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Knowledge, Attitude, and Practices of Advanced Trauma Life Support (ATLS) Protocol in 4 Selected Hospitals in Cameroon: A Cross-Sectional Study Design

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Abstract

Background of the Study: Trauma has long been a major public health problem worldwide, particularly affecting developing countries. It is a leading cause of morbidity and mortality and accounts for about 10% of the global burden of disease and over five million deaths, as well as 52 million disability-adjusted life years annually. Despite the impact of the ATLS protocol on injury management, its awareness and use remain questionable. Thus, this study aimed to assess the ATLS knowledge, attitude, and practices of health personnel involved in the management of injuries in 4 hospitals in Cameroon. **Methodology:** This was a cross-sectional, hospital-based study. A questionnaire was used to assess the knowledge, attitudes, and practices of healthcare providers on the ATLS protocol in four hospitals (Regional Hospital Limbe (RHL), Regional Hospital Bafoussam (RHB), Laquintinie Hospital Douala (HLD), and the Edea Regional Hospital (HRAE)). **Results:** Out of the 225 personnel enrolled in the study, 155 (71.4%) were females, 65 (29.1%) were state-registered nurses, and 40 (17.9%) were general practitioners. The overall knowledge was poor (71%), while 29% had good knowledge. There was a significant association between health facility personnel and knowledge (γ^2 = 20.26, p < 0.001), and the association between qualification and knowledge was also statistically significant (γ^2 = 13.14, p = 0.009). Specialist doctors demonstrated significantly higher knowledge than the other cadres involved in the study. The majority of participants (191; 85%) had a good attitude towards ATLS. The association between the health facility and attitude towards

ATLS was statistically significant (γ^2 = 9.963, p = 0.029). A total of 147 (65%) participants demonstrated good practice of the ATLS protocol. Specialist doctors were four times more likely to have good knowledge compared to other health professionals, AOR 4.737 (95% CI: 1.272 - 17.636, p = 0.02). **Conclusion:** Knowledge of the ATLS protocol was poor among study participants. However, attitudes and practices towards ATLS were good. Knowledge, attitudes, and practices of the ATLS were significantly influenced by the level of education and the location of the participants. Training on ATLS is recommended for healthcare personnel to improve care for injured patients.

Keywords

Injury and Trauma, Adverse Event, Health Education, ATLS Protocol, Impact

1. Introduction

Trauma is a leading cause of morbidity and mortality worldwide and accounts for about 10% of the global burden of diseases, with over five million deaths [1] [2] and 52 million disability-adjusted life years annually [3]. Over 45 million people globally sustain moderate to severe disability each year due to trauma, with more than nine people dying every minute from injuries or violence [4]. Although the identification of trauma as a global health concern can be traced back to the last century [5], trauma still holds a significant share of the global burden of disease. In the United States, more than 50 million patients receive some form of trauma-related medical care annually, and trauma accounts for approximately 30% of all intensive care unit (ICU) admissions [6]. Low and Middle-Income Countries (LMICs) are disproportionately affected by trauma, with about 90% of injury-related mortality occurring in these settings. Over 90% of the global burden occurs in LMICs, which lack the capacity to address the morbidity and mortality associated with injury [7]. To curb this burden, the use of a standardized and widely accepted method for the initial control of multiple trauma patients and the establishment of treatment priorities is essential. Today, the Advanced Trauma Life Support (ATLS) protocol is the most widely accepted method for the initial control and treatment of severe and multiple trauma patients [8].

