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SCHOOL OF MEDICINE, COLLEGE OF HEALTH SCIENCES

Title: The Magnitude and determinants of sepsis and septic shock among adult patients admitted to Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia.

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ABBREVIATIONS AND ACRONYMS

ARDS	Acute respiratory distress syndrome
COPD	Chronic obstructive pulmonary disease
DM	Diabetic mellitus
ED	Emergency department
EGDT	Early goal directed therapy
FMOH	Federal Ministry of Health
HIV	Human immunodeficiency virus
ICU	Intensive care unit
MODS	Multi-organ dysfunction syndrome
SOFA	quick sequential organ failure assessment
SIRS	Systemic Inflammatory Response Syndrome
SOFA	Sequential Organ Failure Assessment.
SSC	Surviving sepsis campaign
TASH	Tikur Anbessa Specialized Hospital
UTI	Urinary tract infection
WHO	World Health Organization

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Abstract

Problem statement - Sepsis is defined as host immune dysregulation in response to an infection causing organ dysfunction. Globally more than 5 million deaths due to sepsis occur every year. In Ethiopia, the prevalence from one multicenter study conducted in ICUs was 26.5/ 100 ICU admissions. No studies outside the ICU and wards, such as the ED, have been conducted in Ethiopia. This study will reflect the burden of community-acquired sepsis and associated factors.

Objectives- To determine the magnitude and associated factors of sepsis and septic shock among adult patients in Tikur Anbesa Specialized Hospital Emergency Department (TASH ED), Addis Ababa, Ethiopia.

Methods – We used a Hospital-based prospective observational study using secondary data from medical records of patient charts. The study was conducted in Tikur Anbesa Specialized Hospital Emergency Department, Addis Ababa, Ethiopia from February 2024 to April 2024. Adult patients who visited the Emergency Department with complete medical records were included during the study period. A sample size of 400 was analyzed. A simple random sampling technique was used and patients were randomly selected by lottery. Data was kept confidentially and analyzed by Stata.

Results: among the 400 total included patients the prevalence of sepsis and septic shock account for 25.25%, and 5.5% of emergency department admissions respectively. The median age was 41 and males accounted for 216 (54%). The most common site of infection was unknown followed by respiratory and intra-abdominal infections (36%, 28%, and 24% respectively). Comorbidity was identified in 67.8% of patients with malignancy being the most frequent 22.25%. Organ failure was noted in 12% of the patients. Risk factors associated with the prevalence of sepsis include >50 years (AOR 2.8, 95% CI = 1.19-6.696), malignancy (AOR 5.54, 95% CI = 2.63-11.648), and organ failure (AOR 5.77, 95% CI =2.63-12.66).

Conclusion: The prevalence of sepsis and septic shock is 25.25% and 5.5% respectively in the emergency department of TASH. The factors associated with sepsis are age above 50, malignancy, and associated organ dysfunction.

INTRODUCTION

Sepsis is host immune dysregulation in response to an infection causing organ dysfunction (1). Organ dysfunction is represented by an increase in the Sequential (sepsis-related) Organ Failure Assessment (SOFA) score of two points or more (2). Septic shock is a severe condition characterized by abnormalities in circulation, cellular function, and metabolism, which can lead to a heightened risk of death (3). Sepsis, and especially septic shock, should be considered a serious medical emergency where time is of the essence, just like stroke and acute myocardial infarction. For this reason, early detection and prompt implementation of resuscitation measures are crucial for patient survival. However, identifying sepsis can be difficult, and optimal management strategies are still being refined (4).

The first definition was developed in a 1991 consensus conference focused on the main problem of sepsis resulting from a host's systemic inflammatory response syndrome (SIRS) to infection. With fulfillment of 2 or more of the 4 criteria (Temperature below 36°C or above 38°C, Heart rate greater than 90/minute, Respiratory rate above 20/minute, or arterial partial pressure of carbon dioxide less than 32 mm Hg, White blood cell count less than 4 × 109/L or greater than 12 × 109/L, or more than 10% bands) (5). Because of higher sensitivity and lower specificity, this definition must be revised (6). The other landmark changes were in 2001, update was made in the clinical and laboratory parameters (7). In 2004 additional revision was required and a surviving sepsis campaign was adopted with subsequent guideline-directed management introduced worldwide for the care of septic patients (8).

The 2016 sepsis committee conference declared new definitions and eliminated terms from the previous documents (Sepsis—A life-threatening condition caused by a dysregulated host response to infection, resulting in organ dysfunction, Septic shock—Circulatory, cellular, and metabolic abnormalities in septic patients, presenting as fluid-refractory hypotension requiring vasopressor therapy with associated tissue hypo perfusion (lactate > 2 mmol/L). The classification of severe sepsis was eliminated (2). In this study, we used the updated definition by Sepsis3 sequential organ failure assessment (SOFA) and the quick version (qSOFA). Quick Sequential Organ Failure Assessment (qSOFA) is a screening method to detect patients at a greater mortality risk. This criterion includes altered mental status, systolic blood pressure of ≤100 mmHg, and respiratory rate of ≥22/min. A score of more than two signifies a high risk of poor outcomes (6)

Global epidemiologic reports from systematic reviews estimate the burden as 13-300/100,000 and 11/100,000 annually for severe sepsis and septic shock respectively (9). Globally more

than 5 million deaths due to sepsis occur every year. In the United States over 750,000 hospitalization and 215,000 deaths occur every year. The incidence increased by 9% yearly (10, 11). Among 15% of septic patients complicated with septic shock, which accounts for about 10% of admissions to intensive care units (ICUs) and has a death rate of more than 50% (4). The data from high-income countries are comparable. The largest part of the global burden of sepsis still occurs unrecognized, since nearly 80 % of the world's population lives in low- and middle-income countries. Studies and data are scarce in this part of the world.

