ORIGINAL RESEARCH

Evaluation of an online journal club–style course on evidence-based surgery for trainees of the College of Surgeons of East, Central and Southern Africa

Victor J. Animasahun[1], Tara Harrop[2], James Aird[3], Brian Cameron[4], Andrew Howard[5], Pankaj Jani[6]

[1]Faculty of Clinical Sciences, Olabisi Onabanjo University, Sagamu, Nigeria
[2]Faculty of Medicine and Dentistry and Global Health Collaborative, University of Plymouth, Plymouth, UK
[3]University Hospitals Plymouth NHS Trust, Plymouth, UK
[4]Department of Surgery McMaster University, Hamilton, ON, Canada
[5]Department of Surgery, University of Toronto, Toronto, ON, Canada
[6]Department of Surgery, University of Nairobi, Nairobi, Kenya

Correspondence: Dr James Aird (james.aird@nhs.net)

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Abstract

Background
Evidence-based surgical practice is key to optimizing patient care. Surgeons need critical appraisal skills to apply the best evidence, so formal training in evidence-based surgery (EBS) is increasingly a part of postgraduate surgical education. Surgeons in Africa must apply research to their unique patient populations, local practices, and limited healthcare resources. To meet this need, partners in Canada and the United Kingdom collaborated with the College of Surgeons of East, Central and Southern Africa (COSECSA) to offer the Surgery in Africa Journal Club (SIAJC) as an online course for COSECSA trainees. We evaluated the participation, satisfaction, and knowledge gained by SIAJC participants over its initial 2 years.

Methods
Knowledge was measured by comparing precourse with postcourse test scores using validated multiple-choice questions. Scores were compared using a paired-samples *t*-test. Trainees gave anonymous feedback on the course, and responses were grouped into themes and analysed.

Results
After exclusions, there were 282 postgraduate surgical trainees who completed the SIAJC precourse test in 2015 and 2016. Postcourse tests were completed by 95 of these 282 trainees (33.7%). EBS knowledge increased significantly, with a mean postcourse test score of 20±5.28 out of 30, vs 15±3.62 out of 30 on the precourse test (t=−10.1, df=110, P<0.001). Trainees reported enthusiasm for the course, improved knowledge of best practices, empowerment to make better clinical decisions, and concerns that EBS would be expensive or conflict with local expert opinion. For some participants, poor Internet access was a barrier to accessing course materials.

Conclusions
The SIAJC effectively taught EBS-related material, but the course had a high attrition rate and has been difficult to sustain because of its dependence on external faculty. A blended model using course materials for local face-to-face journal clubs led by local EBS champions may be the best long-term model to improve EBS skills and practice in the COSECSA region.

Keywords: evidence-based medicine, online learning, postgraduate surgical training, Africa

Introduction

"Evidence-based medicine (EBM) is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients."[1],[2] Evidence-based surgery (EBS) has developed its own literature and training materials[3] as surgeons increasingly publish randomized trials and high-quality research to address specific surgical conditions and treatments. The increasing availability of Internet connectivity

Table 1. Surgery in Africa Journal Club course objectives

After completing this course, we expect that trainees will be able to:
1. Have an awareness of and know where to access the current evidence on the selected clinical topics.
2. Know the basic terminology and principles of evidence-based medicine.
3. Use the essential concepts of critical appraisal when reading a journal article in order to be able to assess how the evidence applies to their setting.
4. Cite evidence to support a clinical opinion on a discussion board.
5. Ultimately to work towards an evidence-based approach to a journal club and the care of patients.

