COLLEGE OF HEALTH SCIENCE DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE.

ASSESSMENT OF CLINICAL PRESENTATION AND OUT COMES OF SEPSIS AMONG CHILDREN ADMITED IN PEDIATRIC EMERGENCY DEPARTMENT OF TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA ETHIOPIA.

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A RESEARCH THESIS SUBMITTED TO COLLEGE OF HEALTH SCIENCER, DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIRMENT FOR THE DEGREE OF MASTERS IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

ADDIS

ABABA, ETHIOPA

June, 2019

ADDIS ABABA UNIVERSITY

COLEGE OF HEALTH SCIENCE

DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE

OF SCIENCE RESEARCH PROPOSAL SUBMISSION FORM

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Full title of the research	Assessment of clinical presentation and outcomes sepsis among children admitted in pediatrics emergency department of Tikur Anbessa Specialized Hospital, Addis Ababa Ethiopia, 2019.
Duration of study	March 2019 to June 2019
Study area	Tikur Anbesa Specialized Hospital
Total cost of the study	31,280 ETB
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June, 2019

Addis Ababa Ethiopia

ASSURANCE FORM

This thesis by Amsalu Alebel is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of master in emergency medicine and critical care Nursing.

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By my signature below, I declare and affirm that this thesis is my own original work in partial fulfillment of the requirements for the degree of master in Emergency medicine and Critical care Nursing

I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All the sources of the materials used for this thesis and all people and institutions who gave support for this work are fully acknowledged. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis. Brief quotations from this thesis may be used without special permission provided that accurate and complete acknowledgement of the source is made. Requests for permission for extended quotations from, or reproduction of, this thesis in whole or in part may be granted by the Head of the Department or all advisers of the theses when in his or her judgment the proposed use of the material is in the interest of scholarship and publication. In all other instances, however, permission must be obtained from the author of the thesis.

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ACKNOLOGMENT

First and foremost, I would like to thank almighty God for unending love, care and blessing through our entire life. My heartfelt appreciation goes to staffs of Addis Ababa University College of Health Science, Department of Emergency medicine for their different support from proposal development to now. I would also like to acknowledge my Advisors Andualem Wubetie (BSC, MSC, and ECCN) and Tigist Bacha (MD, MPH, ASSOCIATE PROFFESSORE) for their provision of constructive advice and encouragement to prepare this thesis.

Contents

List of tables

List of figures

ABRIVETIONS AND ACCRONYMS

ARDS=Acute respiratory distress syndrome

ARF=Acute renal failure

AVPU=Alert-verbal-painful-unresponsive

CHF=Congestive Heart Failure

CSF=Cerebral spinal Fluid

CMV= Cytomegalovirus;

E. coli =Escherichia coli

EPI =Expanded program of immunization.

HIC=High income countries

HIV=human immune virus

HMIS= Health ministry of information system

HSV=Herpes simplex virus

LAMA=Left against medical advisement

LMIC=Low income countries

LODS= Lamebrain organ dysfunction syndrome

PICU=Pediatrics intensive care unit

RDT= Rapid diagnostic test

RSV= Respiratory syncytial virus

SIRS= Systemic inflammatory response syndrome

SOFA=sequential organ failure assessment

ABSTRACT

Introduction: Sepsis is life-threatening organ dysfunction caused by a deregulated host response to infection. It is one of the leading causes of mortality among children worldwide. It is also the second leading cause of death for 1-14 years of age and fourth leading cause of death for under 1 year of age. Appropriate and timely recognition of sepsis is a prerequisite for starting goal-directed therapy bundles. Even though sepsis is common, few researches are done in the area of study and the country.

Objectives: The study was conducted to assess the clinical presentations and outcomes of sepsis among children admitted in pediatric emergency department of Tikur Anbesa specialized hospital, Addis Ababa, Ethiopia.

Methodology: Institutional based retrospective chart review method had been conducted by using standard checklist questionnaire for sepsis patients admitted in pediatric emergency unit of Tikur Anbesa specialized hospital from January 1, 2017 to January 1, 2019. Data has been checked, analyzed, and interpreted by using SPSS Software. The result was presented by tables, bar charts and pie charts.

Result: A total of 305 sepsis patients were studied. Of this 3.9% and 2.9% were diagnosed as a complication of sepsis which were sever sepsis and septic shock during admission. The most common site of infection was chest focus accounted for (71%) of patients. The median value of SIRS criteria was (IQR=2) and most patients (79.3%) were alert. From the total studied sepsis patients, 13.4% have co morbidities. Majority of patients (81%) were started antibiotics more than 1 hour after triage. About 55.1% of studied patients were discharge and 8.2% were death. Of this, 3.6 %(n=11) of the death were within 48 hours.

Conclusion and recommendation: sepsis is significant concerning condition among children due to its cause of mortality in the world. Majority patients had breathing problem; cardiac concomitant diseases and majority were treated after one hour triage time in this study. As a result every health providers should be awared for clinical presentations and treatments of sepsis.

Keywords: Sepsis, pediatric, pediatric emergency, TikurAnbesa hospital

CHAPTER ONE

INTRODUCTION

Sepsis is life-threatening organ dysfunction caused by a deregulated host response to infection (1). Previously the definition was "sepsis syndrome" which is the foundation of systemic inflammatory response syndrome (SIRS) criteria. Thus, the hypothesis that sepsis is a deregulated response implies that attenuating the immune response or blocking some critical immune pathway will improve patient outcomes (2).

Systemic inflammatory response syndrome (SIRS) criteria are when a patient full fills two or more of sign and symptoms of sepsis. Those are; temperature >38.5 °C (100.4 °F) or<36 °C (96.8 °F), tachycardia, tachypenea for age or $PaCO_2$ < 32 mmHg, White blood cell count >12,000/μL or <4000/ μL (3) for age. As a result, in 1992, "sepsis" was formally defined as the presence of both suspected infection and two of the four criteria of the systemic inflammatory response syndrome (1). But by taking these issues into consideration, new sepsis criteria were advocated as "Sepsis-3" in 2017, which redefined sepsis as infection complicated by one or more organ dysfunctions. Organ system dysfunctions are assessed with an increase in the Sequential Organ Failure Assessment (SOFA) score by 2 or more points. The main purpose of this changeover is to focus on more severe patients for the recruitment in future interference studies (4).

An international consensus has recently recommended that sepsis should be defined as "life threatening organ dysfunction caused by deregulated host response to infection" and septic shock as "a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone" (5).

