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How useful are Primary Trauma Care courses in sub-Saharan Africa?

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ABSTRACT

Introduction: More than five million deaths occur each year from injury with the vast majority occurring in low and middle-income countries (LMICs). Africa bears the highest road traffic related mortality rates in the world. Despite this, formal training in trauma management is not widely adopted in these countries. We report our results of 10 consecutive Primary Trauma Care (PTC) courses delivered in seven East and Central African countries, as part of the COSECSA Oxford Orthopaedic Link (COOL) initiative.
Methods: Candidate's knowledge and clinical confidence in trauma management were assessed using a multiple-choice questionnaire and a confidence matrix rating of eight clinical scenarios. We performed descriptive statistical analysis on knowledge and clinical confidence scores of candidates before and after the course. We sub-analysed these scores, examining specifically the difference that exist between gender, job-roles and instructors versus non-instructors.
Results: We have trained 345 new PTC providers and 99 new PTC instructors over the 10 courses. Data sets were complete for 322 candidates. Just under a third of candidates were women ($n = 94$). Over two-thirds of candidates ($n = 240$) were doctors, while the remainder comprised of nurses, medical students and clinical officers. Overall, the median pre-course MCQ score was 70% which increased to 87% post course ($p < 0.05$). Men achieved a higher MCQ score both pre- and post-course compared to women ($p < 0.05$); however there was no significant difference in the degree of improvement of MCQ scores between gender. Instructors outperform non-instructors ($p < 0.05$), and similarly doctors outperform non-doctors on final MCQ scores (post-course). However, it was the non-doctors who showed a statistically significant improvement in scores before and after the course (20% non-doctors vs 16% doctors, $p < 0.05$). Candidate's clinical confidence also demonstrated significant improvement following the course ($p < 0.05$).
Conclusion: Our work demonstrates that COOL-funded PTC courses in the COSECSA region delivered to front-line health staff have helped improve their knowledge and confidence in trauma management, irrespective of their job-roles and gender. Further follow-up is needed to establish the long-term impact of PTC courses in this region.

Introduction

Injury is a leading cause of morbidity and mortality across the world, affecting in particular the young and healthy population who are the main breadwinners. More than 5 million deaths occur each year from injury with the vast majority occurring in low and middle-income countries (LMICs) [1,2]. Africa bears a heavy burden, with more deaths occurring each year from injury (either violence or accidents) than deaths linked to HIV AIDS, tuberculosis and malaria combined.

To deliver uniformly good trauma care in developed countries, the Advanced Trauma Life Support (ATLS) protocol is well

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established and widely adopted. However, although the ATLS principles are universally applicable, the feasibility and practicality of this approach in LMICs are less evident. Barriers include the lack of organised health care infrastructure, workforce, funding and education [3]. Recognising the disparity between the need for and provision of training in trauma management in LMICs, the Primary Trauma Care Foundation (PTCF) was set-up in 1997 to run courses for front-line staff in such countries to try and reduce the human and economic effect of injury [3]. Training is based on ATLS principles but adapted to fit the limited resources in LMICs. Furthermore, PTC courses are open to all front-line staff, free of charge, run by volunteers and encourage local 'cascading', whereby key delegates who have completed the course are trained as instructors.

In 2012, the University of Oxford, in collaboration with the College of Surgeons of East Central and Southern Africa (COSECSA), set up the COSECSA Oxford Orthopaedic Link (COOL) programme [4,5]. This aims to strengthen research and training in trauma and musculoskeletal impairment care in the 10 COSECSA countries. One of the programme's main activities is to support the establishment of sustainable PTC courses in the COSECSA region.

Ten PTC courses funded by the COOL programme were run in COSECSA countries between December 2012 and June 2013. This study aims to establish the impact of these PTC courses on candidates' knowledge and confidence in trauma management and explore the factors affecting this.

Methods

The PTC 2-day course, which is open to all levels of health care practitioners, by invitation or application, involves a combination of lectures, moulages and hands-on skills stations. It requires no high-tech facilities and is delivered by experienced clinicians. The initial PTC course in each country is run by visiting faculty (usually a team of 4), whereas later courses (cascade courses) in each country are run either jointly with or entirely by local PTC faculty.

