



## Original article

## Advanced life support courses in Africa: Certification, availability and perceptions

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## ARTICLE INFO

## Keywords:

Advanced life support  
Resuscitation  
Training  
Education

## ABSTRACT

**Background:** Advanced life support (ALS) short training courses are in demand across Africa, though overwhelmingly designed and priced for non-African contexts. The continental expansion of emergency care is driving wider penetration of these courses, but their relevance and accessibility is not known. We surveyed clinicians within emergency settings to describe ALS courses' prevalence and perceived value in Africa.

**Methods:** We conducted a cross-sectional quantitative analysis of 235 clinicians' responses to the African Federation for Emergency Medicine's online needs assessment for an open-access ALS course in Africa. Participants responded to multiple-choice and open answer questions assessing demographics, ALS course certification and availability, perceptions of ALS courses, and barriers and facilitators to undertaking such courses.

**Results:** 235 clinicians working in 23 African nations responded. Most clinicians reported ALS course completion within the past three years (73%) and in-country access to ALS courses (76%). Most believed the content adequately met their region's needs (60%). Price and course availability were the most common barriers to taking an ALS course. The most common courses were cardiac and paediatric-focused, and the most common reasons to take a course included general career development, personal interest, and departmental requirements.

**Conclusion:** One-quarter of emergency care clinicians lack access to ALS courses in twenty-three African nations. Most clinicians believe that ALS courses have value in their clinical settings and meet the needs of their region. Our findings illustrate the need for an affordable, widely available ALS course tailored to lower-resource African settings that could reach rural and peri-urban clinicians.

## African relevance

- There is an increasing demand for ALS short course training as emergency care expands throughout Africa.
- These courses are designed and priced for high-resource settings despite weak evidence to support their use in low-to-middle-income countries, yet may be regarded as a core criterion for employment or clinician privileging.
- The accessibility, utility and value of ALS courses in Africa are unknown, as are clinicians' perceptions of such courses.

## Introduction

Advanced life support (ALS) short courses have become regarded as an essential component of resuscitation education [1–4]. Current accreditation in topics such as advanced paediatric, cardiac and trauma

life support courses is often regarded as a core criterion for employment or clinician privileging despite opposition from professional societies [5]. Clinicians in low resource settings (LRS) continue to certify - and re-certify - in ALS courses designed (and priced) for high-resource settings with limited evidence of improved outcomes, skills or knowledge to support this practice in low-resource settings [6–8]. For example, to date, over one million clinicians in 80 countries have received Advanced Trauma Life Support (ATLS) course trainings [9]. Based on models of care from high-income countries, standard ALS courses have not been adapted to low-resource clinical settings (with few exceptions) [6,10–14].

The prevalence of ALS training and certification in Africa is unknown. The limited data that exist mainly come from South Africa, where the Colleges of Medicine require “current” ALS certification for fellowship in certain specialties, and most specialist trainees have completed ATLS (69%) or Advanced Paediatric Life Support (APLS) (or

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Received 16 May 2020; Received in revised form 15 July 2020; Accepted 26 July 2020

Available online 13 August 2020

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equivalent) courses (58%) [15]. There are no reliable data from low income countries. A survey of thirteen Intensive Care Units in LRS, mostly in Africa, found that the majority had one or more staff member with Advanced Cardiac Life Support (ACLS) or equivalent course certification, suggesting a higher prevalence in critical care settings [16]. In contrast, a study of seventeen Nigerian referral hospitals with ICUs found that the majority of hospital staff were not trained in basic life support or ACLS and that hospitals did not require certification in either course [17].

As emergency care expands throughout Africa, there is an increasing demand for ALS short course training. While diverse in content and object, ALS courses are united in teaching advanced clinical skills and reasoning beyond those of basic life support courses to enhance the care of critically ill or injured patients. However, the accessibility, utility and value of ALS courses in Africa are unknown, as are emergency care clinicians' perceptions of such courses.

The African Federation for Emergency Medicine (AFEM) is a regional society made up of organizations and individuals working to support the development of emergency care in Africa. AFEM's individual members are both non-clinical and clinical and are mostly directly involved in emergency care in Africa. Each year, AFEM conducts a survey on a topic of interest to its membership, and this year surveyed members regarding the prevalence, utility and value of ALS courses in Africa. Given their diversity in subject and objective, ALS courses were defined as “any course that provides the skills and knowledge to follow locally or internationally accepted advanced resuscitation guidelines.”