Source: https://www.schoolforsurgeons.net

and smartphones in low-resource countries, coupled with improved access to online journals (for example, through the World Health Organization–initiated Health InterNetwork Access to Research Initiative [HINARI]),[4] the potential benefits of EBS appear promising. However, since access to health research does not necessarily translate to effective uptake and correct application, it is imperative to educate surgeons how to search, critically appraise, and apply the best evidence to suit the clinical peculiarities of their specific contexts to achieve better patient outcomes.[3]

Africa currently experiences a paradox of the greatest disease burden and lowest health-sector human resource capacity in terms of number, skillset, and research capacity.[5] It is believed that narrowing the health knowledge gap between low-income and high-income nations via improving access to online resources is a cost-effective means of reducing health inequalities.[4] However, most surgical publications come from high-income countries, and research findings may or may not apply to the patients and available resources in low-resource settings. There is an increasing interest in, and production of, high-quality research partnerships between western countries and Africa, including with the College of Surgeons of East, Central and Southern Africa (COSECSA).[5],[6]

Acknowledging the dearth of clinical evidence in Africa, poor access to electronic publications, and the need to build research capacity in Africa, from 2001 to 2016, the University of Toronto Office of International Surgery, in collaboration with the Association of Surgeons of East Africa, administered the Ptolemy project to provide free access to the University of Toronto's online medical library to over 100 African surgeons and surgeons-in-training.[7] In 2005, the Office of International Surgery began publishing a series of monthly evidence-based Surgery in Africa (SIA) Reviews online in collaboration with COSECSA and the Canadian Network for International Surgery, and these were accredited for continuing education credits by the Royal College of Physicians and Surgeons of Canada. The SIA Reviews were usually coauthored by surgeons from Africa, Canada, and the United Kingdom, linking surgeons from the COSECSA region to the best evidence-based surgical practices applicable to their patients and settings. Recognizing that better knowledge of study designs and limitations can help surgeons become better knowledge consumers and researchers, the SIA Reviews evolved in 2015 into an online journal club format housed on the COSECSA School for Surgeons surgical curriculum website—a collaboration with the Royal College of Surgeons in Ireland.[8],[9]

How can we learn and teach the critical appraisal skills to find and interpret the best available research literature? Short postgraduate courses[10] can improve knowledge and skills of physicians and physicians-in-training, but such courses may lack continuity and relevance. One of the best ways to learn about EBS is through a surgical journal club that uses applicable examples to learn more about research methods.[11] Journal clubs generally include face-to-face discussion between experienced and younger surgeons and are starting to incorporate online formats.[12]

The SIAJC format and objectives (Table 1) have been previously described[8],[9] and was loosely based on the popular Evidence-Based Reviews in Surgery (EBRS) used by Canadian surgical trainees for journal clubs.[13] The 20-week online SIAJC course consisted of 10 modules—each designed to be completed in 2 weeks—on a range of surgical topics, each with a review article, a methods article, input from African surgical experts, multiple-choice questions, and an asynchronous discussion board. Each module highlighted the critical appraisal of a clinical publication relevant to African practice using different study designs (e.g., survey, case–control, randomized trial). Clinical topics included general surgery (e.g., sigmoid volvulus), orthopaedics (e.g., open fractures), thoracic surgery (e.g., empyema), neurosurgery (e.g., motorcycle helmets), plastic surgery (e.g., burns) and paediatric surgery (e.g., Hirschsprung's disease). Trainees were required to complete the precourse test and at least 6 of the 10 modules for their COSECSA membership (MCS) or fellowship (FCS) requirements, but test scores were not used to determine candidate progress.

This study aimed to evaluate the effectiveness of the SIAJC course at improving trainee knowledge and understanding of EBS using the validated precourse and postcourse test results and feedback from course participants.

Methods

Study participants

This was a retrospective, observational study. The study population comprised COSECSA surgeons-in-training who