The most common organisms that can cause sepsis in children are: (H. influenza, S. pneumonia, and Neisseria meningitides). In addition, viral agents (HSV, cytomegalovirus, or enter virus (6). Sever sepsis is when Sepsis complicated by organ dysfunction. When we have one or more of the following signs and symptoms, we can diagnose severe sepsis. These sign and symptoms are: patches of discolored skin, decreased urination, changes in mental status and low platelet count, problems in breathing and abnormal heart functions. Septic shock is when sepsis is complicated by hypotension refractory to adequate volume resuscitation in the absence of an

alternate cause. Symptoms of septic shock include the symptoms of severe sepsis, plus a very low blood pressure (1, 6).

Bacteria are the main cause of sepsis; though, even fungi, viruses, and parasites in the blood, urinary tract, lungs, skin, and other tissues can cause sepsis. But the most common infections to cause sepsis are: abdominal infection, kidney infection and bloodstream infection (7).

Sepsis in children is a significant cause of morbidity and mortality globally (8). Severe sepsis and septic shock are the most common cause of death in children throughout the world. The World Health Organization's statistics show that of the approximately 9 million children that die each year globally die of sepsis. The frequency of pediatric sepsis was found to be greater than 42,000 cases annually, with an associated mortality rate of 10% in the United States (9).

People in low- to middle-income (LMIC) areas of the world and particularly in Sub-Saharan African countries suffer excessively high mortality compared to those from high-income countries (HIC) (10). This is because developed countries have the principles of early recognition, empirical antibiotics therapy, early fluid resuscitation and they have a set up in the guideline.

In developing countries, where the majority of 7.5 million annual deaths in children under 5 years of age are considered to be secondary to sepsis. However, it is neglected (11). Even though the magnitude is high, no enough research has been done related to with sepsis in children in developing countries including Ethiopia.

1.2. Statement of the problems

Sepsis is life threatening condition which needs early intervention and which needs prevention of further its complications. Ideally, pediatrics are highly sensitive for any infection that needs immediate intervention and implementation.

In USA one third of children die with sever sepsis (12**).** It is a leading cause of death throughout the world due to its association with increased morbidity, hospitalizations and mortality (13). Each year in the U.S.A more than 75,000 infants and children develop severe sepsis. Almost 7,000 of these children die which are more deaths than children who die from cancer **(**14).

The World Health Organization's statistics shows that approximately 9 million children that die each year globally. From those approximately 70% of them die from sepsis and its related complication. Different studies shows that sepsis is also the second leading cause of death for 1-14 years of age and fourth leading cause of death for under 1 year of age (17**)**.

In developing countries, where the majority of the 7.5 million annual deaths in children under 5 years of age are considered to be secondary to sepsis. However, it is largely neglected **(**16). In Africa awareness and resources are limited to report the epidemiology; outcomes and management of sepsis. However, this region account for a significant proportion of the global burden of sepsis which goes unrecognized (17).In other method we are comparing that in high - income countries there were 2.3 million cases per year from 20% of world's population. Although, in low and middle-income countries there were 13 million cases were from 80% of the world's population **(**18).

As far as my knowledge, few researches were done in developing counties including Ethiopia specifically related to pediatrics sepsis. But a study conducted between December 1, 2016-june 2017 at TASH pediatrics emergency ward from age 7 days- 14 years concerned on mortality rate of children showed that sepsis was the third fatal case from the top ten next to pneumonia and congestive heart failure (CHF) (19). It shows that the prevalence is high relative to the others. Even though its prevalence is high and also there is gap in developing countries is, no enough research was conducted concerning to pediatrics. Therefore we planned to do this research in order to identify the possible cause and outcome of pediatric sepsis in Tikur Anessa Hospital.

1.3. Significance of the study

This study might be help full to add knowledge for health care providers and for all concerned bodies on complex problem of sepsis and its complication and to gain information about the prevalence and outcomes of sepsis and ways of prevention in the area of study and the country at large. It also creats to understand management of gaps for clinicians. It could help to develop countermeasures (to take action) that could reduce the complications and preventable deaths with sepsis. In addition the study may provide base line information to carry out further research on similar studies. The data obtained in this study, may be used by concerned bodies for planning and evaluating of sepsis preventive and management measures.

CHAPTER TWO

2.1. LITRATURE REVIEW

Sepsis is life threatening condition caused by deregulated host respond to infection. SIRS criteria is the main thing to diagnose it which is when it fulfills two and above sign and symptoms. Though, its main problem is its complication which is fatal and fatality rate is high, it's concerned in developing countries is low and no enough research is conducted. Additionally, there is scarcity of information and resources especially low income countries. Therefore, this study will use as source of information, to add knowledge for health providers, baseline for other similar researches.

In United States of America, more than 1.1 million patients were hospitalized with sepsis in 2008, corresponding to an incidence of 32.7/10 000 patients, a 70% increase compared with that in 2000. Between 2004 and 2009, the sepsis case fatality rate in the United States of America was ranged from 14.7% to 29.9%. This indicates the prevalence of the case is increasing in developed country in the world. Studies from the case-fatality rate, on the supplementary, dropped from 10.3% to 8.9% for that decade (19). Based on the hospitalization database from the 44 children's hospitals in the USA, the prevalence of severe sepsis had been increasing from 3.7% to 4.4% among all the hospitalized children (18 years old or younger) between 2004 and 2012 (20).

AS study is conducted in Bangladesh of the 5.9 million global deaths in children under age 5 in 2015, the majority resulted from sepsis. Sepsis and septic shock are secondary to a systemic inflammatory response and represent a clinical spectrum of a deregulated host response when exposed to an infection that can result in severe, multi-organ dysfunction, including cardiovascular (21).

As a prospective observational study conducted in PICU of a tertiary care government sponsored teaching hospital in Rohtak District, Haryana, India from November 2012 to February 2013 showed us a total of 50 patients (30 (60%) males) were joined in the study, of whom 21 (42%) were discharged (survivors) and rest 29 (58%) expired (no survivor). In this study clinical features were also observed among the enrolled septic children: respiratory distress (42%), shock (30%), worsening sensorial with refractory status epileptics (12%), acute kidney injury (2%), and

congestive heart failure (4%) and rest 10% had a combination of them. They required larger number of fluid boluses (P = 0.007), prolonged isotropic support (P = 0.001), and need of steroids (P < 0.001) (22).

