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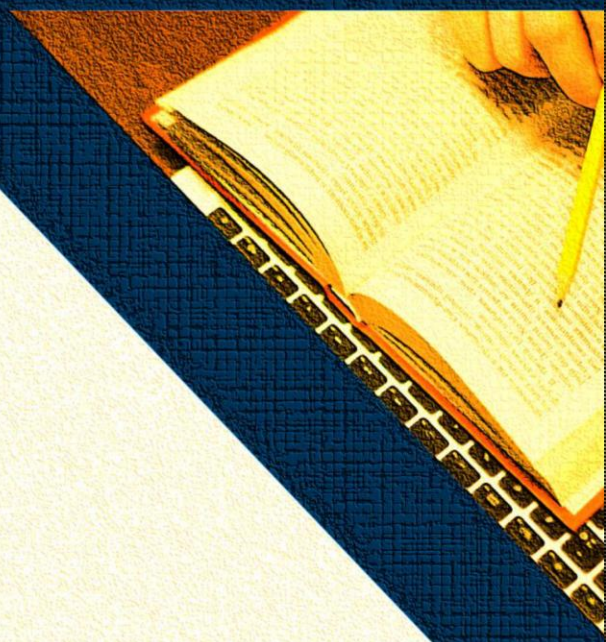

Ethiopian Society of Emergency and Critical Care Professionals

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Original Article

Pan African Journal of Emergency and Critical Care (PAJEC)

Knowledge, attitude, practice and associated factors towards Basic Life Support among health professionals at governmental hospitals in Afar Regional State, Ethiopia

Fikiru Yigezu[1*], Ahmed Adem[1], Kiros G/Kirstos[1], Abubeker Alebachew[1]

ABSTRACT

Introduction*: Basic life support (BLS) is a fundamental knowledge and skill that enables healthcare professionals and individuals to respond effectively in life-threatening emergency situations. The aim of this study was to evaluate healthcare professionals' knowledge, attitude, practice, and associated factors regarding BLS.*

Methods: *An institutional-based cross-sectional study was conducted among healthcare professionals working in governmental hospitals in the Afar regional state of Ethiopia. Structured self-administrative questionnaires adapted from the American Heart Association guidelines were used for data collection. Epidata version 4.4.2.1 and SPSS version 23 were used for binary logistic regression with bivariate and multivariate statistical analysis to determine the significance level, 0.25 and 0.05, respectively.*

Result: *A total of 357 participants with a response rate of 89.2% concluded the study. In this study, 63.6%, 49.3%, and 72.8% of the study participants had poor knowledge, negative attitudes, and poor practice of BLS, respectively. Sex, age, professional type, clinical work experience, serving hospital unit, and lack of training on BLS were significantly associated with the knowledge status of respondents. Professional type, lack of training on BLS, and frequency of CPR performed previously remained significantly associated with health care providers' practice of BLS.*

Conclusions: *This study showed that healthcare providers had poor knowledge, a negative attitude, and poor practice on basic life support. Sex, age, educational level of HCP, professional type, clinical experience, ward currently giving service, and lack of training on BLS were the identified significant factors affecting healthcare providers' KAP.*

Keywords: Knowledge, Attitude, Practice, Basic life support, Afar, Ethiopia

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1. Introduction

Basic Life Support (BLS) is a set of emergency procedures applied for respiratory and/or cardiac arrest patients and emergency events, which comprises several techniques like cardiopulmonary resuscitation (CPR), shocking, opening airways, and use of an automated external defibrillator(AED) to reverse the life-threatening situation of a victim.[1,2] Sudden cardiac death (SCD) is a leading cause of mortality that causes half of all deaths from cardiovascular diseases and disability-adjusted life years (DALYs).[3,4] Neurological dysfunction and tissue hypoxia result in death and disabilities in patients with emergency events like respiratory and cardiac arrest that need immediate provision of basic life support to reduce the risk of death and disability.[5,6] Public health strategies in many African countries do not adequately address the growing burden of cardiac aching emergency medical service results in low cardiopulmonary resuscitation attempt rate in hospitals.[11-18] The significant improvement in the survival of victims of sudden cardiac arrest (SCD) requires a paradigm shift in the delivery of emergency care and resuscitation.[9] Training health care workers, general practitioners, and bystanders to deliver basic life support in the case of an emergency is essential.[11,12] As far as the author's review of literature, there is a paucity of published studies conducted on health professionals' knowledge, attitude, practice, and their determinants on basic life support in Ethiopia in general and in the Afar regional state in particular, which is the very important part of health care services. As a result, this study aimed to evaluate the KAP and factors affecting their KAP on BLS among healthcare providers working in the governmental hospitals of Afar regional state, Ethiopia.

emergencies, and even in Ethiopia, cardiac emergencies are becoming a serious health problem. [7, 8] The survival rate from cardiac arrest, both in and out of the hospital, has remained minimal and essentially remained the same for the last twenty years [9]. The immediate post cardiopulmonary resuscitation survival was 28% in cases of attempted resuscitation, but only 12% survived to hospital discharge or to 30 days.[9, 10]

Cardiopulmonary resuscitation is rarely attempted, leading to a high rate of potentially preventable deaths and disabilities.[3, 7] Previous studies had identified a lack of basic knowledge about cardiopulmonary resuscitation, disregarding the of basic life support importance, delay in the identification of the situation, a lack of resources like automated external defibrillators in public places, limitation of supply of resuscitation equipment, and difficulties in re

2. Methods and Materials

Study area, period, and Study design:

Afar regional state is one of the eleven regions in Ethiopia, located in the northeastern part of the country and 580 kilometers from Addis Ababa, the country's capital city. Afar region is located within the Danakil depression and experiences the harshest climate in Ethiopia, with temperatures reaching up to 50°C. There are five primary hospitals and one general hospital in the region. Abahala Hospital, Kalowan Hospital, Dalifage Hospital, MohammedAklie Memorial Hospital, and Asyita Hospital are primary hospitals, whereas Dubti Hospital is the only general hospital in the region.

Study design and period

An institutional-based cross-sectional study design was used, and data collection was conducted from February to May 2021.

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Study population: All doctors, nurses, midwives, public health officers, and anesthetists working in governmental hospitals in Afar regional state.

Eligibility Criteria

Inclusion: All doctors, nurses, health officers, midwives, and anesthesiologists who were on the job during the study period were eligible for the study.

Exclusion Criteria: Staff who were not responsible for daily patient care and other service units, like pharmacists, biomedical staff, and laboratory professionals.

Sample size determination

The actual sample size for the study was determined by using a single population proportion formula, and the calculated sample size was 364. According to the data obtained from each hospital, the number of health professionals eligible for this study, doctors, nurses, public health officers, midwives, and anesthetists working in all hospitals, was 400. Then, the number of health professionals found in the governmental hospitals of Afar regional states was nearer to the calculated sample size, which is reachable. This study included all healthcare professionals working in those selected hospitals during the study period. So, this study approached all healthcare providers in those hospitals.

Study variables

Dependent variables: Knowledge attitude and practice of health care providers towards BLS

Independent variables: Age, sex, marital status, religion, educational level, training, experience, qualification, work overload, facility type, and serving unit during data collection.

Data collection procedure and quality management

Ethical consideration

After a review of several studies and guidelines, self-administrative questionnaires were adapted from basic life support guidelines and contextualized with some modifications. The questionnaires mainly contain four different parts. These were socio-demographic, knowledge, attitude, and practice of health care providers about BLS based on objectives study identified in English language.[19, 20] Four data collectors were selected based on their exposure and experience of data collection procedure, and they were recruited and trained on the data collection procedure and rules as well as the contents of the data collection tool. Data was collected using standardized and structured self-administered questionnaires. The principal investigator, co-researchers, and supervisors supervised the data collection process and checked every data for its completeness and errors.

Data Analysis

The data was coded, cleaned, and checked for errors. After, it was entered into epidata version 4.4.2.1 and was exported into SPSS version 23 for further analysis. Descriptive statistics were done, and the results were presented in the form of narration, tables, and figures. Binary logistic regressions were done to assess the association between each independent variable and the dependent variables. Those variables having a p-value less than 0.25 were considered to be clinically important for clinical decision-making in the bivariate analysis and were entered into the multi-variable logistic regression model. Multi-co linearity and model fitness were checked. Multivariable logistic regression was done with 95% confidence interval and corresponding AOR to control the influence of potential confounding variables. The statistical significance levels were declared at p-value <0.05.

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Ethical clearance was obtained from Samara University, College of Health Science, and the ethical clearance review board committee of Samara University. It was then approved by the regional health bureau, and finally, the medical director of data hospitals was authorized to obtain ethical clearance. Informed consent was obtained from the hospitals and healthcare professionals who participated in the study. Confidentiality was maintained by omitting their personal identification and any personal identity information.

3. Result

Three hundred fifty-seven (357) respondents, with a response rate of 89.25%, participated. Of these study participants, 213(59.7%) were males. Most of the study participants 223(62.5%) were nurses, 53(14.8%) were physicians, 48(13.4%) were midwives, 25(7%) were health officers and 8(2.2%) were anesthetists. Similarly, 244(68.2%) of respondents were found in the age group of 20 to 29 years, and 88(24.6%) were in the age range of 30 to 39 years. Of the 357 study participants, only 93(26.1%) had training in basic life support. On the other hand, from 357 study participants, 149(41.7) of respondents had never participated in cardiopulmonary resuscitation (CPR) before, 158(44.3%) had performed some times of professional experience, only 50(14%) of them had participated in plenty of time in CPR during their professional experience. Knowledge of health professionals about BLS in hospitals of Afar regional state.

According to this study's results, 84.3% of respondents knew the BLS definition, but only 200 (55.9%) knew emergency medications used during cardiopulmonary resuscitation, and 129(36%) knew when to use an automated external defibrillator. (Table 1)

Table 1: knowledge status the study participants towards BLS (n = 357).

Variables of knowledge assessment	Variable category	Frequency	Percentage %
For how long should you assess for a pulse before deciding the victim needs compression?	**Incorrect answer**	**220**	**61.5%**
	Correct answer	138	38.5%
The three steps to check for breathing in victims	Incorrect answer	151	42.2%
	Correct answer	207	57.8%
How to know when to start chest compression.	Incorrect answer	277	77.4%
	Correct answer	81	22.6%
The correct sequence of CPR for adults	Incorrect answer	287	80.2%
	Correct answer	71	19.8%
Conditions that cause to give rescue breathing for victims	Incorrect answer	187	52.2%
	Correct answer	171	47.8%
Rate of compressions per minute as specified by AHA guidelines for adults.	Incorrect answer	250	69.8%
	Correct answer	108	30.2%
Rescuers switch roles when performing 2 rescuers CPR	Incorrect answer	191	53.4%
	Correct answer	167	46.6%
Action to be taken when more rescuers arrive	Incorrect answer	228	63.7%
	Correct answer	130	36.3%
The goal of CPR	Incorrect answer	153	42.7%
	Correct answer	205	57.3%
A person with severe obstruction in their throat unable to speak, cough, or breathe.	Incorrect answer	118	33.0%
	Correct answer	240	67.0%

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The study included factors that can affect the knowledge of healthcare professionals about BLS. Accordingly, males respondents were 3.589 times more knowledgeable about BLS than females [AOR 3.73: 95% CI: (1.941, 6.638)] and respondents in age group of greater than 40 years were 94.6% more knowledgeable than those age group of 30-39 years AOR 0.054: 95% CI: (0.007, 0.401)] Table 2) and 97.1% more knowledgeable than those in age group of less than twenty years with AOR 0.029: 95% CI: (0.002, 0.39)]. Moreover, those health care providers who had ever had training on BLS were 1.95 times more likely knowledgeable than those who had never trained on BLS with [AOR 1.95: 95% CI: (1.034, 3.676)]

Table 2: Bivariate and multivariate knowledge related factors of respondents (n = 357)

Characteristic		Knowledge		Odds ratio (95% CI)		AOR (95%CI)	
		Poor	Good	COR (p<0.25)	p-value	AOR (P<0.05)	p-value
		Frequency					
Sex	Male	108	105	4.628(2.784,7.69)	0.00	3.589(1.941,6.638)	0.001**
	Female	119	25	**1**			
Educational qualification	Diploma	113	35	0.122(0. 055,0.269)	0.001	0.354(0.125,1.003)	.051**
	BSc.	102	52	0.200(0.092,0.434)	0.0001	0.325(0.122,.867)	.025**
	Specialists	1	15	5.89(3.693, 0.693)	0.104	5.090(.487,53.174)	.174*
	GP	11	28	**1**			
Age group	Age <20 years	8	6	0.375(0.076 ,1.858)	.230	0.029(0.002,0.390)	.008**
	Age 21-29	155	88	0.284 (0.083, 0.970)	.045	0.035(0.004,0.314)	.003**
	Age 30-39	60	28	0.233(0.065,0.840)	.026	0.054(0.007,0.401)	.004**
	Age ≥40 years	4	8	**1**			
Profession type	Nurse	148	75	0.434(0.236,0.801)	.008	0.595(.270,1.315)	.200*
	Midwife	34	14	0.353(0.154, 0.807)	.014	0.442(0.15,1.296)	.137*
	HO	17	8	0.403(0.148,1.098)	.076	0.263(0.074,0.932)	.038**
	Anesthetist	3	5	1.429(0.309,6.608)	.648	0.816(0.130,5.115)	.828*
	Doctor	24	28	**1**			
Clinical experience	< 1year	38	32	1.684(0.786,3.610)	0.180	6.146(1.484,	.012**
	2-4 year	83	52	1.253(0.627,2.506)	0.24	5.456)	.033**
	5-9 year	74	30	0.811(0.389,1.691)	0.576	4.120(1.125,	.259*
	>10 year	32	16	**1**		5.088)	
						2.013(0.598,6.779)	
Service unit	OPD	55	42	0.625(0.237,1.645)	0.341	0.546(0.167,1.789)	.318*
	Medical ward	31	22	0.581(0.206,1.637)	0.304	0.804(0.236,2.737)	.727*
	Surgical ward	41	13	0.259(0.088,0.764)	0.014	0.216(0.057,0.814)	.024**
	Delivery ward	39	10	0.210(0.068,0.644)	0.006	0.276(0.075,1.013)	.052*
	OR	15	16	0.873(0.283,2.696)	0.813	0.708(0.182,2.747)	.617*
	Emergency	32	16	0.354(0.123,1.019)	0.054	0.437(0.130,1.474)	.182*
	AICU/NICU	9	11	**1**			
	Yes						

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p <= 0.25, CI- 95 % (Confidence Interval), COR- crude odds ratio, AOR-adjusted odds ratio Remained statistically significant (p < 0.05) in adjusted odds ratio. (* variables of binary significant, ** variables of multi regression significant.)

Attitude of health care professionals in hospitals of Afar regional state towards BLS.

According to the result obtained from this study, 211(58.9%) of healthcare providers reported that BLS training should given to all health professionals, whereas 77(21.5%) believed the general public should get training on BLS. On the other hand, 69(19.3%) of the respondents said that only emergency room health professionals should be trained on basic life support. Similarly, 257(71.8%) of respondents agree with the inclusion of BLS training in the curriculum of undergraduate students of health professionals. On the other hand, 156(43.7%) of the study participants were not willing to perform cardiopulmonary resuscitation. They reported that they were not willing because of fear of transmission of a disease12.3%, further patient harm 11.5%, and fear of taking responsibility for the victim patient (10.3%). Similarly, they were asked if they would volunteer to give a mouth-to-mouth rescue breath for a collapsed patient, and 127(35.6%) of them were not volunteers to give mouth-to-mouth rescue breath. In this study, 253(70.9%) agree that performing BLS can save lives and prevent organ damage, and 288(80.9%) believe that CPR can preserve life in collapsed patients.

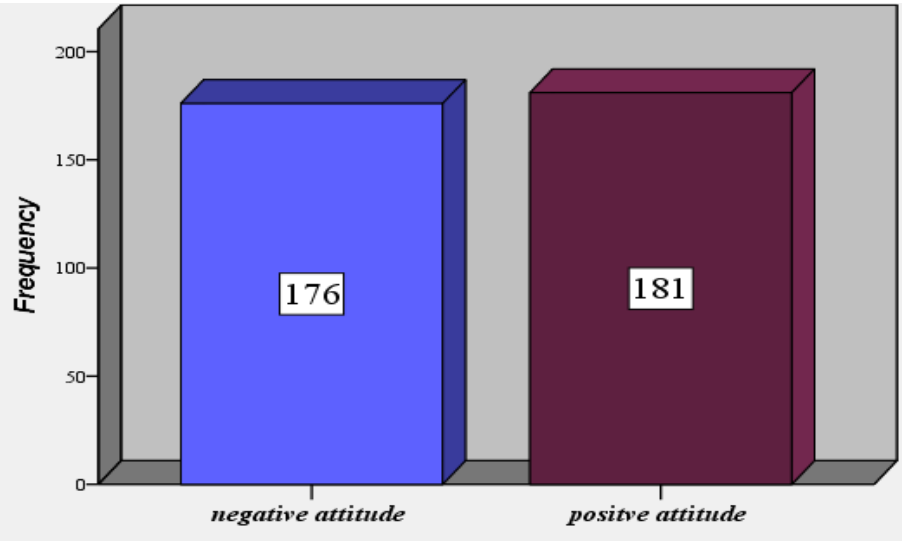

Figure 1: Category of attitude towards BLS

According to statistical analysis of factors affecting health care professionals' attitudes towards BLS, those working in intensive care unit and neonatal intensive care unit had 5.539 times more positive attitudes than those who were working in a medical ward with [AOR 5.539: 95% CI (1.506,20.378)], those who were working in surgical ward were 5.27 times less likely to have a positive attitude with [AOR 5.27: 95% CI (1.375,20.194)], those who were working in labor and delivery ward had 5.541 times negative attitude with [AOR 5.541: 95% CI (1.486,20.654)] and those who were working in operation room were 5.255 times less likely to have positive attitude with [AOR 5.255: 95% CI (1.421,19.433)] when compared with those health care workers serving in intensive care unit and neonatal intensive care unit Table 3.

