Short report

Application of the World Health Organization’s Basic Emergency Care course in Zambia

Morgan C. Broccoli a,⁎, Julia Dixon b, Branden Skarpiak c, Godfrey Phiri d, Andrew E. Muck c, Emilie J. Calvello Hynes b

a Boston Medical Center, Department of Emergency Medicine, Boston, MA, USA
b University of Colorado School of Medicine, Department of Emergency Medicine, Aurora, CO, USA
c University of Texas Health San Antonio, Department of Emergency Medicine, San Antonio, TX, USA
d Zambian Ministry of Health, Mobile & Emergency Health Services, Lusaka, Zambia

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ABSTRACT

Background: In 2013, the Zambian Ministry of Health identified action priorities for strengthening their emergency care system; one of these priorities was emergency care training for healthcare providers. To rapidly train the existing cadre of frontline providers, trainings were implemented in multiple provinces using the World Health Organization’s Basic Emergency Care (BEC) course. The BEC course is open-access and emphasizes a practical syndrome-based approach to critical emergency conditions. This paper describes the first reported larger scale educational intervention of the BEC course in 7 provinces of Zambia.

Methods: Course delivery occurred at seven Zambian hospitals selected by the Ministry of Health over a 1 year period. Participant emergency care knowledge was assessed pre- and post-course with a 25-question multiple choice exam. Participant confidence levels related to emergency care provision and emergency care skills were assessed pre- and post-course using a Likert scale survey.

Results: Overall, 210 participants were trained at 7 sites. Participants demonstrated significant improvements in their multiple-choice exam scores; the overall pre-course mean was 61.47, and the post-course mean was 79.87 (p < 0.0001). Self-reported confidence in the care of ill and injured adults and children increased after taking the course, and participants generally agreed that the BEC course was highly valuable and applicable to local needs.

Conclusion: Implementation of the WHO’s BEC course at seven hospitals throughout Zambia led to improvement in the participants’ emergency care knowledge and confidence levels at all sites. The BEC course has the potential to be implemented in a nationwide initiative but would require allocation of significant human and physical resources. Additional work evaluating patient outcomes and long-term participant educational outcomes is needed.

African relevance

• In many countries, frontline providers who by necessity provide emergency care at their facilities have received little formal training in emergency care.
• The World Health Organization created the open-access Basic Emergency Care course to address this need; the course covers the ABCDE-approach to emergency conditions within the major domains of Trauma, Difficulty in Breathing, Shock, and Altered Mental Status.
• This paper describes the application of the Basic Emergency Care course in seven Zambian provinces and reports on the educational outcomes of participants.

Introduction

A robust emergency care system reduces the morbidity and mortality associated with a range of conditions and provides an essential foundation for effective response to mass casualty incidents, disasters, and epidemic infectious disease outbreaks [1]. Fifty-four to 90% of deaths in low- and middle-income countries are amenable to significant changes

⁎ Corresponding author.
E-mail address: morgan.broccoli@gmail.com (M.C. Broccoli).

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in outcomes if treated with timely emergency care [1,2].

In February 2013, a road traffic incident along Zambia’s Great North Road killed 53 people, despite almost all patients being transferred to a hospital [3]. In response, the Zambian Ministry of Health (MoH) created an action plan to improve emergency care highlighting four key challenges: a lack of emergency care education and infrastructure, no universal emergency number or call centre, minimal provision of prehospital care, and a lack of resources and equipment [4,5]. In order to address the need for training of existing healthcare providers, the MoH identified the World Health Organization’s (WHO) Basic Emergency Care (BEC) course (then in pilot form) to be implemented in multiple provinces [6].

The WHO created the open-access BEC course to address the gap in training for frontline providers who by necessity provide emergency care at their facilities but have received little formal training in emergency care. The BEC course emphasizes the ABCDE approach to emergency conditions within the major domains of Trauma, Difficulty in Breathing, Shock, and Altered Mental Status. Small group teaching sessions make up the majority of the course and include case scenarios and hands-on skill stations with increasing complexity [7] (Appendix).

The BEC course is meant to be locally adapted and previous pilot work had been undertaken in Zambia with local modification made by the MoH [6].

This paper describes the application of the BEC in 7 Zambian provinces and reports on the educational outcomes of participants.

Methods

Setting

Adapted BEC Course delivery occurred between September 2017 and November 2018 at hospitals in seven Zambian cities located in targeted provinces: Kafue, Choma, Kasama, Mpika, Liteta, Mphanshya, and Nyimba. Sites were selected by the Zambian MoH due to their proximity to major roadways and high burden of road traffic injuries.

Participants

For each training, approximately 30 healthcare provider participants including medical officers (physicians), clinical officers (mid-level providers), and nurses from both the hospital and surrounding health centres (clinics) were selected by local partners. Demographic information was collected. None of the participating sites had dedicated emergency unit staff at the time of implementation, and emergency units were staffed by rotating clinical officers and nurses with medical officer supervision.