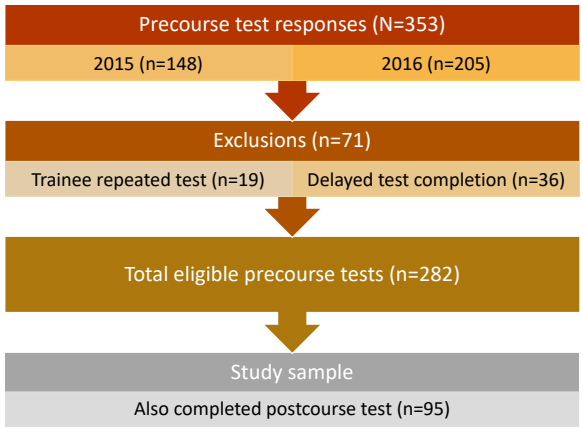

Figure. Inclusion and exclusion flow chart

enrolled in the online SIAJC EBS course and completed the precourse test in 2015 and 2016. Written informed consent to publish findings anonymously was obtained from the participants on the website at the time of submitting the tests online. Ethical approval was obtained from the COSECSA Institutional Review Board.

Data collection

Each module had a 15-item quiz, which provided feedback on the correct answers, and all of the precourse and postcourse questions were taken from the module quizzes. The 30-item precourse test with multiple-choice questions of EBS knowledge was developed by faculty content experts based on the SIAJC module content, with reference to other published EBM assessment tools.[10] Content validity and face validity were achieved by piloting the test with SIAJC course faculty in Canada and East Africa. An initial review of the first 60 trainees confirmed a significant increase in the postcourse test scores after completion of the course.[9]

The precourse and postcourse tests were identical and were completed approximately 5 months apart. The scores for the precourse test were not given to the participants until after they had finished the modules and completed the postcourse test. The durations required for each participant to complete both tests were recorded automatically by the website and stored in the database. At the end of the postcourse test, the trainees were asked to respond to open-ended questions to provide feedback on the EBM course.

Data analysis

Each correct test response was allotted 1 mark, and incorrect responses were allotted 0 marks. A total score was calculated for each participant and stored in the website database. The minimum attainable test score was 0, and the maximum score was 30.

Test scores and test completion durations stored on the website were downloaded into an Excel 2016 (Microsoft Corp., Redmond, WA, USA) spreadsheet. Participants' test scores were excluded if they were duplicates (some took the course again during the second year of the study period), if the test was prolonged by more than 90 minutes or more than 1 sitting, or if the test results were implausible outliers (either all or none correct in a short time). Only participants who completed the postcourse test were included in the analysis.

Data were then analysed using SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, NY, USA). Paired-samples *t*-tests were used to analyse the mean differences between the paired samples of scores and test durations. The level of significance was set at 5%. Responses from the open-ended feedback questions were grouped into themes and analysed.

Table 2. Surgical trainee country of origin (n=85)

Country of origin	n (%)
Burundi[a]	3 (3.5%)
Cameroon	3 (3.5%)
Ethiopia[a]	2 (2.4%)
Gabon	1 (1.2%)
Kenya[a]	14 (16.5%)
Malawi[a]	10 (11.8%)
Namibia[a]	3 (3.5%)
Rwanda[a]	3 (3.5%)
Somaliland	2 (2.4%)
Tanzania[a]	6 (7.0%)
Uganda[a]	8 (9.4%)
Zambia[a]	20 (23.5%)
Zimbabwe[a]	10 (11.8%)

[a]Member country of the College of Surgeons of East, Central and Southern Africa (COSECSA)

Results

There were 353 precourse test results, and 71 were excluded for the following reasons: test completed by a participant who had already completed the test (n=19), prolonged completion time (n=36), and implausible outliers (n=16). This left 282 precourse test results to consider for the analysis. Postcourse tests were completed by 95 of the 282 trainees (33.7%) who completed the precourse test; these 95 trainees comprised the study sample (Figure). Sociodemographic data were available for 85 of the 95 participants: 70 men (82.4%) and 15 women (17.6%). Participants originated from 13 countries, including 10 of the 14 COSECSA member countries (www.cosecsa.org) and 3 other African countries. The national origins of the trainees are summarized in Table 2.

Precourse test scores ranged from 5 to 24 (out of 30), and postcourse scores ranged from 7 to 30 (out of 30). The mean score improved from 15.02±3.62 before the test to 20.18±5.28 after the test (t=−10.1, df=110, P<0.001) (Table 3).