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Table 3: Bivariate and multivariate predictors with attitude of respondents (n = 357)

Character		Attitude		Odds ratio (95% CI)		AOR (95% CI)	
		Negative	Positive	COR (p<0.25)	p-value	AOR (P<0.05)	p-value
		Frequency					
Sex	Male	88	125	2.232(1.449,3.438)	.000	1.121(0.655,1.919)	.676
	Female	88	56	1			
Educational qualification	Diploma	91	57	0.216(0.098,0.477)	.000	.4619(0.156,1.361)	.161
	BSc.	75	79	0.363(0.166,0.796)	.011	.755(0.266, 2.142)	.598
	Specialists	0	16	557060(.638, 0.00)	.998	.	.998
	GP	10	29	1 .			
Clinical experience	< 1year	27	43	1.593(0.758,3.347)	.219	1.269(0.530,3.035)	.593
	2-4 year	71	64	0.901(0.466,1.742)	.758	0.794(0.359,1.755)	.569
	5-9 year	54	50	0.926(0.467,1.835)	.826	1.025(0.447,2.348)	.954
	>10 year	24	24	**1**			
Service unit	OPD	47	50	1.976(0.726,5.378)	.183	3.558(0.998,12.678)	.051
	Medical	24	29	2.244(0.773,6.517)	.137	5.539(1.506,20.378)	.010
	Surgical	28	26	1.724(0.596,4.991)	.315	5.270(1.375,20.194)	.015
	Delivery	25	24	1.783(0.608,5.230)	.292	5.541(1.486,20.654)	.011
	OR	14	17	2.255(0.707,7.191)	.169	3.171(0.767,13.117)	.111
	Emergency	25	28	2.080(0.717,6.036)	.178	5.255(1.421,19.433)	.013
	AICU/NICU	13	7	**1**			
Had you training	Yes	31	62	2.437(1.486,3.996)	.000	1.633 (0.848,3.142)	0.142
	No	145	119	**1**			
Knowledge	Poor	147	80	0.156(0.095,0.256)	.000	0.209(0.114,0.383)	.0001
	Good	29	101	**1**			
	Poor						

Practice level of BLS among healthcare professionals

The study participants were asked how they manage if sudden cardiac arrest occurs in the hospital, and 46(12.8%) responded that the patient starts CPR, gives two rescue breathes and defibrillate, and only 20.7% reported the correct manipulation of AED for the collapsed patient.

Overall, the practice of basic life support among health professionals in this study shows that 260(72.8%) of the study participants have poor practice with (CI 67.8 to 76.8) at a 95% confidence level. (Table 4)

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Table 4: practice status of respondents towards BLS (n = 357)

Assessment variables	Variable code	Frequency	percentage %
The first step of Basic Life Support for adults during in hospital cardiac arrest	**Incorrect answer**	258	72.3%
	Correct answer	99	27.7%
The compression to-ventilation ratio you give as one rescuer CPR for victims.	**Incorrect answer**	310	86.8%
	Correct answer	47	13.2%
The correct sequence of procedure you do for patient with cardiac arrest in hospital	**Incorrect answer**	196	54.9%
	Correct answer	161	45.1%
Depth of compression in infant during CPR	**Incorrect answer**	238	66.7%
	Correct answer	119	33.3%
The correct depth of compression for an adult patient.	**Incorrect answer**	216	60.5%
	Correct answer	141	39.5%
Activities that can maximize quality of CPR.	**Incorrect answer**	145	40.6%
	Correct answer	212	59.4%
The proper steps for operating an AED	**Incorrect answer**	240	67.2%
	Correct answer	117	32.8%
How to help patient with chocking	**Incorrect answer**	162	45.4%
	Correct answer	195	54.6%
The procedure done for infant with chocking.	**Incorrect answer**	162	45.4%
	Correct answer	195	54.6%

Statistical analysis of different variables to determine the set of predictor variables that affect the practice of BLS among health care providers. Accordingly, doctors had 2.919 times better practice than nurses with [AOR 2.919: 95% CI (1.290, 6.607)]. Healthcare professionals who had no previous BLS training had 2.383 times poorer practice than those trained healthcare professionals [AOR 2.383: 95% CI (1.187, 4.783)], and those HCP who had frequently performed CPR procedures had 2.571 times better practice than those who had never performed cardiopulmonary procedures with [AOR 2.571: 95% CI (1.378, 4.797)

Table 5.

Table 5: Bivariate and multivariate predictors with practice of respondents (n= 357)

Character		Practice		Odds ratio (95% CI)			
		Poor Freq.	Good Freq.	COR (p<0.25)	p- value	AOR (P<0.05)	p-value
Sex	**Male**	138	75	3.014(1.767,5.141)	0.00	1.136(0.553,2.336)	.728*
	Female	122	22	**1**		**1**	
Educational qualification	**Diploma**	117	31	0.166(0.078,0.353)	0.00001	0.787(0.150,4.124)	.777*
	BSc.	126	28	0.139(0.065,0.298	.0001	2.341(0.533,10.284)	.260*
	Specialists	2	14	4.375(0.869,22.018)	.073	2.327(0.566,9.561)	.241*
	GP	15	24	**1**		**1**	
Age group	**Age <20 years**	8	6	1.050(0.220,5.003)	.951	2.000(0.148,27.016)	0.602*
	Age 21-29	179	64	0.501(0.153,1.633)	.251	0.467(0.056,3.901)	0.482*
	Age 30-39	66	22	0.467(0.134,1.621)	.230	0.423(0.061,2.927)	0.383*
	Age ≥40 years	7	5	**1**		**1**	

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Profession type	**Nurse**	168	55	0.446(0.238,0.837)	.012	2.919(1.290, 6.607)	0.01**
	Midwife	41	7	0.233(0.088,0.615)	.003	0.367(0.100,1.342)	.130*
	HO	16	9	0.767(0.287,2.053)	.598	1.489(0.420,5.271)	.537*
	Anaesthetist	4	4	1.364(0.307,6.057)	.684	1.936(0.275,13.643)	.507*
	Doctor	30	22	1		**1**	
Clinical experience	**< 1year**	51	19	0.166(0.078,0.353)	.000	0.787(0.150,4.124)	.777*
	2-4 year	95	40	0.139(0.065,0.298)	.000	2.341(0.533,10.284)	.260*
	5-9 year	76	28	4.375(.869,22.018)	.073	2.327(0.566.9.561)	.241*
	>10 year	38	10	1		1	
Service unit	**OPD**	70	27	1.157(0.383,3.494)	0.796	0.823(0.191,3.540)	0.793*
	Medical ward	42	11	0.786(0.234,2.636)	0.696	0.713(0.154,3.311)	0.666*
	Surgical ward	42	11	0.857(0.259,2.841)	0.801	1.954(0.415,9.205)	0.397*
	Labor & deliver	42	7	0.500(0.138,1.817)	0.292	1.226(0.255,5.892)	0.799*
	OR	15	16	3.200(0.932,10.982)	0.064	3.659(0.781,17.137)	0.100*
	Emergency	34	19	1.676(0.527,5.334)	0.382	3.542(0.847,14.819)	0.083*
	AICU/NICU	15	5	**1**		1	
BLS performed frequency	**Never**	128	21	0.227(0.110,0.469)	.000	2.571(1.378,4.797)	0.003**
	Sometimes	103	55	0.737(0.385,1.413)	.358	0.984(0.414,2.339)	.972*
	many times,	29	21	**1**		1	
Had you training	**Yes**	48	45	3.822(2.301,6.348)	.000	2.383(1.187,4.783)	.015**
	No	212	52	1			
Knowledge	**Poor**	197	30	0.143(0.086,0.240)	.000	0.244(0.120,0.495)	.000**
	Good	63	67	**1**		**1**	
Attitude	**Poor**	151	25	0.251(0.149,0.420)	.000	0.461(0.23,0.904)	.024**
	Good	109	72	**1**		**1**	

p <= 0.25, CI- 95 % (Confidence Interval), COR- crude odds ratio, AOR-adjusted odds ratio remained statistically significant (p < 0.05) in adjusted odds ratio. (***** variables of binary significant, ****** variables of multi-regression significant.)

4. Discussion

This study indicated that 46(12.8%) of respondents knew when to start CPR for a collapse occurring in a hospital with no response, only 56(15.6%) of the study participants considered scene safety while performing BLS for a victim, and 39(10.9%) of participants know jaw thrust as a save and appropriate maneuver for a patient with suspected spinal cord injury. This study result is not similar to a cross-sectional study conducted at Saveetha University.[15] The difference between the study results may be due to economic resource supply, educational curriculum policy, awareness of health care professionals, and access to technology to get references and resources. Generally, the overall assessment of health care professional's knowledge about BLS shows that 227(63.6%) of the study participants have poor knowledge about basic life support, which is nearly similar to a cross-sectional study conducted in Pakistan, about 58.3% of the study participants had poor knowledge. [11]

According to this study, males were more knowledgeable about basic life support than females, and older healthcare professionals were more knowledgeable than younger ones. Doctors were more knowledgeable than BSc nurses and public health officers. On the other hand, those healthcare professionals with clinical experience of 10 years and above were more knowledgeable

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about basic life support than those with clinical experience of less than one year, and those with clinical experience between two to four years were less knowledgeable than those with clinical experience of greater than 10 years of clinical experience. This result is congruent with a cross sectional conducted in Amhara region referral hospitals, northwest Ethiopia.[12]

In this study, the majority of respondents agree that all health professionals should train BLS and include BLS in the curriculum of undergraduate students of health professionals. On the other hand, the study participants were not willing to perform cardiopulmonary resuscitation. This result is not congruent with the study conducted in Kist Medical College Hospital, Nepal 95 % of the respondents said that BLS should be included in the undergraduate curriculum, 82.6% of the participants were not eager to perform CPR, 64% preferred to use some barrier for mouth to mouth ventilation, and 7% refused to use barriers for mouth to mouth ventilation.[10] This discrepancy may be due to a lack of adequate knowledge, awareness, and training, as well as a lack of adequate resources for BLS activity. In this study, healthcare professionals working in the intensive care unit and neonatal intensive care unit showed more positive results than those who work in other wards, which is not congruent with a study conducted among healthcare professionals working in the emergency of BPKIHS.[14, 20] The discrepancy may be due to knowledge about BLS, resource availability, and applicability of BLS in the country policy. Overall, nearly three-fourths of the study participants had poor practice. This is congruent with a cross-sectional conducted in Amhara region referral hospitals in Ethiopia; 71.6% of the participants had poor BLS practice. In this study result, doctors had better practice than nurses (p=0.01), healthcare providers who had previous training on BLS had good practice on basic life support for patients (p=0.015), and those health professionals who had frequently performed CPR procedures had better practice of BLS than who had never performed cardiopulmonary procedures (p=0.003). Similarly, those healthcare providers with good knowledge had better practice than those with poor knowledge (p=0.000). This result is congruent with across sectional conducted in Amhara region referral hospitals nurse's knowledge and practice.[12]

Limitations

The study was used only self-reported which can be biased to assess attitude and practice of health professionals. Census study approach is a cross sectional study is also not adequate.

5. Conclusion and recommendation

The overall result of this study indicated that healthcare providers had poor knowledge and practice, and nearly half had a negative attitude toward BLS. Sex, age, professional type, clinical experience, unit of service, previous frequency of BLS performance, and lack of training on BLS were the identified significant predictors that affected the KAP of healthcare providers. Training HCPs on BLS, initiating emergency services in hospitals, creating awareness of BLS in all service units, and enabling all healthcare providers to perform BLS is crucial.

Abbreviations

AED: Automated External Defibrillator
AOR: Adjusted Odds Ratio
ART: Anti-Retroviral Therapy
BLS: Basic Life Support
CPR Cardiopulmonary Resuscitation
DALY: Disability Adjusted Life Years
FMOH: Federal Ministry of Health
FP: Family Planning
HCP: Health Care Providers
ICU: Intensive Care unit

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KAP: Knowledge Attitude and Practice
NCD: Non-Communicable Disease
OPD: Out Patient department
SCD: Sudden Cardiac Death

Author Contributions

Fikiru Yigezu: the principal investigator and setted objectives, developed statement of the problem and conceptual framework, data management and manuscript development.

Kiros G/Krstos: trainer, data collection organizer and literature reviewer for the study. Also worked on result write up, discussion writing and manuscript development

Ahmed Adam and Abubeker Alebachew, developed methodology and model, statistical analysis and result and formatted on manuscript writing.

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Conflict of Interest

The authors declare no conflicts of interest.

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Original Article

Pan African Journal of Emergency and Critical Care (PAJEC)

Rate of Return of Spontaneous Circulation (ROSC) in In-Hospital Cardiac Arrest (IHCA) Cases at AaBET Hospital, Addis Ababa, Ethiopia

Tedros Hagos [1], Fufa Hunduma [1], Tesfaye Getachew[1], Ayalew Zewdie[1,2*]

ABSTRACT

Background: *Cardiopulmonary resuscitation (CPR) is a life-saving procedure performed to restore the function of the heart and brain in individuals. In-hospital cardiac arrests (IHCA) are common, with 1–5 events occurring per 1000 hospital admissions, and are associated with significant morbidity and mortality. Studies investigating the rate of return of spontaneous circulation (ROSC) for in-hospital cardiac arrest (IHCA) patients have not yet been carried out in Ethiopia. Our study aimed to evaluate the ROSC rate at the AaBET Hospital Emergency and Intensive Care Unit (ICU) in Addis Ababa, Ethiopia.*

Methods: *A cross-sectional study using the Cardiopulmonary Resuscitation (CPR) documentation sheet at AaBET hospital with cardiac arrest at the ED and ICU was conducted from October 2019 to September 2021. The data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 20. Descriptive statistics were computed to summarize and present the data in tables and figures.*

Result: *Out of the 68 cases analyzed, forty-five (66.2%) were male, and the mean age was 38.54, with an SD of 17.4. Fifty-five (80.9%) had trauma, and 33 (48.5%) had traumatic brain injury. Among the patients, 51.5% had a non-shockable rhythm, and twenty-two (32.4%) had asystole as the initial rhythm. Sixty-seven (98.5%) cases received adrenaline, while 24(35.3%) received fluid management. Only 8(11.8%) cases were shocked. Twenty-four had ROSC, which makes the ROSC rate 35.3 % with CI (24.7%-47.8%).*

Conclusion: *Cardiac arrest occurred more frequently in males. Trauma was the leading cause of arrest. Non-shockable rhythm is predominant in this IHCA study. Despite resource limitations, a ROSC rate of 35.3% was achieved, indicating the potential for improvement through structured protocols and training. Further national-level studies and a centralized IHCA registry are essential to improving cardiac arrest outcomes and post-resuscitation care in Ethiopia.*

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Keywords: Cardiac arrest, Cardiopulmonary resuscitation, Return of Spontaneous Circulation

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1. Introduction

Cardiopulmonary resuscitation (CPR) is a life-saving procedure performed to restore the function of the heart and brain in individuals who have lost consciousness, mainly due to sudden cardiac arrest (SCA). Sudden cardiac arrest occurs when the heart suddenly stops pumping blood effectively, leading to a cessation of vital organ functions.[1] The American Heart Association (AHA) highlights two crucial elements for boosting the odds of survival from sudden cardiac arrest: early recognition and treatment, highlighting the critical value of prompt intervention. Early detection entails quickly recognizing the warning indications of cardiac arrest and activating the code blue team or emergency response system. The prompt start of effective CPR is crucial when cardiac arrest is suspected or confirmed. Chest compressions and rescue breathing are used in CPR to physically pump blood and provide oxygen to the body's essential organs. While rescue breaths give vital oxygen to the lungs and the bloodstream, chest compressions sustain blood flow. Another crucial link in the chain of survival is early defibrillation. Defibrillation involves shocking the heart with electricity to return it to its normal rhythm.[2, 3, 4]

In-hospital cardiac arrests (IHCA) are common, with 1–5 events occurring per 1000 hospital admissions, and are associated with significant morbidity and mortality.[5] Substantial variations in survival rates from IHCA exist, with rates between 8.3 and 62.5 percent reported. [6, 7, 8, 9, 10]

One of the most important metrics in the treatment of cardiac arrest, especially in hospital settings, is the rate of return of spontaneous circulation (ROSC). Studies carried out in different areas have demonstrated that elements including the standard of CPR, the expertise of medical professionals, and the application of modern resuscitation techniques significantly impact ROSC rates. However, the majority of these studies have been carried out in wealthy nations with well-equipped healthcare systems, which results in comparatively high success rates for resuscitation. Conversely, lower-income nations frequently deal with issues such as a lack of established protocols, insufficient training, and scarce resources, all of which can affect the results for IHCA patients.

Even though comprehending ROSC in the context of IHCA is crucial, research that is especially targeted to Ethiopia is conspicuously lacking. This disparity is important because, in contrast to high-income nations, Ethiopia's healthcare system is unique, with unique obstacles and procedures. The availability of emergency medical services, the education of medical staff, and hospital infrastructure are a few examples of factors that might affect the outcome of cardiac arrest. Furthermore, it is challenging to evaluate how global findings apply to the Ethiopian environment in the absence of local data. The lack of data makes it difficult to create customized training programs and resuscitation techniques that might help cardiac arrest patients in Ethiopian hospitals have better outcomes.

By examining the rate of ROSC among IHCA patients in Ethiopia, the current study seeks to close this crucial evidence gap. A thorough investigation that gathers data from AaBET hospitals will serve as a baseline for future research and provide valuable insights into the efficacy of current resuscitation procedures. Our study aimed to evaluate the ROSC rate at the AaBET Hospital emergency and ICU in Addis Ababa, Ethiopia.

2. Methods and Materials

Study Design

A cross-sectional descriptive study using cardiopulmonary resuscitation (CPR) documentation sheet from October 2019 to September 2021 was done at Addis Ababa Burn Emergency and Trauma (AaBET) Hospital.

Study Area

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AaBET Hospital is an affiliate of Saint Paul's Hospital Millennium Medical College (SPHMMC), which serves as a referral center for emergency, burn, and trauma cases. It offers various medical services, including emergency and critical care, orthopedic surgery, neurosurgery, general surgery, and plastic and reconstructive surgery.

The hospital's Emergency and Critical Care Department operates both the emergency department and the intensive care unit (ICU). The department provides a 3-year residency program for physicians specializing in emergency medicine and critical care. The emergency room has three zones (red, orange, and yellow /green) for accepting patients based on their triage level. ICU has 11 beds and two-bed step-down units.

Study Participants

All patients who had complete CPR documentation sheets for whom CPR was done at AaBET Hospital emergency and ICU were included, while out-of-hospital cardiac arrest and dead bodies on arrival were excluded from this study.

Data collection instruments and procedures

A thorough dataset was gathered for the study by employing the AaBET hospital CPR documentation sheet. This dataset included vital information on the CPR procedures, such as the time and order of treatments, the delivery of medications, defibrillation, and procedures (intubation and/ or chest tube).

Data Analysis

The data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 20. Descriptive statistics were computed to summarize and present the data in the form of tables. Ethical clearance was obtained from the SPHMMC institutional ethical review board (IRB).