Although there are limited reports on the outcome of sepsis in low- and middle-income countries, the prevalence of low hygienic standards, widespread malnutrition, and a high incidence of bacterial, parasitic, and HIV infections suggest that sepsis causes disproportionately high morbidity and mortality in these countries (12).

Sub-Saharan Africa (SSA) is affected more despite not having much data to reflect the burden and the applicability of the current guideline is also poor (13). There are different factors for poor treatment outcomes in SSA these are; a lack of microbiologic and radiologic diagnostic facilities and a shortage of appropriate antibiotics (14)

In Ethiopia, the prevalence from one multicenter study conducted in ICU is 26.5/ 100 ICU admissions (15). To our knowledge, no studies outside of the ICU, such as the ED, were found. This will reflect the burden of community-acquired sepsis and associated factors. Recent studies on bloodstream infections done in Ethiopia have revealed an increasing prevalence of drug-resistant pathogens and a shortage of effective antibiotics (16). This may also affect the magnitude and factors contributing to sepsis and septic shock in the emergency department.

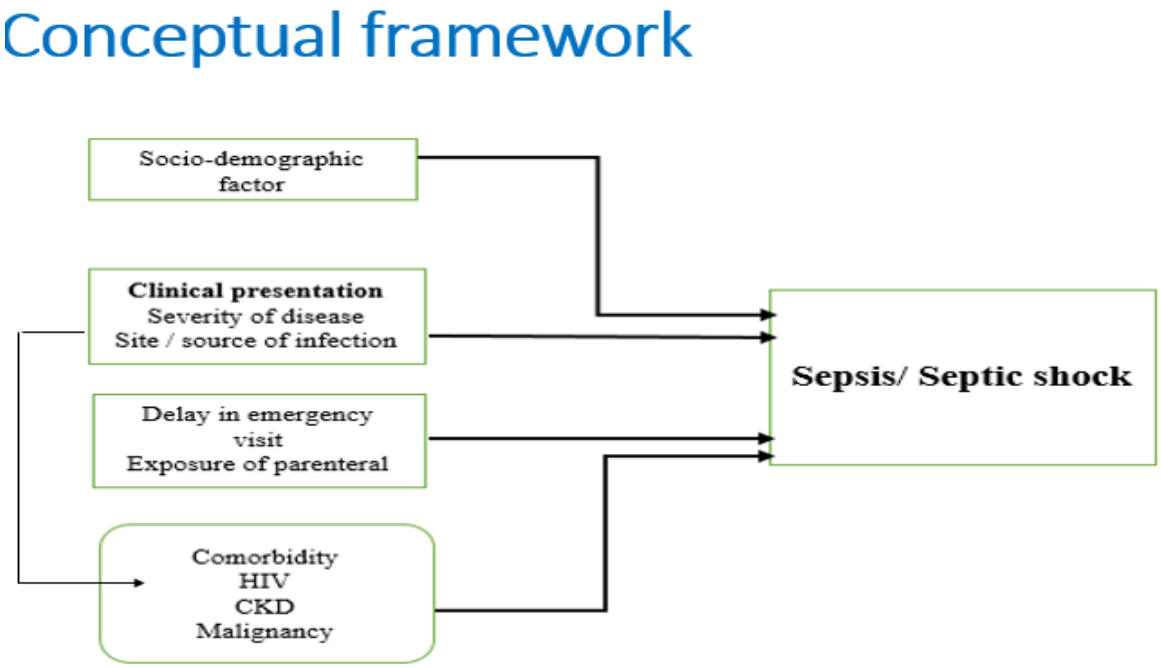
Despite advances in diagnostics and protocol-based management, sepsis mortality remains high in high-income countries. Emergency Department (ED) mortality of patients with sepsis is above 20% which is high when compared with ST-segment elevation myocardial infarction (10%) and hemorrhagic stroke (15%) (17). Improved detection, early antimicrobial administration, and aggressive hemodynamic optimization have improved outcomes in severe sepsis and septic shock. Still, one in five patients died of sepsis before discharge from the hospital (18).

Different factors have been showing effects on sepsis and septic shock. The first is sociodemographic factors the highest mortality and prevalence documented in the extremes of age, males affected more than females, and non-Caucasians predominantly affected than Caucasians (19). The etiologic agent and the site of infection are also important factors in the disease burden. Community-acquired infections are found in 66% of patients suspected to

have sepsis among this respiratory tract infections take half of the share, and bloodstream infections and urinary tract infections are also common (20,21). Gram-negative bacteria are the most commonly identified pathogens. The prevalence of multidrug-resistant bacteria is increasing in Ethiopia, and this is also a factor identified in septic patients (16). Comorbid illness has been mentioned as the greatest risk factor for the development of sepsis and septic shock; HIV, COPD, DM, AKI, and cancer were mentioned (22). The other factors that should be considered during the study are the duration of illness before hospital presentation, prior intravenous antibiotic use, and hospital admission before ED visit, we hypothesized that these factors will have an impact on the magnitude of sepsis and septic shock.