Candidates were asked to complete a multiple-choice questionnaire (MCQ) at the start and end of the 2-day course. This comprised a set of 30 questions related to trauma which candidates had up to 45 min to complete. One point was awarded for every correct single best answer out of 5 options. There was no negative marking. Candidates were asked to complete the same set of questions at the end of the 2-day course and the percentage improvement was calculated. The MCQ was compiled from a list of questions within the PTC database that have been widely used in PTC courses over 60 countries. The MCQs were presented in a non-biased manner according to the best practice guidelines of writing multiple-choice questions. In addition to the MCQ, candidates were asked to rate how confident they would be in managing eight different trauma scenarios on a scale of one to five (five being very confident). This same confidence matrix was presented to candidates at the end of the 2-day course and the difference in scores were analysed. General data on patient demographics, including occupation, gender, place of work and trauma management experience, were also compiled.

A 1-day instructor course was held immediately after the end of the 2-day PTC course. Candidates for the instructor course were chosen based upon their clinical and leadership skills, either by the local course organiser at the end of the 2-day course, or put forward before the start of the course by faculty at their local hospital. These newly qualified instructors helped run the second 2-day PTC course that took place on day 4 and 5 of that same week. This 5-day schedule (2-day PTC course, 1 day PTC instructor course, 2-day PTC course run by newly qualified instructors) replicates the PTC introductory model known as 2:1:2, initially described by Wilkinson et al. [6].

Scores were collated and represented in percentages for comparative purposes. In addition to analysing the differences in overall MCQ and confidence matrix scores for candidates pre- and post-course, the impact of candidates' gender, occupation and whether they went on to become an instructor was compared.

Statistical analysis was carried out using STATA version 13.0 (Stata Corp, College Station, TX, USA) programme. A p-value of <0.05 was considered statistically significant. All candidates enrolled in this study gave written consent for their scores to be used in this analysis.

Results

General data and demographics

The first 10 COOL-funded PTC courses, from December 2012 to June 2013, have been held in seven of the COSECSA countries (Table 1). Each of these PTC courses followed the 2:1:2 model and was held over 5 consecutive days [6].

A total of 345 candidates participated in the courses, although we have complete data for 322 candidates (Table 2). Just under a third of candidates were women ($n = 94$). Four candidates had missing data on gender assignment which could not be ascertained from any other data gathered.

Over two-thirds of candidates ($n = 240$) were "doctors" which included physicians, anaesthetists, surgeons and medical officers. The remaining candidates were a combination of nurses, medical or nursing students, clinical officers and plastering technicians. A third of candidates ($n = 99$) were recruited as new instructors and delivered training during the second 2-day course.

Multiple-choice questions

Overall, the median pre-course MCQ score was 70% which increased to 87% at the end of the 2-day course ($p < 0.05$) (Fig. 1, Table 3). Thirty candidates (9%) failed to show an improvement post-course, where 14 candidates demonstrated no change, while 16 demonstrated a decline in their MCQ scores (range 0 to −5).

Of the 30 candidates that failed to show an improvement in scores, 18 had an MCQ score that was greater than 75% both pre- and post-course. The remaining candidates that scored less that 75% consisted of 2 nurses, 1 health care worker and 9 doctors (combination of anaesthetists, surgeons, physicians, paediatricians and general practitioners).

Men achieved a higher MCQ score both pre- and post-course compared to women (73% for men vs 67% for women pre-course, and 87% for men vs 83% for women post-course, $p < 0.05$, respectively), however there was no significant difference in change of scores between genders (Fig. 2).

Candidates who went on to become instructors on subsequent 2-day PTC courses obtained a higher MCQ score overall (both pre- and post-course) compared to non-instructors (73% and 90% vs 67%

Table 1
List of COOL-funded PTC courses from December 2012 to June 2013.

Course no.	COSECSA country	Course date	Location
1	Kenya 01	December 12	Nanyuki
2	Malawi 01	February 13	Blantyre
3	Uganda 01	February 13	Kampala
4	Mozambique 01	March 13	Maputo
5	Rwanda 01	April 13	Kigali
6	Kenya 02	April 13	Kitale
7	Zimbabwe 01	April 13	Harare
8	Uganda 02	May 13	Soroti
9	Malawi 02	May 13	Blantyre
10	Ethiopia 01	June 13	Addis