3. Result

Socio-demographics

A total of 97 CPR documentation sheets were found filled during the study period, and 68 cases were analyzed after excluding 13 incomplete documentation and 16 out-of-hospital cardiac arrests (9 at home, 3 out of home, and four dead bodies on arrival). Forty-five (66.2%) were male, and the mean age was 38.54 with SD 17.4. Fifty-five (80.9%) had trauma, and 33 (48.5%) had traumatic brain injury. Twenty-two (32.4%) had asystole as the initial rhythm. (Table 1)

Table 1: Socio-demographic status of patients with IHCA at AaBET Hospital, Addis Ababa, Ethiopia, October 2019 to September 2021

Variables (n=68)	Category	Frequency	Percent
Age(Mean = 38.54,SD 17.4	<20 years	14	20.6
	21-40 years	26	38.2
	41-60 years	21	30.9
	> 60 Years	7	10.3
Sex	Male	45	66.2
	Female	23	33.8
Place of arrest	Red	27	39.7
	Orange	14	20.6
	Intensive Care Unit(ICU)	27	37.5
Underlying condition	Medical condition	13	19.1
	Trauma	55	80.9
Diagnosis	TBI	33	48.5
	Thoraco-abdominal injury	12	17.6
	Burn injury	5	7.4

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	Bone fracture	4	5.9
	Sepsis	3	4.4
	Gullian-Barré Syndrome	2	2.9
	Pneumonia	2	2.9
	Cardiac illness	1	1.5
	Coma	2	2.9
	Diabetic ketoacidosis	1	1.5
	Asthma	1	1.5
	Osteomyelitis	1	1.5
Mechanism of injury	**Road traffic injury**	10	14.7
	Fall related accident	10	13.9
	Burn	5	7.4
	Gunshot	3	4.4
	Fighting	2	2.9
	Stab	1	1.5
	Unknown	4	5.9

Interventions and outcomes

Adrenaline was administered in 98.5% of cases (n=67), while 24(35.3%) received fluid management. Only 8(11.8%) cases were shocked, and 2 cases were shocked six times. Sixteen (23.5%) cases were intubated. (Table 2). Twenty-four had ROSC, which makes the ROSC rate 35.3 % with CI (24.7%-47.8%). (Figure 1)

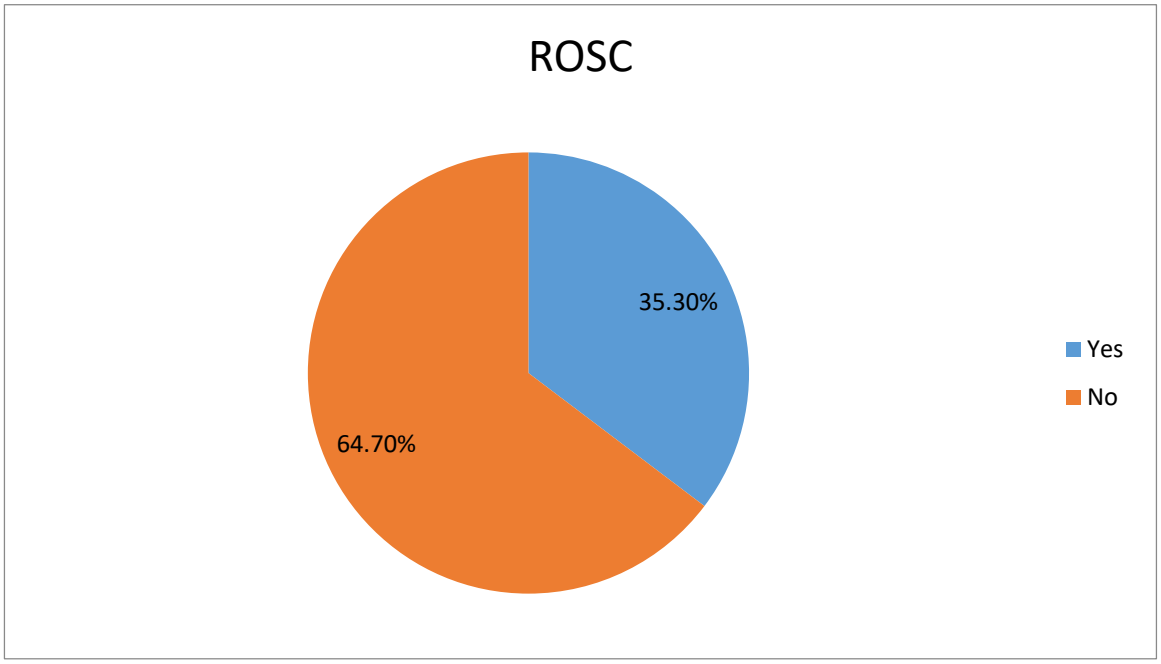

Figure 1: ROSC in patients with IHCA at AaBET hospital, Addis Ababa, Ethiopia, October 2019 to September 2021

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Table 2: Interventions and outcomes for patients with IHCA at AaBET Hospital, Addis Ababa, Ethiopia, from October 2019 to September 2021

Variables	Category	Number	Percent
Medication/fluid given at the time of arrest	Adrenalin	67	98.5
	Normal Saline	24	35.3
	Blood	1	1.5
Initial rhythm	Asystole	22	32.4
	Pulseless electrical activity(PEA)	13	19.1
	Pulsless Ventricular tachycardia(Vtac)	6	8.8
	Ventricular fibrillation(Vfib)	2	2.9
	Not documented	25	36.8
Defibrillation	Yes	8	11.8
Number of shocks	2.00	6	8.8
	6.00	1	1.5
	7.00	1	1.5
Intubation	Yes	16	23.5
	No	39	57.4
	Already intubated	13	19.1
Chest tube	Yes	14	20.6
	No	53	77.9
	Already inserted	1	1.5

Of those with ROSC, 45.8% were between 41 and 60 years old, 66.7% were male, and 54% had a non-shockable rhythm. (Table 3)

Table 3: ROSC in patients with cardiac arrest at AaBET hospital, Addis Ababa, Ethiopia, October 2019 to September 2021

Variables	Subcategories	Return of Spontaneous Circulation (ROSC)	
		Yes n=24 No. (%)	No n=44 No. (%)
Age(Mean = 38.54,SD 17.4)	**<20 years**	8(33.3)	6(13.6)
	21-40 years	11(45.8)	15(34.1)
	41-60 years	4(16.7)	17(38.6)
	> 60 Years	1(4.2)	6(13.6)
Sex	**Male**	16(66.7)	29(65.9)
	Female	8(33.3)	15(34.1)
Place of arrest	**Emergency**	14(58.3)	27(61.4)
	Intensive Care Unit	10(41.7)	17(38.6)
Underlying condition	**Medical**	5(20.8)	8(18.2)

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	Trauma	19(79.2)	36(81.8)
Initial rhythm	**Non-Shockable**	8(18.2)	27(61.4%)
	Shockable	3(12.5)	5(11.4)
	Unknown	13(54.2)	12(27.3)
Defibrillation	**Yes**	3(12.5)	5(11.4)
	No	21(87.5)	39(88.6)
Medication	**Yes**	23(95.8	44(100.0)
	No	1(4.2)	0(0.0)

4. Discussion

This is the first study examining the frequency of ROSC in the AaBET hospital's emergency and ICU. This measure is critical since it is a crucial sign of whether or not resuscitation attempts for cardiac arrest victims were effective. Healthcare practitioners can evaluate the success of their actions and pinpoint areas where emergency care protocols need to be improved by looking at the rate of ROSC.

Males constituted 66.2% of the subjects in this research who required cardiopulmonary resuscitation (CPR). Moreover, 69.1% of the cases were in the age range of 20 to 60, the most common age group.

The hospital's primary specialization in trauma care, alongside other emergency services, likely explains the high prevalence of trauma patients (80.9%) observed in this study.

Traumatic brain injury (48.5%) was the most commonly seen diagnosis among individuals who suffered from cardiac arrest. It draws attention to the necessity of early diagnosis, suitable treatment, and all-encompassing care for those with traumatic brain injuries. Studies showed that traumatic cardiac arrest has a poor prognosis.[11]

Most patients in this research who received cardiopulmonary resuscitation (CPR) had non-shockable initial heart rhythms. In particular, upon cardiac arrest, 51.5% of the patients had a non-shockable rhythm. This is similar to previous reports that in-hospital, the most common arrest rhythm was non-shockable.[8,12,13] In general, non-shockable rhythms have a poorer survival rate than shockable rhythms, which respond better to defibrillation.

The investigation found that the first arrest rhythm of 36.8% of the patients was not recorded. This could have substantial consequences, including delays in identifying and treating shockable rhythms. Developing quality improvement initiatives, educating nurses on proper recording techniques, having physicians review documentation, and conducting audits are all essential in addressing the problem of incomplete documentation and insufficient data on early arrest rhythms. Only 11.7% of the cases had shockable rhythms, and defibrillation was done.

Almost all patients got adrenaline, but no patient from those with shockable rhythms got amiodarone according to advanced cardiac life support (ACLS) algorithms. The absence of amiodarone administration to patients with shockable rhythms may be attributed to either the unavailability of the drug or the failure of healthcare professionals to document or order its administration. Hence, the availability of essential drugs is crucial during

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resuscitation. Healthcare professionals should rigorously adhere to the ACLS algorithms and be aware of the medications recommended for various cardiac arrest rhythms. This adherence improves the likelihood of a successful resuscitation and enhances patient outcomes.

The overall ROSC rate of this study was 35.3%. This is lower than international reports from Chicago (40.3%), USA14(44%), Canada 15(46.9%), Cambridge 16(68.5%) but closer to Beijing (35.5%), and other studies [8-10,14-16] This could be because of dedicated team and trainings in ACLS at the hospital which requires further study.

Sixty-five percent of trauma patients in this research had no ROSC, and it was noted that traumatic cardiac arrests had a poor outcome. In light of these findings, it is advised that trauma CPR adheres to the trauma CPR algorithm, as indicated by the Berlin guidelines.[17]

ED ROSC rate was 34.1%, while in ICU, it was 37 %, which is higher than the Uganda study ED (2.5%) and ICU (25%).[18] In this study area, both the ED and ICU were run by the Emergency and Critical Care Medicine department, and the team has similar resuscitation skills and techniques.

Different studies showed that involvement in national quality improvement, using technologies and feedback mechanisms, showed improved ROSC trends.[19, 20] Performing quality improvement projects and making feedback devices available could help improve the study site's ROSC rate.

Limitation

Since the study was cross-sectional, it found that some cases lacked documentation. Furthermore, the single-center design of the study precluded extrapolating the results to other emergency rooms. Since it has a small sample size, determining factors for ROSC were not analyzed, and further study is needed in the future, including post-cardiac arrest care and out-of-hospital survival. Multicenter research with the development of a CPR registry is necessary to fully evaluate the rate of Return of Spontaneous Circulation (ROSC) in Ethiopia.

5. Conclusion

Cardiac arrest occurred more frequently in males. Trauma was the leading cause of arrest. Non-shockable rhythm is predominant in this IHCA study. Despite resource limitations, a ROSC rate of 35.3% was achieved, indicating the potential for improvement through structured protocols and training. Further national-level studies and a centralized IHCA registry are essential to improving cardiac arrest outcomes and post-resuscitation care in Ethiopia.

Abbreviations

AaBET: Addis Ababa burn, emergency and trauma
ACLS: advanced cardiac life support
CPR: Cardiopulmonary Resuscitation; ED- emergency department
ICU: Intensive Care Unit; IHCA-In-hospital Cardiac Arrest; IRB-Institutional Review Board
MRI: Magnetic Resonance Imaging
ROSC: Return of Spontaneous Circulation; RTA-Road Traffic Accident
SPHMMC: St. Paul's Hospital Millennium Medical College
SSI: Surgical Site Infection
USA: United States of America

Author Contributions

The authors have all contributed equally to the conception of the work, including the acquisition, analysis, or interpretation of data, drafting and revising, and final approval of the version to be published, and they have agreed to be accountable for all aspects of the work.

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Competing interests

The authors declare no conflicts of interest.

Data Availability

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The data used to support the findings of this study are available from the corresponding author upon request.

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Original article

Pan African Journal of Emergency and Critical Care (PAJEC)

Improving Patient Safety: Residents Insights on Handover Practices in Tikur Anbessa Hospital

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ABSTRACT

Background: *A patient handover refers to the transfer of care from one care provider to the next and involves three aspects: a transfer of information, responsibility, and authority. Researchers and hospitals have been implementing different standardized models of handing over patients and training their staff on how to use this model.*

Objective*: To assess the knowledge, attitude, and practice of residents currently doing their residency at TASH toward the effectiveness of the presently implemented handing-over system of admitted patients and the use of standardized methods.*

Methods: *A cross-sectional survey was conducted, which included current residents at AAU, School of Health Science, using a structured questionnaire. Residents who had their previous attachment at the in-patient units of TASH from 2018-2021 were included. The study was conducted from August 2021 to November 2021. Study participants were given a consent form to participate and asked to complete a structured questionnaire online. The data collection instruments were coded, and data quality was checked daily. Data entry and cleaning were done using Microsoft Excel 2013, then exported to the SPSS version 26.0 statistical package for analysis. Outcomes were analyzed using descriptive analysis.*

Result: *This study showed that residents were knowledgeable (n=245, 90.8%) about the consequences of poor handover on patient outcomes. However, they lacked knowledge (n=245, 3.1%) regarding standardized methods of handing over patients. Their attitude towards the current method they were using to handover patients was not good as well (n=245, 72.7%). Rather, they showed a good attitude (n=245, 87.6%) towards change to a standardized and proper way of handover. They also felt positive about the possible training of all residents on these standardized methods. When it comes to practice, this study showed a significant number of residents reported having poor practice (n=245, 42.5%).*

Recommendations and Conclusion: *This survey has shown that poor patient handovers during the end of care are common in TASH and, at times, lead to bad patient outcomes. It is, therefore, important to train and develop a system where standardized handovers are undertaken. Further studies can be done to compare whether these new methods decrease the rate of patient harm due to poor handover.*

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1. Introduction

Studies show medical errors affect one in 10 patients worldwide. One study shows that 180,000 people die each year partly as a result of iatrogenic injury.[1] In the US, Medical errors resulting in patient harm have become the major cause of death.[2,3] Among the different types of errors, miscommunications during transitions of care are the main cause.[4-12] In Ethiopia, there is limited information regarding health professionals' ethics and surgical and medical error trends. One survey showed a prevalence of 57.6%, but all were related to medication errors in this study.[13]

A patient handover refers to the transfer of care from one care provider to the next.[14] This entails three important facets: a transfer of information, responsibility, and authority.[15,16] Handover, therefore, is a critical clinical and organizational process that occurs at all hospital levels, from an individual level (e.g., between nurses) [17] to an organizational level (e.g., between hospitals during patient transfers).[18]

Communication errors are a leading cause of sentinel events, unexpected occurrences involving death or serious physical injury, or the risk thereof. [19] The effects of end-of-rotation or service transitions in care may be equally detrimental to patient care but have received substantially less attention.[12] During this transition, one physician permanently transfers the care of an entire list of patients to another physician. Unlike shift handovers, when the original physician resumes care during his/her next shift and the service transition is permanent, the clinician signing out has no further contact with these patients or their new physician.[20] While early studies show patients affected by these transitions suffer increased length of stay (LOS) and cost, [21, 22] multiple large- scale studies have suggested a significant increase in mortality in patients exposed to these transitions.[11, 12]

The organized structure facilitates care, and recent work found that a structured handover template may improve perceived outcomes during resident end-of-shift or end-of-attachment [23]. However, interventions aimed at service handover have not been extensively tested. This study will, therefore, help in understanding the practice and knowledge of residents currently doing their residency in Addis Ababa University, School of Medicine, that have previously attached to places where in-patient service is provided in TASH, towards the effectiveness of currently implemented off-service system from their own most recent experience. The research will also address their knowledge and attitude as to what constitutes a good quality handover, whether they believe there is a gap in the system, and whether other better methods of transferring patients' information need to be put in place.

Hospitals are the places where various methods of communication take place. Multiple healthcare professionals take care of the patients during any patient's treatment period in healthcare settings. Each caregiver working with a patient must provide accurate and updated information to other caregivers.[27] Experts on handovers have recommended that a proper handover must take place in quiet settings, both face-to-face and in written format, using a standardized checklist with active participation on both sides regarding issues not only of what happened but also anticipated events and future plans. It must also have only limited interruptions. Although they have derived this from research in non-healthcare industries, it also pertains to hospitals.[28] It is also recommended that hospitals train their healthcare providers to properly transfer their patients at the end of their shift or attachment.[29]

Some key strategies have also been proposed

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such as (a) Use of standardization methods[30] for instance, with the use of structured templates 31 and communication mnemonics (e.gs. including SBAR, I-PASS, ANTICipate, SIGNOUT)[32] (b) the incorporation of training sessions to train care providers better perform effective handoffs[33,15] for instance, with the use of simulated clinical exercises, and finally (c) the use of tools such as online forms, [34] checklists,[35] and other computerized technologies[30] that can provide a structure to guide healthcare providers to share important information.

This recommendations are derived from the following studies

In one study comparing handover methods, only 2.5% of patient information was retained using the verbal-only handover method, 85.5% was retained when using the verbal with note-taking method, and 99% was retained when a printed handout containing all patient information was used. [36]

A system review on the impact of the communication and patient handover tool SBAR on patient safety was found from eight studies with a before-after design and three controlled clinical trials performed in different clinical settings[26] different patient outcomes were measured, of which eight were reported to be significantly improved. Eleven were described as improved, but no further statistical tests were reported, and six outcomes did not change significantly. This study found moderate evidence for improved patient safety through SBAR implementation, mainly when using structured communication over the phone. However, high-quality research on this widely used communication tool is lacking.[37]

In controlled study by study by Joshua Lee Denson et al., a structured ICU end-of-rotation care transition strategy was implemented with high fidelity.[52] While mortality and LOS were not affected in a pilot study with limited power, this intervention's ambitious strategy holds hope for future trials

One study was done in Indonesia on nurses in the Nursing School of PPNI, West Java, Indonesia, in 2019, where nurses were assessed on their knowledge, attitude, and practice of proper handover criteria mentioned above. Results showed the nurses had good knowledge (n=47, 77%) and positive attitude (n=42, 68.9%) toward patient handover. It also showed nurses with negative attitudes had 5.333 times developed poor clinical handover, and nurses with poor knowledge had 5.280 times poor clinical handover performance.[39]

Another study on medical students in Glasgow, Scotland, assessed the knowledge and attitude towards the standardized handover of patients before training. Subsequently, training was given, and they were reassessed. The post-training assessment showed that their knowledge and attitude improved, and all students agreed or strongly agreed that their ability to perform a structured handover had improved.[40]

Some studies have shown handovers in several hospitals as being remarkably haphazard[41] and formulaic, partial, and cryptic.[42] In addition, several healthcare researchers and practitioners have also highlighted that poor handovers often end in patient harm.[43] These are mentioned in the following paragraphs.

A prospective, observational study using video recording in an academic intensive care unit in Ontario, Canada, evaluated the use of handover transcripts documenting elements of three communication schemes: SBAR (Situation, Background, Assessment, Recommendations); SOAP (Subjective, Objective, Assessment, Plan); and a standard medical admission note. The majority of

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handovers' content consisted of recent and current patient status. The remainder included physicians' interpretations and advice. Questions posed by the incoming physicians accounted for 5.8% (± 3.9%) of the handovers' content. Elements of all three standardized communication schemes appeared repeatedly throughout the handover dialogs with no consistent pattern. For example, segments of SOAP's Assessment were present 5.2 (± 3.0) times in patient handovers; they followed Objective blocks in only 45.9% of the opportunities and preceded Plan in just 21.8%. Some components of communication were occasionally absent. For example, SBAR's Recommendation and admission note information about the patient's Past Medical History were absent from 22 (55.0%) and 20 (50.0%), respectively, of patient handovers.[44]

Most reports of poor handover follow the recent mandatory reduction in working hours for residents in the US, which has resulted in frequent handovers of patients. Increased frequency of patient transfer produces less efficient care. This can result in a longer length of admission and increased use of laboratory tests. A study by Lofren et al. showed transfer of care was associated with a 33% increase in the median length of stay, a 40% increase in the use of total laboratory tests, and a 20% increase in the number of laboratory tests per hospital day.[10]

Some researchers have highlighted the barriers to effective handovers,[14] while others have studied the consequences of poor handovers.[45] The three major handover barriers identified in prior studies were related to communication challenges, [46,15] lack of a standard handover system[47,48] and lack of handover training for healthcare providers.[33] For example, Arora et al.[49] described that handover communication was mostly influenced by content omissions either related to medications, treatments, tests, consults, or active medical problems and failure-prone communication processes due to the absence of face-to-face communication, double sign-outs (night floats), and illegible/unclear notes.