As descriptive and observational cohort study with retrospective and prospective data was conducted in the pediatric ICU of hospital in Brazil was resulting with 115 patients, 40 cultures were positive (34.8%). Most positive tests occurred in blood cultures, followed by urine cultures. The most common community-acquired infectious agents were S. aurous (11/40), Klebsiella pneumonia (7/40), N. meningitides (5/40), Pseudomonas aeruginosa (4/40) and E. coli (4/40). The other agents found included Streptococcus pneumonia (2), S. pyogenic (1), Serratia marcescens (1), Enterococcus facials (1), Staphylococcus haemolyticus (1) and Enterobacter aerogenes (2) (23).

A point prevalence study was showed on 5 days throughout 2013–2014 at 128 sites in 26 countries. From this study: the most common primary sites of infection were respiratory (40%) and bloodstream (19%). An infectious organism was isolated in 65% of patients, and blood cultures were positive in 26%, including patients with secondary bacteremia. There was a similar proportion of Gram-positive (26.5%; 95% CI, 22.9–30.3%) and Gram-negative (27.9%; 95% CI, 24.2–31.8%) infections, with Staphylococcus aurous being the most commonly isolated bacteria. Fungi, mainly Candida species, were isolated in 13.4% (24).

The rationale for this is based on a recent cohort study in Killifish, Kenya (25). The study applied seven observable criteria (six for subjects more than 60 days old) that are intended to identify children in need of antibiotic therapy, toward a cohort of 11,874 admissions between 1999 and 2001 (this could be considered a vertical prediction model of serious bacterial illness). A total of 813 (7%) children died in hospital (no post-discharge surveillance was conducted). Application of these criteria identified 53% of all admitted patients (6281) among whom 12% died (93% sensitivity to predict inpatient death). Of the remaining 5593, only 1% of children died (99% negative predictive value) (26).

African research conducted prospective observational cohort study at Bwindi community hospital showed that 115 pediatric patients were admitted. From these study: Blood pressure was not recorded; 11 children (35.5%) were hypoxemic (SpO2 < 94%). The majority of patients

had normal mental status upon assessment but altered mental status was more common in children On follow-up assessment (24–48 hours after admission), one (3.2%) patient had been discharged home in improved condition; none had died or been transferred. Of those patients still; three children (10%) were hypoglycemic. But compared to enrollment, fewer patients had severe hypo perfusion formerly 15 children (50.0%) had persistently elevated lactates. Patients (83.9%) received at least one antibiotic during their admission. These are; Ceftriaxone (29%), gentamicin (29%) and ampicillin (25.8%); also 25% received an ant malarial agent. Patients who were severely hypoxic (SpO2 < 90%) received supplemental oxygen support. Fluid resuscitation was defined as $\geq$ 20 mL/kg of isotonic fluid in children within the first 24hr of admission (27).

Similarly Prospective descriptive study was conducted on children (28 days to 14 years) with sepsis presenting to a tertiary emergency medicine department(EMD)in Dare Salaam, Tanzania (July 1 to September 30, 2016). This research presented us predictive abilities of SIRS criteria, the Alert-Verbal-Painful-Unresponsive (AVPU) score and the Lambaréné Organ Dysfunction Score (LODS) for in-hospital, early and late mortality was tested. The results were a total of 2,232 children presented to the EMD during the study period. There were 433 patients (19.4%) who had SIRS with an assumed infection, 405 subjects were successfully joined. Of those enrolled, 402 (99.3%) were followed to hospital discharge. The median age of children was: 73.1% were under 5 years of age (n = 296) (28).

In another study conducted with a retrospective chart review of children (0–18 years old) technique (July 2014 to July 2015) shows that the median triage time and times from triage to vascular access, fluid administration, and antibiotic administration were 26, 48.5, 76, and 135 min, respectively. The guideline-adherence rates to rapid vascular access and timely administration of antibiotics and appropriate fluid bolus were 21, 34, and 26%, respectively. Patients (8, (19%)) were in the adherent group (antibiotics administered within 1 h and fluids administered within 15 min from sepsis recognition time and 35/43 (81%) patients were in the non-adherent group (27).

In Tanzania Dare Salem also; under the study Severe malnutrition was present in 12.6% (n = 51) of children, 6.9% (n = 28) tested positive for malaria by rapid diagnostic test (RDT) or microscopy, 1.7% (n = 7); 7/22 had confirmed (by RDT or antibody testing) .On arrival, 82% (n= 331) of children were “alert” by the AVPU score. Using the LODS as a measure of illness

severity, 46.7% (n = 189) of subjects had the lowest severity score of zero, while 17.8% (n = 72) had a score of two or more. The median number of documented SIRS criteria was 3 (IQR 2–3), with 41.2 (n = 167), 41.0 (n = 166), and 17.8% (n = 72) of subjects meeting 2, 3, and 4 criteria, respectively. Respiratory insufficiency was the most common SIRS criteria, occurring in 86.4% (n = 350) of patients, followed by abnormal temperature, abnormal heart rate, and abnormal appearance occurring in 70.9 (n = 287), 60 (n = 243), and 53.3% (n = 216) of patients, respectively. Some form of microbiologic culture was collected during hospitalization in 35.8% (n = 145) of patients: blood, urine and cerebral spinal fluid (CSF) cultures were collected in 29.9, 14.8, and 4.0% of patients, respectively. Of the cultures collected, 11.6, 10, and 0% of blood, urine and CSF were positive, respectively. Of the 402 patients followed to discharge, 57 patients died in the hospital, yielding and in-hospital mortality of 14.2%. Six subjects died in the EMD, representing 10.5% (6/57) of the patients who died, and the overall in-ED mortality was 1.5% (6/402 (28).

As much as my knowledge, research is conducted with similar topic in Ethiopia. But one study done for five years ago retrospective study review of pediatric mortality from neonate to 13 years was conducted at the pediatric emergency unit In Tikur Anbesa specialized hospital Addis Ababa Ethiopia. This study shows that Pneumonia 60(17.8%), Congestive heart failure 46(13.6%) and sepsis 40(11.8%) were the top causes of pediatric emergency mortality in pediatric emergency unit. This indicates it is the third leading cause of death from top ten diseases (18).

CHAPTER THREE

3. OBJECTIVES

3.1. General objectives

To assess clinical presentations and outcome of sepsis among children admitted in pediatric emergency department of Tikur Anbessa Specialized hospital (TASH) from January 2017 to January 2019.

