifted to another vicinity due to financial reasons.

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Through this case, we want to highlight the importance of POCUS training in pediatric emergency medicine (PEM) practice.

POCUS is “the acquisition, interpretation, and immediate clinical integration of ultrasonographic imaging performed by the treating physician at the patient’s bedside.”¹ It is now used in many clinical settings and all phases of care, from diagnosis to procedural guidance and resuscitation monitoring. It has become associated with changes in clinical decision-making.² POCUS differs from traditional departmental ultrasonography in which the test is ordered by the treating physician, performed by a resident or technician, and then interpreted by a radiology consultant who was not directly involved in the patient’s care. Since POCUS is performed directly by the treating clinicians, it may reduce consultative ultrasonographic services.³

Utility of POCUS in Clinical Practice

POCUS has been used by many clinical subspecialties, especially emergency medicine (EM), where it has become a core competency in EM training.⁴ It is used to assist in diagnosing and managing various clinical conditions ranging from undifferentiated shock, respiratory failure, and cardiac arrest,^{5,6} which have shown a positive impact on clinical decision-making and resulted in a decreased emergency department and hospital length of stay.⁷ An emergency physician skilled in this technology can improve patient management by providing timely care, optimizing diagnostic accuracy, and upturning procedural safety.

POCUS in Pediatric Emergency Medicine (PEM)

POCUS is also a valuable diagnostic tool in managing pediatric patients for whom radiation exposure is a significant concern. It is used to aid in the diagnosis and management of a variety of pediatric medical and surgical emergencies like gastrointestinal emergencies⁸ (acute appendicitis, small bowel obstruction, intussusception, pyloric stenosis), respiratory emergencies⁹ (pneumonia, bronchiolitis, pleural effusion, pneumothorax) cardiac emergencies¹⁰ (LV dysfunction, cardiac tamponade, pericardial effusion, cardiomyopathies) trauma,¹¹ shock,¹² musculoskeletal emergencies¹³ (fractures, joint effusions, soft tissue infections), foreign body identifications,¹⁴ central and peripheral access.¹⁵

PEM POCUS Curriculum for Low-Income Countries

The American Academy of Pediatrics also published a policy statement regarding the use of POCUS by pediatric emergency physicians, and they have been using it for many years in developed countries.¹⁶ Despite the evident literature regarding the utility of POCUS in PEM practice, there is a lack of specialized training for pediatric emergency physicians, especially in low-income countries. There is a dire need to develop a specialized POCUS curriculum for PEM physicians from low-income countries. The curriculum should not only focus on the education and training of the physicians but also developing leadership skills, credentialing, and research. We recommend adapting the existing curriculum recommended by the Accreditation Council for Graduate Medical Education (ACGME), the American College of Emergency Physicians (ACEP), P2 Network,¹⁷ and other accreditation societies. We also suggest involving trained pediatric radiologists to develop the national curriculum and competency levels.

Conclusion

In conclusion, the evidence regarding the effectiveness of POCUS as an adjunct to the clinical examination of PEM physicians is growing. National training committees should start considering integrating this technology safely and effectively into our postgraduate curricula to improve the care of pediatric patients. We must understand the limitations and challenges of integrating POCUS into PEM practice. Moreover, we must stay abreast of current medical advances and provide our patients with the safest, most efficient, state-of-the-art care. POCUS will help us to meet this goal.

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