Among studies regarding the consequences of poor handover, a survey conducted in 2006 of all resident physicians in internal medicine and general surgery at Massachusetts General Hospital (MGH) concerning the quality and effects of handovers during their most recent in-patient rotations, the residents reported the presence of harm to patients from problematic handovers to be as high as 59%. [7] In this study harm was divided as major and minor. Minor patient harm was defined as a limited clinical consequence such as a need for more frequent monitoring or transient discomfort; it may lead to prolonged hospitalization but without significant organ dysfunction or worsening of clinical condition. Major or significant harm was defined as follows: Significant clinical consequences such as deterioration in clinical status, organ dysfunction, prolonged hospitalization, disability beyond discharge, or death.[8]

Another study done by Joshua L. Denson et al. showed that end-of-rotation resident handovers were significantly associated with an increase in both unadjusted and adjusted all-cause hospital mortality.[12] Although improved by the 2011 ACGME duty-hour regulations, a trend toward higher mortality remained following resident handover. A follow-up study by the same researcher showed among patients admitted to internal medicine services in 10 US Veterans Affairs hospitals, end-of-rotation transition in care was associated with significantly higher in-hospital mortality in an unrestricted analysis that included

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most patients.[11]

Considering the bad outcomes of a poor transition of care, a standardized system should be in place. However, a survey done by Leora I Horowitz et al. showed that although transfers of care are increasingly frequent, few internal medicine residency programs have standardized transfer-of-care systems in place, and most do not provide formal education in sign-out skills to all residents.[7]

2. Methods and Materials

The study was conducted among current residents at Addis Ababa University, College of Health Science, with previous attachments in the in-patient wards, ER, and ICU at Tikur Anbessa Specialized Hospital (TASH) between August and November 2021. It was an institution-based, cross-sectional survey focused on residents who had worked in the wards, ER, or ICU at TASH from 2018 to 2021.

The study population included residents from multiple specialties: Internal Medicine, Surgery, Pediatrics, Gynecology/Obstetrics, Neurology, Neurosurgery, Emergency Medicine, Urology, Pediatric Surgery, Orthopedic Surgery, and Anesthesiology. Only residents with prior attachment to in-patient services at TASH were included, with the most recent attachment being considered to reduce recall bias. Residents from the aforementioned specialties with previous attachments to TASH wards and residents who consented to participate in the study were included. Residents who declined to participate were excluded from the study.

The sample size was calculated using a single proportion formula with a 95% confidence interval and a 5% margin of error based on a 59% P-value obtained from a related study. This yielded a required sample size of 243 participants. Residents were provided with a consent form and asked to complete a structured questionnaire administered via Google Forms. The questionnaire was adapted from the study "Handoffs Causing Patient Harm: A Survey of Medical and Surgical House Staff," published in The Joint Commission Journal on Quality and Patient Safety in 2008.

3. Result

Study Demographic

Table 6: List of residents

Frequency		Percent	Cumulative Percent
Anesthesia and Critical Care	10	4.1	4.1
Emergency Medicine	25	10.2	14.3
General Surgery	38	15.5	29.8
Gynecology and Obstetrics	37	15.1	44.9
Internal medicine	58	23.7	68.6
Neurology	10	4.1	72.7
Neurosurgery	9	3.7	76.3
Orthopedic Surgery	11	4.5	80.8
Pediatric Surgery	4	1.6	82.4
Pediatrics	37	15.1	97.6
Urology	6	2.4	100.0
Total	245	100.0	

Among these residents, 34.3, 28.6, 28.6, 7.8, and 0.8 percent were first, second, third, fourth, and fifth years in their residency programs. The majority had attachments to in-patient wards, mainly ICU and emergency, in the past 01 month.

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Of the 245 participants, 49% had an attachment to an in-patient within the last 01 month, 22% within the last 1-6 months, 14.7% within the last 6-12 months, and 14.3% had their attachments more than a year back. Among the places of attachment, the wards were the recent place of attachments for most residents (54.3%) followed by the Emergency (24.1%) the ICU (21.6%).

Knowledge assessment

Questions were asked to assess knowledge of proper handover and the consequences of poor handover, and the results are summarized in Table 3.

Table 7: The satisfaction rate of study participants towards the emergency department services in Gondar University Hospital from July 15 to September 15/2021 (n = 195).

Questions	True	False
1. Effective Communication is essential for the Provision of safe patient care	100%(245)	0%
2. Poor handover is a type of ineffective communication	100%(245)	0%
3. Miscommunication is a type of medical error	100% (245)	0%
4. Poor communication can lead to Inaccurate patient plan leading to harm	93.8%(230)	7.2%(15)
5. Poor communication can lead to delays in the transfer of patients to appropriate wards	87.7%(215)	12.3%(30)
6. Poor communication can lead to delays in discharging patients	81.6%(200)	18.4%(45)
7.Poor communication can lead to unnecessary Lab tests	79.5%(195)	20.5%(50)
8. Poor communication can lead to Uninformed patient or caretaker	84.4%(207)	15.6%(38)

With these results, the overall score regarding knowledge of proper handover and the consequences of poor handover was 90.87%. This shows residents have good knowledge of this matter. However, when knowledge of standardized patient handing-over methods was assessed, the results were different.

Only 15.9% of the residents were aware of the SBAR method, but none were aware of other methods. This shows that residents have poor knowledge of standardized methods of handing over patients.

Attitude Assessment

First, residents were asked their opinion on the current non-standardized method of handing over patients implemented in the hospital from their most recently completed in-patient (ward/ICU) rotation. The results showed that 72.7% think the handovers are either fair or poor, while 27.3% think they were good or excellent.

Next, attitudes towards change to a standardized model of handover were assessed.

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Table 6. Attitudes towards change to a standardized model of handover

Questions	Agree or Strongly agree	Disagree or strongly disagree	Neutral
1. Do you think miscommunication can be successfully avoided	86.1%(211)	13.1%(32)	0.8%(2)
2. Do you think a standardized handover method using checklists is necessary?	71%(174)	15.9%(39)	13.1%(32)
3. Do you think handing over should be done only face-to-face	11.8%(29)	86.9%(213)	1.2%(3)
4. Do you think handover should be done only in written format	8.1%(20)	89.7%(220)	2%(5)
5. Do you think handovers should be done both verbally and in written format?	96.3(236)	0.8%(2)	7(2.8%)
6. Do you think handovers should be done in a quiet place where the active involvement of every participant is possible?	98.7%(242)	0%	1.2%(3)
7. Do you think training on standardized handing over of patients should be given to all residents?	84.8%(208)	4.8%(12)	10.2%(25)

This shows that the overall opinion towards changing to standardized handover done both in written format and face-to-face with possible training for all residents is 87.6%, which shows residents have a good attitude.

Practice Assessment

First, the possible frequency of problematic handovers was assessed. Residents were asked to answer questions based on their most recent in-patient attachments. By taking the percent of residents who answered sometimes, often, and always, 62.4% of residents indicated problematic handovers that were missing information, and 50.6% of residents were uncertain about management decisions because they lacked patient information.

Second, the characteristics and contents of handovers were assessed. It showed the most common ways of handing over patients (often and always), 58.3% of residents reported it being done in written format while 49.4% of residents reported face-to-face handover. Face-to-face handover with accompanying written documentation was reported by only 11.8% of the residents. Among those handovers done face-to-face, 58.3% of residents reported that the handovers were interrupted one or more times. Regarding the setting where handovers were conducted, 38.8% of residents reported it to be done in a quiet or private place, and 52% reported that the opportunity to ask or respond to questions was possible.

Regarding the content of the handover, residents reported the patient identifier (98%), principal reason for admission (93.4%), and current clinical condition of the patient (92.7%) as the most included data in the handover, whereas anticipated events for a

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period of coverage (19.6%), the name of the responsible senior physician (25.7%), and tasks to be completed (26.5%) were the ones that were least included.

Finally, the consequences of problematic handover was assessed using the resident's most recent in-patient attachments. The first question assessed difficulty in communicating with other caretakers, patients, or patient attendants as a result of receiving an incomplete handover. The results showed around 39% of residents reported having difficulty in providing accurate information to other healthcare providers, patients, or patient attendants as a result of receiving problematic handovers.

Second, the consequences of a problematic handover on the patient's well-being were assessed. The residents were asked to identify problems that resulted to the patient because of this poor handover from their most recent in-patient attachments. These problems were divided into major and minor harm.

Minor harm or limited clinical consequences were defined as a need for more frequent monitoring or transient discomfort, which may lead to prolonged hospitalization without significant organ dysfunction or worsening of clinical condition. Major or Significant Harm was defined as significant clinical consequences such as deterioration in clinical status, organ dysfunction, prolonged hospitalization, disability beyond discharge, or death.

Half of the residents reported some harm to the patient, with the majority being minor (49.8%), while 29% reported major harm that occurred because of being given a problematic handover. In conclusion, this table summarizes the findings of the practice assessment.

Table 13. Summary of Practice Assessment

Assessment component	Percent
Received complete handover	37.6%
No Problematic handover leading to uncertainty in decision-making	49.4%
Handovers being done in both verbal and written format	11.8%
Non-Interrupted handovers	41.7%
Conducted in a quiet place	38.8%
Conducted in an environment allowing for questions to be asked and responses to be made	52%
Able to provide information to patients, patients' attendants, and other health care providers	61%
No harm to the patient because of problematic handover	48.4%
Average Result	42.5%

With this summary, we can conclude that the current handover practice fails to fulfill the criteria for a good-quality patient handover.

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Additional Analysis

Furthermore, the frequency of reports of harm done to patients was determined based on the residents' department. Additionally, the places (wards, ICU, ER) where the highest frequency of these problems occurred were assessed. The following two graphs summarize the findings

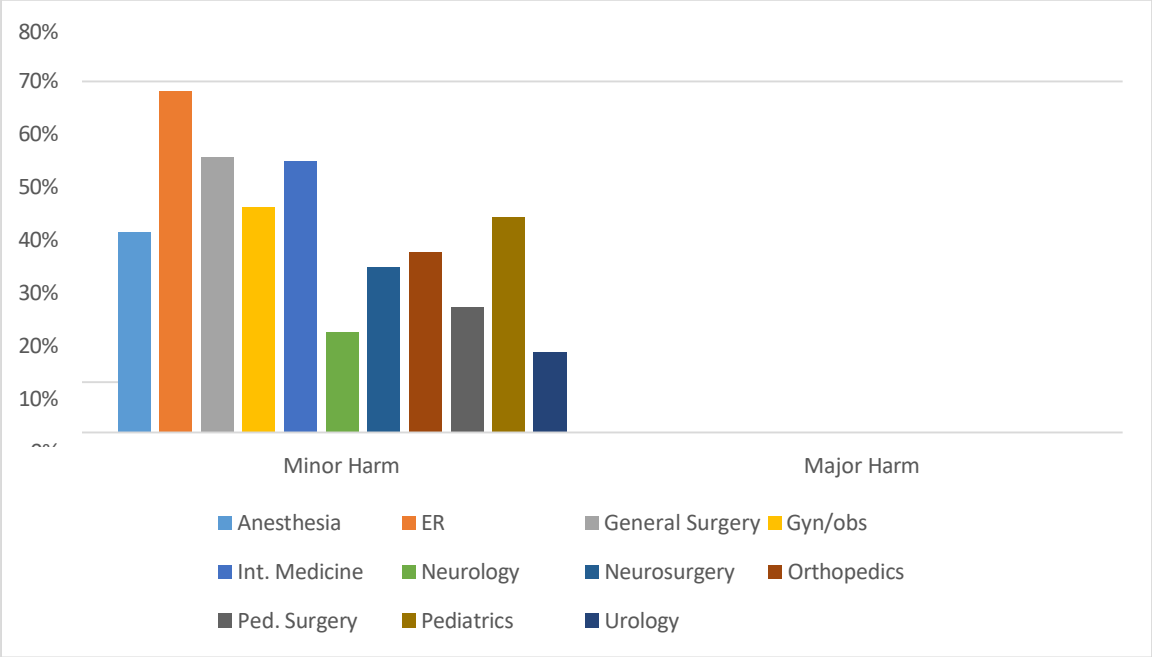

Fig 1. Frequency of harm to the patients reported by residents based on departments

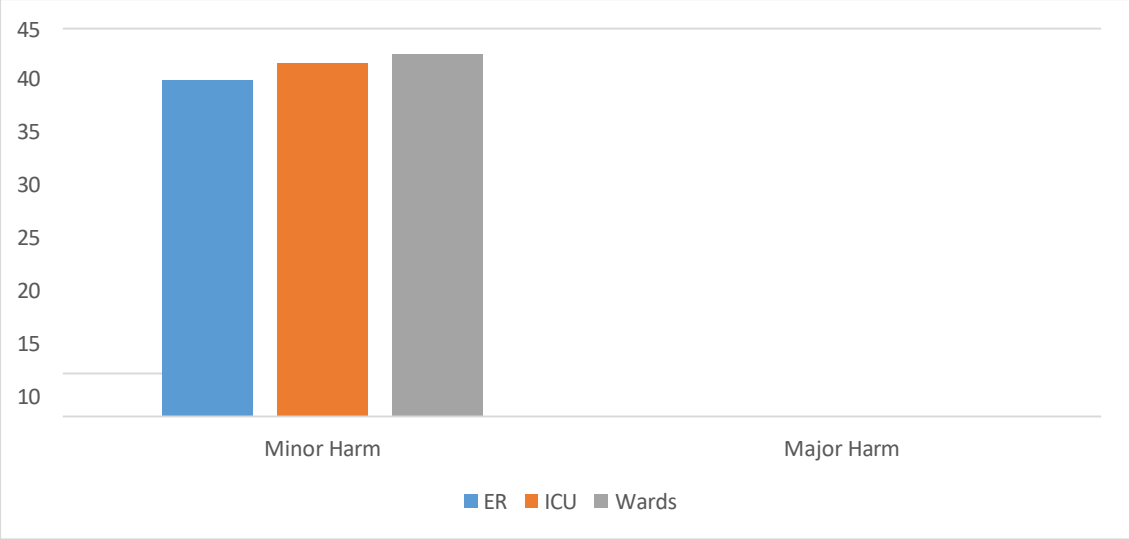

Fig 2. Places where the highest frequency of harm to the patient because of problematic handover

These results show that residents from the Emergency department reported the highest rates of minor and major harm to patients due to problematic patient handover. In addition, when all residents combined, the highest rate of major harm occurred during their attachments at the

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Emergency department, followed by the ICU. Minor harms were reported at comparable rates in all three places.

When it comes to handover characteristics, considering residents who answer often and always, the face-to-face handover was more common in general surgery and gynecology departments than in internal medicine, neurology, urology, and anesthesiology departments, where the written form of handover was commonly used. Even though the rate of handing over both in written and face-to-face format is low, it is practiced more in the neurology and internal medicine departments. Results are summarized in the next graph.

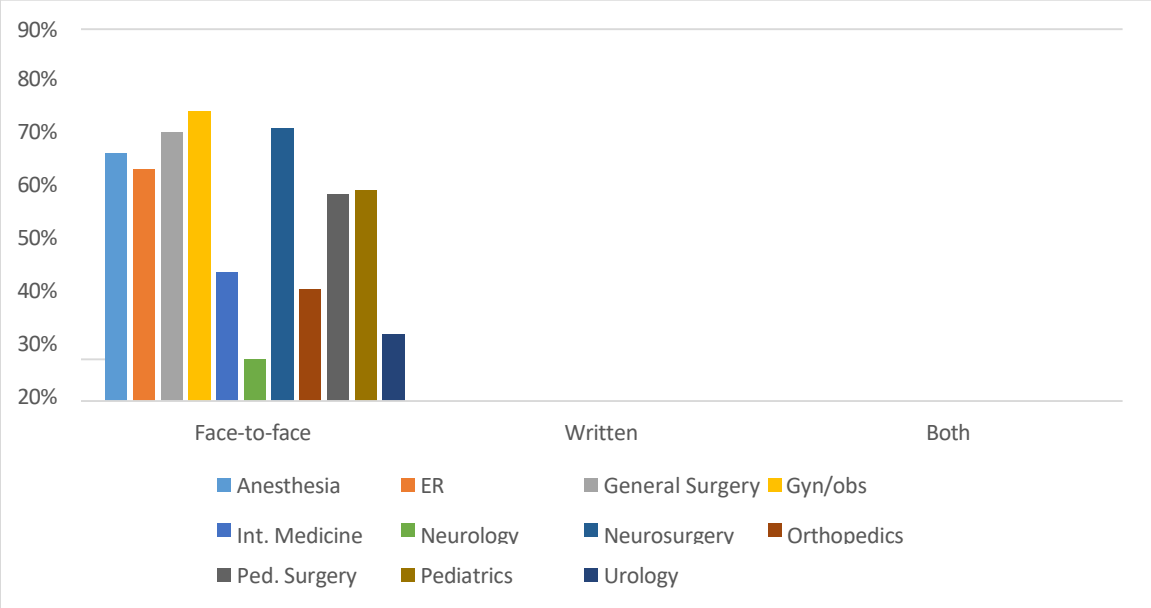

Fig 3. Characteristics of the handovers based on the different departments

Regarding the setting, the place reported to have the highest likelihood of an interrupted handover was the ICU, followed by the emergency and wards, as shown in the next figure.

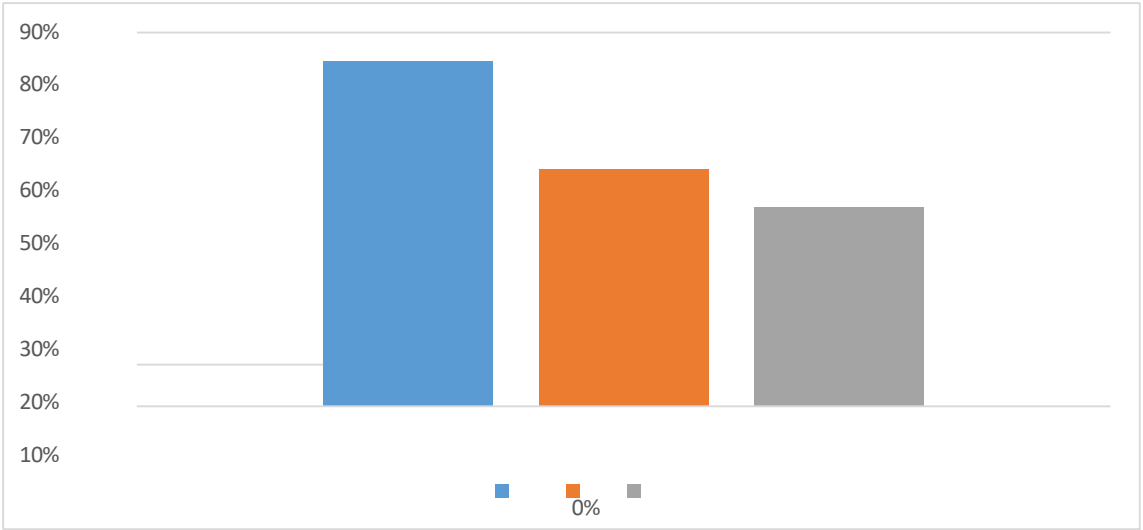

Figure 4. Setting where handovers were interrupted one or more times

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4. Discussion

This research aimed to assess how much residents know about proper handover and their attitude towards it. In addition, it assessed and evaluated how the residents are currently handing over their patients and whether it fulfills the criteria required for a handover to be of good quality, as described in the literature review.

