

Brief

Training the trainers in emergency medicine: an advanced trauma training course in Rwanda's medical simulation center

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Brief

Emergency medicine (EM) has undergone rapid development in Rwanda and the delivery of healthcare has steadily improved over the past two decades [1]. Life expectancy has risen while maternal and child mortality have declined [2]. However, trauma remains a leading cause of morbidity and mortality in Rwanda, similar to other countries in Sub-Saharan Africa [3-5]. Therefore, the Human Resources for Health (HRH) and the Rwanda Ministry of Health have made acute EM and trauma training a priority to improve patient care and public health outcomes [6]. Faculty from the Rwandan Post Graduate Degree (PGD) Course in Emergency and Critical Care Medicine and the Masters of Medicine in Emergency Medicine, both based at the University Teaching Hospital of Kigali (CHUK), have collaborated with providers from two US-based Medical Schools and Emergency Department to help improve EM in Rwanda. In October 2013, a group of eight EM providers were invited to Rwanda to conduct an intensive course in emergency trauma care, with the focus on providing care in resource-limited settings. The course, originally developed for Nicaragua, was specifically redesigned to meet the needs and resources in Rwanda. Previous results showed significant improvement in knowledge through simulation and written assessments [7]. The course was conducted at the Centre for Simulation and Training at CHUK, Rwanda's new and only facility for medical simulation in conjunction with CHUK faculty from the surgery and EM departments [8]. The 3-day trauma course was developed to address major concepts in trauma care, while accounting for local injury patterns and resource constraints in Rwanda. Training consisted of didactic lectures intermixed with two procedure labs, four live simulation cases, and team-building workshops. Fourteen Rwandan residents participated of which eleven were in the Rwandan PGD course in Emergency and Critical Care Medicine, two were from Family Medicine, and one was from Internal Medicine.

Core Content: participants received didactic lectures from US and Rwanda based EM and surgical faculty. The 14 lectures covered basic trauma concepts including shock, head trauma and spinal injuries as shown in **Table 1**. Previously recorded video demonstrations were utilized to demonstrate the primary/secondary survey, effective communication, and teamwork. Trainees then participated in interactive simulation activities involving residents and CHUK nurses to practice learned skills during a trauma resuscitation and to receive real-time feedback from colleagues and course faculty.

Procedure Labs: procedure stations were designed in collaboration with residency directors to address skill deficits of the residents. Didactic sessions were conducted covering proper technique and methodology. Participants were then divided into smaller groups and rotated through two procedure stations: tube thoracostomy and focused assessment sonography for trauma (FAST). Simulation equipment was designed using low cost materials including rehabilitated CPR mannikins and locally available equipment so that participants could replicate this teaching technique with providers at their home institutions.

Practicum: on days 1 and 3, participants were randomly assigned to Group A or Group B and underwent pre- and post-training evaluations consisting of a 23-question written exam (Test A or B) and 2 distinct simulation cases (cases 1 and 2 or cases 3 and 4), (See **Figure 1**). All forty-six written questions were reviewed for content by US board certified physicians in EM and surgery.

Simulation Cases: medical simulation cases teaching trauma assessment and management were modified for the Rwandan context. Simulations were performed utilizing course faculty as actors in roles as patient, nurse and case facilitator (e.g. adjusted simulated patient's clinical condition based on management by course trainees). Simulation cases received two scores: 1) a completion checklist scored out of 100 and 2) time elapsed to complete pre-identified actions. Themes for the four simulation cases are shown in **Table 1**. Completion check-lists and critical actions were tailored for each simulation case. Simulations were video-taped for residency development purposes. A debriefing session at the end of the course provided feedback to participants regarding management strengths and pitfalls. All 14 participants completed the didactic and simulation components of the course, and performance was formally assessed with feedback to participants. A follow-up trauma skills and refresher course is planned to ensure knowledge and practice retention. In addition, CHUK EM faculty are regularly monitoring the Rwandan physicians when they are managing trauma patients to ensure that the skills taught in the course are utilized. The medical simulation and skills center was an effective venue for the delivery of intensive trauma training. Since the course was designed with a "train the trainer" approach, it is anticipated that the medical simulation and skills center will continue to demonstrate its value as future clinicians in-training are educated in this center exclusively by Rwandan faculty.

Competing interests

The authors declare no competing interest.

Authors' contributions

All authors: concept and Design. Robert Partridge, John Foggie, Devin Kato, Ramon Millan, Payal Modi, JB, Grace Wanjiku: curriculum development, training faculty, writing and revision of manuscript. Hannah Janeway: curriculum development, data collection/interpretation, table and figure creation, writing and revision of manuscript. Robert Partridge, Hannah Janeway: literature search. All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and to the management of the case.

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Table and figure

Table 1: course content

Figure 1: pre and post-course testing and assessment

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Table 1: course content

Lectures	Simulation Cases	Procedure labs/Interactive Sessions
Intro/Trauma Overview	Closed Head Injury (1)	Thoracostomy
CHUK Triage	Blunt Traum in Pregnancy (2)	Ultrasound: FAST Exam
Primary/Secondary Survey	Gun Shot Wound to Chest (3)	Primary/Secondary Survey Lab
Shock	MCC with Splenic Laceration (4)	Teambuilding Workshop
Chest Trauma		
Abdominal/Pelvic Trauma		
Thoracostomy/FAST		
Head Trauma		
Cervical Spine Trauma		
Teamwork in Trauma		
Extremity Trauma		
Pediatric Trauma		
Elderly Trauma		
Trauma in Pregnancy		

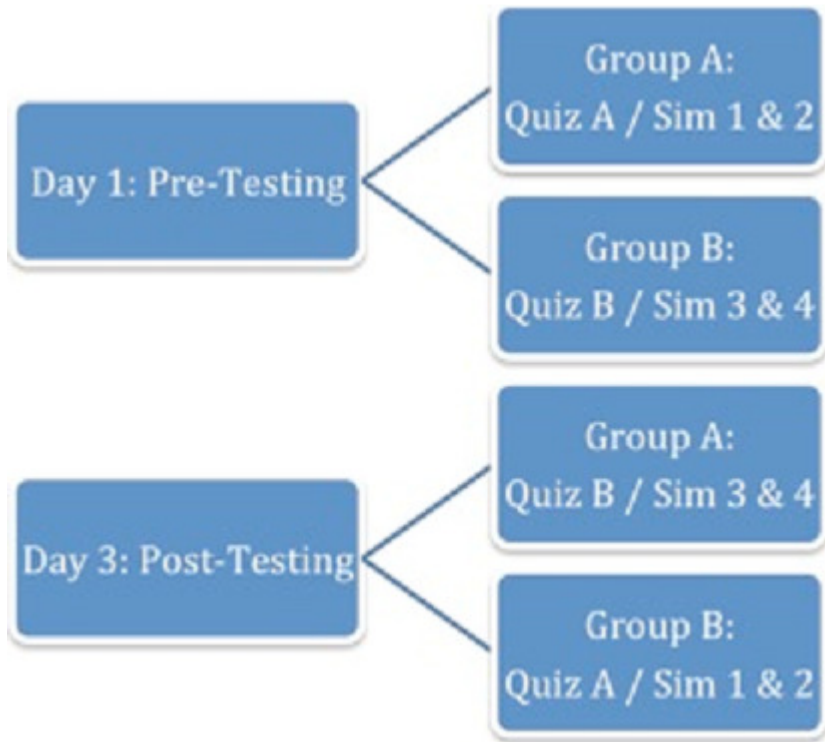


Figure 1: pre and post-course testing and assessment