3.2. Specific objectives

- ✓ To know demographic data of patient diagnosed with sepsis
- ✓ To know pattern of sepsis severity category
- ✓ To determine the commonest focus of infection
- ✓ To assess commonest underline illness that predisposed the patient
- ✓ To assess the commonest management of sepsis
- ✓ To determine the length of stay of the patient
- ✓ To determine occurrence rate of sepsis
- ✓ To determine mortality rate of children with sepsis
- ✓ Ultimately, to contribute in developing standard guideline for treatment of sepsis and to lay ground for further sepsis research for future.

CHAPTER FOUR

4. METHODS AND MATERIALS

4.3. Study design and period

The study was conducted by using a retrospective cross-sectional study design. The study was conducted on secondary data, by reviewing of patient registration book and patient medical chart. Of patients admitted with sepsis from January 2017 to January 2019 and the data was collected from March to April 2019.

4.1 Study area and period.

The study was conducted at pediatric emergency department of Tikur Anbesa hospital; Addis Ababa. Tikur Anbesa hospital is a large referral hospital and sees approximately 370,000-400,000 patients per a year. The hospital has 800 beds, with 165 specialists, 65 non-teaching doctors. It is the largest teaching hospital in Addis Ababa University, College of health science in Ethiopia (29**).** The pediatric emergency department sees around 20,000 complicated patients admitted per a year which has 42 beds. It is equipped with two pediatric emergency and critical care trained physicians and also 13 Nurses and 8 Physicians in a day including residents and interns. From those, 343 sepsis patients were admitted with in a study period.

Patients a year which has 42 beds. From those, 343 sepsis patients were admitted with in a study period.

4.4 Source & study population

4.4.1. Source of population

- ✓ All pediatric patients admitted in pediatric emergency department of Tikur Anbessa specialized hospital from Jan 1, 2017 to Jan 1, 2019.

4.4.2. Study population

- ✓ All pediatric sepsis patients admitted in pediatric emergency department of Tikur Anbessa specialized hospital from Jan 1, 2017 to Jan 1, 2019.

4.4.3. Study unit

- ✓ Selected pediatric sepsis patients admitted in pediatric emergency department of Tikur Anbesa specialized hospital whose charts full fill inclusive criteria from Jan 1, 2017 to Jan 1, 2019.

4.5. Eligibility criteria

4.5.1. Inclusive criteria

- ✓ All children from aged 28 days up to 12 years old with diagnosis of sepsis admitted in pediatric emergency of Tikur Anbesa specialized hospital from Jan 1, 2017 to Jan 1, 2019. We planned to study this, to specify the study site and our intention was to show the problems on sepsis pediatrics sepsis patients. Because, it is life threatening organ dysfunction that needs early intervention and implementation.

4.5.2. Exclusion criteria

- ✓ Incomplete cards were excluded from the study.

4.6. Sample technique and sample size determination

4.6.1. Sample size determination

- ✓ All pediatric patients diagnosed with sepsis patients admitted in pediatric emergency department from Jan 2017 to Jan 2019 had been taken as sample size.

4.6.2. Sampling procedure and technique

A review of pediatric sepsis patient recorded from March to April 2019 that were seen at pediatric emergency for the past two years from January 2017- January 2019 was conducted from the patient record center. Based on the patient registration number, the chart was taken from patient record center and secondary data was collected.

4.7. Variables

4.7.1. Dependent variables

- ✓ Outcomes of sepsis for pediatric septic patients from 2017 to 2019. We used mortality rate.

4. 7.2. Independent variables

- ✓ Socio-demographic characteristic of study participant (age and sex) and Clinical presentation of study patients.
  - ✓ Time of triaging
  - ✓ Time of admission
  - ✓ Time of diagnosis and starting time of treatment
  - ✓ Severity category
  - ✓ Focus of infection
  - ✓ Etiology of infections
  - ✓ Nutrition status
  - ✓ HIV status
  - ✓ Co morbidity diseases
  - ✓ Malaria status

4.8. Operational definition

Sepsis: is the body's extreme response to an infection and full fills SIRS criteria.

Sever sepsis: Sepsis causing dysfunction of at least 1 organ system- such as acute kidney injury/acute renal failure, acute respiratory failure, or encephalopathy.

Septic shock: Severe Sepsis with refractory hypotension, despite adequate fluid resuscitation along with perfusion abnormalities (often requiring vasopressin therapy) or sever sepsis with Lactic acidosis (lactate level >4 mm/L).Systemic inflammatory respond syndrome Criteria; two or more of the following sign and symptoms of sepsis.

SIRS criteria: when a patient full fills two or more of sign and symptoms of sepsis.

Lamebrain organ dysfunction score: it is multiple organ dysfunctions due to septic shock. It can be scored as 0, 1, 2,3and 4. Totally it is secondary to sepsis or with its complications**.**

Pediatrics: Are children whose age is between 28 days_ 12 years old in this study.

Focus of infection: is site of infection. Those are chest, pulmonary, gastro intestinal, genito-urinary and skin infection.

Nutritional status: MUAC measurement (≤11.5cm and >11.5cm).

Fully immunized: patients who took measles vaccine in this study.

Partially immunized: patients took not took measles vaccine or patients age <9 months in this study.

4.9. Data collection methods and tools

4.9.1. Data collection methods

Data was collected from patients' medical record cards by using pre tested data collection checklist. The pretest was done before the actual data collection out of the study site. Five BSC nurses and one supervisor were trained for one day that involved for data collection. Data was collected from documents of patient chart. The completeness of the data was checked daily and corrective measures were taken.

4.9.2. Data collection tool

The data collection tool was prepared in a checklist form after reviewing of different literatures and standard questioners (27)). It was written in English language and the data was collected from the patients chart (annex I).

4.10. Data processing and Statistical analysis

Data was entered into expanded program of immunization-data version 3.1 computer programs and we used double data entry to minimize data entry error and were exported for analysis to SPSS version 21, and then cleaning, analyzing was done. To explain the study population in relation to relevant variables, descriptive statistics such as frequencies and percentages was calculated. Logistic regression analysis was done to identify the association between dependent and independent variables.

4.11. Quality control

The data collection tool was standardized by testing it in 5% of the sample size from saint paoulose referral hospital before the actual data collection to make sure that the data collecting sheet was capable of yielding the required data for the study and some modifications was done according to the results found. The collected data was checked for completeness consistency and clarity.