The study has included almost all departments in TASH that provide in-patient service except for oncology. This makes this study better when compared to a similar study done by Kitch at Massachusetts General Hospital (MGH) in 2006 concerning the quality and effects of handoffs during their most recent in-patient rotations,[8] which included only internal medicine and general surgery residents. However, the academic year of the residents was more or less similar (38.5%, 28%, 26.1%, 2.5%, and 2.5% of 1st, 2nd, 3rd, 4th, and 5th year, respectively). The last places the residents have attached are similar, except the current study included more residents whose recent attachment was at the ER. (46.9%, 20.3%, and 14.1% had last attachments at the ward, ICU, and ER, respectively).

Similar to the study in Indonesia on nurses in 2019,[39] this study showed that the study subjects are knowledgeable (n=245, 90.8%) about poor handovers and their consequences; however, they lack knowledge (n=245, 3.1%) about standardized methods of handing over patients.

Similarly, they showed a good attitude (n=245, 87.6%) towards the proper way of handover. They also felt positive about the possible training of all residents on these standardized methods. Their attitude towards the current method they use to handover patients was not good (n=245, 72.7%). This attitude differs from the study by Kitch in 2006, which showed only about a third (31.0%) of residents at MGH rated the overall quality of the handoffs they received on their most recent rotation as fair or poor. This discrepancy might be because most handovers occurred face-to-face in the Kitch study, and the setting was mostly in the wards.

Regarding practice, this study showed that many residents reported receiving incomplete handovers with omitted patient data (n=245, 62.4%). Similar to the prospective study done in Ontario, Canada, on handover patterns: an observational study of critical care physicians, the handovers had elements of all standardized communication schemes but with no consistent pattern. The physicians in this Canadian study followed objective blocks in only 45.9% of the opportunities. Again, similar to this study, most handover content consisted of recent and current patient status.

These handovers usually happened only in written format (n=245, 58.3%) or face-to-face (n=245, 49.4%) and only occasionally in both ways (n=245, 11.8%). Residents who reported that the handovers were interrupted one or more times were 58.3%, and only 38.8% reported that it was being done in a quiet place. Compared to the Kitch study, virtually all residents (93.6%) reported that face-to-face handoffs occurred most of the time or always. However, almost half of residents (43.6%) reported that these handoffs were rarely or never conducted in a quiet, private setting. More than one-third (36.6%) reported that the handoffs were most of the time or always interrupted one or more times.

Reporting on events from only their most recently completed rotation, 49.8% of residents in this study reported that at least one patient had suffered minor harm by a problematic handoff, and 29.4% reported that at least one patient had

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suffered major harm. These results differ from the study by Kitch, which showed a result where 59% of residents reported that one or more patients had been harmed during their most recent clinical rotation because of problematic handoffs, with 58.3% reporting minor harm and 12% reported that the harm had been major. The discrepancy in the rate of major harm results might be because the MGH study included only internal medicine and surgery residents. In contrast, this study included many other departments, including emergency medicine residents, who reported the highest frequency of harm.

The frequency of problematic handovers varied by location in the MGH study as well, similar to this study, the emergency was the place with the highest rate of poor handovers but contrary to this study, both medical and surgical residents reported intensive care units (ICUs) as the location with the lowest frequency.

Regardless, this study showed reports of a significant number of worse patient outcomes because of poor handover that cannot be ignored, similar to other studies.

Limitations

This study has certain limitations. First, more than one resident may have reported the same harm. For example, harm to a particular patient may have been noted by two resident and both may have reported it when they completed their surveys. Second, data on patient harm and its attribution to problematic handovers were based on the perceptions of resident physicians, and were not checked through either direct observation or a medical record review. Even though the definition of minor and major harm was provided to the respondent, it cannot be ascertained that the reported events actually caused patient harm or that the harm was attributable to a problematic handover. Hindsight bias and other factors may have led residents to incorrectly recall events or contributing factors, leading to an exaggeration of the frequency of harm; conversely, residents may also have failed to report events that an another observer would have detected. In addition some of the residents who participated in this study might have completed their in-patient attachments several weeks or months by the time they participated in this study which further adds to the recall bias. Finally, the exact time of the day the handovers took place or whether it was end of shift handover (occurring by the end of day or night shift) or end of attachment (eg. after one month of attachments) was not clearly specified. This factors may influence the relative quality of the handovers in the transmission of key clinical information. Finally a potential limitation to almost any survey is the potential for nonresponse bias. Although response rate was quite good, the distribution of residents across different departments was not even.

5. Conclusion

The results of this study suggest that residents in multiple departments of TASH perceive that patient harm from problematic handover is common. It also indicates that best-practice recommendations for handovers are not consistently being observed. It shows that though residents lack knowledge of standardized models, they are well aware of poor handovers and their consequences and have good opinions about changing the practice by incorporating standardized models and by taking training on proper handover methods. Miscommunication should be recognized as preventable and amenable to process improvement. The culture should change from viewing handover-related harm as inevitable to where error minimization is possible. Second, training programs and hospitals should create awareness that handovers must be conducted in

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quiet settings and provide such settings. Others should also be trained to limit interruptions. It shall be conducted to include an opportunity and time for the recipient to ask questions and respond. The variability observed in the content of handovers and experts' views on best practices suggests that implementing a standardized handover format may be important. Finally, further detailed investigations are needed into the settings and mechanisms by which problematic handovers lead to harm, along with interventional studies comparing standardized and non-standardized handover methods. Ongoing institutional efforts to improve the safety and care of hospitalized patients are vital.

Abbreviation

AAU: Addis Ababa University
TASH: Tikur Anbessa Specialized Hospital
IMR: Internal Medicine resident
EMR: Emergency Medicine resident
Gyn/Obs: Gynecology and obstetrics
ICU: Intensive Care Unit
SBAR: Situation-Background-Assessment-Recommendation
I-PASS: Illness severity, Patient information, Action list, Situational awareness and contingency plans, and Synthesis by receiver
ANTICipate: Administrative Data; New clinical information; Tasks to be performed; Illness severity; and Contingency plans for changes.
SIGNOUT: Sick or DNR, Identifying data, General hospital course, New events of the day, Overall health status/clinical condition, Upcoming possibilities with plan, Tasks to complete overnight with plan, rational.
US: United States
UK: United Kingdom

Author Contributions

Eyosias Lemma and Henok Baharu conceived and designed the study, developed the survey tool, and supervised the overall project.
Ashenafi Tesfaye, Dereje Nigatu, and Atiklet Zerihun coordinated data collection, performed statistical analysis, and drafted the initial manuscript.
Liban Dida, Muluken Alemayehu, Kebron yihenew, and Ashenafi Negash contributed to the refinement of the survey instrument, facilitated data acquisition, and assisted with interpretation of findings.
All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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Conflict of Interest

There is no conflict of interest.

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Case Report

Pan African Journal of Emergency and Critical Care (PAJEC)

Exploring Olanzapine Overdose in an Ethiopian Patient: A Case Report

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Keywords: Olanzapine overdose; Hypertension; Tachycardia; QTc prolongation

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ABSTRACT

Background

Olanzapine is an atypical antipsychotic drug that has been Food and Drug Administration (FDA) approved for schizophrenia and bipolar disorder. It has a tolerable side effect profile of some metabolic disturbance, including weight gain and hyperglycemia. Even though it has a broad therapeutic index, ingestion in large amounts can result in toxic manifestations, which are an extension of its pharmacodynamics.

Case Presentation

We are reporting a 58-year-old man who presented after ingesting 90 tablets (450mg) of olanzapine 5mg. He presented with difficulty in communication, with clinical findings of hypertension and tachycardia 8 hours after his ingestion. Additionally, laboratory investigations revealed prolonged QTc and mild hyponatremia.

Discussion

Owing to its broad-spectrum action on different central nervous system receptors, olanzapine has a wide range of clinical presentations. These include agitation, delirium, somnolence, respiratory depression, and hypertension or hypotension. Patients may also experience catastrophic complications such as cardiac toxicity.

Conclusion

This is the first case of olanzapine overdose in an Ethiopian patient, and it has given us insight as to how to approach and manage such patients. Moreover, despite the high dose of ingestion, a benign presentation was witnessed. Hence, we believe this case report will serve as a stepping stone for future such encounters.

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1. Introduction

Olanzapine is a second-generation (atypical) antipsychotic with antagonistic activity on many receptors. These include serotonin (5-HT2A), dopamine (D1, D2, D3, D4), histamine (H1), and muscarinic receptors. It is used for the treatment of psychoses, schizophrenia, schizoaffective disorders, bipolar disorders, and other conditions with psychotic or delusional components.[1]

It is effective against positive and negative symptoms of schizophrenia. Besides its superior antipsychotic efficacy, therapeutic doses (5–20 mg/d) of olanzapine have been reported to produce fewer extrapyramidal symptoms compared to first-generation antipsychotics. In addition, olanzapine has not been associated with agranulocytosis. The most frequent adverse effects of olanzapine are sinus tachycardia, orthostatic hypotension, anticholinergic effects, sedation, and weight gain. The ''atypical'' antipsychotic profile of olanzapine is mainly based on its mesolimbic selectivity and its distinct pharmacodynamic profile. It has a higher binding affinity for 5-HT receptors than for dopamine D2 receptors, high affinities for histaminergic (H1) and muscarinic (M1) receptor subtypes, and relatively low affinities for α-adrenergic receptors.[2]

However, despite its improved tolerability compared to conventional agents, the exact safety profile of olanzapine remains uncertain. For instance, olanzapine has been associated with hyperglycemia, ketoacidosis, new-onset diabetes mellitus, and weight gain. Furthermore, convulsions, neuroleptic malignant syndrome, tardive dyskinesia, and neutropenia have also been reported during olanzapine therapy.

In acute olanzapine overdose, the most frequent symptoms observed were lethargy/coma, tachycardia, anticholinergic syndrome, confusion, and agitation. Patients may also have delirium, miosis, dysarthria, myoclonus, and hypertension or orthostatic hypotension. Because of its profound central nervous system (CNS) depression and the frequently observed miosis, olanzapine overdose tends to mimic opioid overdose. In a few cases of overdose, rapid fluctuations between sedation and agitation or ‘‘agitation despite sedation’’ have been described. These patients are often described as being sedated with an underlying anticholinergic delirium.[3]

In addition, hyperthermia, mydriasis, blurred vision, hypotension, respiratory depression, and leukocytosis have been reported. Moreover, prolongation of the QT interval, hypothesized to occur via direct inhibition of the cardiac delayed potassium rectifier, may play a role in fatal arrhythmias. Still, olanzapine appears to have the least direct effect compared with other antipsychotics. Cardiovascular disease is a significant risk factor for ischemic and thrombotic vascular events, as well as for QT prolongation, and the increased prevalence of coronary artery disease in patients with schizophrenia may be relevant in the context of elevated psychotropic drug concentrations after overdose.[4]

2. Case report

A 58-year-old Ethiopian male known to have major depressive disorder, patient on regular follow-up for 30 years, taking sodium valproate 500 mg Per os (PO) twice daily, **olanzapine 5 mg** PO once daily, and imipramine 10 mg tablet once daily. He was brought to the Emergency Room (ER) by his daughter after he presented with difficulty communicating for an 8-hour duration. He had ingested 90 tablets (450 mg) of olanzapine. He had a history of similar attempts. He had diabetes and hypertension on medication.

On physical examination, he was confused. Vital signs revealed an elevated blood pressure of 198/114 mmHg and a tachycardia of 108 beats per minute. Glasgow Coma Scale (GCS) was 14(E-4, V4,

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M-6). All other system examinations were non-revealing.

Investigations

Laboratory tests, including a complete blood count, liver enzymes, renal function, and cardiac markers, were all within normal limits. Serum electrolytes were unremarkable except for mild **hyponatremia**. Electrocardiogram (ECG) showed Corrected QT interval (QTc)-479ms; QRS-179ms; Index- QTc Prolongation, Nonspecific interventricular conduction delays as shown below.

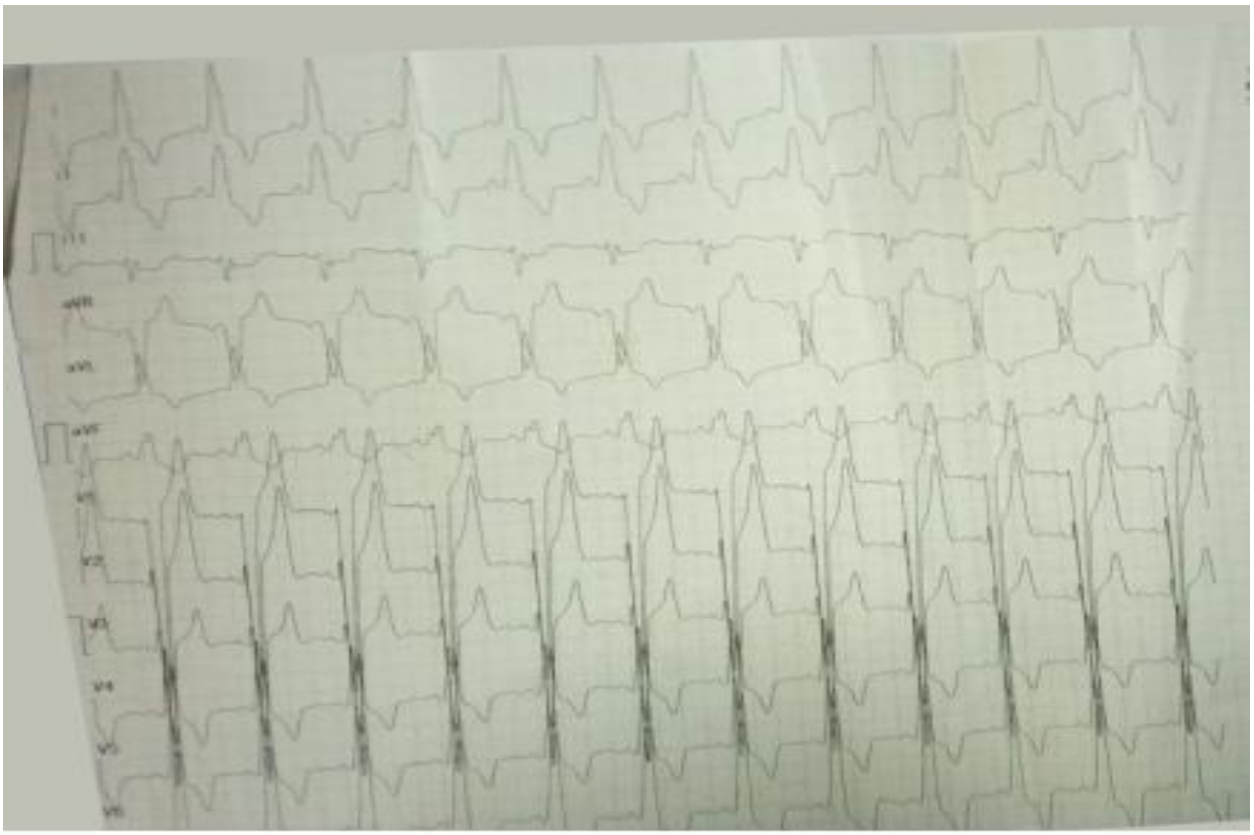

Fig. 1 The patient's ECG showing QT prolongation and interventricular delay

Treatment and outcome

He was put on cardiac monitoring; Olanzapine was discontinued; a single dose of 2 g intravenous **Magnesium** was given; He was not given activated charcoal as he presented far beyond the window of opportunity. His GCS improved, and then he was followed for 48 hours and discharged with an immediate link to a psychiatric ward as his SAD PERSON score was 7.

3. Discussion

Similar to conventional agents, the majority of patients who accidentally or intentionally overdose with atypical antipsychotics will remain asymptomatic or develop only mild to moderate toxicity. Death following an overdose is a rare complication, particularly if treatment is initiated in a timely manner. The toxic and lethal doses are highly variable and depend primarily on the presence of co-intoxicants, age, habituation of the patient, and time from exposure to initiation of treatment. Children and nonhabituated adults are more sensitive to the toxic effects of this agent. The toxic effects that occur following overdose of atypical antipsychotics are essentially an exaggeration of the pharmacologic effects.[5]

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The therapeutic dose of olanzapine ranges from 5 to 15mg per day. However, there are no standard reference values for the expected concentrations of olanzapine after therapeutic administration. In clinical studies, steady-state blood (plasma) concentrations of olanzapine are rarely over 150 ng/mL, but the potential for toxicity has been suggested at concentrations as low as 100 ng/mL.[6]

Olanzapine overdose can present with different clinical pictures. The most common symptoms that arise as a result of olanzapine overdose include central nervous system (CNS) depression with somnolence, blurred vision, low blood pressure, respiratory depression, extrapyramidal and anticholinergic effects, hyperthermia, leukocytosis, and elevated creatine phosphokinase levels.

Some studies point to the possibility of olanzapine overdose mimicking opiate intoxication. Therefore, olanzapine should be added to opioid and α2-adrenergic agonist intoxication in the differential diagnosis of a patient with depressed mental status and miosis. Deaths attributed to probable cardiac toxicity have been continuously reported from olanzapine overdose.

It is postulated that the most probable mechanism of death in an overdose of olanzapine involves cardiac toxicity at the cellular membrane level, although the exact mechanism remains elusive. One possible explanation is that its QTc prolongation occurs by directly inhibiting delayed potassium rectifiers.[7]

The findings in our patients, which are confusion and dysarthria, severe hypertension, mild tachycardia, and investigation results of mild hyponatremia and QTc prolongation, can be explained by the pharmacodynamics of olanzapine.

Olanzapine's antagonist effect on cholinergic and histamine receptors accounts for its manifestation as fluctuating confusion, delirium, and sedation. Hypotension is the usual presentation in patients overdosing on olanzapine, but our patient was an exception. However, since the patient is already a known hypertensive on medication, the marked elevation of blood pressure at the time of presentation cannot solely be attributed to olanzapine overdose, because we do not have his recent blood pressure as a baseline.[8]

The severity of an overdose is related to the amount of the drug ingested.