The ATLS is a training program for medical providers used in the management of acute trauma cases, developed by the American College of Surgeons [9]. The goal is to supply its participants with a safe and reliable method for immediate treatment of injured patients and the basic knowledge necessary to: 1) assess a patient's condition rapidly and accurately; 2) resuscitate and stabilize patients according to priority; 3) determine whether a patient's needs exceed the resources of a facility and/or the capability of a provider; 4) arrange appropriately for a patient's inter-hospital or intra-hospital transfer; and 5) ensure that optimal care is provided and that the level of care does not deteriorate at any point during the evaluation, resuscitation, or transfer process [9]. ATLS is divided into primary,

secondary, and tertiary surveys. The primary survey is the first and key part of the assessment of patients presenting with trauma. Life-threatening injuries are identified, and simultaneously, resuscitation is begun following the mnemonic ABCDE (A: Airway, B: Breathing, C: Circulation, D: Disability, E: Exposure), which details the order in which problems should be addressed. The secondary survey involves a head-to-toe evaluation, complete history, physical examination, and reassessment of all vital signs. The tertiary survey involves careful and complete examination to recognize missed injuries, allowing definitive care [10].

In Cameroon, the first practitioners who come in contact with injured patients are nurses and general practitioners; thus, appropriate knowledge of the ATLS protocol is mandatory in order to provide organized and fast lifesaving care to injured patients. Poor adherence to the ATLS protocol by practitioners can be detrimental to the outcome of the patient [11]. Deviations from ATLS guidelines could be due to poor knowledge of practitioners involved in the management of patients [12], leading to poor compliance with established guidelines in the management of the injured [13]. Thus, this study sought to investigate the knowledge, attitude, and practice of health care workers regarding the ATLS protocol in the management of the injured.

2. Materials and Methods

2.1. Study Site

Cameroon is a sub-Saharan country made up of 10 regions with a population of over 27 million inhabitants [14]. This study was implemented in four hospitals involved in the management of injured patients in Cameroon. They included: the Regional Hospital Limbe (RHL), which is the largest hospital in the Southwest, with more than a 200-bed capacity and the principal referral hospital in the Southwest Region [14]; the Regional Hospital Bafoussam with over 250-bed capacity and the largest in the West region, the Laquintinie Hospital Douala (LDH) and the Regional Hospital Annexe Edea (HREA), both in the Littoral Region. They are found along the Douala-Yaoundé highway, which is known to be among the deadliest roads in Cameroon, as it records the highest number of accidents.

2.2. Study Design and Population

This was a cross-sectional hospital-based study conducted between May 2023 and October 2023 in four selected hospitals in the South West, Littoral, and West regions of Cameroon. The study involved medical doctors and nurses working in the emergency, surgical unit, theatre, and intensive care (ICU) units and directly involved in the management of injuries. The sample size was calculated using the single population proportion formula for epidemiological cross-sectional studies. A consecutive sampling method was used to recruit participants into the study. To adjust for the design effect of the sample design, the sample size was multiplied by the design effect. The minimum sample size for this study was 145 at 20% attrition. Hence, a total of 225 participants were finally recruited into the study. The

number of participants that were sampled in each treatment center was determined based on the probability proportionate to size.

2.3. Data Collection

Data were collected by trained research assistants (one per hospital) with a minimum qualification of a Bachelor of Science in Nursing Sciences. The data collection tool was a structured questionnaire consisting of 4 sections (demographic data, knowledge of ATLS, attitude towards the ATLS protocol, and practice of the ATLS). The questionnaires were printed in French and English and administered to doctors or nurses involved in care and who consented to participate in the study. Before data collection, the questionnaires were pretested at the District Hospital, Limbe.

2.4. Data Analysis

Data were entered using a template developed in Kobo Collect and analyzed in SPSS version 26. Knowledge scores were grouped into good and poor knowledge. Poor knowledge referred to scores less than 50%, while good knowledge referred to scores above 50% on the knowledge section. Poor attitude referred to scores less than 50%, while good attitude referred to scores above 50%. This was set at 50% because it is the average. In the case of practice, poor practice referred to scores less than 75%, while good practice referred to scores above 75%. The 75% mark was set because error in practice directly impacts morbidity and mortality outcomes compared to knowledge and attitudes. The Chi-square test was used to determine the associations between demographic data and knowledge, attitude, and practice of the ATLS protocol. A logistic regression model was used to identify factors independently associated with the knowledge, attitude, and practice of the ATLS protocol.

