African Journal of Emergency Medicine (2016) 6, 125–131

African Federation for Emergency Medicine

African Journal of Emergency Medicine

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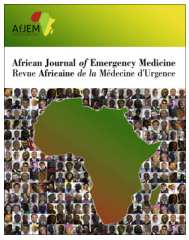

ORIGINAL RESEARCH ARTICLES

Bedside ultrasound training at Muhimbili National Hospital in Dar es Salaam, Tanzania and Hospital San Carlos in Chiapas, Mexico

Formation en échographie au chevet du patient à l'Hôpital national Muhimbili à Dar es Salaam, Tanzanie et à l'Hôpital San Carlos au Chiapas, Mexique

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Received 8 May 2015; revised 6 February 2016; accepted 8 March 2016; available online 7 April 2016

Introduction: In resource-rich settings, bedside ultrasound has rapidly evolved to be a crucial part of emergency centre practice and a growing part of critical care practice. This portable and affordable technology may be even more valuable in resource-limited environments where other imaging modalities are inaccessible, but the optimal amount of training required to achieve competency in bedside ultrasound is largely unknown. We sought to evaluate the feasibility of implementation of a mixed-modality bedside ultrasound training course for emergency and generalist acute care physicians in limited resource settings, and to provide a description of our core course components, including specific performance goals, to facilitate implementation of similar initiatives.
Methods: We conducted a standardised training course at two distinct sites—one large, urban tertiary hospital in Tanzania with a dedicated Emergency Centre, and one small, rural, hospital in southern Mexico with a general, acute intake area. We report on pre-training ultrasound use at both sites, as well as pre- and post-training views on most useful indications.
Results: Overall, participants were very satisfied with the course, although approximately one-third of the providers at both sites would have preferred more hands-on training. All participants passed a standardised exam requiring image acquisition and interpretation.
Discussion: Introducing bedside ultrasound training in two distinct resource-limited settings was feasible and well-received. After a brief intensive period of training, participants successfully passed a comprehensive examination, including demonstration of standardised image acquisition and accurate interpretation of normal and abnormal studies.

Introduction: Dans les contextes riches en ressources, l'échographie au chevet du patient a rapidement évolué pour devenir un élément essentiel de la pratique en centre d'urgence et un élément d'importance croissante de la pratique des soins de courte durée. Cette technologie portable et abordable peut être encore plus précieuse dans des environnements limités en ressources où d'autres modes d'imagerie sont inaccessibles, mais la quantité optimale de formation nécessaire pour atteindre une compétence suffisante en échographie au chevet du patient est largement inconnue. Nous avons cherché à évaluer la faisabilité de la mise en œuvre d'un cours de formation en échographie au chevet du patient à modes mixtes pour les médecins de soins de courte durée d'urgence et généralistes dans un contexte aux ressources limitées, et à fournir une description des composantes de notre cours fondamental, notamment en termes d'objectifs de performance spécifiques, afin de faciliter la mise en œuvre d'initiatives similaires.
Méthodes: Nous avons effectué un stage de formation normalisé sur deux sites distincts - un grand hôpital urbain tertiaire en Tanzanie équipé d'un Centre d'urgence dédié, et un petit hôpital rural au sud du Mexique ayant une zone d'admission de soins généraux intensifs. Nous établissons un rapport sur l'utilisation de l'échographie en pré-formation sur les deux sites, ainsi que sur les avis formulés avant et après la formation à propos des indications les plus utiles.
Résultats: Dans l'ensemble, les participants étaient très satisfaits du cours, bien qu'environ un tiers des fournisseurs sur les deux sites auraient préféré plus de formation pratique. Tous les participants ont réussi un examen normalisé requérant une acquisition et une interprétation d'images.
Discussion: La fourniture d'une formation en échographie au chevet des patients dans deux contextes distincts aux ressources limitées était faisable et bien reçue. Après une brève période intensive de formation, les participants ont réussi un examen complet, incluant notamment la démonstration de l'acquisition d'image normalisée et de l'interprétation exacte d'études normales et anormale.

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Peer review under responsibility of African Federation for Emergency Medicine.

http://dx.doi.org/10.1016/j.afjem.2016.03.001

African relevance

- Point-of-care ultrasound training is feasible and valued by providers in Africa.
- Ultrasound provides bedside clinical decision-making support in settings where access to other imaging modalities is delayed or nonexistent.
- Equipment and maintenance costs of portable ultrasound are dropping, making its use ever more feasible in Africa.