Table 1: Depicting ingested dose and CNS manifestations, source, Life in the Fast Lane, olanzapine toxicity

Dose (ADULT)	EFFECT
<40 mg	Therapeutic sedation and antipsychotic effects (occasionally used for serotonin toxicity)
40 – 100 mg	Mild-to-moderate sedation with potential for anticholinergic effects.
100 – 300 mg	Sedation with intermittent marked agitation
>300 mg	Increasing sedation progressing to coma requiring intubation. Hypotension

Early identification and institution of treatment are crucial in the management of olanzapine overdose. The management is supportive, as there is no specific antidote for the drug. As it can cause central nervous system depression and respiratory compromise, the ABCs should be tended to as is done in any other poisoning patient. In addition, magnesium sulfate, as it has been done for our patient, helps with the QTc prolongation and resuscitative measures for hypotensive patients. In addition, benzodiazepines can be given for agitated patients; physiostigmine has been reported to reverse agitation and coma caused by olanzapine and catheterization for urinary retention.

4. Conclusion

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This is the first case of olanzapine overdose in an Ethiopian patient, and it has given us insight as to how to approach and manage such patients. Moreover, despite the high dose of ingestion, a benign presentation was witnessed. Hence, we believe this case report will serve as a stepping stone for future encounters. Moreover, it reminds us that even unusual drugs for intentional overdose can be ingested. Hence, clinicians have to be wary in this regard to institute management promptly.

Abbreviations

FDA: Food and Drug Administration
ECG: Electrocardiogram
CNS: Central nervous system (CNS)

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Competing interests

The authors declare that they have no competing interests in relation to the publication of this case report. There are no financial, personal, or professional conflicts of interest that could bias the reporting or interpretation of the findings. The authors have no affiliations or financial involvement with any organization or entity that has a direct or indirect interest in the subject matter discussed in this case report. This competing interests statement is provided in the interest of transparency and to ensure the integrity and impartiality of the research presented.

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Case Report

Pan African Journal of Emergency and Critical Care (PAJEC)

Vision-Saving Intervention: Emergency Lateral Canthotomy and Cantholysis in a Pediatric Patient with Orbital Compartment Syndrome: A case report

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ABSTRACT

Lateral canthotomy is an emergency procedure done to relieve orbital compartment syndrome (OCS), typically when intraocular pressure (IOP) rises above 40 mmHg. OCS is an ophthalmic emergency usually caused by increased pressure in the orbit, often due to retro-orbital bleeding or hematoma. We present the case of a 5-year-old child who developed orbital compartment syndrome following a road traffic accident. The patient underwent lateral canthotomy and cantholysis in the emergency department. Through this report, we aim to advocate for emergency physicians to perform this procedure in the ED setting to avoid delays associated with waiting for an ophthalmologist.

Keywords: Lateral canthotomy and cantholysis.
Orbital compartment syndrome.

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1. Introduction

Orbital compartment syndrome (OCS) is a true eye emergency that needs to be recognized and treated quickly to avoid permanent vision loss. The orbit functions as a closed space, tightly bound by the orbital septum and surrounding periosteum. Any sudden increase in volume behind this septum, such as from bleeding or swelling, can rapidly raise orbital pressure. If not managed promptly, this elevated pressure can cut off blood flow to the optic nerve and retina, leading to irreversible damage.[2]

The most common causes of orbital compartment syndrome include retrobulbar hemorrhage from trauma, especially if in a hypocoagulable state,[3] retrobulbar anesthetic injection, and eyelid surgery. Spontaneous retrobulbar hemorrhage due to venous anomalies, atherosclerosis, intraorbital aneurysm of the ophthalmic artery, hemophilia, leukemia, von Willebrand disease, and hypertension are uncommon but have also been described. Other causes include prolonged prone positioning,[4] orbital cellulitis (with or without subperiosteal abscess), expanding tumor, orbital emphysema (patient blows nose after a blowout fracture), orbital inflammatory syndrome, and aggressive fluid resuscitation in patients with burns due to third-spacing of fluid in the orbit.[5,6]

Patients with increased orbital pressure present with pain, proptosis, decreased vision, dyschromatopsia, diplopia, limited extraocular movements, ecchymosis around the eye, bloody chemosis, increased intraocular pressure (IOP), resistance to retropulsion, and a relative afferent pupillary defect.

The lateral and medial canthal tendons attach the eyelids to the orbital rim and are in continuity with the orbital septum, which limits anterior displacement of the globe.[7]

Orbital pressure can be relieved with an emergent lateral canthotomy and cantholysis. [8] Without decompression, increased orbital pressure can cause irreversible vision loss due to direct compressive optic neuropathy, central retinal artery occlusion, compression of optic nerve blood supply, or ischemic optic neuropathy from stretching of blood vessels.[9]

Lateral canthotomy and cantholysis should be performed for ocular compartment syndrome (most commonly caused by retrobulbar hemorrhage) with acute loss of visual acuity, relative afferent pupillary defect, increased IOP, and proptosis.[10] In the unconscious or uncooperative patient, an IOP greater than 40 mm Hg, especially with a relative afferent pupillary defect, is an indication for lateral canthotomy (normal IOP is 10-21 mm Hg).[11]

2. Case report

We present a case of a 5-year-old female child who arrived at the ED approximately two hours after being involved in a road traffic accident (RTA) as a pedestrian struck by a moving vehicle. She was brought in by her cousins, who described her as having been thrown into the air. She experienced a loss of consciousness following the incident.

She had no known past medical or medication history. Her last meal was 5 hours before the trauma. She was initially taken to the local Health Center and then referred to the Emergency Department (ED).

Blood-tinged secretions were suctioned, an oral airway was inserted, and she was subsequently intubated. Respiratory rate was 32–34 breaths per minute, with SpO2 of 94% on face mask oxygen. Auscultation revealed bilateral chest congestion. Blood pressure was 86/49 mm-Hg, and pulse was 137, feeble. She was given 20 ml/kg of cross-matched blood, after which BP improved to 132/100 mmHg and PR to 128. Glasgow Coma Scale (GCS) was E2V2M4 8/15. RBS was 134 mg/dl. Pupils were bilaterally dilated and sluggish.

Her left eye was markedly swollen and felt as hard as a rock. Significant periorbital edema made it difficult to retract the eyelid. Visual assessment was challenging due to her altered mental status. Bedside ocular ultrasound revealed signs of a retrobulbar hematoma. CT imaging confirmed bilateral frontal

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acute epidural hematomas and a left-sided retrobulbar hematoma. We did a bedside lateral canthotomy and cantholysis.

Details of the procedure

1) After confirming the affected eye and noting findings of unilateral proptosis, an afferent pupillary defect, decreased visual acuity, and an intraocular pressure (IOP) of ~40 mm Hg or higher.
2) We irrigated the left eye with normal saline.
3) We provided adequate anesthesia by injecting 1 mL of lidocaine 2% with epinephrine into the left lateral canthal area. We directed the needle tip toward the left lateral orbital rim and began injecting when the needle touched bone. The combination of lidocaine with epinephrine assists with hemostasis and local anesthesia.
4) We used a straight hemostat to clamp (crimp) the skin at the lateral corner of the patient's eye all the way down to the orbital rim for 1-2 minutes. Clamping facilitates homeostasis and marks the location where the incision is to be made.
5) We then identified the inferior crus of the lateral canthus and incised it.
6) We did not cut the superior crus of the lateral canthus since the first procedure significantly reduced the pressure.

Subsequently, the patient underwent bi-frontal craniotomy and hematoma evacuation. She was able to be extubated on the 3rd day and discharged from the hospital after 10 days with intact vision

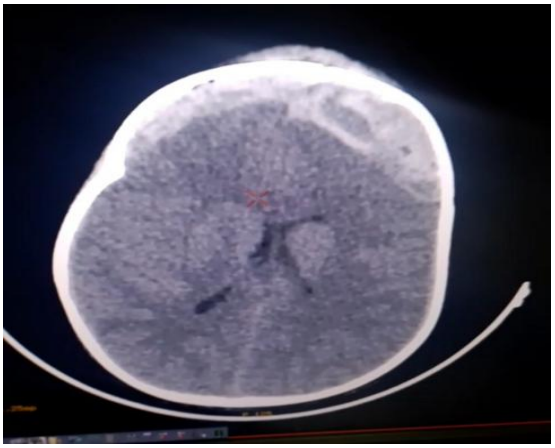

Fig 1: Head CT, which shows a bifrontal hyperdense lesion suggesting bifrontal AEDH

Fig 2: Head CT, which shows a hyperdense area inside the left orbit, which shows left retrobulbar hematoma

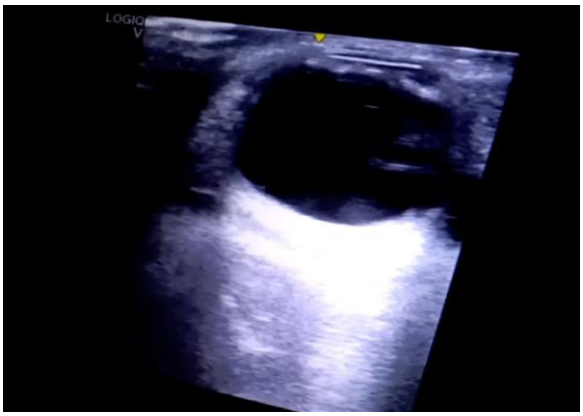

Fig 3: Ocular ultrasound image showing retrobulbar hematoma

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3. Discussion

Orbital compartment syndrome (OCS) is a rare but vision-threatening emergency that results from a rapid increase in intraorbital pressure, typically due to retrobulbar hemorrhage. If not promptly treated, OCS can lead to ischemic optic neuropathy and permanent vision loss.[12,13] Lateral canthotomy and cantholysis (LCC) is the primary emergency procedure used to decompress the orbit and preserve vision in such cases. [12,14]

Although more frequently reported in adults, OCS can occur in pediatric patients, often following blunt orbital trauma, surgical complications, or bleeding disorders.[15,20] The incidence of OCS in children is not well established due to its rarity, but clinicians must maintain a high index of suspicion, especially in trauma cases. Pediatric OCS can be particularly challenging to recognize due to difficulties in clinical examination and communication, especially in younger, non-verbal children. Key signs such as proptosis, a firm globe, decreased visual acuity, relative afferent pupillary defect (RAPD), and increased intraocular pressure should prompt immediate action.[16,20]

The procedure involves making an incision at the lateral canthus, followed by lysis of the inferior and sometimes superior canthal tendons to allow for decompression of the orbital contents. LCC is a rapid, effective, and sight-saving intervention that can be performed at the bedside with minimal equipment. Studies have reported vision preservation in approximately 67%–85% of cases when the procedure is performed within one hour of symptom onset.[14,17] Delays beyond 90–120 minutes are associated with significantly higher rates of permanent vision loss.[14,18]

In our case, the patient presented with clinical signs consistent with OCS, including proptosis, pain, reduced visual acuity, and elevated intraocular pressure following blunt orbital trauma. Prompt recognition and intervention with lateral canthotomy and inferior cantholysis resulted in immediate clinical improvement. Visual acuity improved post-procedure, and intraocular pressure normalized, supporting the effectiveness of this emergency intervention.

Despite its high success rate, LCC is not without risks. Possible complications include globe perforation (especially in cases with posterior staphyloma), eyelid notching or malposition, infection, hemorrhage, scarring or cosmetic deformity, and incomplete decompression if only partial cantholysis is performed.[13,19] In pediatric populations, the risks are slightly heightened due to anatomical differences and increased difficulty with procedural cooperation.[20] However, in the setting of impending or established OCS, these risks are justified by the potential to prevent irreversible blindness.

This case highlights the importance of timely recognition and management of OCS in children. Emergency physicians, trauma teams, and pediatric care providers should be trained in LCC as a core procedural skill.

4. Conclusion

Lateral canthotomy and cantholysis are vision-saving emergency procedures that should be promptly performed when orbital compartment syndrome is suspected, even in pediatric patients. This case highlights the importance of early recognition of clinical signs, such as proptosis, ophthalmoplegia, and elevated intraocular pressure, and the use of bedside tools like ocular ultrasound to support diagnosis when clinical examination is limited. Timely intervention in this case likely contributed to the prevention of permanent vision loss. It also emphasizes the need for heightened awareness among emergency

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and critical care providers to act swiftly in such rare but critical scenarios in children.

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Competing interest

The authors declare that they have no competing interests.

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Case Report

Pan African Journal of Emergency and Critical Care (PAJEC)

Acquired Esotropia, Focal Seizure, and Subdural Hemorrhage (SDH) in a newly diagnosed moderate hemophilia B child: a case report

Ephrem Basazinew[1*], Merahi Kefyalew[1], Getachew Alemu[1], Alemu Bimrew[1], Enyew Liyew[1], Getachew Abebe

ABSTRACT

Introduction*: This case report is relevant to clinicians across multiple disciplines, especially in resource-limited settings, as it illustrates how careful non-surgical management can lead to favorable outcomes in complex bleeding conditions. It could guide future case management, especially for pediatricians and hematologists.*

Case Presentation*: We present the case of a 2-year and 4-month-old male Ethiopian child who was newly diagnosed with moderate hemophilia B and developed esotropia, focal seizures, and subdural hemorrhage after a fall. The surgery was deferred because of the high risk of bleeding, and he was successfully managed with factor IX (FIX), and the child was discharged with a full recovery. Currently, the child is 4 years and 6 months old, and he is active without any apparent focal neurological deficits or seizures. The child is on regular follow-up and does not require any further interventions except for factor IX (FIX) transfusion.*

Conclusions*: This is the first case report describing a newly diagnosed child with Hemophilia B presenting with acquired esotropia, subdural hemorrhage, and focal seizure. Despite the presence of mass effects, the patient was successfully treated with factor IX replacement therapy, avoiding the need for neurosurgical intervention.*

Keywords: Esotropia, Seizure, Subdural Hemorrhage, Hemophilia

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1. Introduction

Hemophilia is a rare genetic disease that results from mutations in the genes that code for proteins necessary for normal blood clotting [1]. Worldwide, the prevalence per 100,000 males is 17.1 cases for hemophilia A, 3.8 cases for hemophilia B [2]. In Africa, the overall prevalence of Hemophilia A was 6.82 cases per 100,000 persons [3]. In Ethiopia, the prevalence of Hemophilia is 2.2 to 9.6 cases per 100,000 persons [4]. There are three types of Hemophilia caused by a deficiency of coagulation factors: hemophilia A, hemophilia B, and hemophilia C. [5]

Hemophilia A is caused by a deficiency of clotting factor VIII and is the most common type. A deficiency in clotting factor IX causes Hemophilia B (also known as Christmas disease) [6]. Hemophilia C (also known as Rosenthal syndrome) is a deficiency of clotting factor XI. It is a sporadic form of hemophilia that is found equally in men and women and is most common in certain ethnic groups, especially people of Ashkenazi Jewish descent (occurring in up to 8%). Most patients with hemophilia C have less severe bleeding problems than those with factor VIII or IX deficiency and do not experience hemarthroses. The risk of bleeding does not correlate with the Factor level in patients with hemophilia C. [7]

In Hemophilia A and B, severity is classified into three categories according to the level of circulating clotting factors. Mild hemophilia is defined by greater than 5% to 40% factor activity. Moderate hemophilia has 1% to 5% factor activity. Severe hemophilia has less than 1% factor activity. Patients with mild hemophilia tend to experience abnormal bleeding only in response to surgery, tooth extraction, or injuries. Conversely, patients with moderate hemophilia experience prolonged bleeding responses to relatively minor trauma, and patients with severe hemophilia experience frequent spontaneous bleeding, especially recurrent hemarthroses and soft-tissue hematomas, leading to severe arthropathy, joint contractures, and pseudotumors and, consequently, to chronic pain, disability, and reduced quality of life.[8]

Over time, Hemophilia A and B are considered clinically indistinguishable from each other. Recent evidence, however, suggests that patients with hemophilia B have a less severe bleeding phenotype, a lower bleeding frequency, and better long-term outcomes (a lower likelihood of joint arthroplasty).[9] This is the first case report globally of acquired esotropia, focal seizures, and subdural hemorrhage in a newly diagnosed child with type B hemophilia following an accidental fall. This case report is unique because of its multifaceted clinical presentation, the challenges posed by Hemophilia B, and the implications for treatment strategies across different specialties.

2. Case report

History of presenting illness

This was a 2-year and 4-month-old male Ethiopian child who presented to the pediatric emergency department with abnormal body movement, which was characterized by rhythmic jerking of his right hand with lip-smacking. He had three attacks, each lasting 4 to 5 minutes with drooling of saliva, but he gained consciousness between each episode. In association with this, he had a history of high-grade intermittent fever and decreased mental acuity. For this, he visited a nearby governmental hospital and was admitted for 4 days with the assessment of complicated meningitis + focal seizure. The patient was on ceftriaxone, vancomycin, and phenytoin. A brain MRI revealed a subdural hemorrhage, so the patient was referred to Tikur Anbesa Specialized Hospital (TASH) for neurosurgical evaluation. At TASH, a detailed history revealed that the child's maternal uncle had hemophilia and that the child had a history of easy bruising but no bleeding during circumcision.

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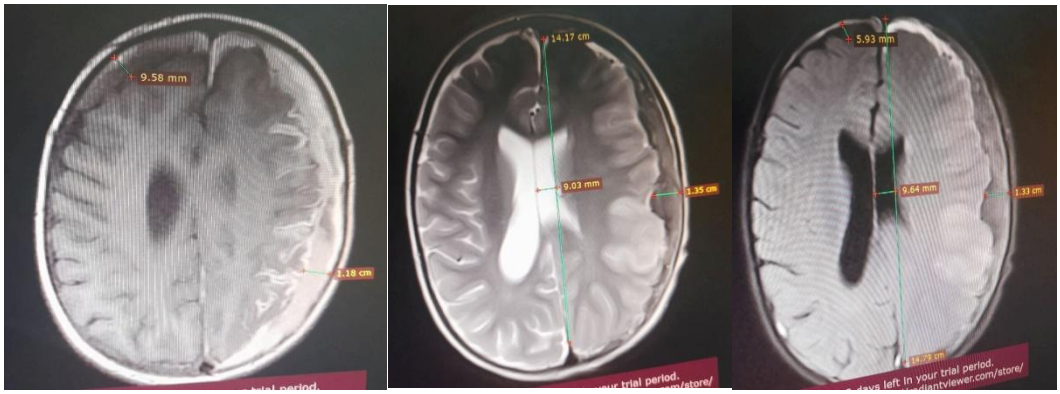

Figure 1: Brain MRI with contrast: Left holocerebral convexity and right occipital SDH (acute to subacute) with subfalcine herniation plus left front oparietal gyriform restriction likely postictal

Past Medical History

A month back, he experienced a fall on the left side of the head while he was playing in the house. The next morning, he started to experience frequent episodes of vomiting of ingested matter, and he developed inward deviation of his left eye. The vomiting stopped with ondansetron. For the eye complaint, the patient visited an ophthalmology clinic, and on retinoscopy examination, there was a slightly blurry disc margin. With the assessment of acquired esotropia, he was managed with eye patching therapy. The ophthalmologist suggested brain imaging, but it was not performed at that time.

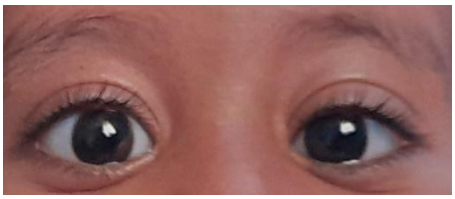

Figure 2: Patient picture: Patient image showing left eye inward deviation (esotropia). Posted with parental consent

Physical examination

The patient was irritable in general appearance. The vital signs were unremarkable except for the fever (38.3 degrees centigrade). HEENT evaluation = Inward deviation of the left eye, Pale conjunctiva, 2x3 cm ecchymosis over the left mandibular area. Central nervous system evaluation, Pediatric coma score =14/15 (E4M6V4), pupils were midsized and reactive bilaterally with no signs of lateralizing.