3. Results

3.1. Socio-Demographic Characteristics of Medical Personnel Enrolled in the Study

Out of the 225 healthcare personnel interviewed, 76 (33.9%) came from LDH. The majority of the participants (106; 48.6%) were aged 21-30 years old. More than seventy percent (155; 71.4%) were female. Most of the health workers, 100 (44.8%), were nursing assistants, and 40 (17.9%) were general practitioners (Table 1).

3.2. Knowledge of the ATLS Protocol by Health Care Providers

Our study revealed that only 23 (10.2%) of the study participants considered addressing respiratory insufficiency as the highest priority in managing a patient whose injuries included a closed extremity fracture (Table 2). When assessing knowledge of ATLS, less than half of the participants, 110 (48.9%), did not know the next step in addressing a patient with a deviated trachea and chest pain. The

Table 1. Socio-demographic characteristics of study participants.

Variable	Categories	Frequency (n)	Percentage (%)
Health facility	HRAE	25	11.2
	LDH	76	33.9
	RHB	58	25.9
	RHL	65	29
	Total	**224**	**100**
Age (years)	21 - 30 years	106	48.6
	31 - 40 years	86	39.4
	41 - 50 years	24	11
	50+	2	0.9
	Total	**218**	**100**
Sex	Female	155	71.4
	Male	62	28.6
	Total	**217**	**100**
Qualification	Nurse assistant	100	44.8
	SRN/B.Sc. in nursing	53	23.8
	General practitioner	40	17.9
	Specialised nurse	18	8.1
	Specialist doctor	12	5.4
	Total	**223**	**100**
Years of experience	0 - 5	147	67.4
	6 - 10	35	16.1
	10+	36	16.5
	Total	**218**	**100**

SRN: State-registered nurse; B.Sc.: Bachelor of Science.

Table 2. Knowledge of health care providers on ATLS protocol.

Variables	Categories	Frequency (n)	Percentage (%)
The highest priority in managing a patient whose injuries include a closed extremity fracture	Correct	23	**10.2**
	Incorrect	202	89.8
An individual with a deviated trachea complains of chest pain, BP 80/50, HR 140, RR 24, %SO2 60. Give the next step	Correct	110	48.9
	Incorrect	115	51.1
The condition most likely requiring attention in an emergency is	Correct	99	44
	Incorrect	126	56
The simplest way to open the airway in an unconscious patient	Correct	97	43.7

Continued

	Incorrect	128	56.3
The patient was brought to casualty, bleeding profusely from the thigh wound; immediate management of the wound consists of	Correct	130	57.8
	Incorrect	95	42.2
Primary measures helpful in preventing further injury in a trauma patient	Correct	133	59.1
	Incorrect	92	40.9
Size of IV catheter preferred when performing adult resuscitation	Correct	102	45.3
	Incorrect	123	54.7
Priority in the treatment of an unconscious patient	Correct	76	**33.8**
	Incorrect	149	66.2
Last check-in trauma patient in an emergency among the list	Correct	147	65.3
	Incorrect	78	34.7
The patient who is the highest priority in a mass casualty situation	Correct	84	37.7
	Incorrect	141	62.3
A patient from a fire has severe respiratory distress, a hoarse voice, soot around the mouth and nares, an RR of 32, and stridor. Which of these is the best intervention?	Correct	112	49.8
	Incorrect	113	50.2
The next step in the assessment of a traumatic patient after the airway is established	Correct	116	51.6
	Incorrect	109	48.4
The last step of the primary surveys	Correct	89	39.6
	Incorrect	136	60.4
A complete history of the trauma event should be obtained prior to the decision for management	Correct	83	36.9
	Incorrect	142	63. 1
Fluids should be routinely used during resuscitation	Correct	173	76.9
	Incorrect	52	23.1

overall knowledge of health personnel on the ATLS protocol was poor for the majority of the participants, 160 (71%), while 65 (29%) of participants had good knowledge. The mean knowledge score was 6.44 ± 2.008 on a scale of 10. Mean knowledge score per health facility was highest (7.28) for HRAE and lowest (5.33) for RHB (Figure 1). There was a significant association between the knowledge of ATLS and health facility (γ^2 = 20.26, p < 0.001) and between qualification and knowledge (γ^2 = 13.144, p = 0.009) (Table 3). The participants from RHB were less likely to have good knowledge of the ATLS protocol than those from RHL (AOR = 0.166: 95% CI = 0.056 - 0.487, p = 0.001). Specialist doctors were 4 times more likely to have good knowledge (AOR = 4.737; 95% CI = 1.272 - 17.636, p = 0.020) than SRN/B.Sc. nurses (Table 4).