Sepsis is a life-threatening condition that can cause multiple organ dysfunction. However, it can be reversed if detected and treated early (23). Despite advances in pathogenesis, diagnosis, and therapeutic and supportive care, the incidence and mortality of severe sepsis and septic shock have increased over the past decades (21). This study mainly focuses on studying the magnitude and associated factors of sepsis and septic shock in Tikur Anbessa Specialized hospital emergency department, this makes the first study done in our setup. As it has been suggested in one study done in the ICU in Addis Ababa it was very difficult to estimate the duration of emergency stay and its effect on mortality, so this study will address this question (22,24).

Conceptual Framework



OBJECTIVE

General Objective:

To determine the Magnitude and determinants of sepsis and septic shock among adult patients admitted to Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia.

Specific objectives

- To determine the prevalence of sepsis and septic shock among adult patients in the emergency department, ICU, and internal medicine wards.
- To assess factors associated with sepsis among adult patients in the emergency department.

METHODS

Study setting

The study was conducted in Tikur Anbesa Specialized Hospital Emergency Department (TASH ED), Addis Ababa, Ethiopia. TASH boasts a highly experienced faculty of senior specialists and subspecialists and an academic teaching hospital. TASH is a tertiary referral center with 800 beds, providing care to ~400,000 patients annually. There are 200 doctors, 379 nurses, and 115 other health professionals available. The medical ward has approximately 90 beds, while the intensive care unit has around 30. The emergency department at TASTH has 9 consultants and 28 residents, It serves 18,000 patients per year who are 13 years of age and older. On an average day, around 50 presents for a care in the TASH ED.

Study design and period

Study design: A prospective observational study was undertaken from February 2024 to April 2024, to estimate the magnitude of sepsis and septic shock among adult patients admitted to TASH ED, Addis Ababa, Ethiopia.

Source population and study population

Source population: All adult patients admitted to the emergency department of Tikur Anbessa Specialized Hospital during the study period (February 2024 – April 2024) constituted the source population.

Study Population: All patients included in this study fulfilling the inclusion criteria taken as the study population.

Eligibility

Inclusion criteria:

All adult patients were admitted to the emergency department of TASH during the study period and stayed at least 48 hours.

Adults age above 18 years.

Exclusion criteria:

Patients who are deceased upon arrival or have incomplete chart records will be excluded.

Sample size determination:

The required sample size for the first objective will be calculated using a single population formula. Assuming the observational study conducted in four selected ICUs in Addis Ababa

to estimate the prevalence of sepsis and septic shock among patients admitted to ICU is 26.5, 5% type I error and 10% non-response rate.

Let

$$n = \frac{(Z_{\alpha/2})^2 \; P(1 - P)}{d^2}$$

n = minimum sample size required

Z = is the standard score (critical value) corresponding to a 95% confidence interval level = 1.96

d = is the proportion of sampling error between the sample and the population = 5% (0.05)

P = is the estimated prevalence of sepsis and septic shock = 0.26

The sample size calculated using the Epi InfoTM7 calculator was 296 and by considering a 10% non-response rate finally got a sample size of 326 study participants to be included.

We used the double population proportion formula to calculate the sample size for the second objective. The sample size was determined using Epi Info version 7 taking sex, comorbidities like HIV, and malignancy.

Table 1 Double population proportion sample size calculation

Factors (variables)	95% CI	Power	Ratio	Odds ratio	% of cases with exposure	% of control with exposed	Total
Sex	95%	80%	1:1	1.8	62.8	37.2	400
HIV	95%	80%	1:1	1.7	60.8	39.2	392
Malignancy	95%	80%	1:2	2.8	78.8	21.2	288

CI – Confidence Interval

Therefore, to achieve both objectives, a maximum sample size of 400 is required for the study.

Sampling Procedure:

Simple random sampling techniques were used as a probability sampling technique to estimate the magnitude and associated factors. In this cross-sectional study, patients were randomly assigned every day after numbering the 24-hour admitted patients and used a lottery to pick the patients. We used the registry from the emergency department triage area. Our sample size was 400 and the data collection took 60 days so we randomly selected 8 patients every weekday and 5 patients every weekend until we achieved a total of 400 patients.

Study variables

Dependent variables

- Sepsis and septic shock

Independent variables

- Age
- Gender
- Comorbidity
- Source of infection
- Duration of current illness before presentation

Data collection procedures:

The Data was collected using the data extraction tool using secondary data. Data was retrieved from the medical records of the patients. The principal investigator collected the data. The data extraction tool was pretested at the ALERT hospital emergency department on 5% of the sample size.

Operational definitions:

Sepsis - Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection.

Septic shock -. Septic shock is a subset of sepsis with underlying circulation, cellular, and metabolic abnormalities measured with this criteria

- Serum lactate concentration > 2 mmol /L
- Hypotension requiring vasopressors to maintain MAP > 65 mm Hg
- In the absence of hypovolemia

Quick SOFA criteria- patients with altered mental status (GCS < 13), respiratory rate >22, and systolic blood pressure <100

ICU -adult intensive care unit in which critically ill patients are treated

Comorbidity- Patients with Diabetes mellitus, chronic kidney disease, hypertension, congested heart failure and cancer

Immunosuppression-diseases that affect the immunity of a patient like HIV/AIDS, cancer, CKD

Previous admission – patient admitted to hospital for more than 24 hours over the past 3 month

Incomplete data- a medical record that does not include a clinical assessment tool as per the qSOFA criteria.