Investigations

On CBC, WBC=13.2 K With a neutrophil count of 82.8%, hematocrit=22.3, hemoglobin=7.4 and platelet=300k

Factor IX =1.8%, Factor VIII =293.9%, aPTT =190 seconds, INR=1.08 and PT=10.7.

Management

For this, he started Factor IX (FIX) therapy by using Factor IX replacement formula (according to World Federation of Hemophilia and other standard guidelines): FIX dose (IU) = (Target F IX levels –Factor FIX baseline levels) X body weight (kg) X 1 unit/kg. In this case, the target was 100% because of intracranial bleeding.

Outcome

After 3 days of initiation, the esotropia disappeared, the child became active, the seizures and fever were controlled, the aPTT normalized (24.4 s), and the repeated MRI revealed a significant reduction in the midline shift.

The surgery was deferred due to the high risk of bleeding, and there was great clinical improvement with the factor replacement. With an 8-day total stay in the pediatric ward, the child was discharged in full recovery and assigned to the OPD

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of hematology, neurology, and neurosurgery. After 4 months of continued phenytoin, an electroencephalogram (EEG) was performed, which revealed a normal wake EEG tracing. Thus, the neurology team decided to taper the phenytoin and discontinued it. Currently, the child is 4 years and 6 months old, and he is active without any obvious focal neurological deficits or seizures. The child is on regular follow-up and does not require any further interventions except for factor IX (FIX) transfusion.

Figure 3: Patient Picture: After esotropia disappeared with treatment

3. Discussion

The strengths of this case report include the Novelty of the case, a comprehensive management approach, and multidisciplinary relevance. As a single case report, the findings may not be generalizable to all patients with hemophilia. Our case illustrates that conservative management with factor replacement without neurosurgical treatment may be considered and may result in good outcomes in hemophilic children with complications such as esotropia, seizures, and subdural hematomas. Intracranial hemorrhage (ICH) is relatively rare, with an incidence ranging from 2 -15%, but it is one of the most dangerous and life-threatening events in individuals with hemophilia.[10] Several risk factors are associated with ICH in patients with hemophilia, including a history of trauma, severe disease, the presence of factor inhibitors, age over fifty years, age two years or younger, and not receiving prophylactic treatment regimens.[11]

ICH patients present with a wide spectrum of manifestations. Among these, the patient will have focal neurologic signs. The specific presenting symptoms may vary according to the location of the bleeding overlying the brain structures impacted. For example, if the bleeding involves the frontal lobe, the patient will have hemiparesis and speech impairment, and if the posterior fossa is involved, the patient will experience headache, vomiting, anisocoria, nuchal rigidity, ataxia, and cranial nerve palsies. Among the cranial nerve palsies, abducens nerve palsy (cranial nerve 6) is responsible for acquired esotropia. Esotropia is a type of strabismus or misalignment. In esotropia, the eyes are crossed; that is, while one eye looks straight ahead, the other eye is turned in toward the nose. Without proper treatment, esotropia poses increased risks of injury, irreversible vision loss, and decreased functional ability, ultimately significantly reducing one's socioeconomic status. [12, 13]

Hemophilia is a type of secondary hemostasis disorder that manifests as increased activated partial thromboplastin time (aPTT). The platelet count and prothrombin time (PT) are normal in hemophilia patients. Measurement of the factor activity level revealed a reduced level (less than 40%). Neuroimaging, particularly noncontrast head CT, is a vital tool for diagnosing intracerebral hemorrhage. However, factor administration should not be delayed while awaiting neuroimaging; an immediate dose should be given to raise the levels of FVIII or FIX to 80-100% in severe and life-threatening CNS bleeding.[14] For hemophilia A, an initial acute dose of approximately 50 IU/kg of FVIII, followed by repeated bolus dosing every 8–12 h or continuous infusion. In hemophilia B, the initial dose, in general, is 100–120 IU/kg followed by bolus dosing every 12–24 h or continuous infusion. As per the World Federation of Hemophilia Guidelines, for confirmed CNS bleeding, appropriate factor levels

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need to be maintained for a period of up to 14 days. [15]

The mainstay of treatment for hemophilia B involves replacing the missing blood coagulation factor FIX when bleeding episodes occur (on-demand treatment) or by scheduled infusions several times per week (prophylaxis treatment). Both plasma-derived (PD) and recombinant (r) FIX clotting factor concentrates are suitable for these different strategies of hemophilia B management. [16]

Owing to the economic constraints associated with its procurement, bleeding episodes are regularly dealt with fresh frozen Plasma (FFP) or cryoprecipitate in low-resource countries. Compared with FFP, Cryoprecipitate is better owing to rapid correction of the coagulation fraction, which leaves a lower chance of volume overload and minimizes the likelihood of recipient leucocyte-mediated nonhemolytic febrile transfusion reactions. However, FFP is a readily available and affordable option. [17] Studies have shown that simultaneous treatment with TXA and rFVIII significantly improves clot stability in patients with hemophilia A. [18] Desmopressin (DDAVP) is a treatment option for some patients with mild factor VIII deficiency. DDAVP causes the release of vWF and factor VIII stores from endothelial cells. A DDAVP challenge is performed to prove the response. If a patient has an adequate response to DDAVP, it can be used as a treatment for acute bleeding and prophylactically for tooth extraction in patients with mild disease. DDAVP is not effective in patients with moderate or severe hemophilia A. [19]

The use of surgery for subdural hematomas in hemophiliac children is debatable. The general recommendation for hemophilia patients with intracranial hemorrhage is conservative and is based on factor replacement. Neurosurgery in a child with hemophilia may be considered only when the patient has life-threatening central nervous system bleeding. [20]

4. Conclusion

This is the first case report describing a newly diagnosed Ethiopian child with Hemophilia B presenting with acquired esotropia, subdural hemorrhage, and focal seizure. Despite the presence of mass effects, the patient was successfully treated with factor IX replacement therapy, avoiding the need for neurosurgical intervention.

Abbreviations

aPTT -activated partial thromboplastin time
DDAVP- Deamino-8-D-arginine vasopressin
EEG-Electroencephalogram
FFP-Fresh frozen Plasma
SDH -Subdural hematoma
ICH-Intracranial hemorrhage
PD-Plasma-derived
PT-prothrombin time
TASH -Tikur Anbesa Specialized Hospital

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Competing interests

The authors declare that they have no competing interests.

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Ethics under pressure: A narrative review of critical care challenges and contemporary approaches

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ABSTRACT

Critical care medicine involves rapid, high-stakes decision-making that often gives rise to complex ethical dilemmas. These challenges are intensified in low-resource settings such as Ethiopia, where infrastructure, training, and access to services are limited.

This narrative review explores four major thematic areas of ethical concern in critical care: resource allocation and triage decisions, end-of-life care, informed consent, and equity in service delivery. It examines both traditional ethical frameworks, including the four principles approach, deontology, and virtue ethics, and contemporary approaches such as narrative ethics, relational autonomy, and ethics consultation services. Cultural values, system limitations, and communication gaps are analyzed with specific reference to the Ethiopian context.

By synthesizing international literature with low-income country realities, the review highlights the urgent need for contextualized ethical guidelines, expanded ethics education, and institutional support mechanisms. Strengthening ethical capacity in critical care is essential to ensure compassionate, fair, and patient-centered care delivery in both high- and low-resource settings.

Keywords: Ethical dilemmas, Critical care, Ethiopia, Resource allocation, Informed consent, End-of-life care

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Introduction

Critical care medicine operates in an environment characterized by high-stakes decision-making, where healthcare professionals are often required to make rapid choices under conditions of extreme uncertainty and significant emotional stress. [1, 2] These settings, which are primarily concerned with managing life-threatening conditions, are inherently prone to ethical dilemmas due to the need to navigate complex scenarios involving conflicting values, scarce resources, and the unpredictable nature of critical illnesses. [3]

In low-income countries like Ethiopia, these ethical dilemmas are further compounded by chronic under-resourcing, limited healthcare infrastructure, and systemic barriers to access. For instance, ICU bed availability and mechanical ventilator access are often extremely limited, placing disproportionate ethical burdens on frontline providers who must make triage decisions with few formal guidelines and under immense pressure. A study reviewing ICU services in Ethiopia reports only 0.3 public ICU beds per 100,000 people, far below those in high-income countries, highlighting the acute scarcity of critical care infrastructure.[4, 5]

One of the most prominent ethical challenges in critical care is the allocation of scarce resources, such as ventilators, ICU beds, medications, and trained personnel, particularly during periods of high demand like pandemics or mass casualty events.[6] During the COVID-19 pandemic, for instance, healthcare systems around the world were forced to implement triage protocols to prioritize care based on factors such as the likelihood of survival and quality-adjusted life years, highlighting the ethical complexities of balancing utilitarian and egalitarian principles in medical decision-making.[7] These protocols, however, often inadvertently exacerbate existing health inequities and disproportionately affect vulnerable populations, further complicating ethical deliberations.[8]

End-of-life care in critical care settings presents another set of substantial ethical dilemmas, particularly around decisions to withhold or withdraw life-sustaining treatments. Healthcare providers must often navigate between respecting patient autonomy and professional assessments of medical futility, while also considering the cultural and religious beliefs of patients and their families.[9] Conflicts can arise when family members demand continued aggressive treatment despite a poor prognosis, which can lead to moral distress among healthcare providers who may feel that the care provided is not in the patient's best interests.[10, 11]

The issue of informed consent is particularly challenging in critical care. Many patients are unable to participate in decision-making due to the severity of their conditions, necessitating the involvement of surrogates who may not always be well-informed or may have conflicts of interest. In emergencies, obtaining informed consent can be further complicated by the level of mentation, time constraints, language barriers, and the absence of advance directives, which complicates the healthcare provider’s ability to act following the patient's wishes.[12] Studies show that up to one-third of ICU admissions involve some degree of surrogate decision-making, and their emotions and cognition undergo complex processes during the decision-making, underscoring the frequency and ethical complexity of these situations.[13]

Equity and fairness in the provision of critical care services also pose significant ethical challenges. Disparities in access to critical care are well-documented, with differences in treatment availability and quality often correlated with factors such as

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race, socioeconomic status, insurance coverage, and geographic location. In many cases, systemic inequities may be further exacerbated by implicit biases, institutional policies, or structural barriers, necessitating deliberate efforts to ensure the just distribution of care.[14]

Given the profound impact of these ethical challenges on patients, families, and healthcare providers, there is an urgent need for robust ethical frameworks and strategies to guide decision-making in critical care settings. Various frameworks have been proposed, including those grounded in the principles of bioethics, virtue ethics, and care ethics. Yet, there remains considerable debate over how best to apply these frameworks in diverse and resource-limited environments.[1, 15] This review builds on existing literature to examine the primary ethical dilemmas in critical care and evaluate relevant decision-making frameworks, with attention to their applicability in low-resource settings such as Ethiopia.

Ethical principles

A classic on the subject of medical ethics is Beauchamp and Childress' Principles of Biomedical Ethics. The four principles of beneficence, justice, respect for autonomy, and non-maleficence were "unveiled" in the first edition, which was released in 1979 in the then-emerging field.

Ethical decision-making in critical care revolves around the four fundamental principles. These principles serve as a framework for healthcare providers to navigate complex ethical situations.

A. **Autonomy** refers to the patient's right to make informed decisions about their care, reflecting the values of self-determination and respect for personal choice.

B. **Beneficence** involves actions that promote the well-being of patients, obligating healthcare providers to act in the best interest of the patient.

C. **Non-maleficence** emphasizes the duty to do no harm, requiring careful consideration of the risks and benefits of treatment options.

D. **Justice** relates to fairness in the distribution of healthcare resources, ensuring equitable access and treatment across different populations.

Application in critical care

In critical care settings, these ethical principles guide clinicians' decisions to balance competing demands and values:

A. Autonomy in critical care

The principle of autonomy can be challenging to uphold in critical care, where patients may be incapacitated due to their medical condition and unable to participate in decision-making.

B. Beneficence and non-maleficence in critical care

Beneficence and non-maleficence are central to the critical care practice, where clinicians must continually weigh the potential benefits of life-sustaining treatments against the risks and possible harms.[16] This is particularly challenging in cases with uncertain prognoses or where interventions may prolong suffering without meaningful recovery.

C. Justice in critical care

The principle of justice is particularly relevant in critical care during times of resource scarcity, such as pandemics or mass casualty events, where decisions about allocating limited resources must be made.

Major ethical dilemmas in critical care

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These dilemmas often arise due to conflicts between ethical principles, clinical uncertainty, limited resources, and diverse patient values and preferences. To address such challenges, clinicians rely on structured ethical frameworks, interdisciplinary collaboration, and institutional ethics consultation services, which guide real-time decision-making. Three central areas of ethical concern in critical care are resource allocation and triage decisions, end-of-life care decisions, and informed consent.

1. Resource allocation and triage decisions

Resource allocation in critical care refers to the difficult choices that must be made about the distribution of a few resources, such as ventilators, ICU beds, drugs, and staff time, particularly in times of emergency or natural catastrophe.[9, 17] Triage decisions, particularly in resource-limited environments, amplify the challenge of applying ethical principles fairly and consistently in time-pressured scenarios.[17]

Triage is a common process used to prioritize patients based on their clinical condition and likelihood of benefit from treatment. However, triage decisions can be controversial, as they may disadvantage certain groups of patients, leading to ethical debates about fairness and equity.[6] For instance, during the COVID-19 pandemic, many triage protocols prioritized patients with the highest likelihood of survival, which sometimes disadvantaged older adults and those with disabilities.[18]

Ethical frameworks for triage

Various ethical frameworks have been proposed to guide triage decisions:

- **Utilitarian approach:** this approach aims to maximize overall benefits by prioritizing patients most likely to survive with treatment or those who require fewer resources. While practical, this method may disadvantage older adults, those with disabilities, or individuals with pre-existing conditions, raising concerns about discrimination.[19]
- **Egalitarian approach:** this approach advocates for equal access to treatment regardless of prognosis, often using a "first-come, first-served" basis or random selection (lottery system). While fair in principle, this approach may not always be practical in emergencies where time and resources are scarce.[20]
- **Priority to the worst off:** this ethical principle, also known as the "rule of rescue," emphasizes prioritizing those who are most critically ill or at greatest risk of death. However, this can sometimes conflict with utilitarian approaches and lead to less efficient use of limited resources.[21]
- **Life cycle or fair innings approach:** this method gives priority to younger patients or those who have not yet lived through a normal life span, based on the idea of maximizing the total number of life years saved. While this approach may be socially acceptable, it also raises ethical concerns about ageism and the equal value of all lives.[22]

In Ethiopia, the absence of national critical care triage protocols during pandemics or disasters can lead to inconsistencies and moral distress. While utilitarian principles might theoretically guide resource allocation, in practice, healthcare workers often rely on ad hoc judgments shaped by urgency, cultural expectations, and the availability of equipment. Physicians frequently face bedside rationing and fairness dilemmas due to resource limitations and a lack of supporting guidelines.[4]

2. End-of-Life care decisions

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Medical futility refers to situations where interventions like mechanical ventilation, extracorporeal oxygenation, intra-aortic balloon counterpulsation devices, hemodialysis, and organ transplantation are unlikely to achieve meaningful benefits for the patient, such as survival with a reasonable quality of life. In critical care, defining and recognizing medical futility is particularly challenging due to clinical uncertainty, differing definitions of what constitutes "meaningful" outcomes, and variable prognostic tools.[23]

In many Ethiopian healthcare settings, end-of-life decisions are influenced by limited access to palliative care services and a lack of legal frameworks supporting advance directives. Cultural values also emphasize family-centered decision-making, often making it challenging to navigate conflicts between perceived obligations to continue treatment and clinical judgments of medical futility. Palliative care in Ethiopia remains urban-centric and donor-driven, with rural regions, home to ≈78% of the population, receiving little to no access.[24] A qualitative study across referral hospitals in the Amhara region reveals gaps in end-of-life care education, limited hospice programs, and patient suffering at life's end.[25]

A. Balancing autonomy and beneficence

There is often a tension between respecting patient autonomy, honoring their wishes, advance directives, or surrogate decisions, and healthcare providers' duty of beneficence, which may involve recommending the cessation of non-beneficial or harmful treatments.

Conflicts may arise when patients or their families demand life-sustaining treatments deemed medically futile by healthcare providers. While some jurisdictions allow providers to refuse such requests, others require continued treatment until an agreement is reached, creating ongoing ethical and legal challenges.[26]

B. Communication challenges

Effective communication between providers, patients, and families is crucial for making informed end-of-life care decisions. However, communication breakdowns are common, particularly in high-stress environments like ICUs, and can exacerbate ethical conflicts. A lack of formal training in navigating cultural values, shared decision-making, and palliative care communication further complicates end-of-life decision-making. Communication barriers may include language differences, cultural misunderstandings, emotional distress, or unrealistic expectations about treatment outcomes. Structured communication interventions, such as family meetings, decision aids, and ethics consultations, have been shown to improve understanding and reduce conflict.[27]

Ethical frameworks for end-of-life care decisions

Ethical decision-making at the end of life often employs a combination of the principle-based approach, virtue ethics, and narrative ethics. The principle of beneficence supports the compassionate withdrawal of futile interventions, while non-maleficence emphasizes the avoidance of harm through prolonged suffering. Autonomy is respected through advance directives or surrogate decision-making, although these are often underutilized in low-income contexts.

Narrative ethics encourages clinicians to understand patients' lived experiences and cultural narratives, which is particularly important in Ethiopia, where decisions are frequently guided by family consensus and spiritual values. Virtue ethics, emphasizing compassion, honesty, and courage, also plays a key role in supporting healthcare professionals through emotionally taxing end-of-life scenarios.[28]

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In Ethiopia and similar LICs, cultural values such as collective family decision-making, religious beliefs about suffering and death, and limited availability of palliative care services significantly influence end-of-life decisions. The lack of hospice infrastructure and legal recognition of advance directives often leaves healthcare providers in ethically gray zones, requiring culturally sensitive, case-specific judgment.

3. Informed consent in critical care

Informed consent is the process by which patients or their surrogates are provided with adequate information to make voluntary, well-informed decisions about their care. In critical care, obtaining informed consent is challenging due to the acuity of the patient's condition, the urgency of decision-making, and the frequent lack of patient capacity.