3.3. Attitude of Health Care Personnel towards the ATLS Protocol

In this study, 161 (73.5%) of the participants thought that the most important

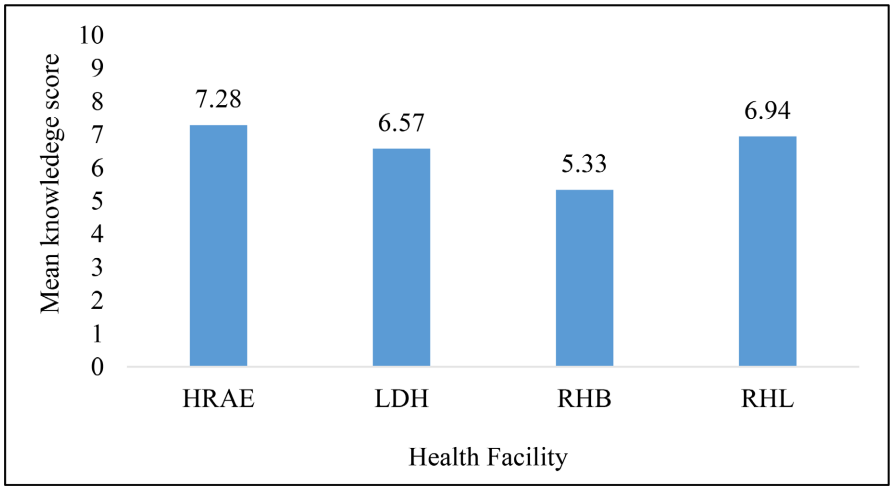

Figure 1. Distribution of knowledge scores for the various health facilities.

Table 3. Association between knowledge of the ATLS protocol and demographic characteristics.

Variable	Categories	n	Knowledge				Chi-square	p-value
			Good	%	Poor	%		
Health facility	HRAE	25	13	5.80	12	5.36	20.263	**<0.001**
	LDH	76	22	9.82	54	24.11		
	RHB	58	5	2.23	53	23.66		
	RHL	65	25	10.71	41	18.30		
Age (in years)	21 - 30	106	35	16.06	71	32.57	2.53	0.392
	31 - 40	86	22	10.09	64	29.36		
	41 - 50	24	5	2.29	19	8.72		
	50+	2	1	0.46	1	0.46		
Sex	Female	155	40	18.43	115	53.00	2.032	0.154
	Male	62	22	10.14	40	18.43		
Qualification	Assistant nurse	35	7	3.14	28	12.56	13.144	**0.009**
	General practitioner	40	19	8.52	21	9.42		
	Specialised nurse	18	6	2.69	12	5.38		
	Specialist doctor	12	6	2.69	6	2.69		
	SRN/B.Sc.	118	26	11.66	92	41.26		
Years of experience	1 - 5	147	47	21.56	100	45.87	1.345	0.511
	6 - 10	35	10	4.59	25	11.47		
	10+	36	8	3.67	28	12.84		

Table 4. Factors independently associated with knowledge of health personnel on ATLS.

Variable	Categories	AOR	95% CI		Sig.
			Lower	Upper	
Health facility	HRAE	1.718	0.645	4.58	0.279
	LDH	0.387	0.165	0.908	0.029
	RHB	0.166	0.056	0.487	**0.001**
	RHL	1			
Qualification	Assistant nurse	0.991	0.364	2.7	0.986
	General practitioner	4.173	1.693	10.286	**0.002**
	Specialised nurse	1.512	0.445	5.134	0.507
	Specialist doctor	4.737	1.272	17.636	**0.020**
	SRN/B.Sc.	1			

reason for the ATLS protocol course was that it is important in the management of trauma patients. Up to 83 (37.2%) of the participants think the ATLS protocol is a major advantage on their CV (Table 5). The majority of the participants, 191 (85%), had a good attitude towards the ATLS protocol. The mean attitude score was 6.22 (Figure 2). There was a significant association between health facility and attitude towards ATLS ($\chi^2 = 9.963$, p = 0.029) (Table 6).