Data Management and analysis procedures

The participants' identities and MRN were kept anonymous. The data was cleaned as per the inclusion and exclusion criteria

The data was extracted from the data extraction tool and then coded in Epi Data version 4.6.0.6 and analyzed using the Stata/MP 17.0. Descriptive statistics are used to summarize the data, providing information such as means, standard deviations, and frequencies. The Z or chi-square test was employed to show the association between factors and outcomes. For discrete data, such as binary outcomes or categorical variables, a mixed model for logistic regression used. Logistic regression allows for the examination of the relationship between independent variables (potential risk factors) and a binary dependent variable (outcome). The odds ratio was calculated to quantify the strength of these associations. Variables that show a significant association with the outcome ($p < 0.05$) were selected for further analysis using multiple logistic regression models. Multiple logistic regression allows for the examination of multiple independent variables simultaneously while controlling for confounding factors. The strength of association was interpreted using odds ratios and confidence intervals. Odds ratios greater than 1 indicate a positive association, while those less than 1 indicate a negative association. Confidence intervals provide an estimate of the precision of these odds ratios Furthermore, it is important to understand the relationship between various risk factors and the magnitude of sepsis and septic shock. This analysis identifies the relationships between these risk factors and sepsis.

Ethical considerations and review process

Ethical clearance and approval were obtained from the Institutional Ethical Review Board of Addis Ababa University, College of Health Science. The data was protected by a password on the computer. The data was only accessed by the principal investigator of the study. Study data was analyzed by the principal investigator.

Results

Demographic Characteristics of Study Participants

A total of 400 patients who have fulfilled the inclusion criteria were included in our study. The majority of patients were male 216 (54%) and the mean age of the participants was 43.3 ±17.15 years with a range of 18-89 years. Most (51.8%) of patients were in the age group of 25-50 years, followed by age above 50 (31.2%). Most 264 (66%) patients were medical patients followed by surgery 127(31.8%) and Gyn/Obs 9(2.2%).

Among participants, 25.25% (101/400) had sepsis based on qSofa criteria, and septic shock was 5.5% (22/400). Among 101 septic patients male 61(60.3%) and female were 40(39.6%). The majority of patients are from the medical side 79(78.2). Age distribution in septic patients, the most commonly affected age group is age above 50 which is 47(46.53%) followed by 25-50, 43(42.57%).

Clinical Characteristics of Study Participants

From the total cases, the underlying comorbidities were identified in 260(65%) of the patients. Comorbidities include malignancy, human immune deficiency virus (HIV), diabetes mellitus (DM), congestive heart failure (CHF), hypertension (HTN), chronic liver disease (CLD), multiple comorbid illnesses, and others. The most common comorbidity was malignancy 89/400 (22.25%) and 57/400 (13.25%) patients had >2 comorbidities. Patients with HTN and CHF contributed 27 (6.75%) each. HIV, DM, CLD, and CKD (4%, 3.2%, 2%, and 1% respectively). 5% of patients are categorized in others majority being asthma, post TB fibrosis, and cron's disease. Based on the history of comorbidity among septic patients, 88/101 (87.12%) had underlying comorbid conditions.

The most common site of infection was respiratory tract infection 28(7%) followed by intra-abdominal infection 24(6%), blood steam infection 6 (1.5%), skin/soft tissue infection 4(1%), CNS 1 (.25%), renal 2(.5%), in 36 (9%) patient source remained unknown, Organ failure was observed in 37(9.25%) of the total patients among this renal involvement is in 25(67.6%), followed by respiratory, cardiac, liver, and CNS (16.2%, 8.1%, 5.4%, and 2.7% respectively). Organ failure was documented in 23 (22.7%) septic patients. Among these, the most common failed organ was the renal system12 (52%), the respiratory system failed in 5 (21%) patients, and the cardiovascular system, liver, and neurologic system (13%, 8.6%, and 4.3% respectively).

The majority 219(54.75%) patients presented to the emergency department within one week of illness followed by the second week to the end of the first month 131(32.7%), then 30 days.

Table 2 Baseline characteristics of the patients admitted to TASH ED

Variable	Category	Frequency	Percent
Age Group	18-24	68	17
	25-50	207	51.8
	>50	125	31.2
Sex	Female	184	46
	Male	216	54
Site of infection	Lung	28	7
	Intra-abdominal	24	6
	Renal	2	0.5
	CNS	1	0.25
	Blood Stream	6	1.5
	Skin soft Tissue	4	1
	Sepsis of Unknown Focus	36	9
	None	299	74.25
Organ Failure	Yes	48	12
	No	352	88
Sepsis	Yes	101	25.25
	No	299	74.75
Septic Shock	Yes	22	5.5
	No	378	94.5
Admission Category	Surgery	127	31.8
	Medical	264	66
	GYN/OBS	9	2.2
Duration of Illness in days	<16	307	78.3
	16-30	44	11.2
	31-90	25	6.4
	>90	16	4.1
Systolic BP	<100	122	27
	>=100	288	72
Respiratory rate	>22	141	35.2
	<=22	259	64.8
GCS	<14	42	10.5
	>=14	358	89.5
History of Comorbidity	Yes	271	67.8
	No	129	32.2