When patients cannot provide consent, surrogates are often involved; however, they may face emotional distress, have a limited understanding of medical complexities, or lack knowledge of the patient's true preferences.[29]

In Ethiopia, informed consent is further complicated by language diversity, limited health literacy, and traditional beliefs about authority and healing. Clinicians may struggle to balance the ethical obligation of patient autonomy with family-centered norms and urgent decision-making in emergency settings. These challenges reveal the importance of incorporating ethics and culturally sensitive communication training into clinical practice, particularly in multilingual and low-literacy settings. A study on breaking bad news in Ethiopia emphasized that patients prefer gradual, empathetic disclosure, accompanied by families, tailored to religious values and cultural norms.[30]

Ethical frameworks for informed consent in critical care

The ethical basis for informed consent is rooted in autonomy, supported by fidelity and veracity. In critical care, clinicians must make rapid decisions while ensuring respect for the patient's rights and preferences. The relational autonomy framework is particularly applicable in LICs like Ethiopia, where family members often share in decision-making and where individual autonomy is socially contextualized.[30]

Casuistry, or case-based reasoning, also plays a role in adapting consent practices to complex, time-sensitive scenarios, especially when cultural norms prioritize collective decision-making or when formal advance directives are absent.

Cultural norms in Ethiopia often emphasize deference to authority, family-centered consent, and spiritual beliefs in healing, which can complicate Western notions of individual autonomy. In areas with limited health literacy, clinicians must also navigate how best to ensure informed participation while balancing time constraints and patient vulnerability.[30]

Ethical frameworks and approaches for decision-making in critical care

Ethical decision-making in critical care involves applying structured frameworks to navigate complex dilemmas and balance competing values. Several frameworks guide clinicians in making ethically sound decisions that respect patient autonomy, promote beneficence, minimize harm, and ensure justice. Generally speaking, healthcare professionals prioritize issues like patient rights, justice, comfort, dignity, and respect for their wishes. A crucial component of aligning the care given with the patient's preferences, expectations, values, and circumstances is involving the patient and family in the decision-making process, whenever feasible. Figure 1 illustrates the ethical decision-making process in critical care

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settings. It outlines key steps, including recognizing ethical dilemmas, interdisciplinary team discussion, evaluating ethical principles, involving patients or surrogates, and transparent disclosure. The arrows indicate the logical sequence of actions, emphasizing that ethical decision-making is a dynamic and collaborative process guided by core bioethical principles. (adapted from Amanda Rischbieth, Julie Benbenishty, Ethical Issues in Critical Care | Clinical Gate).[31]

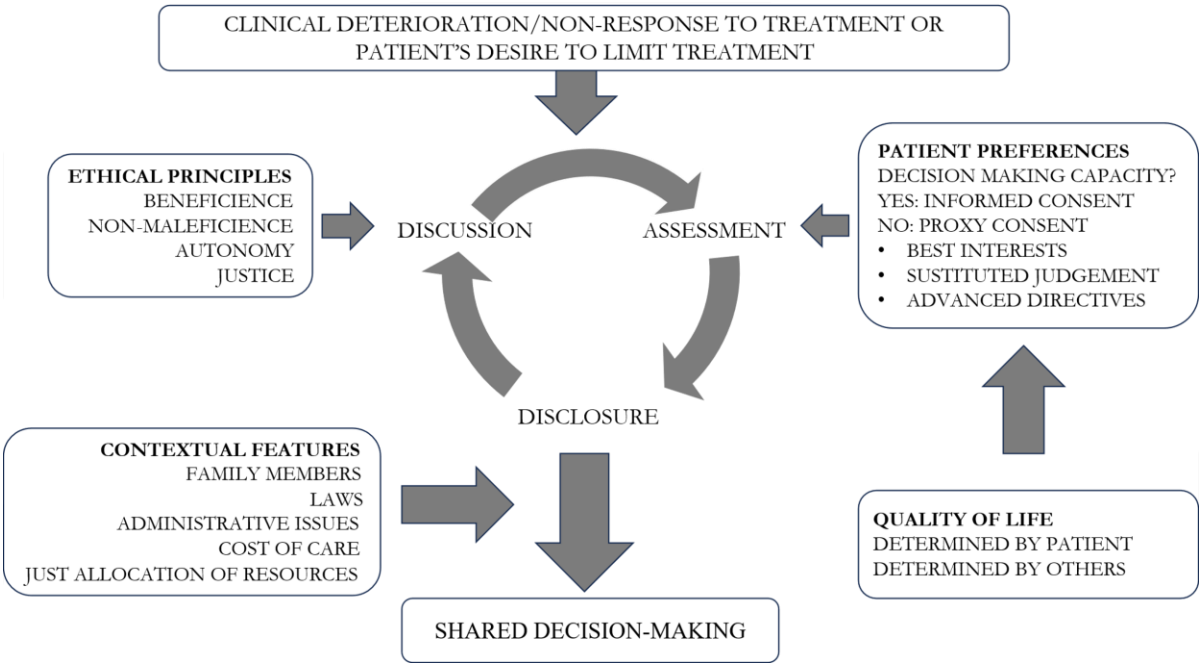

Figure 1: The ethical decision-making process in times of ethical dilemma in critical care

Ethical decision-making in critical care involves utilizing both traditional ethical frameworks and contemporary approaches to address complex dilemmas and balance competing values. Below is a classification of these frameworks and approaches:

1. Traditional ethical frameworks

A. Four-Principles Approach

The four-principles approach (Beauchamp & Childress) emphasizes the core principles of autonomy, beneficence, non-maleficence, and justice. It serves as a foundational framework for ethical decision-making by providing a balanced method to consider different ethical aspects in critical care. In critical care, this framework helps navigate ethical issues by respecting patient autonomy, ensuring beneficence and non-maleficence, and promoting justice, particularly in resource allocation and end-of-life care.

- **Advance directives**, such as living wills or durable powers of attorney for healthcare, are tools designed to protect patient autonomy in critical care. These documents allow individuals to outline their preferences for medical treatment should they become unable to communicate their decisions. However, they are often underutilized or unavailable in urgent situations, creating ethical tension for healthcare providers who must act in the patient's best interest while respecting their autonomy.[32]
- When patients are incapacitated and unable to communicate their preferences, the **Substituted Judgment Principle** is employed to guide decision-making. This principle directs

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surrogates, often family members, to make choices that align with what the patient would have wanted, based on their known values and prior statements. The goal is to respect the patient's autonomy even in the absence of direct consent. However, challenges arise when surrogates lack sufficient knowledge of the patient's wishes or when these wishes conflict with the healthcare team's assessment of what is in the patient's best interest.[33]

B. Casuistry

Casuistry focuses on case-based reasoning and uses specific examples to navigate ethical dilemmas, drawing on past cases and analogies. In critical care, this approach is useful for resolving complex instances in which general principles may conflict, providing flexibility and context-specific judgment.[34]

C. Deontology

First put forward by Immanuel Kant (1724 – 1804), deontology is a duty-based ethical framework that prioritizes adherence to moral rules and principles, regardless of the consequences. It is grounded in the belief that certain actions are inherently right or wrong.[35]

Deontology plays a significant role in guiding decisions in critical care by emphasizing strict adherence to moral principles and ethical rules.[36] In high-pressure ICU settings, this means prioritizing duties such as maintaining confidentiality, ensuring informed consent, and honoring advance directives, like do-not-resuscitate (DNR) orders. For instance, clinicians are often faced with the ethical obligation to uphold a patient's autonomy by respecting their documented wishes, even when family members push for alternative actions.

However, deontology's rigidity can present challenges. In the rapidly evolving circumstances of critical care, strict adherence to rules may not always accommodate the complexities of individual cases.[37] For example, a rigid commitment to a DNR order might overlook new, potentially life-saving interventions that align with the patient's broader values. Additionally, conflicts between ethical duties, such as balancing respect for autonomy with the duty to prevent harm, can create moral dilemmas for providers. Deontology's focus on the morality of actions rather than their outcomes can further complicate decisions when lives are at stake.[37]

While deontology provides a strong ethical foundation in critical care, its limitations highlight the need for complementary approaches, such as phronesis (practical wisdom) or narrative ethics, to navigate the complex and context-sensitive nature of critical care environments.

D. Virtue ethics

Virtue ethics centers on the character and moral virtues of healthcare providers, such as compassion, courage, and integrity. In critical care, it emphasizes the importance of the clinician's moral integrity and character in making decisions, particularly in morally distressing situations.[38]

E. Ethics of care

The ethics of care approach highlights the importance of caring relationships, empathy, and responsiveness to patient needs. In critical care, this framework supports a compassionate, patient-centered approach that addresses the emotional, social, and psychological needs of patients and their families.[39]

F. Fidelity

Fidelity refers to the ethical duty of healthcare providers to remain loyal, uphold commitments, and maintain trust with patients and their families.[40] Fidelity is essential in high-pressure environments like ICUs, where patients and families

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rely heavily on healthcare providers to act in their best interest. This includes maintaining continuity of care, being transparent about treatment goals, and advocating for the patient even when resource limitations or institutional policies pose challenges.[41] For example, a critical care physician might prioritize a patient's well-being over administrative pressures to discharge or transfer for resource optimization.

G. Veracity

Veracity is the ethical obligation to tell the truth and provide patients with accurate and honest information.[38] In critical care, veracity becomes particularly important in end-of-life discussions or when communicating about prognosis and treatment options. While full disclosure is essential, balancing honesty with empathy can be challenging, especially when delivering bad news. Veracity ensures that patients and families can make informed care decisions, fostering trust and ethical practice.

H. Paternalism

Paternalism involves making decisions on behalf of patients, based on the belief that it is in their best interest, sometimes overriding their autonomy.[42] In critical care, paternalism often arises when patients are incapacitated, requiring surrogates or healthcare providers to act on their behalf. While well-intentioned, paternalistic actions can conflict with respect for autonomy, especially if advance directives are unclear or unavailable.[43] For instance, a critical care team might initiate emergency surgery on an unconscious patient without consent, following the principle of implied consent. While paternalistic, this action is ethically justified to save the patient's life.

2. Contemporary approaches

A. Narrative ethics

Narrative ethics focuses on understanding the patient's and family's stories, values, and lived experiences to inform ethical decision-making. In critical care, it emphasizes individualized care and helps guide end-of-life decisions or conflicts over treatment goals by incorporating the patient's narrative into the decision-making process.[44]

B. Relational autonomy

Relational autonomy emphasizes the social context, relationships, and power dynamics that influence decision-making. According to this decision-making, exclusively focused on the individual exercise of autonomy fails to align well with patients' preferences at the end of life. In critical care, this approach addresses ethical issues related to cultural sensitivities, power imbalances, and family dynamics, providing a more nuanced understanding of patient autonomy.[28]

C. Ethics consultation services

Ethics consultation services offer structured support for healthcare teams, patients, and families in navigating ethical dilemmas through ethics committees or trained ethicists. In critical care, these services help improve communication, reduce moral distress, and mediate conflicts, ensuring ethically sound decision-making.

D. Moral distress mitigation strategies

These strategies aim to address moral distress experienced by healthcare providers when external constraints prevent them from acting according to their ethical beliefs. In critical care, approaches like ethics education, open communication, and organizational policy development help mitigate moral distress and promote ethical practice.[45]

The emotional burden of bedside triage, especially without structured ethical guidance, underscores the need for targeted ethics education and formal triage training in resource-limited settings like Ethiopia.

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E. Interdisciplinary team approaches

Interdisciplinary teams involving physicians, nurses, social workers, chaplains, and ethicists provide diverse perspectives and shared decision-making in ethical dilemmas. These teams are crucial in critical care for comprehensive and collaborative decision-making, ensuring all voices are considered.[46]

The unclassified phronesis

Phronesis (practical wisdom) is best understood as a more inclusive method that transcends the traditional vs. contemporary classification. It serves as a meta-ethical concept foundational to all ethical decision-making, regardless of the framework employed.

But why?

Foundational nature

Phronesis originates from Aristotelian philosophy and emphasizes practical wisdom, which underpins ethical reasoning in any context. It is not tied to any specific ethical framework but rather informs how frameworks are applied in real-world situations.

Universality

Both traditional approaches (like the four-principles approach, deontology, or virtue ethics) and contemporary approaches (like relational autonomy or narrative ethics) benefit from the application of phronesis. It guides practitioners in choosing which framework or principle to prioritize based on the specific context.

Adaptability across time

While rooted in classical philosophy, phronesis is timeless and applicable to modern, evolving ethical challenges. It supports the contextual, nuanced application of principles that are crucial in dynamic settings like critical care.

Hence, phronesis is a general and overarching concept. It acts as the ethical "glue" that allows both traditional and contemporary frameworks to be applied wisely and effectively in real-world situations, particularly in complex environments like critical care. It is not confined to any one approach but rather enriches and supports ethical decision-making across all paradigms.

Strengthening ethical practice in critical care settings

The field of critical care is evolving rapidly, presenting new ethical challenges that demand innovative solutions. As healthcare systems become more complex and patient populations more diverse, there is a growing need for robust ethical frameworks, policies, and strategies to address dilemmas in critical care settings.

1. Enhancing ethical competence through training and institutional support

Although not always explicitly addressed, many of the ethical challenges in this review, such as end-of-life care decisions, informed consent under pressure, and fair resource allocation, require healthcare professionals to possess strong ethical reasoning and communication skills. Institutions in Ethiopia and other LICs should incorporate targeted ethics education into medical and nursing curricula and provide in-service training focused on context-relevant dilemmas. These programs can improve clinicians' capacity to apply ethical frameworks practically in emotionally and culturally complex situations.

Enhancing ethics training for healthcare professionals

Critical care teams should receive comprehensive ethics training as part of their professional development. This training should encompass not only the theoretical aspects of traditional ethical

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frameworks but also practical skills in communication, conflict resolution, and cultural competence. Incorporating ethics training in medical and nursing curricula will better prepare clinicians to handle ethical dilemmas effectively and confidently.[47]

Implementing simulation-based ethics education

Simulation-based education has proven effective in teaching complex clinical skills and could be adapted to ethical decision-making. Scenario-based learning allows healthcare professionals to practice responding to ethical challenges in a controlled environment, enhancing their confidence and competence in real-life situations.[48] Expanding simulation programs to include ethical dilemmas related to end-of-life care, resource allocation, and patient autonomy can promote more robust ethical practices.

2. Promoting interdisciplinary collaboration and communication

Encouraging interdisciplinary teamwork

Collaboration among healthcare professionals from diverse disciplines is crucial for addressing ethical dilemmas comprehensively. Institutions should foster a culture that promotes open dialogue, respect, and shared decision-making among interdisciplinary team members. Regular ethics rounds or multidisciplinary meetings can facilitate this exchange of perspectives, reducing misunderstandings and fostering consensus.[49]

Improving communication with patients and families

Effective communication is fundamental to ethical decision-making in critical care. Healthcare providers should be trained in patient-centered communication techniques to build trust, clarify values, and ensure that patient and family preferences are understood and respected.[50] Using decision aids and adopting shared decision-making models can help bridge the gap between clinicians and families, particularly in high-stress environments like the ICU.

Ethical decision-making frameworks such as the four-principles approach, ethics of care, and narrative ethics are most effective when applied through interdisciplinary collaboration. In critical care, diverse team members, including physicians, nurses, social workers, and chaplains, bring different perspectives that enrich ethical deliberation. Ethical frameworks serve as shared languages that help these teams evaluate complex cases together, promoting consensus, clarity, and moral integrity in decisions.

3. Strengthening institutional support and policies

Developing clear ethical guidelines and protocols

Healthcare institutions should develop and regularly update ethical guidelines and protocols tailored to the complexities of critical care. These guidelines should cover key issues such as withdrawing and withholding life-sustaining treatment, managing medical futility, and handling conflicts of interest. Institutions should ensure that all staff members are familiar with these guidelines and that they are consistently applied in practice.

Establishing robust ethics consultation services

Hospitals should enhance access to ethics consultation services to support healthcare providers, patients, and families when ethical dilemmas arise. These services should include trained ethicists and multidisciplinary ethics committees capable of offering timely and impartial advice to assist with complex decision-making processes,

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for instance, when there are unrepresented patients among others.[51]

4. Addressing moral distress and enhancing provider well-being

Implementing oral distress mitigation programs

Moral distress is a significant issue for critical care providers, leading to burnout, reduced job satisfaction, and compromised patient care. Institutions should implement programs to identify, measure, and mitigate moral distress among healthcare providers, including peer support groups, debriefing sessions, and resilience training.[52]

Promoting a culture of ethical practice and support

Creating a supportive environment that prioritizes ethical practice is essential for fostering moral courage and integrity among healthcare providers. Leadership should encourage open discussion of ethical concerns, recognize ethical challenges as a natural part of clinical practice, and provide resources to support ethical decision-making.[53]

5. Capitalizing on technology and innovation

Utilizing digital tools for ethical decision-making

Technology, such as Artificial Intelligence (AI) and machine learning, has the potential to assist in ethical decision-making by providing real-time data analysis and decision support. These tools could help predict patient outcomes, optimize resource allocation, and identify potential ethical conflicts early, enabling proactive management of ethical dilemmas. The article "Use of Artificial Intelligence in critical care: opportunities and obstacles" by Pinsky et al. (2024) discusses the integration of AI-based clinical decision support systems (CDSS) in critical care. While AI offers significant potential to improve decision-making, challenges include data biases, lack of model transparency, legal barriers, and technical integration issues. The authors emphasize responsible design, fairness, and situational awareness in AI applications. They advocate for robust governance, interdisciplinary collaboration, and workforce upskilling to ensure safe and effective implementation.[54]

Developing telemedicine and remote ethics consultation services

With the expansion of telemedicine, remote ethics consultations could become more feasible, providing access to ethics expertise for providers in remote or underserved areas. This can help ensure that all critical care settings, regardless of location, can benefit from structured ethical guidance.[55]

6. Tailoring ethical frameworks for low-income contexts

Ethical decision-making frameworks must be adapted to local realities. In Ethiopia, this includes developing context-specific guidelines, investing in ethics education tailored to resource-limited environments, and promoting community engagement in discussions about critical care ethics. Expanding access to ethics consultation services and palliative care, even though telehealth, can help bridge the ethical support gap in under-resourced hospitals.

Conclusion

Ethical dilemmas in critical care are inevitable due to the high-stakes nature of the environment, where rapid decisions must often be made with limited resources and information. Challenges surrounding resource allocation, end-of-life care, informed consent, and ensuring equity are particularly pronounced in low-income countries like Ethiopia, where infrastructural, legal, and cultural

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factors further complicate ethical decision-making.

This review highlights how applying both traditional ethical frameworks (such as the four-principles approach, deontology, and virtue ethics) and contemporary approaches (including narrative ethics, relational autonomy, and interdisciplinary consultation) can guide clinicians through complex ethical scenarios.

Strengthening ethical practice in critical care requires a multifaceted approach that includes ethics education, institutional support, culturally sensitive communication, and context-specific guidelines. By integrating these strategies, critical care teams can foster more compassionate, just, and patient-centered care, even under pressure.

Abbreviations

PAJEC: Pan African Journal of Emergency and Critical Care
ICU: Intensive Care Unit
COVID-19: Coronavirus Disease 2019
QALY: Quality-Adjusted Life Years
DNR: Do Not Resuscitate
AI: Artificial Intelligence
CDSS: Clinical Decision Support Systems
LIC / LICs: Low-Income Country / Low-Income Countries

Author Contributions

NMM conceived the study, led the literature review, and drafted the initial manuscript.
MKM contributed to the literature search, analysis, and drafting of sections on end-of-life care and informed consent.
Both authors reviewed, revised, and approved the final manuscript.

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Conflict of Interest

The authors declare that they have no conflicts of interest related to this work.

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