Table 5. Attitude of health care providers towards ATLS protocol.

Variables	Categories	Frequency (n)	Percentage (%)
ATLS saves lives	No	9	4.1
	Yes	213	95.9
ATLS knowledge could be useful to you.	Yes	203	92.7
	No	17	7.3
The ATLS protocol can be useful for your career.	A major advantage on your CV	83	37.2
	A minor advantage on your CV	36	16.1
	Essential for your CV	87	39
	No advantage at all on our CV	17	7.6
The most important reason for taking the ATLS course	Helpful for CV and career purposes	7	3.2
	Mandatory for your proposed career	10	4.6
	Very important in the management of trauma patients	161	73.5
	Worthwhile as general medical education	42	18.7

Continued

Confident in your ability to provide initial trauma care	Yes	121	54.5
	No	101	45.5
Need for formal training in trauma care in the hospital	No	93	41.9
	Yes	129	58.1
There is a need for formal training in trauma care in the hospital	Yes	196	88.3
	No	26	11.7

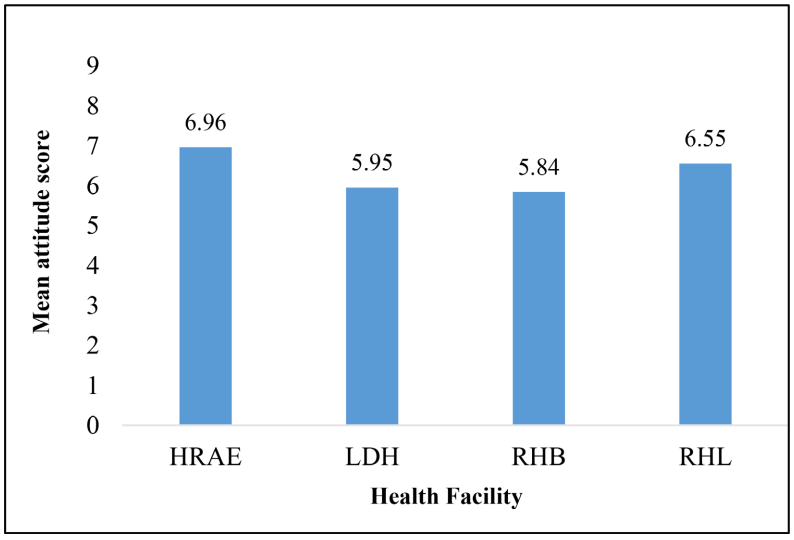

Figure 2. Variation in overall attitude per health facility.

Table 6. Association between attitude towards ATLS and demographic characteristics of study participants.

Variable	Categories	n	Attitude				Chi-square	p-value
			Negative	%	Positive	%		
Health facility	HRAE	25	2	0.89	23	10.27	9.963	**0.029**
	LDH	76	10	4.46	66	29.46		
	RHB	58	16	7.14	42	18.75		
	RHL	65	6	2.68	59	26.34		
Age (years)	21 - 30	106	15	6.88	91	41.74	2.165	0.589
	31 - 40	86	13	5.96	73	33.49		
	41 - 50	24	6	2.75	18	8.26		
	50+	2	0	0.00	2	0.92		
Sex	Female	155	27	12.44	128	58.99	3.083	0.079
	Male	62	5	2.30	57	26.27		