4.12. Dissemination and utilization of the result

The study result was presented to Addis Ababa university institution of medicine and health science, department of emergency medicine and critical care and the document was disseminated to all concerned bodies in the study

4.13. Ethical considerations

Ethical clearance was obtained from departmental research ethical review committee of Addis Ababa University, college of health science, department of pediatrics and child health prior to the study and also submitted to department of pediatrics and child health. Official letter was written to Tikur Anbesa hospital department of pediatric emergency for permission. After obtaining permission from the hospital we had obtain relevant information from patient card. All the collected data was confidential and no one accepted the members of the research team had access to the collected information and no name patients name was included under questioner. All paper and computer records of the study was kept in a secured place under lock and the name and/or other personal information was not been notified in any report.

CHAPTER FIVE

5.1. RESULT

5.1.1. Socio demographic data

From total of 343 sepsis patients admitted in pediatrics emergency department in the study period, 305 (88.9 %) was studied who has a complete chart record and relevant information. One hundred seventy three (56.7 %) of the studied patients were male with a male to female ratio of 1.3:1. The age was ranged from 28 days to 12 years. Majority of patients were less than two years of age 90.9% (n=279) and mean (9 months) of age with SD of ±20.55. patients with age between 24 and 60 months were 6.2% (n=19) and age above 60 months were 2.3% (n=7).

5.1.2. Status of patients

The malaria status of 1.6 % (n=5) patients had malaria. Most patients 201(65.9%) were negative for HIV status and 1.3 % (n=4) were positive. Regarding immunization status, 83.6% (n=255) were partially immunized and the rest 16.4% (n=50) were fully immunized. The nutritional statuses of 3.9 % (n=12) patients were ≤ 11.5cm their MUAC measured value. (See Table 1).

Table1: status sepsis patients among children admitted to pediatric emergency of Tikur Anbesa Hospital Addis Ababa - Ethiopia, 2019

Variables		Frequency	Percent (%)
Malaria status	Positive	5	1.6
	Negative	116	38.0
	Not done	184	60.3
	Total	305	100.0
HIV status	Positive	4	1.3
	Negative	201	65.9
	Not done	100	32.5
	Total	305	100
MUAC	≤ 11.5cm	12	3.9
	>11.5cm	53	17.4
	Unrecorded	240	78.7
	Total	305	100
Immunization status	fully immunized	50	16.4
	partially immunized	255	83.6
	Total	305	100.0

5.1. 4. Illness severity

The illness severity of the studied sepsis patients were tried to assess based on the predictive abilities of SIRS criteria, the Alert-Verbal-Painful-Unresponsive (AVPU) score and the Lambaréné Organ Dysfunction Score (LODS) for in-hospital, early and late mortality test. The results showed that the majority79.3% (n=242) were alert and the least 5.2 % (n=16) were unresponsive. Using the LODS as measure of illness severity 72.1% (n=220) of subjects had the lowest severity score of zero, while 20.7% (n=63), 6.9% (n=21) and 0.3% (n=1) had score of 1, 2 and 3 respectively. (See Figure 1).

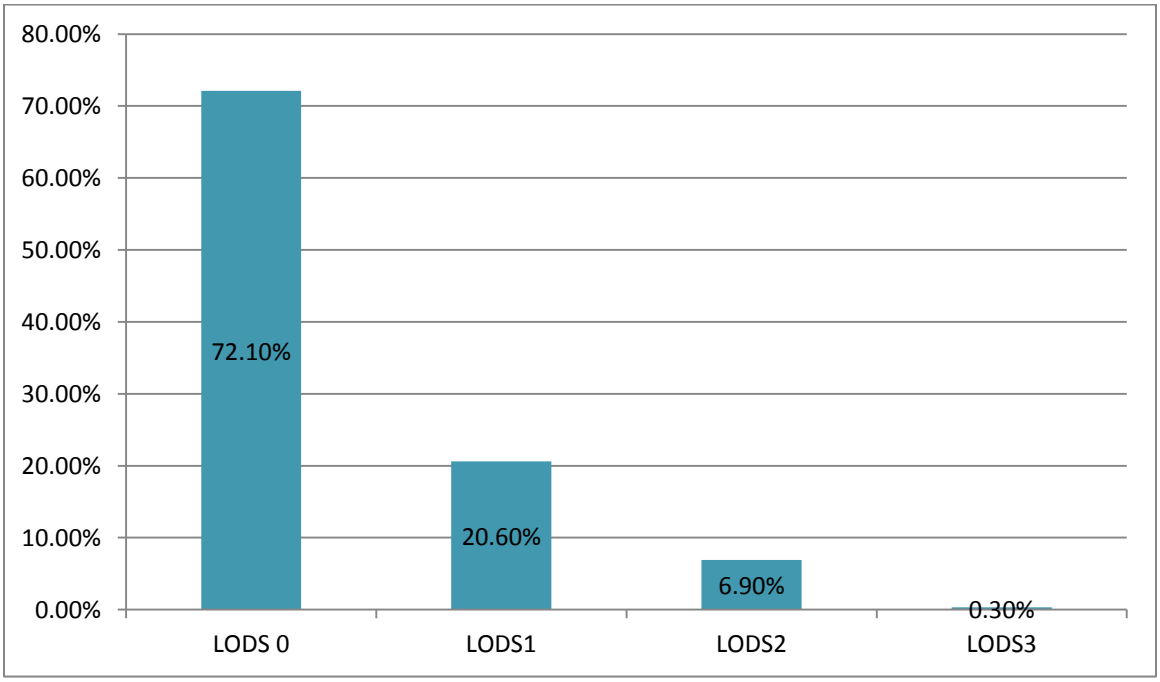

Figure 1: percentage distribution of LODS score of sepsis patients among children admitted to pediatric emergency of Tikur Anbesa Hospital Addis Ababa-Ethiopia, 2019

Regarding SIRS criteria, the median is 3.3 and mean 2 with (S.D ±0.8). The majority of patients 50.5% (n=154) were categorized in SIRS criteria 2 and the rest 28.2% (n=86), 14.8% (n=45) and 6.6% (n=20) of subjects met SIRS criteria 3,1and 4 respectively. With Regard to vital sign abnormality, the majority of sepsis patients 59.7% (n=182) and 46.9% (n=143) have abnormal Respiratory rate and heart rate measured value respectively. Abnormal temperature were measured for 43.2% (n=132) patients. The mean measurement of temperature was 37.5oC with a (S.D ±0.65).