Factors associated with the magnitude of sepsis

All covariates were checked against the dependent variable sepsis for a significant association of age, sex, site of infection, organ failure, duration of illness before presentation, presence of co-morbidities, and admission category met the criteria for multivariate analysis (P-value <0.2). Those septic patients aged above 50 years (AOR 2.8, P-value0.018, 95% CI = 1.19-6.696), those with the diagnosis of malignancy (AOR 5.54, P-value 0.000, 95% CI = 2.63-11.648), and patients having organ failure (AOR 5.77, P-value0.000, 95% CI =2.63-12.66) are factors associated with the magnitude of sepsis at the emergency department.

Table Type of comorbidity among patients in TASH ED

Type of comorbidity	**sepsis**	
	yes	**no**
CHF	**10**	**17**
CKD	**2**	**4**
CLD	**3**	**5**
DM	**5**	**8**
HIV	**4**	**12**
HTN	**4**	**23**
Malignancy	**34**	**55**
Multiple	**15**	**38**
Others	**11**	**9**

Table 3 Binary and multiple logistic regression of sepsis and associated factors

Variable	Sepsis		COR	P-value	AOR	P-value
	Yes	No	(95% CI)		(95% CI)	
Age Group						
<25	11	55	1		1	
25-50	43	163	1.32(0.64-2.74)	0.457	1.16(0.54-2.54)	0.577
>50	47	81	2.90(1.38-6.08)	0.005	2.8(1.19-6.7)	0.018
Organ Failure						
Yes	25	18	5.14(2.21-7.75)	0.000	3.47(1.75-6.88)	0***
No	76	281	1		1	
Comorbidity						
Yes	88	172	4.99(2.67-9.35)	0.000	3.50(1.80-6.82)	0***
No	13	127	1		1	
Admission category						
Medical	79	185	1.49(0.30-7.35)	0.621	1.78(0.34-9.45)	0.21
Surgical	20	107	0.65(0.13-3.38)	0.613	1.41(0.25-7.99)	0.445
GYN/OBS	2	7	1		1	
Type Of comorbidity						
CHF	10	17	5.88 (2.23-15.4)	0.000	2.6 (0.88-7.7)	0.083
CKD	2	2	10 (1.29-76)	0.027	2.9 (0.318-28)	0.338
CLD	3	5	6 (1.28-28)	0.023	4.09 (0.79-20)	0.091
DM	5	8	6.5 (1.78-21.9)	0.004	2.6 (0.65-10)	0.176
HIV	4	12	3.33 (0.9-11)	0.063	2.41 (0.6-9.62)	0.21
HTN	4	23	1.7 (0.5-5.8)	0.368	0.5 (0.1-1.97)	0.324
Malignancy	34	55	6.1 (3-12.6)	0.000	5.54 (2.63-11.6)	0.000
Multiple	15	38	3.9 (1.7-9)	0.001	1.42 (0.55-3.7)	0.464
Other	11	9	12.2 (4.2-34)	0.000	10.13 (3.3-30.4)	0***
None	13	130	1	1	1	

Discussion

The main objective of this study was to assess the magnitude of sepsis in the emergency department, providing representative data on referral hospital TASH. Of the entire study population sepsis and septic shock account for 25.25%, and 5.5% of emergency department admissions respectively. The mean age was 43.3 and the most common site of infection was unknown followed by respiratory and intra-abdominal infections. Comorbidity was identified in 65% of total study patients among these malignancy is the most frequent at 22.25%. The commonest site of infection was unknown followed by respiratory and intra-abdominal 36%, 28%, and 24% respectively. Organ failure was noted in 12% of the patients.

The major bias in our study is the subjective nature of the diagnosis of sepsis in resource-limited settings like Ethiopia. In short of diagnostic laboratories we cannot confirm the infection diagnosis. The presumptive diagnosis of infection and clinical judgment in the diagnosis made by the treating physician. There is an evaluator-subjective difference in the diagnosis of septic patients and the adherence to diagnostic criteria. In one study done in the USA, they observed a difference in the discharge pattern of septic patients between physician's level and experience. (9)

We used the sepsis 3 quick SOFA criteria as inclusion criteria to our study which is validated for screening of sepsis in emergency department (3). This criteria was used in multiple studies done in emergency departments as an initial screening tool. One prospective study done in Uganda which is the largest study in a sub-Saharan African country also used this criteria (5).

The finding in our study is in line with the burden of the disease observed globally, 48.9 million cases of sepsis were diagnosed in the year 2017 and 11 million deaths were reported, one in 5 septic patients died (10). The burden of sepsis contributed by developed nations is 13% the highest burden 87% is contributed by low and middle-income countries and is understudied and taught to be higher (11).

The findings of our studies on the factors associated with the prevalence of sepsis align with the global risk factors for sepsis and septic shock, which are older age, immunosuppression, and organ failure. (10). The inherent nature of immune suppression as age increases, organ failure, and comorbid conditions like DM, HIV, and malignancy are the major pathophysiologic explanations for our findings. (10,12)

This cross-sectional study showed that sepsis prevalence was 25.25% in the emergency department according to the sepsis-3 definition using qSofa score where the TASH ED triage

is routinely used as a screening. We aimed to determine sepsis prevalence in a real emergency department situation of a resource-limited setup. This result confirms that sepsis is a common pathology among patients who present at the ED.