Continued

Qualification	Assistant nurse	35	10	4.48	25	11.21	6.367	0.153
	General practitioner	40	3	1.35	37	16.59		
	Specialised nurse	18	2	0.90	16	7.17		
	Specialist doctor	12	1	0.45	11	4.93		
	SRN/B.Sc.	118	18	8.07	100	44.84		
Years of experience	0 - 5	147	19	8.72	128	58.72	4.13	0.127
	6 - 10	35	9	4.13	26	11.93		
	10+	36	4	1.83	32	14.68		

3.4. Practice of Health Care Providers on the ATLS Protocol

Our study revealed that 57 (26%) participants were very likely to suction the patient in case of trauma with dyspnea, and 59 (26.8%) were very likely to place a neck collar during the primary survey. Only 122 (55.7) were very likely to auscultate the patient's chest in a trauma case. Also, 142 (64.5%) of health workers were very likely to place 02 large-bore IV access during resuscitation. (Table 7). Overall, 147 (65%) participants had good practice, while 78 (35%) had poor practice. The mean practice score was 20.3 on a scale of 1 to 29 (Figure 3). There was a significant association between the practice of the ATLS and health facility ($\chi^2 = 23.585$, $p < 0.001$). Among health personnel with good practice, 34 (15.2%) were general practitioners, while 3.5% were specialist doctors. There was an association between qualification and practice of ATLS ($\gamma^2 = 19.42$, p-value 0.002) (Table 8). There was a statistically significant association between knowledge and practice $\gamma^2 = 8.681$, p-value 0.003. There was also an association between attitude and practice $\gamma^2 = 22.819$, <0.001 (Table 9). The participants from LDH were less likely to practice the **A**TLS (AOR = 0.19: 95%CI = 0.077 - 0.471, $p < 0.001$) compared to those from RHL. General practitioners were 5 times more likely to practice the ATLS protocol (AOR = 0.166: 95%CI = 0.056 - 0.487, $p = 0.001$) than SRN/B.Sc. nurses. The participants with a negative attitude were less likely to practice ATLS than those with a positive Attitude (AOR = 0.213: 95%CI = 0.089 - 0.509, $p < 0.001$) (Table 10).

Table 7. Practice of health care providers on ATLS Protocol

Variable	Categories	Frequency (n)	Percentage (%)
Suction the patient's mouth in cases of trauma with dyspnoea.	Likely	63	28.9
	Unlikely	46	21.1
	Very likely	57	**26.1**
	Very unlikely	52	23.9
Place a neck collar on a patient during the primary survey.	Likely	75	34.1
	Unlikely	49	22.3

Continued

	Very likely	59	**26.8**
	Very unlikely	37	16.8
Auscultate the patient's chest in a trauma case.	Likely	48	21.9
	Unlikely	31	14.2
	Very likely	122	**55.7**
	Very unlikely	18	8.2
Place two large-bore IV accesses during resuscitation.	Likely	49	22.3
	Unlikely	13	5.9
	Very likely	142	**64.5**
	Very unlikely	16	7.3
Focused assessment sonography for trauma will be performed in suspected hemoperitoneum.	Likely	65	29.8
	Unlikely	30	13.8
	Very likely	102	**46.8**
	Very unlikely	21	9.6
Completely undress the patient for a full examination following trauma.	Likely	68	31.1
	Unlikely	26	11.9
	Very likely	115	**52.5**
	Very unlikely	10	4.6
Evaluate and record the initial state of consciousness of the trauma patient.	Likely	30	15.0
	Unlikely	19	9.5
	Very likely	136	**68**
	Very unlikely	15	7.5

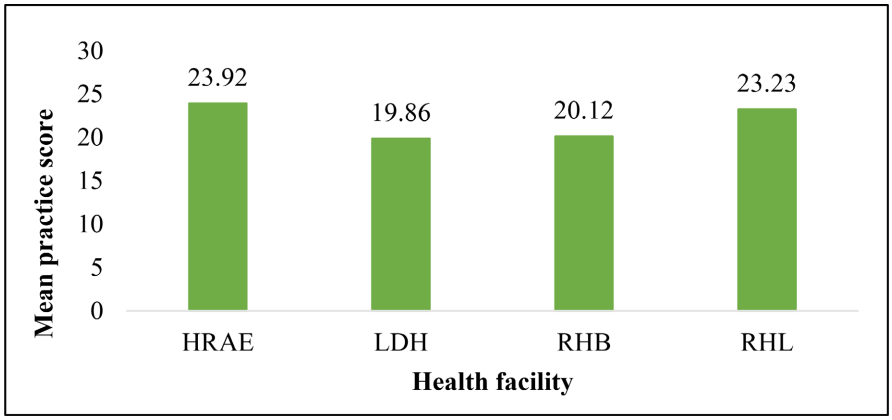

Figure 3. Distribution of practice variation in overall practice per health facility.