## Methods

We created an anonymous, web-based survey composed of multiple-choice and free-response questions about ALS in Africa using Google Forms (Google LLC, used with permission) and distributed it via a web-based mailing service (MailChimp®, <https://www.mailchimp.com>). Responses were automatically compiled onto an access controlled, central Google Sheets document (Google LLC, used with permission) and accepted from the 12th of April until the 4th of November 2019. The Human Research Ethics Committee at the University of Cape Town (REF: 428/2019) and the Executive Committee of the African Federation for Emergency Medicine (AFEM) granted approval for this study.

We used list-serve and snowball methods to collect survey responses. All individuals in the AFEM membership database (n = 838) received an email invitation to participate in the study with a link to the survey in addition to two reminder emails to complete the survey. The AFEM membership database is stored on a password protected AFEM server with access limited to the AFEM executive committee. A snowball method was used to capture an additional network of Sudanese residents and physicians (n = 328) wherein one Sudanese respondent requested permission from AFEM to distribute the survey to emergency medicine colleagues. The survey and all communication were available in English and French with direct translation by a native French speaker fluent in English.

All respondents self-reported direct provision of clinical care primarily based within a low-to middle-income country (LMIC) (according to World Bank Classification 2019) and were therefore eligible for inclusion. Non-clinical AFEM members who did not directly provide patient care were instructed to self-exclude from the survey. Respondents who indicated a primarily non-LMIC setting such as the United Kingdom, United States and Australia were excluded.

The questionnaire included 46 multiple-choice and free-response questions assessing clinician demographics, qualifications, certification in ALS courses, availability of ALS in the clinicians' region, and general perceptions of ALS. A ten-point Likert scale was used to assess self-reported confidence and competency in ALS.

We used a mixed methods approach to analyse qualitative and

**Table 1**  
Sample characteristics of respondents (235).

Socio-demographic characteristic	N	%
<i>Age</i>		
20–29	40	17.0
30–39	118	50.2
40–49	56	23.8
50–59	12	5.1
60–69	7	3.0
Unknown	2	0.9
<i>Gender</i>		
Female	65	27.7
Male	170	72.3
<i>Role</i>		
Doctor	154	65.5
Mid-level clinician	4	1.7
Nurse	44	18.7
Prehospital clinician	33	14.0
<i>Setting</i>		
Rural	25	10.6
Urban	210	89.3
<i>Specialist training</i>		
Yes	105	34.5
No	49	20.8
No answer	81	34.3
<i>Country</i>		
Angola	1	0.4
Botswana	7	3.0
Cameroon	1	0.4
DRC	7	3.0
Egypt	7	3.0
Ethiopia	9	3.8
Ghana	16	6.8
Kenya	15	6.4
Lesotho	2	0.9
Libya	2	0.9
Madagascar	3	1.3
Malawi	1	0.4
Mali	2	0.9
Namibia	3	1.3
Nigeria	13	5.5
Rwanda	4	1.7
Somalia	5	2.1
South Africa	37	15.7
Sudan	50	21.3
Tanzania	19	8.1
Uganda	22	9.4
Zambia	5	2.1
Zanzibar	1	0.4
Zimbabwe	3	1.3

quantitative questions. Data from free-response questions were analysed for recurring themes through a thematic content analysis using the qualitative software Atlas.ti.8 (Scientific Software Development GmbH; Berlin, Germany). Quantitative data were analysed for descriptive statistics, including median scores and proportions of respondents, using STATA (StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP).

## Results

### Study population characteristics

We invited 1166 AFEM members to participate and received 276 responses for a 24% response rate. 235 clinicians from LMICs were included and 41 participants from non-LMICs were excluded. Demographics are reported in Table 1. Participants were primarily male (73%), doctors (66%) and urban practitioners (89%) with a median age of 36 (Table 1). Over one-third of clinicians reported specialist training (34%). The most well-represented countries were Sudan (21%), South Africa (16%), Uganda (9%), and Tanzania (8%).

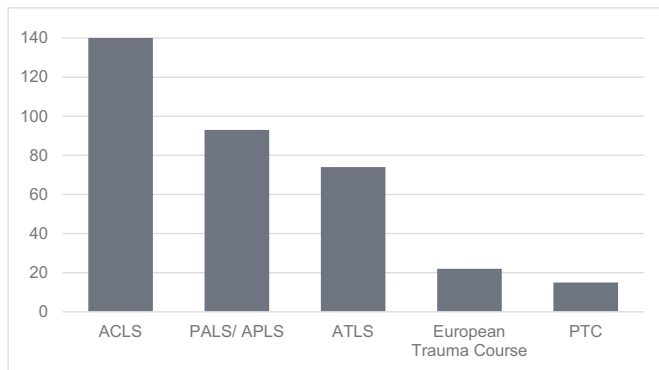


Fig. 1. Frequency of ALS courses completed, by type.

