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EDUCATION AND TRAINING

Emergency obstetrics knowledge and practical skills retention among medical students in Rwanda following a short training course

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ABSTRACT

Objective: To describe rates of improved knowledge following a structured 2-day emergency obstetrics training course. **Methods:** Quantitative assessments to evaluate emergency obstetrics knowledge and practical skills were administered before, immediately after, and 3–9 months following the training course for 65 final-year medical students at the National University of Rwanda. A survey was administered during the final assessment. **Results:** In total, 52 (80.0%) students demonstrated knowledge improvement after training. Fifty-seven (87.7%) students improved or maintained their scores from the post-training written test to the final assessment, and 32 (49.2%) retained practical skills. Twenty-one (32.3%) of the class demonstrated competency in both written and practical skills. According to multivariable logistic regression analysis, female gender was associated with overall competency ($P=0.01$), and use of the internet for academic purposes more than 3–5 times per week tended toward competency ($P=0.11$). **Conclusion:** A 2-day emergency obstetrics training course increased knowledge among medical students. Because educational policies are tailored to address high rates of maternal mortality in resource-poor settings, workshops dedicated to emergency obstetrics should be promoted.

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1. Introduction

Maternal mortality and morbidity are among the leading causes of death and illness among women aged 15–49 years in low-income countries [1]. Despite a significant decrease between 2005 and 2008, the maternal mortality ratio in Rwanda remains high, at an estimated 249–584 maternal deaths per 100 000 live births [2,3].

Rwanda—a country of 10.7 million people—has 1 physician for every 18 000 inhabitants. Each year, approximately 80 students graduate from a 6-year Bachelor of Medicine and Surgery program at the National University of Rwanda (NUR) Faculty of Medicine, Butare, Rwanda [4,5]. In their final year, students complete internships in 4 fields: internal medicine; surgery; pediatrics; and obstetrics/gynecology (OB/GYN).

Upon graduating, students complete a 1-year internship in a district hospital (the second point of care after community health centers), where they are often required to handle complicated obstetric emergencies and cases. Appropriate and rapid competency-driven medical education is critical to preparing healthcare providers for administering effective emergency obstetrics interventions and saving lives.

In January 2011, the NUR and the University Teaching Hospital in Kigali (UTH-K) piloted a yearlong educational initiative wherein all sixth-year medical (MD6) students received a targeted orientation prior to beginning each clerkship. The OB/GYN faculty modeled this orientation after the Advanced Life Support in Obstetrics (ALSO) course, which was developed by the American Academy of Family Physicians as a structured, evidence-based approach to maintaining the knowledge and skills necessary to manage obstetric emergencies [6,7].

The study had 3 main aims: to determine improvement in knowledge among MD6 students after completion of ALSO training; to determine retention of knowledge from completion of the ALSO course to the final assessment; and to determine individual, structural, and

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environmental factors that might predict competence among students with regard to provision of quality obstetric care.

2. Materials and methods

Quantitative assessments to evaluate emergency obstetrics knowledge and practical skills were administered before, immediately after, and 3–9 months following intensive training of MD6 students attending the ALSO course at the NUR. Study activities were conducted in collaboration with the NUR, UTH-K, and the Duke Global Health Institute, Durham, USA. Data were collected from January 17 to October 19, 2011. The investigation was performed in accordance with the guidelines of the Duke University Health System Institutional Review Board (IRB) and the UTH-K Ethics Committee; the Duke IRB declared the protocol exempt from review. Students provided verbal consent, and participants were assigned identification numbers to ensure confidentiality.

Throughout 2011, each MD6 student ($n = 67$) participated in 1 of 4 ALSO trainings at UTH-K prior to their OB/GYN clerkship. Trainings—using ALSO-adopted material—were conducted in English by ALSO-certified trainers in January, March, June, and July 2011. Before beginning the training, students completed a 20-question standardized written exam testing their knowledge of major causes of maternal mortality and appropriate preventative and treatment measures. Following the training, students repeated the 20-question exam. Both pre- and post-training tests were graded on a 100-point scale. Trainers then administered a practical skills exam to each participant. The exam assessed critical tasks, including the following: ability to recognize the need for assisted vaginal delivery; demonstration and knowledge of manual skills with vacuum extraction; ability to recognize and manage shoulder dystocia; and ability to recognize and manage postpartum hemorrhage. A standardized ALSO checklist, adapted to low-resource settings, facilitated consistent scoring of each student's performance on the practical skills assessment. Points were awarded for each of the critical tasks, and a total score out of 100 was calculated for each student [8].