Table 8. Association between practice and demographic characteristics.

Variable	Categories	n	Practice				Chi-square	p-value
			Good	%	Poor	%		
Health facility	HRAE	25	22	9.82	3	1.34	23.59	**0.001**
	LDH	76	45	20.09	31	13.84		
	RHB	58	27	12.05	31	13.84		
	RHL	65	53	23.66	12	5.36		
Age (years)	21 - 30	106	73	33.49	33	15.14	1.72	0.549
	31 - 40	86	52	23.85	34	15.60		
	41 - 50	24	15	6.88	9	4.13		
	50+	2	1	0.46	1	0.46		
Sex	Female	155	99	45.62	56	25.81	0.59	0.443
	Male	62	43	19.82	19	8.76		
Qualification	Assistant nurse	35	17	7.62	18	8.07	19.42	**0.002**
	General practitioner	40	34	15.25	6	2.69		
	Specialized nurse	18	11	4.93	7	3.14		
	Specialist doctor	12	8	3.59	4	1.79		
	SRN/B.Sc.	118	75	33.63	43	19.28		
Years of experience	1 - 5	147	103	47.35	44	20.18	4.47	0.107
	6 - 10	35	18	8.26	17	7.80		
	10+	36	23	10.55	13	5.96		

Table 9. Association between practice, knowledge, and attitude towards the ATLS protocol.

Variable	Categories	n	Practice				Chi-square	p-value
			Good	%	Poor	%		
Knowledge	Good	65	52	23.11	13	5.78		
	Poor	160	95	42.22	65	28.89	8.681	**0.003**
	Total	**225**	**147**	**65.33**	**78**	**34.67**		
Attitude	Negative	34	10	4.44	24	10.67		
	Positive	191	137	60.89	54	24.00	22.819	**< 0.001**
	Total	**225**	**147**	**65.33**	**78**	**34.67**		

Table 10. Factors independently associated with the practice of the ATLS protocol among health care providers.

Variable	Categories	AOR	95% CI		Sig.
			Lower	Upper	
Health facility	HRAE	1.622	0.38	6.92	0.514
	LDH	0.19	0.077	0.471	**<0.001**

Continued

	RHB	0.233	0.098	0.552	**0.001**
	RHL	1			
Qualification	Assistant nurse	0.634	0.267	1.508	0.303
	General practitioner	5.235	1.776	15.428	**0.003**
	Specialized nurse	1.302	0.381	4.447	0.674
	Specialist doctor	1.658	0.41	6.708	0.478
	SRN/B.Sc.	1			
Attitude	Negative	0.213	0.089	0.509	**<0.001**
	Positive	1			

4. Discussion

Studies on ATLS knowledge, attitudes, and practices among healthcare workers show a mixed picture, with some revealing deficiencies in knowledge and practice, while others highlight positive attitudes and a desire for training. In this study, the socio-demographic factors of age, gender, and years of experience, in relation to ATLS practices, were similar across the different health facilities involved in the study ($p > 0.05$). This is similar to the results of the study carried out across three hospitals in Pakistan with a similar demography, where 75% of healthcare workers were female and less than 55% were below 25 years of age [15].