Table2: distribution percentage illness severity of sepsis patients among children in Tikur anbesa specialized hospital pediatrics emergency department, A.A Ethiopia /2019.

variables		Frequency	Percent (%)
Types of organ dysfunction	No organ dysfunction	219	71.8
	Heart	30	9.8
	Kidney	17	5.6
	Liver	3	1.0
	Above one	15	4.9
	Others	21	6.9
	Total	305	100.0
AVPU score	Alert	242	79.3
	respond to verbal	14	4.6
	respond to pain	33	10.8
	un responsive	16	5.2
	Total	305	100.0
SIRS criteria	1	45	14.8
	2	154	50.5
	3	86	28.2
	4	20	6.6
	Total	305	100.0
Heart rate	Normal	147	48.2
	Abnormal	158	51.8
	Total	305	100.0
Temperature measurement value	<36oc	52	17
	360c_38.4oc	173	56.7
	>38oc	80	26.3
	total	305	100
Respiratory rate	normal	123	40.3
	abnormal	182	59.7
	Total	305	100.0

Concomitants medical conditions

Of total studied patients 38.7% (n=118) had co morbid disease, of these 13.4% (n=41) and 4.9% (n=15) had cardiac diseases and hematologic malignancy respectively. Forty (13.1%) of Patients had more than one chronic disease.

With regard to the clinical presentation of sepsis patients during admission, the majority 59.7% (n=182) had breathing problem followed by shock 19.3 %(n=59).

The most common site of infection was chest focus 71 %(n=217) followed by gastro intestinal 14.8% (n=45) and skin infection 9.2% (n=28). (See Table3).

Table 3: co morbid conditions and clinical presentation of sepsis patients during admission among children admitted to pediatric emergency department of Tikur Anbesa Hospital A.A Ethiopia (2019).

Variables		frequency	Percent (%)
Chronic diseases	No chronic disease	187	61.3
	cardiac disease	41	13.4
	Hematology	15	4.9
	Epilepsy	5	1.6
	above 1 chronic disease	1	.3
	Others	56	18.4
	Total	305	100.0
No of concomitants	1	76	24.9
	>or=2	40	13.1
	Total	116	38.0
Clinical presentations of patients during admission	Breathing	182	59.7
	Airway	18	5.9
	Shock	25	8.2
	Others	59	19.3
	Total	305	100.0
Focus of infection	Chest	217	71.1
	Gastro intestinal	45	14.8
	Pulmonary	4	1.3
	Genito urinary	6	2.0
	Above one	6	1.6
	Total	305	100.0

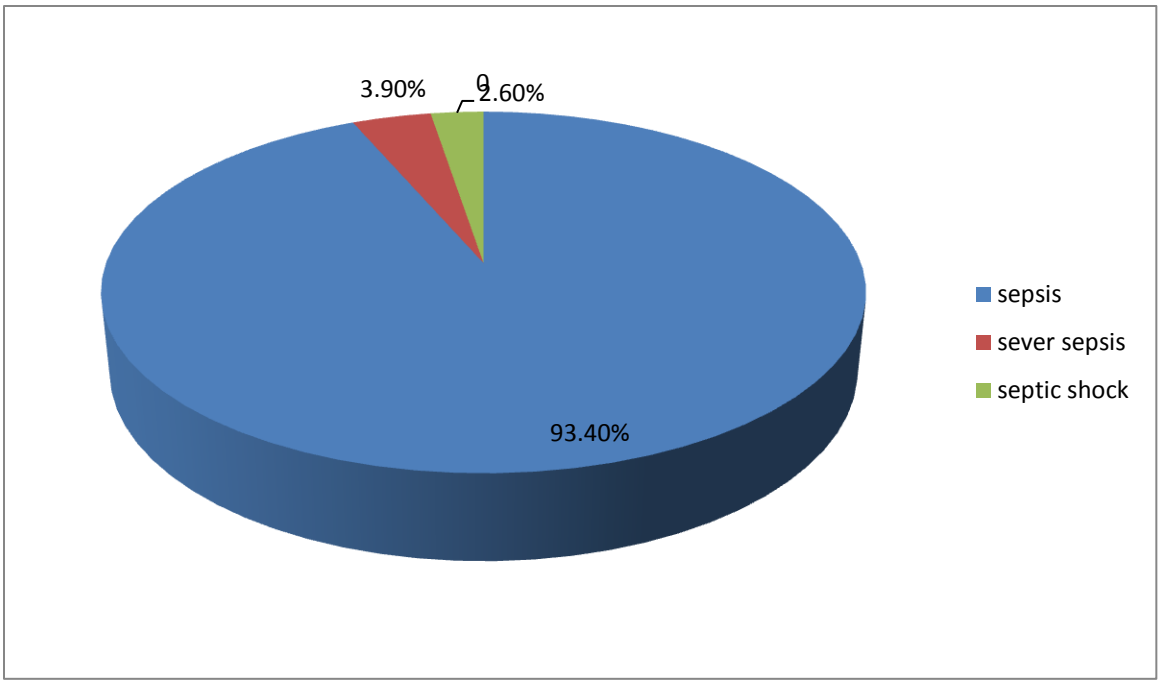

Figure 2: Admission diagnosis of sepsis patients among children admitted to pediatric emergency department of Tikur Anbesa Hospital A.A Ethiopia (2019).

5.1.5. Laboratory results

From total sepsis patients 90.5% (n=276) had normal HGB level but 31.5 %(n=96) of sepsis patients had abnormal WBC Count. Suspected Patients were checked for CRP status and positive for 45.6 %(n=140), negative for 25.2 %(n=76) qualitatively. Blood, urine and CSF culture was done for 19.3 % (n=59), 17% (n=54) and 2%(n=6) patients respectively. Gram positive cocci were more dominant blood culture result and gram negative bacteria for urine culture result. (See table 4).

Table 4: percentage distribution of laboratory results among sepsis patients in pediatrics emergency department in Tikur anbesa specialized hospital, A.A Ethiopia 2019.

Variables		Frequency	Percent
CRP LEVEL	Negative	76	25.2
	Positive	140	45.6
	Not done	89	29.2
	Total	305	100.0
Blood culture results	gram positive coccid seen	7	2.3
	no growth	33	12.4
	Not done	265	83.6
	Total	305	100.0
Urine culture results	few gram negative bacteria seen	1	.3
	no growth	53	17.4
	Not done	251	82.3
	Total	305	100.0
CSF culture results	Klebsela pneuma	3	.0.9
	no growth	3	1.0
	Not done	299	98.0
	Total	305	100.0
Microbial type	Unrecorded	291	95.4
	E.coli	2	.7
	s.aurous	3	1.0
	oxytoca klebsella	1	.3
	gram positive cocci	5	1.6
	fast bacilli	1	.3
	Total	305	100.0
HGB level	Normal	276	90.5
	Abnormal	22	7.2
	Unrecorded	7	2.3
	Total	305	100.0
Platelet count	Normal	288	94.4
	Abnormal	9	3.0
	Unrecorded	8	2.6
	Total	305	100.0
WBC count	Normal	202	66.2
	Abnormal	96	31.5
	Total	305	100
Serum creatinine	Normal	206	67.5
	Abnormal	55	18.0
	Unrecorded	44	14.4
	Total	305	100.0

5.1.6. Managements

Majority of patients 44.3% (n=135) were triaged on the day time between 12:01pm-6:00pm and the least 10.5% (32) were at night between 12:01am-6:00am.