In line with our study, the prevalence of sepsis was 24.4% in a study done in the Netherlands in patients admitted to emergency and initially suspected later having confirmed sepsis. (2) Though our study is on the magnitude two studies done in emergency departments in Addis Ababa mentioned sepsis and septic shock as the leading cause of death within the 72-hour emergency department admission. (3,4).

The largest study in sub-Saharan Africa done in Uganda showed a prevalence of sepsis in the emergency department at 21.3%, which is lower than our finding this might be the seasonal variation of sepsis in Uganda especially with malaria. (5)

In one large multicenter study done in the France emergency department, the prevalence of sepsis was 39 %. (1) This is higher than our study that was because of methodological differences and the larger sample size used in the France study also they used more sensitive diagnostic criteria.

In this study, the multivariate analysis demonstrated that age above 50 had a significant association with the magnitude of sepsis (AOR 2.8, P-value0.018, 95% CI = 1.19-6.696), this finding suggests that older age has increased the risk of sepsis in the emergency department. This finding is in line with a study done in Gondar, Durban, and Uganda which is similar age category affected (5,6,7)

In our study organ failure was observed in 12% of the patients and it was statistically significant (AOR 5.77, P-value 0.000, 95% CI =2.63-12.66). This means patients having organ failure at presentation are a risk for the prevalence of sepsis. However, the organ involved in the different studies showed respiratory system failure as the commonest site in our finding renal system followed the respiratory system. (1) this difference might be due to the difference in the study area which is in the emergency department the other studies reported were in the ICU (6).

The prevalence of malignancy in our study was 22.25% among septic patients which has a statistically significant association with sepsis (AOR 5.54, P-value 0.000, 95% CI = 2.63-11.648), which is in line with a study done in Ethiopia 26.9% (22). A study done in the USA showed 13.5% of sepsis admissions associated with malignancy the difference in the epidemiology is due to the lower prevalence of malignancy. (8).

Limitation

Even though we have conducted a prospective observational study the quality of the data found by the treating physicians was incomplete and inter-physician variations were observed. The other limitation we have diagnostic laboratory results were not fulfilled especially the culture for presumptive diagnosed septic patients.

Strength

To the knowledge of the investigator, this is the first prospective study to observe the magnitude of sepsis in the emergency department in our country.

Conclusion

We have conducted a prospective observational study and the magnitude of sepsis and septic shock is 25.25% and 5.5% respectively in the emergency department of TASH. The factors associated with sepsis are age above 50, malignancy, and associated organ dysfunction.

Recommendation

In the emergency department physicians should have a high index of suspicion for sepsis at the first encounter of patients at the emergency when they have qSOFA above 2 in a patient presented with comorbidity, old age, and organ failure.

Sending a blood culture to confirm the presumptive diagnosis of infection is mandatory.

To the hospital administration to avail appropriate diagnostic tools used for sepsis diagnosis.

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ASSURANCE OF PRINCIPAL INVESTIGATOR

I the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide timely progress reports to my advisor and seek the necessary advice and approval from my primary advisors in the course of the research. I will communicate timely to my advisors all stakeholders involved in the study including any source of funding for this research.

Name of the student: Hikma Fekadu_____

Signature: _____

Date: _____

Approval of the primary Advisor

Name of the primary advisor:__Dr. Wondwossen Amogne Degu _____

Signature: _____

Date: _____

Annexes

Annex A: Information sheet and consent

Research Project: The Magnitude and determinants of sepsis and septic shock outcome among adult patients admitted to Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia.

Name of Principal Investigator: Dr. Hikma Fekadu Teferedegn

Introduction:

This information sheet and consent form is prepared by Dr. Hikma Fekadu Tefredegn whose main aim is to study The Magnitude and determinants of sepsis and septic shock outcomes among adult patients admitted to Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia. The investigator is an infectious disease fellow at Tikur Anbesa Specialized Hospital. You are kindly invited to take part in our research because we believe you can provide the necessary information for the research. Participation in the study is voluntary. If you are willing to participate in our project, you need to understand and sign the consent form. Then, you will be asked to give your response by the data collectors. All the responses given by the participants and the results obtained will be kept anonymous and confidential. No one outside the research team will have access to your responses. We take blood samples for laboratory evaluation which is one of the routine care.

The benefits of this research are to identify the gaps and to propose a suitable management protocol for patients like you or your family.

Incentives: There are no incentives given for participation nor you will be charged for unnecessary expenses

Confidentiality and Anonymity: The information that we will collect from this research project will be kept confidential. Information about you that will be collected from the study will be stored in a file, which will not have your name on it, and it will not be revealed to anyone except the principal investigator.

Right to Refuse or withdraw: you have the full right to refuse to participate in this research or you can choose not to respond to some or all of the questions. If you do not wish to participate, a his will not affect you. You have also the full right to withdraw from this study at any time you wish to, without losing any of your rights as a patient in this hospital. Persons to contact for

further information: If you have any questions you can contact the principal investigator at the following address:

Name: Dr. Hikma Fekadu Teferedegn

Tel: 0931692110

Email: hikmafekadu@gmail.com

If you agree to participate in this study, I appreciate your truthfulness. After having this consent form read to you, please put a sign below to show if you are willing to participate are you willing to participate in this study.