ALS certification, availability and context in Africa

Most respondents (73%) had completed an ALS course in the last three years and reported attending to critically unwell or injured patients requiring ALS on a daily basis (67%) when asked how frequently they saw such patients. The most frequently completed courses were ACLS (60%), PALS/APLS (40%) and ATLS (32%) found in Fig. 1 with additional courses not listed in the survey reported in Fig. 2. ALS courses were most often required for all clinicians (29%) and ICU/ED staff (18%).

We examined the relationship between AFEM geographical regions and ALS availability using a chi-square test of independence. Sub-group analyses by AFEM Regions, including North, East, West and Southern Africa, revealed significant differences in ALS course availability ( $X^2$  (3,  $N = 235$ ) = 25.41,  $p < 0.001$ ), ALS course offering frequency ( $X^2$  (12,  $N = 235$ ) = 36.84,  $p < 0.001$ ) and meeting of regional needs by such courses ( $X^2$  (9,  $N = 231$ ) = 83.49,  $p < 0.001$ ) (Supplemental Table 1). West and East African clinicians reported significantly less frequent course offerings and general course availability (60% and 61.5%, respectively) than North and South African clinicians (96.6% and 71.0%, respectively). North African clinicians reported that ALS courses met regional needs at a significantly higher rate than all other regions' respondents.

A sub-group analysis of Sudan, the most represented country comprising 21.3% of all responses, did not yield any significant differences in frequency of course offering or certification compared to all respondents. However, a chi-square test of independence revealed significant difference in general ALS course availability ( $X^2$  (1,  $N = 235$ ) = 17.77,  $p < 0.001$ ), and meeting of regional needs ( $X^2$  (3,  $N = 231$ ) = 24.61,  $p < 0.001$ ) in Sudan. Upon excluding Sudanese responses, general ALS course availability decreased from 72.3% to

66% indicating respondents from Sudan were more likely to believe that ALS courses are currently available and meet regional needs.

Courses were available in 72% of clinicians' countries with offering frequency most reported as unknown (38%) followed by occasional (2–4 times per year, 25%) or frequent (> 5 times per year, 24%). The most common interval for re-certification frequency was every two years (33%). The majority of participants believed that ALS courses' content adequately met their regions' needs (56%), though 26% of participants did not answer this question. Overview of all findings regarding needs and availability can be found in Table 2.

Motivations and barriers to ALS course enrolment

The 172 respondents who had taken an ALS course reported that primary motivations for enrolment were general career development (74%), personal interest in content (60%), a requirement of their department (45%), or a requirement to work overseas (23%). The 63 participants who had not taken ALS reported that the primary barriers to doing so were course expenses (48%), unavailability in their town (33%) or country (29%), or material adequately covered by other training (24%). Details are provided in Table 3.

ALS courses' value and limitations

Individual free text responses to “What is the value of ALS?” were analysed until thematic saturation was reached. Overall, ALS was most frequently valued as a common foundation or base for management and care of critical patients for all clinicians, especially trainees, junior doctors and newer practitioners. Additionally, ALS was valued as a Continuous Medical Education (CME) opportunity or refresher course that provides evidence-based updates and maintains clinicians' skills and knowledge in basic resuscitation principles. Many respondents believed that ALS training leads to better patient care and saves lives, increasing clinician competency and confidence. ALS was generally perceived as “essential”, “mandatory”, “necessary”, etc. or requisite for all clinicians, and especially those working in emergency units. Few clinicians mentioned limitations to the course in the context of resource-limited settings and redundancy for advanced clinicians or those who frequently resuscitate patients.