Antibiotics was given for almost all sepsis patients 99.6% (n=304) but most of them 81.3 % (n=148) were started after one hour of triage. Only 18.3 % (n=56) patients started within 1 hour after triage. Ampicillin and gentamicin was the most common antibiotics given for 44.6% (n=136) patients followed by Ampicillin and cefotaxime 23% (n=70). IV fluid and blood was given for 81% (n=247) and 5.9 % (n=18) patients. Of this only 2.6 % (n=8) was given a resuscitation fluid.

Table 5: distribution percentage for type of management with sepsis patients during admission among children admitted to pediatric emergency department of Tikur Anbesa Hospital A.A Ethiopia -2019.

Variables		frequency	Percent
Triage time	6:01 am- 12:00 am	61	20.0
	12:01pm_6:00pm	135	44.3
	6:01pm_12:00pm	62	20.3
	12:01am_6:00am	32	10.5
	Unrecorded	15	4.9
	Total	305	100.0
Iv fluid given	above 24 hours	10	3.3
	resuscitation and maintenance fluid	42	13.8
	Total	305	100.0
Blood transfusion	Yes	18	5.9
	No	287	94.1
	Total	305	100.0
time of antibiotics started after triage	> 1 hour	248	81.3
	≤ 1 hour	56	18.4
	not given	1	.3
	Total	305	100.0

5.1.7. OUTCOMES

From the total 305 studied sepsis patients 91.8% (n=280) were discharged. Twenty five (8.2%) from the total sepsis patient were death. From total of studied, 3.6% (n=11) were death within 48 hours of admission. Hospital Length of stay was ranged from one day to one month. The mean length of stay was 6 days with SD of ± 5.8 and median of 5.

Table 6: distribution percentage of outcomes of sepsis among children at Tiku anbesa specialized hospital in pediatrics emergency department A.A Ethiopia /2019

Variables		Frequency	Percent
death	Death within 48 hours	14	4.6
	Death above 48 hours	11	3.6
	Total	25	8.2
Discharge	Without complications	270	92.5
	With complications	10	7.5
	Total	280	100
Length of days	<1 day	61	20.0
	1_7 days	162	53.1
	>7 days	82	26.9
	Total	305	100.0

5. 1.8. Staticall analysis

5.1.8.1. Factors associated to sepsis outcome among children

Logistic regration was used to determine the set of predictor variables that predicted the outcomes of sepsis among children for whom admitted in pediatrics emergency department. Variables entered to bivariate logistic regration ($p<0.25$) were: temperature measurement value, shock, times of starting antibiotic after admission, sepsis, having breathing problem and having organ dysfunction. Those variables that had association with the outcomes variables in bivariat logistic regration analysis were entered to multivariate logistic regration. Then, finally, antibiotic initiation time, breathing problem and organ dysfunction were remained significant in the multivariate analysis ($p<0.05$).

Based on these, patients who had not started within 1 hour after triage was 7.5 times (AOD =7.457, CI= 95 %(1.77, 31.498) more likely risk to death. Patients who had above one organ dysfunction were 6.3 times (AOD =6.247, CI= 95 %(1.397, 27.944) more likely risk to death than patients who had only one organ dysfunction. Additionally, patients who were admitted with breathing problem were 8.45 times more likely to death (AODS= 0.047 CI, 95 %(1.33, 53.577) than patients who had not. (See table 8)

Table 7: Bivariate and multivariate analysis of factors associated outcomes of sepsis among

Children in pediatrics department of TASH A.A Ethiopia 2019

variables	**category**	**Death**		P_value<0.25	COR(95% C.I)	p-value <0.05	AOR(95% C.I)
		yes	no		**(lower, upper)**		**(lower, upper)**
Antibiotic initiation time	<=1hour	10	238		1		1
	>1hour	15	41	0.00	8.5(3.58,20.185)	0.06	7.467(1.77, 31.498)**
Breathing problem	yes	4	174	.000	8.618(2.88025.791)*	0.023	8.452(1.33, 53.577)**
	no	21	106		1		1
organ dysfunction	one	9	59		1		1
	Above one	8	10	0.005	5.244(1.637, 16.806)*	0.016	6.249(1.397,27.944)**
temperature	normal	7	166		1		1
	abnormal	18	114	0.004	0.267(.108, 6.60)*	0.488	0.582(0.126, 2.687)
shock	yes	5	194	0.000	0.137(0.052, 0.363)*	0.99	1.011(0.202, 5.051)
	no	19	27		1		1

*P<=0.25, CI, 95 %(confidence interval), COD, crude odds ratio, AOD, adjusted odds ratio

**remained spastically significant (CI<=0.05) in adjusted odds ratio

CHAPTER SIX

6.1. DISCUSSION

A Total of 305 charts were reviewed. Of these, 56.7% (n=173) were males and majority were under 24 months of age 90.2 % (n=270) with median of 2 months. Malnutrition status of 3.9 patients were MUAC ≤11.5. Similar study done in Tanzanian showed that 58.3% (n=236) were male and 48.2% (n=195) were under 2 years with median of 25 months. But 12.6% of patients were severe malnutrition (27). The difference may be due to miss diagnosis and the site of this study has no service for nutrition management.

Illness severity is the degree of disease which would be measured by LODS score and AVPU score. In this study, 72.1% and 79.3% of patients were LODS score 0 and Alert respectively.50.5% of patients fulfilled SIRS criteria 1. But the study done in Tanzania showed that 46.7% and 82% of patients were LOD score 0 and Alert respectively. 41.2% of patients were fulfilled SIRS criteria 2. The discrepancy may be due to patients characteristics, misdiagnosis and measurement problem.

Chronic diseases were assessed and 38.7% of studied patients had chronic disease. Of this (13.4%) and 4.9% had cardiac and hematologic malignancy respectively. It is similar to the study conducted in India, Rohtak District in which 13.4% of patients had cardiac diseases (22).

