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A pilot training program for point-of-care ultrasound in Kenya



Programme pilote de formation en échographie sur le lieu de soins au Kenya

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Introduction: Ultrasound is an effective and affordable clinical diagnostic tool highly attractive for use in low and middle income countries (LMICs), but access to training programs in these countries is limited. The objective of our study was to develop and pilot a program for healthcare providers in Kenya in the use of point-of-care ultrasound.

Methods: Trainees were recruited in district hospitals for participation in three all-day workshops held every 3–5 months from September 2013 through November 2014. Prior to the initial workshop, trainees were asked to study a training manual, and a knowledge test was administered. Ultrasound-credentialed emergency physicians provided brief didactic lessons then hands-on training for eFAST and obstetric training. This was followed by an observed assessment of scanning image quality (IM) and diagnostic interpretation (IN).

Results: Eighty-one trainees enrolled in four initial training sessions and 30 attended at least one refresher session. Among those trainees who attended refresher sessions, there was an increase in the proportion passing both the knowledge and practical tests at the follow-up, as compared to the initial session. Overall, mean practical skill scores also trended toward an increase over time, with a significantly higher mean score in November 2014 ($2.64 + 0.38$, $p = 0.02$) as compared to March 2014 ($2.26 + 0.54$), $p < 0.05$. Pre-workshop preparation evolved over time with the goal of maximizing trainee readiness for the hands-on course. A strong correlation was observed between knowledge and practical skill scores illustrating the importance of pre-workshop training.

Conclusions: Our pilot workshop showed promise in promoting knowledge and practical skills among participants, as well as increasing use in patient care. Results also suggest that refresher training may provide additional benefits for some participants. These findings provide a strong rationale for expanding the training program and for measuring its clinical impact.

Introduction: L'échographie est un outil de diagnostic clinique efficace et abordable très attrayant pour les pays à revenu faible et intermédiaire (PFR-PRI), mais l'accès aux programmes de formation dans ces pays est limité. L'objectif de notre étude était de développer et de piloter un programme destiné aux fournisseurs de soins de santé au Kenya visant à les former à l'utilisation de l'échographie sur le lieu de soins.

Méthodes: Les stagiaires ont été recrutés dans les hôpitaux de district pour participer à trois ateliers d'une journée complète tous les 3 à 5 mois, de septembre 2013 à novembre 2014. Avant le premier atelier, il a été demandé aux stagiaires d'étudier un manuel de formation, et leurs connaissances ont ensuite été évaluées. Des médecins d'urgence qualifiés en matière d'échographie ont délivré de brèves leçons didactiques, puis une formation pratique à eFAST et en obstétrique. La formation a été suivie d'une évaluation sous observation de la qualité d'image (IM) de balayage et de l'interprétation en termes de diagnostic (IN).

Résultats: Quarante-vingt-un stagiaires se sont inscrits à quatre sessions de formation initiale et 30 ont participé à au moins une session de remise à niveau. Parmi les stagiaires ayant assisté à des séances de remise à niveau, lors du suivi, une augmentation de la proportion réussissant les contrôles des connaissances comme les tests pratiques a été observée par rapport à la première session. Dans l'ensemble, la moyenne des notes en compétences pratiques a aussi connu une tendance à la hausse dans le temps, avec une note moyenne bien plus élevée en novembre ($2,64 + 0,38$, $p = 0,02$) par rapport à mars ($2,26 + 0,54$), $p < 0,05$. La préparation avant l'atelier a évolué dans le temps dans le but de maximiser l'état de préparation des stagiaires à la formation pratique. Une forte corrélation a été observée entre les notes sur les connaissances et celles sur les compétences pratiques, ce qui montre l'importance de la formation préalable à l'atelier.

Conclusions: Notre atelier pilote s'est révélé prometteur en termes de promotion des connaissances et des compétences pratiques auprès des participants, ainsi que d'utilisation croissante dans le cadre des soins aux patients. Les résultats suggèrent également que la formation de remise à niveau peut offrir des avantages supplémentaires pour certains participants. Ces résultats apportent une justification solide au développement du programme de formation et de la mesure de son impact clinique.

African relevance

- Most district hospitals in Kenya have no access to ultrasound training.

- This training program is appropriate for care providers at different training levels.
- The program increases knowledge and practical ultrasound skill proficiency.
- Its format is readily expandable to other low and middle income countries.

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Introduction

Ultrasound has increasingly become an effective clinical diagnostic tool in low and middle income countries (LMICs).¹ Compared to other imaging modalities, ultrasound equipment is portable, durable, and its use is safe and relatively affordable. The availability of portable bedside ultrasound equipment in particular, has served to boost the diagnostic capacity of rural healthcare facilities in resource-limited areas,^{1,2} and studies have shown that patient management was changed based on ultrasound use.³⁻⁵ Despite its utility, however, an estimated two-thirds of people in LMICs have no access to radiologic imaging.⁶ Availability of ultrasound machines and the proctored skill training needed are the two limiting factors for expanded use of point-of-care ultrasound in LMICs.