In this study, 65 (29%) of the participants involved in trauma management had adequate knowledge of the ATLS protocol. The knowledge levels were shown to vary significantly ($p < 0.05$) among staff with different levels of training and from one health facility to another. Reviews of articles examining healthcare workers' knowledge of the ATLS protocol consistently highlight a significant concern regarding inadequate knowledge and potential associated risks, which can lead to poorer patient outcomes in trauma situations due to missed critical interventions and delayed management. The knowledge level in this study was, however, lower than that obtained in Nigeria by Amaraegbulam *et al.* in 2013 [12], where 60% of the general practitioners (pre-specialist) with different levels of educational backgrounds had adequate knowledge of the ATLS protocol. The majority of our study participants were nurses, who are usually not very knowledgeable about the ATLS protocol and its applicability when compared to doctors, who probably take ATLS training as a compulsory course during their training. Additionally, this also reflects rote learning, where participants with poor knowledge simply memorized information through repetition and only focused on recall rather than deep understanding, institutional protocols that guide practice, or it may have been a potential limitation in the assessment tools.

According to a study carried out by Campbell *et al.* in 2020, over 90% of the participants demonstrated a good attitude towards the ATLS [16]. Similarly, Girma *et al.* in Ethiopia obtained 98.6% of the participants who had a positive

attitude towards ATLS [17]. Although there are slight differences in the results obtained in these studies, the overall trends indicate that the overwhelming majority of healthcare workers demonstrate positive attitudes towards the ATLS protocol. A study in Kenya also showed a positive attitude towards ATLS principles among the participants [18]. Research consistently indicates a strong positive association between healthcare providers' knowledge of the ATLS protocol and their positive attitudes towards it, which often translates into improved practices when managing trauma patients. In this study, observed practices of ATLS protocols by healthcare providers were significantly influenced by the level of participants' knowledge of the ATLS protocol ($P = 0.003$) and their attitudes ($P = 0.001$), because the higher the knowledge on a subject, the better the awareness of its value and its application. In Sudan, a study in a State Hospital showed 77% of the study participants stated that their teaching skills affect how they apply ATLS and demonstrated a positive attitude towards ATLS [19]. Studies have also concluded that by embracing the principles of ATLS, healthcare providers uphold the gold standard for safe, effective, and compassionate trauma management, ultimately saving lives and restoring hope in times of crisis [20], and have also demonstrated the positive relationship of increased knowledge and attitudes with improved practices of the ATLS protocol [21].

5. Conclusion

Health personnel in the four hospitals had poor knowledge of the ATLS protocol and demonstrated a positive attitude towards ATLS. The study highlights the importance of proper ATLS training among healthcare personnel in the management of trauma and injury. The study recommends investing in ATLS training at the institutional level to reduce the burden of traumatic injuries, as well as incorporating standardized trauma modules into medical and nursing curricula. Other recommendations include incorporating formal ATLS training into medical school or pre-internship curricula, rather than relying on informal learning from seniors during clinical practice. Integrating mandatory ATLS certification for emergency unit staff will also improve injury management.

Consent and Ethical Approval

The study protocol was approved by the Faculty of Health Sciences Institutional Review Board of the University of Buea (Application number: 1517-03). Administrative authorization was obtained from the Regional Delegation of Public Health for the West, Littoral, and South Regions and the directors of the various health facilities where data were collected. All eligible participants were asked to provide their consent by signing an informed consent form before enrollment in this study.

Limitations of the Study

Reliance on self-reported data for practice, where participants tend to over-report "good" and under-report "bad" behaviors, threatens the internal validity and ac-

curacy of the data because the self-reports may not have reflected actual practices. The sample, drawn from a limited number of specific institutions (four hospitals), may not be representative of the broader population of all hospitals in Cameroon. This limits the external validity of the study, as the results may not apply or be transferable to other settings.

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Authors' Contribution

Mary-Magdalene Signe: Conceptualization, data curation, formal analysis, supervision, methodology.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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List of Abbreviations

ATLS	Advanced Trauma Life Support
B.Sc.	Bachelor of Science
HREA	Edea Regional Hospital
ICU	Intensive Care Unit
LDH	Laquintinie Hospital Douala
LMIC	Low- and Middle-Income Countries
RHB	Regional Hospital Bafoussam
RHL	Regional Hospital Limbe
SRN	State-registered nurse