Though quantitative analysis affirmed that ALS courses adequately met regional needs, open-answer responses to the same question revealed dissatisfaction with ALS courses' lack of tailoring to local contexts. Clinicians reported that ALS course content better approximated highly resourced settings with adequate material and human resources, resulting in impractical ALS algorithms and protocols for low-resource settings. ACLS's cardiac arrest and myocardial infarction protocols were frequently referenced as examples of such mismatch given differences

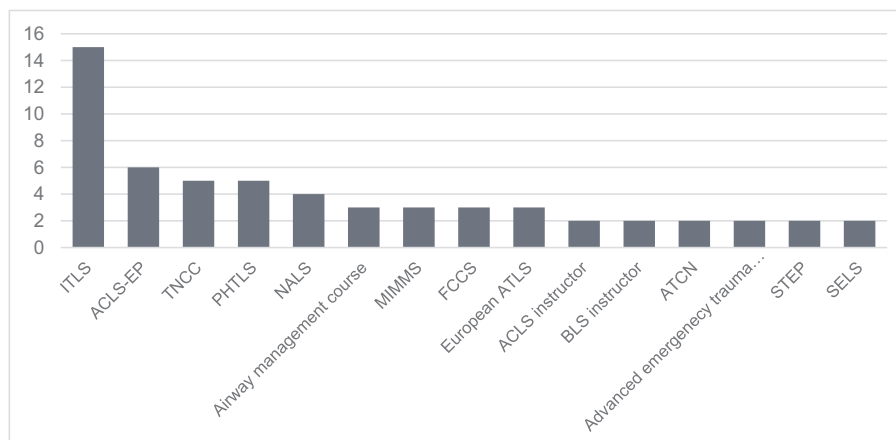


Fig. 2. Frequency of other courses taken by respondents.

**Table 2**  
ALS needs & availability.

ALS needs & availability	N	%
<i>Freq of seeing critically unwell or injured patients requiring ALS</i>		
Daily	157	66.8
Weekly	59	25.1
Monthly	9	3.8
Rarely	10	4.3
<i>Completed BLS in past 3 yrs</i>		
Yes	204	86.8
No	31	13.2
<i>Completed ALS in past 3 yrs</i>		
Yes	172	73.2
No	63	26.8
<i>Types of courses completed (could answer more than once)</i>		
ACLS	140	59.6
PALS/APLS	93	39.6
ATLS	74	31.5
European Trauma Course	22	9.4
PTC	15	6.4
Other	61	26.0
Not answered	63	26.8
<i>Is an ALS course currently available in your country?</i>		
No	65	27.7
Yes	170	72.3
<i>How often is the ALS course offered?</i>		
Never	2	0.9
Infrequently (1 time or less per year)	27	11.5
Occasionally (2–4 times per year)	59	25.1
Frequently (> 5 times per year)	57	24.3
Unknown	90	38.3
<i>How often must providers take course to be accredited?</i>		
Rarely or none	11	4.7
Once	8	3.4
Multiple times a year	8	3.4
Annually	7	3.0
Every 2 yrs	78	33.2
Every 3 yrs	25	10.6
Every 4 yrs	4	1.7
Every 5 yrs	5	2.1
Unknown	89	37.9
<i>Who is required to take the course? (could answer more than once)</i>		
All clinicians	68	28.9
ICU/ED Staff	43	18.3
Doctors	17	7.2
ICU/ED Doctors	8	3.4
Pre-hospital EMS	8	3.4
Residents	4	1.7
Consultants	3	1.3
Trainees	1	0.4
Advanced mid-level clinicians	1	0.4
Not required	2	0.9
Unknown	62	26.4
<i>Does this content adequately meet needs of the region?</i>		
No	40	17.3
Yes	129	55.8
Unknown	1	0.4
No answer	61	26.4

in patient presentations and access to essential medications, devices and definitive and post-arrest therapies.

**Discussion**

Our findings describe ALS course availability and certification as well as motivations and barriers for undertaking ALS courses among clinicians in Africa for the first time to our knowledge. Almost three-quarters of clinicians reported some ALS course availability in their countries, and certification within the past three years. The most common motivations for taking the courses were general career development, personal interest and departmental requirement.

**Table 3**  
Reasons for taking course and skills gained.

Reason for taking ALS courses	N	%
<i>% of all respondents</i>		
<i>Why ALS was taken (of the 172 who answered yes to completing ALS)</i>		
General career development	128	74.4
Personal interest in content	104	60.5
Requirement of the department	77	44.8
Requirement to work overseas	39	16.6
Other	7	3.0
<i>If ALS not taken, why not? (of the 63 who answered no to completing ALS)</i>		
Too expensive	30	47.6
Unavailable in my town	21	33.3
Unavailable in my country	18	28.6
Material adequately covered in my current	10	15.9
Other	9	14.3
Too infrequent	5	7.9
Not important to me	1	1.6

Both quantitative and qualitative analyses revealed that current ALS courses clearly hold value in the African context as a foundation for basic resuscitation principles that unite clinicians in a team-based approach to improve care for critical patients. As ALS courses are tailored to high-resource settings, 40% of respondents believed that such courses did not meet their regions' needs. Our qualitative analysis identified ALS courses' lack of adaptation to local contexts and resource constraints as serious limitations to their utility in African settings that requires future exploration.