Yes [ ] No [ ]

Annex B: Data extraction tool

Socio-demographic characteristics of the study participants.

MRN ……I-care number ……. Age _____ Sex M☐ F- ☐

Date of admission to ED: …… Admission time: ……. Date of discharge: ……

Admission category 1. Surgery ☐ 2. Medical ☐ 3. Gyn/obs ☐

Table 1 qSOFA criteria during the first 48 hours of ED admission

Blood pressure systolic in Mmhg	
Respiratory rate /min	
GCS	

Table 2 comorbidities of patients, source of infection before sepsis and septic shock development.

comorbidities	yes	no	Site of infection	yes	no	Organ failure	yes	no
DM			Lung			Neurologic failure		
COPD			Intra-abdominal infection			Cardiovascular failure		
CHF			Urethral infection			Renal failure		
CAD			CNS			Respiratory failure		
Cancer			Bloodstream infection			Hematologic failure		
HTN			Skin/soft tissue infection			Metabolic failure		
Renal failure			Sepsis of unknown focus			Liver failure		
Liver failure			Others					
HIV								
others								

Table 3 Type of microorganism found if any in previous admission

Microorganism identification in the previous admission YES ☐ NO ☐

Type of sample: Blood ☐ Urine ☐ Sputum ☐ other ……..

Type of microorganism								
No	**Gram-negative**			**Gram-positive**			**Fungi**	
1	***Escherichia coli***		**1**	**Coagulase-negative sta*phylococcus***		**1**	**Candida species**	
2	***Acinetobacter baumanii***		**2**	**S.aures**		**2**	**Aspergillus spp.**	
3	***Pseudomonos aeruginosa***		**3**	**Streptococcus pneumoniae**		**3**	**Pneumocystis**	
4	***Klebsiella pneumoniae***		**4**	**Enterococcus species**				
5	***Enterobacter species***		**5**	**Streptococcus species**				
6	**Others gram negatives**			**Others_____**				

Table 4 Type of microorganism found if any samples taken in the current admission

Was the sample taken before antibiotics were administered YES ☐ NO ☐

Type of sample: Blood ☐ Urine ☐ Gram-negative other ……..

Type of microorganism								
No	**Gram negative**			**Gram-positive**			**Fungi**	
1	***Escherichia coli***		**1**	**Coagulase negative *staphylococcus***		**1**	**Candida species**	
2	***Acinetobacter baumanii***		**2**	**S.aures**		**2**	**Aspergillus spp.**	
3	***Pseudomonos aeruginosa***		**3**	**Streptococcus pneumoniae**		**3**	**Pneumocystis**	
4	***Klebsiella pneumoniae***		**4**	**Enterococcus species**				
5	***Enterobacter species***		**5**	**Streptococcus species**				
6	**Others gram negatives**			**Others_____**				

Table 5 Time of treatment initiated, treatment given, and duration spent from the initial symptom to current presentation.

Time fluid was initiated **Mention the fluid type** **……..**	1. **0-1 hr.** 2. **1-3 hr.** 3. **3-6hr.** 4. **>6hr**
Time antibiotics were initiated **Mention the antibiotics given and the route of administration** **…….**	1. **0-1 hr.** 2. **1-3 hr.** 3. **3-6hr.** 4. **>6hr**

Time vasopressor was initiated **Mention the vasopressor type…….**	1. **0-1 hr.** 2. **1-3 hr.** 3. **3-6hr.** 4. **>6hr**
Time steroids were initiated **Mention type, route, and doses……**	1. **0-1 hr.** 2. **1-3 hr.** 3. **3-6hr.** 4. **>6hr**
Is antifungal given **Mention the type and route of administration……**	**Yes ☐** **NO ☐**
Total duration of illness before presentation	1. **Before any medical care/at home ……..** 2. **After visiting another medical center ……**
Are Antibiotics administered before ER visits in other Facilities	**1. Yes ☐** **2. No ☐**
If yes to the above question mention the antibiotics used and the route of administration	**……**
If antibiotics are used duration of treatment in other facility	**……**

Table 6 Laboratory investigation

Testes	Values	First sample Date	Second sample date (4th day)
CBC			
CRP			
Serum lactate			
PCT			
RFT			
LFT			
UA			
Serum Vit D level			
HBsAg			
HCV Ab			
HIV serology			
VDRL			
CXR			
Other imaging findings			
Culture and sensitivity	1. Blood …… 2. Urine …….. 3. Other ……		

Table 7 Focus of infection, choice of antibiotic on current treatment, total antibiotic duration, outcome of the patient

Focus of infection	
What antibiotics are used empirically	1. …… 2. ……. 3. ……..
If vancomycin is used, is the loading dose given	1. Yes ☐ 2. No ☐
Duration of empiric treatment	
Are antibiotics revised	1. Yes ☐ 2. No ☐
If yes to the above question mention which antibiotics used	1. ……. 2. ……. 3. ……..
Outcome of treatment	1. improved and discharged 2. discharged against medical advice 3. died