All MD6 students were invited to UTH-K for a final assessment on October 10–11, 2011, the timing of which was determined based on their graduation in December. Students were asked to complete a practical skills exam and a 50-question written exam, which included the 20 original questions from the pre- and post-training written exam. At this point, students had completed the ALSO course between 3 and 9 months earlier. Fig. 1 shows the assessment schedule.

A quantitative survey instrument evaluating the students' demographics, career aspirations, academic standing, and feedback on ALSO training was also developed and administered with the final assessment at UTH-K. All assessment and survey materials were written in English.

Three outcomes were measured: improvement in knowledge between pre- and post-training tests; retention of knowledge from post-training test to final assessment; and competency after final assessment. Improvement in knowledge was defined as either an increase in assessment score to at least 70% or maintenance of the

70% or higher score from pre- to post-training tests. Retention of knowledge was defined as maintenance or improvement of baseline knowledge and practical skills demonstrated from post-training test to final assessment. Competency was defined as aptitude to address emergency obstetrics issues, as demonstrated by performance on the final, comprehensive written and practical ALSO exam. Participants with scores of at least 85% on the written exam and at least 80% on the practical skills assessment were defined as competent.

To maintain consistency in analysis for the written exam testing improvement in knowledge and retention of knowledge, scores for the 20-question exam were compared pre-training, post-training, and in the final assessment. Median scores for the 50-question final written assessment were used to define competency.

Collected data were entered into Excel (Microsoft, Redmond, WA, USA) and coded. Data analysis was performed using Stata version 11.0 (StataCorp, College Station, TX, USA). Descriptive and summary statistics (means for continuous variables and proportions for categorical variables) were calculated. Bivariable analyses used χ^2 and Fisher exact statistics for common and rare outcomes to estimate the association between potential predictors and the various outcomes of interest. The α level was set to 0.2 as the level of significance for both the χ^2 and the Fisher exact tests. All potential predictors independently associated with a given outcome (at an α level of 0.2) during bivariable analysis were retained for multivariable regression. For each outcome, multivariable analyses were begun by running logistic regression models that included all independent predictors for that outcome that were retained during bivariable analysis. Backward elimination was then used to remove any variables that had Wald test P values at or above 0.2. The most parsimonious model for each outcome (the model in which all the predictors had Wald P values less than 0.2) was retained as the final predictive model.

3. Results

At the time of data collection, there were 67 MD6 students attending the Faculty of Medicine at NUR. In total, 65 students voluntarily participated in the study; linked data from ALSO training and final assessment results were obtained for all 65. With the final sample, there was a power of 0.96 to detect a difference in score of 5 percentage points (or a 1-point difference on the 20-point scale) between pre-training and post-training tests at an α level of 0.05 for the primary outcome of improvement in knowledge. Table 1 outlines the basic demographic details of the participants. Of the 65 students, 55 (84.6%) were male and 10 (15.4%) were female. Students completed their OB/GYN clerkships at 3 referral hospitals: University Teaching Hospital of Butare ($n = 26$); UTH-K ($n = 30$); or King Faisal Hospital ($n = 9$). Forty-one (63.1%) students reported that physicians spent 1–2 sessions per week or less on instruction during their clerkship. Fifty-one (78.5%) students assisted with 25 or fewer deliveries during this time.

In total, 52 (80.0%) students met the criteria for knowledge improvement, demonstrating a sufficient increase in test score after

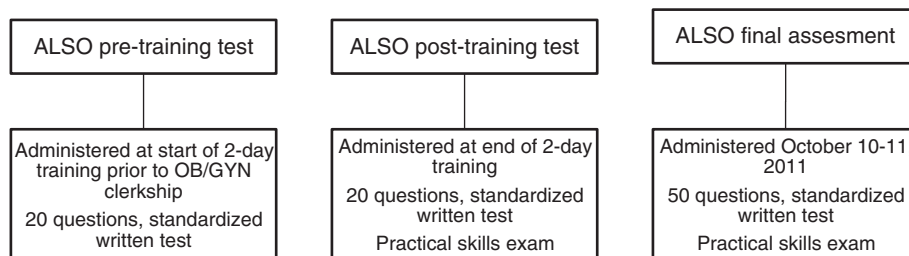


Fig. 1. Schedule of emergency obstetrics training assessment.

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