The quarter of survey respondents who had not taken an ALS course reported course expense and availability as the primary barriers to their enrolment. The deterrent of course expense is unsurprising given that these resource-intensive, multi-day trainings require participant fees to cover the cost of trainers, simulation and materials – a recent study in Mongolia calculated the minimum cost per ATLS course with foreign instructors at ~27,000 USD [18]. The accompanying participant fees remain unaffordable for many clinicians in LRS. Though ALS courses were available in most participants' countries, many clinicians reported that they had not taken a course due to a lack of availability in their town or country, illustrating potential discrepancies between urban, peri-urban and rural course availability as demonstrated in South Africa [19].

Our analysis revealed significant regional differences in ALS course availability, frequency of offering, and meeting of regional needs. Clinicians in middle and upper-middle income countries in North and South African regions reported greater accessibility and satisfaction with ALS courses than their lower-income counterparts in East and West African regions likely due to regional wealth disparities. Overrepresentation of Sudanese respondents recruited through snow-ball methodology may have additionally inflated ALS course availability in North Africa and in the general survey. Such findings emphasise the importance of targeting and contextualising future ALS education based on regional needs and resources rather than standards based on high-income countries.

Our findings support the restructuring of ALS courses to address lower-resource African settings and increase accessibility. Similarly, a 2015 International Liaison Committee on Resuscitation systematic review concluded that limited improvement in clinical outcomes and skill performance among ALS students necessitated “alternative instructional strategies in low-income countries” [7]. The World Health Organization's (WHO) open-access Basic Emergency Care Course (BEC) is a successful example of a short course designed for health workers in low-resource settings that covers basic life support [20]. Future research should investigate how to create affordable and context-specific ALS courses to better serve African clinicians, including a corollary ALS



course to the BEC course.

Convenience sampling from AFEM's membership base incurred selection bias: most participants had a demonstrated interest in emergency care and worked in an emergency unit, in countries with national emergency medicine professional societies. Most clinicians lived in urban areas with adequate internet connection to respond to the survey and where ALS courses are more readily available. The low response rate (24%), and high representation of speciality training among respondents also suggests selection bias. Given these limitations this analysis likely overstates the accessibility, utility and value of such courses, meaning that our results are a best-case scenario. The survey was sent out in English and French only and excluded clinicians with limited or no proficiency in either language. Our study included responses from twenty-three African nations and is not representative of the entire continent. Though responses were equally divided between geographical regions, sub-group regional analyses revealed differences that require further investigation. Sub-group analysis of Sudan, an overrepresented country, produced significantly different results regarding ALS course availability and utility, suggesting further selection bias.

## Conclusion

One-quarter of emergency care clinicians lack access to ALS courses in twenty-three African nations. Most clinicians believe that ALS courses have value in their clinical settings yet are unaffordable and unavailable to most African emergency care clinicians. 40% of clinicians do not feel the current content of ALS courses meets regional needs due to lack of contextualisation to a low-resource setting.

Our findings illustrate the need for an affordable, widely available ALS course tailored to lower-resource African settings that could reach rural and peri-urban clinicians. Like the BEC course, an open-access ALS course developed by AFEM could broaden access to ALS courses in Africa while providing context-appropriate protocols and algorithms. The creation of such a course and its associated guidelines could mitigate the current limitations of ALS courses in low-resource settings.

## Dissemination of results

Preliminary results from this study were presented to the AFEM Assembly and Research Committee during the Emergency Medicine Society of South Africa (EMSSA) conference in Cape Town, November 2019. The results will also be published through the AFEM mailing list.

## Author contributions

Authors contributed as follow 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: AL contributed 50%; KW 20%, LW 15%, and HG 15%. All authors contributed to revising the manuscript and have approved of the final version.

## Declaration of competing interest

KW is a paid employee of AFEM; HG and LW are unpaid AFEM Directors; LW is an editor of the African Journal of Emergency Medicine. LW was not involved in the editorial workflow for this manuscript. The African Journal of Emergency Medicine applies a double blinded process for all manuscript peer reviews. The authors declare no further conflict of interest.

## Acknowledgements

We thank Shannon Pincus and Sandra Weitzner for their assistance in data cleaning and data management.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.afjem.2020.07.013>.

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