የመረጃ ወረቀት እና ስምምነት

የምርምር ፕሮጀክት፡ ወደ ጥቁር አንበሳ ስፔሻላይዝድ ሆስፒታል አዲስ አበባ፣ ኢትዮጵያ በገቡ ጎልማሳ ታማሚዎች መካከል ያለው የሴፕሲስ እና የሴፕቲክ ድንጋጤ ውጤት መጠን እና መለኪያዎች።

የዋና መርማሪ ስም፡- ዶ/ር ሂክማ ፍቃዱ ተፈረደድን።

መግቢያ፡-

ይህ የመረጃ ወረቀት እና የስምምነት ፎርም የተዘጋጀው በዶ/ር ሂክማ ፈቃዱ ተፈረደኝ ዋና አላማቸው በጥቁር አንበሳ ስፔሻላይዝድ ሆስፒታል፣ አዲስ አበባ፣ ኢትዮጵያ በገቡ ጎልማሳ ታማሚዎች ላይ የሴፕሲስ እና የሴፕቲክ ድንጋጤ ውጤቶችን መጠን እና መለኪያዎችን ማጥናት ነው። መርማሪው በጥቁር አንበሳ ስፔሻላይዝድ ሆስፒታል የተላላፊ በሽታ ባልደረባ ነው። ለምርምሩ አስፈላጊውን መረጃ መስጠት ትችላላችሁ ብለን ስለምናምን በጥናታችን እንድትሳተፉ በአክብሮት ተጋብዘዋል። በጥናቱ ውስጥ መሳተፍ በፈቃደኝነት ነው. በፕሮጀክታችን ውስጥ ለመሳተፍ ፍቃደኛ ከሆኑ የስምምነት ቅጹን መረዳት እና መፈረም አለብዎት። ከዚያ፣ ምላሽዎን በመረጃ ሰብሳቢዎች እንዲሰጡ ይጠየቃሉ። በተሳታፊዎች የተሰጡ ሁሉም ምላሾች እና የተገኙ ውጤቶች በማይታወቁ እና በሚስጥር ይያዛሉ. ማንም ከምርምር ቡድን ውጭ የእርስዎን ምላሾች ማግኘት አይችልም። የደም ናሙናዎችን እንወስዳለን የላብራቶሪ ምርመራ ይህም ከመደበኛ እንክብካቤ አንዱ ነው.

የዚህ ጥናት ጥቅሞች ክፍተቶቹን መለየት እና እንደ እርስዎ ወይም ቤተሰብዎ ላሉ ታካሚዎች ተስማሚ የሆነ የአስተዳደር ፕሮቶኮል ማቅረብ ነው።

ማበረታቻዎች፡ ለተሳትፎ የተሰጡ ማበረታቻዎች የሉም ወይም ለማያስፈልጉ ወጪዎች እንዲከፍሉ አይደረጉም.

ምስጢራዊነት እና ማንነትን መደበቅ፡- ከዚህ የምርምር ፕሮጀክት የምንሰበስበው መረጃ በሚስጥር ይጠበቃል። ከጥናቱ የሚሰበሰበው ስለእርስዎ መረጃ በፋይል ውስጥ ይከማቻል, ስምዎ በእሱ ላይ አይኖረውም, እና ከዋናው መርማሪ በስተቀር ለማንም አይገለጽም.

እምቢ የማለት ወይም የመውጣት መብት፡ በዚህ ጥናት ላይ ላለመሳተፍ ሙሉ መብት አልዎት ወይም ለአንዳንዶቹ ወይም ለሁሉም ጥያቄዎች ምላሽ ላለመስጠት መምረጥ ይችላሉ። መሳተፍ ካልፈለጉ አሄስ አይነካዎትም። እንዲሁም በዚህ ሆስፒታል ውስጥ እንደ ታካሚ ያለዎትን መብቶች ሳያጡ በማንኛውም ጊዜ ከዚህ ጥናት የመውጣት ሙሉ መብት አለዎት። ለበለጠ መረጃ የሚያገኟቸው ሰዎች፡ ማንኛውም አይነት ጥያቄ ካለዎት ዋናውን መርማሪ በሚከተለው አድራሻ ማግኘት ይችላሉ።

ስም፡ ዶ/ር ሂክማ ፍቃዱ ተፈረደድን።

ስልክ፡ 0931692110

ኢሜል፡ hikmafekadu@gmail.com

በዚህ ጥናት ላይ ለመሳተፍ ከተስማሙ፣ እውነትነትዎን አደንቃለሁ። ይህ የስምምነት ፎርም ከተነበበላችሁ በኋላ፣ በዚህ ጥናት ለመሳተፍ ፈቃደኛ መሆንዎን ለማሳየት እባክዎ ከዚህ በታች ምልክት ያድርጉ።

አዎ አይ [ ]

ለታካሚዎች ትርጉም የሚያስፈልጋቸው ጥያቄዎች

ከሆስፒታል ጉብኝት በፊት በቤት ውስጥ የሕመም ጊዜ

አሁን ያለውን ሆስፒታል ከመጎበኘታቸው በፊት በሽተኛው የጎበኘው ሌላ የጤና ተቋም ነበር።

ለታካሚው በሌላኛው ተቋም ውስጥ ሕክምና ተሰጥቷል

ከላይ ላለው ጥያቄ አዎ ከሆነ

ምን ዓይነት መድሃኒት ተሰጥቷል?

በሽተኛው ለምን ያህል ጊዜ እንደወሰደው በደም ውስጥ የሚደረግ ሕክምና ነው?