Table 3. Evidence-based surgery test results (n=95)

Variable	Precourse test	Postcourse test	*P* value
Mean ± SD test score out of 30	15.02±3.62	20.18±5.28	<0.001
Mean ± SD interval to test completion, min	40.67±25.02	30.05±18.35	<0.001

SD, standard deviation

The intervals to test completion ranged from 12 to 120 minutes for the precourse test and 2 to 87 minutes for the postcourse test. The mean interval to test completion decreased from 40.67±25.02 minutes for the precourse test to 30.05±18.35 minutes for the postcourse test (t=4.56, df=110, P<0.001).

Participants' feedback on the SIAJC course

The overall feedback from the course participants was positive, with comments such as, "made research oriented material more palatable and interesting", "encouragement to keep focused on the standard of care", and "wealth of knowledge gained enormous".

In terms of the course objectives, analysis of participant feedback identified the following 5 themes (with representative quotations):

1. The SIAJC course improved awareness of best practices.

"I have learned to look for strong evidence in most of the decisions I make."

"Helped bring perspective especially regarding practising in my setting"

"Applicable to my daily practice in Africa"

2. Knowledge of EBS empowered trainees to make better clinical decisions.

"I enjoyed the fact that when I talk about a subject, I feel like I have to confirm the best evidence first… systematic reviews and their importance…"

"I feel more confident discussing surgical topics with colleagues."

3. Concerns that the preferred evidence-based choice of management may be expensive.

"I feel more confident when discussing with my seniors about the choice of the treatment we will use… but what to do when the best choice is very expensive…"

4. Concerns that there may be conflict between evidence-based management options offered by trainees and local senior expert opinion.

"It should be good if our seniors were more involved because it is up to them to make changes in the practice. We, as trainees, have not the ability to decide what must be done in the department: we just give our opinion and, in many cases, we work according to the material we have, not according to the evidence-based practice."

5. Unreliable Internet limited the SIAJC course access for some participants.

"Internet access is very expensive, and that limits duration of log in and interaction."

"… this rely on Internet availability which at times I personally failed more than twice to finish the tasks [tests] and have to re upload the answers after failure to load in first place."

Discussion

LaGrone et al.[14] identified language, access to journals, and training as global barriers to surgeons' practice of EBM. With better access to the Internet and surgical literature, a lack of training in critical appraisal is among the main barriers to knowledge consumption and utilization. Several studies from Africa have reported minimal exposure to EBM training either at the undergraduate or postgraduate levels of medical education.[15],[16] EBM courses are being integrated into undergraduate training,[17] but there is still a need to provide better learning resources to postgraduate surgical trainees globally.

Investigations of face-to-face EBM courses have demonstrated improvements in knowledge through precourse and postcourse tests, with response rates ranging from 87% to 100%,[7],[18]-[21] including from high-income countries.[22] Recent publications have also looked at online instruction in EBM.[15],[23],[24] Stellenbosch University in South Africa offered a 12-week online EBM course to family medicine residents and found improved EBM knowledge and skills associated with course completion.[15] There were challenges explaining difficult concepts online, and the methods discussed were limited to randomized controlled trials and guidelines. Course tutors emphasized the importance of ensuring that examples were practical and relevant to daily practice.

In comparing online with face-to-face instruction about EBM, El Sayed and Abdelmonem[25] found that online learners had similar exam scores but higher project scores than face-to-face learners. Student satisfaction was similar between the groups, but one-third of the face-to-face students perceived inconsistencies among instructors. They concluded that blended learning provides an optimum learning environment and that integrating EBM into practice would be ideal.[25]

COSECSA and its collaborators from the Royal College of Surgeons in Ireland have pioneered a model of disseminated postgraduate surgical education using online resources, so the Internet-based platform was already available to move SIAJC online.[8] Advantages of an online course for COSECSA surgical residents include the opportunity for self-paced learning, and the asynchronous discussion board. Disadvantages noted by participants were the lack of opportunities for detailed questions and explanations of difficult concepts, and the challenges associated with Internet

reliability. However at least a couple of trainee groups used the course materials for their own local face-to-face journal clubs and reported back to the online discussion board in a blended learning format.