Introduction

In resource-rich settings, bedside ultrasound has rapidly evolved to be a crucial part of Emergency Centre practice[1–6] and a growing part of critical care practice,[7–10] serving to diagnose life threatening conditions[11–17] and guide resuscitation and invasive procedures.[18,19] Relative to computed tomography and magnetic resonance imaging, ultrasound is a low-cost technology, both in terms of initial capital investment and recurrent costs associated with its use.[19–22]

This portable and affordable technology may be even more valuable for practitioners in resource-poor environments where other imaging modalities are either geographically or economically inaccessible and where early diagnosis may be critical for timely transfer to higher-level facilities.[23–37] In Rwanda[38] and Liberia,[39] pilot studies have shown that training in bedside ultrasound is both feasible and well received, and that its use changes diagnosis in up to 30–60% of cases.[40] A recent review of ultrasound use (including bedside and radiology-based) in low- and middle-income countries (LMIC) identified 58 articles published between 2000 and 2011 that describe initiatives in over 25 countries, and shows a dominance of obstetric and non-traumatic abdominal indications.[27]

Despite exploding interest in the use of this technology in LMICs, the optimal amount of training required to achieve competency in bedside ultrasound is largely unknown. The second edition (years 2011–2013) of the World Health Organization's Manual of Diagnostic Ultrasound no longer includes the specific training parameters that were included in the first edition (1998). The first edition included a general pronouncement that training should include "lectures and practical demonstrations" over three to six months with 300–500 scans, that the examinations should be "appropriate for the disease profile of the country or region where the training is conducted" and that "in most countries, an appropriate distribution of examinations would be: abdominal examinations (50%); obstetric examinations (20%); gynaecological examinations (20%); and examinations of other parts (10%)".[41] These parameters are not specific to bedside ultrasound (i.e. performed at the site of clinical care by the treating provider), and are well beyond any protocols described in the recent literature on training initiatives in LMICs.[42]

The American College of Emergency Physicians (ACEP) has published a policy statement "Emergency Ultrasound Guidelines" in which residency-based and practice-based pathways for achieving ultrasound competency are described.[43] A minimum of sixteen hours of didactic and hands-on training is recommended for initial competency. Post-training completion of a proctored hands-on exam, coupled with a formal written exam including image review, are recommended for quality assurance. To be considered fully credentialed under these guidelines, trainees must submit 25 exams of each core application for quality review.

While they do specifically address bedside ultrasound in the acute care setting, the ACEP guidelines were developed in and for environments in which continuous proctored exams are possible and in which other confirmatory diagnostic studies are readily available, and they remain largely unvalidated recommendations. The optimal content and duration of ultrasound training in environments where ultrasound has been recently introduced and where an experienced sonographer is present only intermittently or for initial training is unknown. The few studies that do document ultrasound training in resource-limited settings do not elaborate a particular training structure, making these interventions difficult to compare or generalise.

In the present study, we sought

(1) to evaluate the feasibility of a bedside ultrasound training course for emergency and generalist acute care physicians in limited resource settings,
(2) to provide a description of our core course components to facilitate implementation of other similar initiatives,
(3) and to report on participant views on setting-specific priority indications for ultrasound.

In order to evaluate the suitability of our curriculum to diverse environments, we conducted our evaluation at two distinct sites—one large, urban tertiary hospital in Tanzania with a dedicated Emergency Centre, and one small, rural, hospital in southern Mexico with a general, acute intake area.

Methods

A standardised ultrasound training programme was implemented at Muhimbili National Hospital (MNH), in Dar es Salaam, Tanzania, and Hospital San Carlos (HSC), in Altamirano, Chiapas, Mexico.

The 1500-bed Muhimbili Hospital is the main tertiary care government hospital in Tanzania, treating 1000–1200 outpatients weekly and the same number of admitted patients daily.[44] MNH serves patients from the Dar es Salaam area and those referred from across the country. MNH has limited formal (i.e. radiology-performed) ultrasound capacity for inpatients, and prior to our study, minimal bedside (i.e. provider-performed) ultrasound was available for patients presenting to the Emergency Centre. A larger, non-battery powered ultrasound (Mindray DP3300) was available, and bedside ultrasound was occasionally performed for trauma, as providers had previously received brief one to two day training in the Focused Assessment with Sonography in Trauma (FAST) exam. Providers had received no formal training in other ultrasound applications. All 14 MNH study participants were registrar doctors in their first year out of general internship and were assigned permanently to the recently-established Emergency Centre – Tanzanian registrars do not have specific specialty designations by training, but are usually assigned to work in a specific department or practice area. Training at MNH was conducted in English.