Course structure

The WHO BEC course was taught over five days at each site by preestablished tools and criteria for passing the BEC course were used after local adaptation during pilot implementation: participants must score ≥70% on their post-course exam, demonstrate proficiency with each of the skill stations, and act as the “team leader” for at least one case scenario [6]. Participant knowledge was assessed pre-and post-course with a 25-question multiple choice exam. Participant confidence levels related to emergency care provision and skills were assessed pre- and post-course using a Likert scale survey [6,7].

Beginning in October 2018, ToT courses were taught alongside the BEC course, and 11 Zambian BEC Instructors were trained during this time. Only those who had completed a prior BEC course were eligible to be trained as instructors, and candidates were selected based on proficiency and leadership skills as assessed by trainers and hospital leadership. The BEC ToT course was conducted over 2 days, and after this training candidates co-taught a full BEC course in partnership with the U.S. instructors.

Data analysis

Descriptive statistics were calculated for both the exams and provider perceived confidence. Only data from five (out of seven) sites were able to be fully analysed, as at the first two sites the pre- and post-course exams were not paired with the full demographic data from the confidence questionnaires. A paired t-test was used to compare pre- and post-course scores using overall percentages. Differences in pre- and post-course exam scores between provider groups and employment sites were analysed using one-way analysis of variance (ANOVA).

Ethics

This study was approved by the Zambian National Health Research Authority (Ref. No. 005-01-18), and was classified as exempt by the Boston University Institutional Review Board. Verbal and written consent was obtained from all participants.

Results

Participant characteristics

Overall, 210 participants were trained at 7 sites (Table 1). The majority of trainees were nurses and midwives, and most worked at 1st level district hospitals or 2nd level general hospitals. Course participants averaged 6.74 (±std 6.54) years since completing their training, and had been working in their current job for an average of 4.75 (±std 5.38) years.

Written exam

Participants demonstrated significant improvements in exam scores. The overall pre-course mean was 61.47, and the post-course mean was 79.87 (Table 2).

Medical officers had the highest pre-course scores and all medical providers showed significant improvement. Non-medical participants did have improvement in mean scores, but it was not statistically significant (Table 3).

Confidence

Self-reported confidence in the care of ill and injured adults and children considerably increased after the course. Those who described themselves as “very confident” in their ability to provide care to adults who were acutely ill or injured increased from 22.83% to 72.22%, and 32.26% to 81.82% respectively. Those who felt “very confident” in caring for medically ill or injured children increased from 19.20% to 62.94%, and 23.77% to 70.42% respectively.

Discussion

Implementation of the WHO’s BEC course at seven 1st and 2nd level hospitals throughout Zambia led to improvement in the participants’ emergency care knowledge and confidence levels at all sites.

Although all sites showed significant improvement, there was notable site variation. At the site with the lowest pre-course mean, the post-course mean was almost 10 points lower than the second-lowest scoring site. This irregularity may be due to the site’s participant composition; 21% of the participants were non-medical personnel, while all other sites had at most one (3%) non-medical participant. As the
course was designed for medical professionals, it is understandable that non-medical personnel would score lower. A more appropriate training for this cohort may be a course targeting lay providers.

As expected, medical officers scored the highest on the pre-course exam, and all groups improved in their post-course scores. “Other” medical professionals (pharmacists, radiographers, laboratory technicians) showed the most improvement; while this group was not initially targeted for training, they proved that they are able to learn the material, and were enthusiastic in doing so. This cohort may be considered for future trainings, as in many hospitals they become involved in medical care during mass casualty incidents out of necessity.

There are several limitations to this study. At the first two sites (Kafue and Choma), pre- and post-course exams were not paired with the confidence questionnaires, so the provider and site differences were unable to be analysed. This study also does not report on long term knowledge retention. A retention exam was attempted, but when investigators returned to the study site, almost all of the providers who had taken BEC had been rotated to other healthcare facilities. Rotating providers is common across the African setting where human resources may be limited. However, once a provider is trained in BEC, rotating them out of their environment disrupts teams (crucial for the delivery of emergency care), interrupts any momentum from process changes implemented by trained providers, and removes the positive influence of modelling quality emergency care delivery to their peers. The frequent cycling of healthcare providers to other locations in Zambia makes implementing a refresher curriculum and studying knowledge and skill retention difficult. We plan to address this by creating online retention materials, videos, and exams [9].

An additional limitation was the outcome measurement of knowledge acquisition and confidence levels in treating emergency conditions. The gold standard of any educational intervention would be an associated decrease in morbidity and mortality after course administration. The funds required for such a study are much higher than were available for this intervention. Thus, we followed the evaluative guidance prescribed by the WHO.