To investigate the outcomes of this course, we considered the criteria for evaluating an educational intervention described by Belfield[26]: participation, satisfaction, knowledge, behaviour change, and patient outcomes. We were able to evaluate the first 3 concepts, but evidence-based practice and patient outcomes are rarely reported because they are difficult to measure. The course completion rate—as indicated by completion of the postcourse test—was 33.7%, indicating high attrition. Some trainees may have decided to defer their fellowship exams another year and may have subsequently retaken the course. Others indicated that the course reading was a lot of extra work on top of their clinical responsibilities, which made it difficult to keep up. Some may not have overcome the Internet challenges when attempting to download the course materials, and 1 trainee suggested that access would have been easier with the provision of a downloadable zip file with all of the course content.

Trainee satisfaction was high, as gauged by the informal feedback at the end of the course and as illustrated in quotations listed in this article. Significantly improved knowledge was well documented in our comparison of precourse and postcourse test results, and given that the postcourse test took place 5 months after the precourse test and that the postcourse test was associated with shorter completion times, it seems that the knowledge gain was sustained. There were specific trainee suggestions to improve the course, including shorter modules, better moderation of discussion, extension of the course to 1 full year, more explanation of statistical methods, and the addition of live discussion forums.

The long-term sustainability of any educational collaboration can be challenging. The SIAJC continued for 4 years, but the time commitments required from both trainees and faculty was significant. A core of modules has been developed and continues to be relevant. The online discussion is among the most valued parts of the course, but with dozens of participants, optimization of its usefulness requires attentive moderation and local surgical expert participation. There is no doubt that the content and format have sparked keen participation and improved knowledge of evidence-based surgical practice, but revisions to the SIAJC format will be needed to allow it to continue as a valuable learning resource.

Limitations

There were a few limitations to this retrospective study. There was attrition bias since only 33.7% of trainees who completed the precourse test went onto complete the postcourse test. Attrition bias is a known bias for before-and-after intervention evaluation exercises, and since the postcourse test was not compulsory, we did not explore the reasons explaining why trainees did not complete it.

Second, some individuals entered multiple responses due to weak Internet connection and unfamiliarity with the website interface. Although multiple responses were eliminated when analysing the study data, we hope to improve the user interface to make it more user-friendly, create a user demo, and configure the website to prevent multiple responses.

Finally, 36 trainees took between 2 hours and 3 days to complete either test. These data were excluded because we did not feel that they would have portrayed an objective assessment of the individuals' knowledge. We hope to design a countdown timer on the website that will automatically log an individual out of the test site when the allotted time lapses and prevent account holders with elapsed time allotments from taking further tests in the future.

Conclusions

We have described the outcomes of a collaborative intervention using online teaching modules to improve knowledge of EBS for surgeons training in the COSECSA region. The increased postcourse scores and decreased time taken to complete the postcourse test relative to the precourse exercise suggest a measure of success. We propose that addressing the limitations described earlier and scaling up this intervention would help surgeons prioritize seeking good evidence, translate evidence to local clinical practice, and partake in relevant research to fill in knowledge and literature gaps.

The COVID-19 pandemic has produced challenges to travel and having face-to-face workshops and meetings between the Global South and North, but it has provided more opportunities for remote e-learning. COSECSA's online surgical curriculum provides a regionally relevant model that can be emulated anywhere and includes global faculty. The SIAJC course has proven to be popular and valued, and we can conclude that EBS knowledge has increased amongst participants. However, teaching and learning evidence-based surgical practice requires critical appraisal and discussion between learners and experts, which may be best done in a blended online and face-to-face format. The next iteration of the SIAJC may provide a model for local content experts and research methods experts in the COSECSA region (and beyond) to emulate for their surgical journal clubs.

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