Although the World Health Organization (WHO) has established guidelines in ultrasound training for local practitioners, there are no standardized approaches to program length, content, trainer qualifications or mechanism of training.⁷⁻¹¹ Only a handful of ultrasound training programs in Africa including a train-the-trainer program have been described.¹²⁻¹⁷ Results from these evaluations show that many basic applications can be competently performed and interpreted by non-radiologists.^{18,19} The program we designed and piloted is unique in that it focuses on a few basic but high yield applications and uses a multimedia-based training manual²⁰ to maximize pre-training preparation. Both of these factors are designed for more efficient use of limited instructor time.

Methods

The study was a national pilot of a workshop to train healthcare providers in Kenya in the use of point-of-care ultrasound. Participants were from district hospitals that represented seven of the eight Kenyan provinces. The Health Research Ethics Committee of The Aga Khan University where the training workshops were held approved the study.

The Christian Health Association of Kenya (CHAK) helped to distribute an application form to various healthcare facilities across the country, both to assess interest in the training program and to identify facilities where the use of ultrasound would significantly impact care. Information collected included (a) numbers of inpatients and outpatients, (b) number of providers and their level of training, (c) the level and frequency of obstetric, surgical, and infectious diseases care, (d) whether they had a reliable electrical power source, and (e) an inventory of their radiology equipment.

A total of 38 hospitals were chosen to participate based on the following criteria: (a) return of the application form (measure of interest), (b) identification of at least two providers from the facility with training as doctors, clinical officers (equivalent to U.S. physician's assistants), nurses, and/or radiology technicians who were willing to sign a contract of intent to participate, (c) facility provides obstetric care and at minimum, minor surgical care for the district (measure of potential impact), and (d) a reliable electrical source (measure of feasibility). The contract of intent indicated that the participant was willing and able to attend the 1-day initial workshop and two refresher workshops.

Four to six weeks prior to the workshop, trainees were provided with training materials²⁰ and asked to study their contents. The content of the pre-workshop materials changed based on participant feedback and trainer perceptions of how well participants were prepared for hands-on training. Specifically, prior to the first session in September 2013, we provided each attendee with a locally developed *Point of Care Ultrasound Handbook* with instructions to read it before the session began. Because individual facilities may have limited Internet access, we provided all materials off-line.

We found that the participants were not well prepared for this first session. The trainees reported that the manual was difficult to cover in its entirety. Based on this feedback, starting with the December 2013 workshop, we provided subsequent trainees only the manual chapters that covered the ultrasound applications specific to their clinical needs. These topics were basic physics and machine use; the abdominal, pleural and cardiac assessment for free fluid; the thoracic exam for pneumothorax; and an obstetric exam for intrauterine pregnancy, cul-de-sac fluid, fetal heart activity and position.²⁰ We also included more images, illustrations and descriptive narratives. In March 2014, we added multi-media videos to better illustrate the concepts and techniques.

A written exam consisting of questions adapted from the ACEP Emergency Ultrasound Exam was administered online to the trainees before the start of each workshop. As with content, trainee pre-workshop assessment changed over time. For workshops held from September 2013 to June 2014, the trainees were not allowed access to the training materials during the test. We empirically set a passing score of 50% to assess the educational training's ability to prepare participants for skill training. [For board certification, residents are required to achieve a 70% score.] We found a strong correlation between knowledge and practical skill scores during this period, with trainees scoring over 50% being more likely to achieve practical skill proficiency. Because of the observed correlation and because the goal was trainee preparation not participant exclusion, we changed the educational training format in the final workshop of the pilot study (November 2014). Briefly, the online survey was administered as before, but participants were able to access the material to fill knowledge gaps and re-test until a score of 90% was achieved.

Each workshop was a full day session and sessions were held every 3-5 months from September 2013 through November 2014. Ultrasound-credentialed emergency physicians (credentialed according to American College of Emergency Physician's (ACEP) 2008 Emergency Ultrasound Guidelines) provided the training. Workshop components included short bedside review of content, instructor demonstrations, trainee scanning of live models, and clinical application discussions, all in groups of 4-5 trainees. Testing of practical skills was performed using the objective structured clinical examination (OSCE) format as established by the Point-of-care Ultrasound in Resource-Limited Environments (PURE) Initiative. Testing involved two skills, assessing image interpretation (IN) and image quality (IM). Each skill was composed of 9 tasks. Scores for each skill were the average of the task scores, with 4.0 and 3.0 being maximum scores for IN and IM, respectively. An average score of 2.0 for both IN and IM was considered passing, defined as the minimum proficiency for proper image acquisition and for interpretation of findings to answer "most" clinically relevant questions.

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