At the three final sites, Zambian BEC instructors assisted the US lecturers with the trainings. Zambian MoH sustainability planning depends upon local trainers continuing to educate medical professionals in emergency care provision. As the MoH scales their BEC training, future research may include comparison of the educational impact between participants trained by international instructors and those trained by local instructors. Integrating the BEC course into the curricula of MoH nursing, clinical officer, and medical officer schools would be an effective way to increase training without need to increase resources; most healthcare training schools have simulation materials, and the professional educators would make natural BEC instructors.

Conclusion

The WHO BEC course is a practical, resourceful educational intervention that can be used to rapidly train frontline healthcare workers in the initial assessment and resuscitation of acutely ill and injured patients. The BEC course increases the emergency care knowledge and confidence of participants post implementation. The BEC course has also been suggested to decrease mortality in similar settings [10]. In Zambia, this course has the potential to be implemented in a large-scale, nationwide initiative if sufficient resources are allocated to train and support local instructors. Further research on effectiveness of the train the trainer model, knowledge retention, and patient centred outcomes is needed.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.afjem.2020.09.011.

Table 1
Hospital and participant characteristics.

| Province     | Total | Kafue | Choma | Kasama | Mpika | Liteta | Mpanshya | Nyimba |
|--------------|-------|-------|-------|--------|-------|--------|----------|--------|
| Level of hospitala | 2nd   | 2nd   | 2nd   | 1st    | 1st   | 1st (Mission) | 1st      | 1st |
| Catchment area population [8] | 300,000 | 300,000 | >300,000 | 300,000 | 380,000 | 50,000 | 100,000 |
| Participants total | 210   | 31    | 27    | 32     | 36    | 31     | 29       | 24     |
| Nurses and midwives N (%) | 95 (45.2) | 20 (64.5) | 10 (37.0) | 16 (50.0) | 17 (47.2) | 13 (41.9) | 13 (44.8) | 6 (25.0) |
| Clinical officers | 36 (17.1) | 1 (3.2) | 6 (22.2) | 5 (15.6) | 12 (33.3) | 6 (19.4) | 4 (13.8) | 2 (8.3) |
| Medical officers and specialists | 24 (11.4) | 2 (6.5) | 5 (18.5) | 7 (21.9) | 2 (5.6) | 5 (16.1) | 1 (3.4) | 2 (8.3) |
| Other (medical)b | 38 (18.1) | 7 (22.6) | 3 (11.1) | 1 (3.1) | 2 (5.6) | 6 (19.4) | 10 (34.5) | 9 (37.5) |
| Other (non-medical)b | 8 (0.5) | 1 (3.2) | 0 | 0 | 0 | 1 (3.2) | 1 (3.4) | 5 (20.8) |
| Missing position | 9 (0.5) | 0 | 3 (11.1) | 3 (9.4) | 3 (8.3) | 0 | 0 | 0 |

a Level 1 = district hospital, Level 2 = general hospital.
b Other: Medical includes biomedical scientists, medical laboratory technologists, radiographers, dental therapists, medical equipment technicians, physiotherapists, students.

Table 2
Scores by location.

| Site         | N (%) | Pre-course mean | Post-course mean | Mean difference (post-pre) |
|--------------|-------|-----------------|-------------------|---------------------------|
| Kafue        | 60 (29) | 60.69 | 79.10 | 18.41 |
| Choma        | 64 (44) | 64.44 | 85.33 | 20.89 |
| Kasama       | 65 (31) | 65.71 | 79.50 | 13.87 |
| Mpika        | 65 (29) | 65.29 | 80.33 | 16.13 |
| Liteta       | 59 (10) | 59.10 | 80.90 | 11.80 |
| Mpanshya     | 59 (25) | 59.45 | 82.76 | 23.27 |
| Nyimba       | 53 (28) | 53.28 | 69.67 | 16.39 |
| Overall      | 61 (47) | 61.47 | 79.87 | 18.40 |

Table 3
Scores by clinical position.

| Position          | N (%) | Pre-course mean | Post-course mean | Mean difference (post-pre) |
|-------------------|-------|-----------------|-------------------|---------------------------|
| Medical officers  | 21    | 75.76 | 85.76 | 10.00 p < 0.0001 |
| Clinical officers | 31    | 65.98 | 84.46 | 18.48 p < 0.0001 |
| Nurses            | 64    | 62.44 | 79.34 | 16.90 p < 0.0001 |
| Medical officers  | 24    | 46.84 | 77.67 | 30.83 p < 0.0001 |
| Other (non-med)   | 4     | 36.39 | 60.39 | 24.00 p = 0.1750 |
Dissemination of results

Results from each training site were compiled into a report that was distributed to leadership at each hospital. All training reports were also sent to the Zambian Ministry of Health.

Authors’ contribution

Authors contributed as follows to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: MCB contributed 35%; JD and ECH contributed 20% each; BS and AEM contributed 10% each; and GP contributed 5%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of competing interest

The authors have no conflicts of interest to report.

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