The most clinical presentation of patients during admission was breathing problems (59.7%) which are relatively higher than other studies (40%) (22, 24).

In this study abnormal range of WBC was 31.5%. Most of pa platelet count (94.4%, hemoglobin count (90.5%) were normal range and Qualitative measured value of CRP (45.6 %) patients had positive result and25.2% had positive result. In this study only 19.3% blood culture result out of total population. Among thus, 3.8% and12.7% was positive and no growth results in blood culture respectively. Two point three percent of total population were gram positive bacteria and had 0.3% urine culture result. In contrast to this study, study conducted on Pediatric ICU of hospital in Brazil, 34.8% were positive for culture, A point prevalence study was showed on 5 days throughout 2013–2014 at 128 sites in 26 countries 26% were positive blood culture result a as study of Tanzania blood culture result was 11.6%. In this study also urine result was 10%. The results were different, but Tanzanian result was nearer result. Others were highly different

results. This may be due to; patients might come to the hospital after they had taken antibiotics and bottles always not available, Considering to CSF result, our study showed that 2% were done. Among thus, 0.6% was positive but as Tanzanian research it was 0%. As result the reasons may be, due to misdiagnosis and patients condition, patients might take antibiotics. (27, 28, 31) in this study the most common community acquired microbial were S. aurous (3/13), E. coli (2/13) and klebsela pneumonia (1/13) respectively. But study conducted on pediatric ICU of hospital in Brazil showed the most common community acquired bacteria were S. aurous (11/40), Klebsiella pneumonia (7/40), N. meningitides (5/40), Pseudomonas aeruginosa (4/40) and E. coli (4/40) (23). Thus were different to this study, but S,aurous was the commonest for both study.

Most patients were treated with antibiotics and fluid but only 18.4% were started antibiotics within one hour after triage. From the total 80.6% of sepsis patients treated with fluid, 16.4% were resuscitated with fluid which is less than the study conducted in Bwindi community hospital accounted 26%.(23) but similar with antibiotic initiation time within one hour for the study conducted in other African countries accounted about19%. (27).

Ampicillin and gentamicine were the most common antibiotics given in this study, 44.6%.But a study conducted in Bwindi community hospital showed that 83.9% of patients were treated with ceftriaxone. This may be due to the difference in treatment national guideline.

In this study most patients (91.8%) were discharged and 8.2% of patients were death. This is relatively comparable with the previous study conducted in different countries including United states of America conducted between 2004 and 2009, sepsis fatality rate was8.9% and in Kenya from 1999 to 2001,death rate was 12% and the previous study in Tikur Anbesa was 11.8% (21,26,18).

This study showed that death more than 48 hours was 48% but 52% were within 48 hours. Contrast to these Tanzanian study showed 65 % and 35. % was death above 48 hours and within 48 hours respectively. It was somewhat different results. According to death within 48hours it was less, so it might due to early triage problem and early assessment of patients; due to lack of resources and clinicians knowledge .The length of stay in this study was ranged from 1 day to 30 days with a mean of 6 days which is similar to the study done in Tanzanians (28).

CHAPTER SEVEN

7.1. STRENGTH AND LIMITATIONS OF THE STUDY

7.1.1. Strength of the study

The study tried to dig out information about clinical presentations, outcomes and factors of sepsis among children in the study area. And the study had good sample size. It is good clues for base lines study for other researchers.

7. 1.2. LIMITATIONS OS THE STUDY

Even though, the study assessed all sepsis pediatric patients admitted in the study period, it has the following limitations: since it is retrospective study design, it has missed data and patient charts making it incomplete information. The other limitation, it is done only one study site that may not be possible to generalize.

CHAPTER EIGHT

8.1. CONCLUSION AND RECOMONDATIONS

8.1.1. Conclusion

Based our study findings, the following were concluded

Sepsis has significant impact on pediatrics health and one of the leading causes of mortality in our ED. Majority patients had respiratory problem and the most had chest focus of infection.

Most Patients had concomitant disease; especially, majority had heart dysfunction. major patients were started antibiotics above one hour of admission.

Also statically significant association were identified between sepsis and its outcomes thus were: patients who had not started within 1 hour after triage, Patients who had above one organ dysfunction patients who were admitted with breathing problem were more likely to death $p<0.05$).

8.2. Recommendations

Based on finding of this study, the following are recommended:

Sepsis among children needs immediate intervention in everywhere, because it is life threatening organ dysfunction condition. Due to this:

To all health provider in health center and hospital should be awared.

To hospital administrators: health providers should take training for preventing and treating sepsis patients among children.

To ministry of health bureau: by considering this study result, there should be national guidelines protocol to prevent and to treat sepsis.

For researchers, employing observational study designs (prospective study design) by involving more than three hospitals is recommended to gain relevant information and this elaborates gapes more.

References

1. Adhikari, N.K.; Fowler, R.A.; Bhagwanjee, S.; Rubenfeld, G.D. Critical care and the global burden of critical illness in adults. Lancet 2010, 376, 1339–1346. [CrossRef]

2.Goldstein B, Giroir B, Randolph A. International pediatric sepsis consensus conference: definitions for sepsis and organ dysfunction in pediatrics. Pediatr Crit Care Med. 2005; 6(1):2–8. Doi: 10.1097/01.PCC.0000149131.72248.E6. [PubMed] [CrossRef]

3.Carcillo JA.Reducing the global burden of sepsis in infantsand children: A clinical practice research agenda. Pediatr Crit Care Med. 2005; 6:S157–64. [PubMed]

4. M.M. Levy, et al. 2001 SCCM/ESICM/ACCP/ATS/SIS international sepsis definitions conference Crit Care Med, 31 (4) (2003), pp. 1250-1256 CrossRef View Record in Scopus Google Scholar.

5. Sarthi M, Lodha R, Vivekanandhan S, Arora NK. Adrenal status in children with septic shock using low-dose stimulation test.Pediatr Crit Care Med. 2007; 8:23–8. [PubMed]

6 .Medically reviewed by Steven Kim, MD and Debra Sullivan, PhD, MSN, CNE, COIee on August 31, 2018 — Written by Krista O'Connell and Valencia Higuera

7. Wolach B. Neonatal sepsis: pathogenesis and supportive therapy. Semin Perinatol. 1997; 21(1): 28-38[PubMed (http://www.ncbi.nlm.nih.gov/pubmed/9190031

8. Singer M, Deutschman CS, Seymour CW, et al. The third international consensus definitions for sepsis and septic shock (sepsis-3) JAMA. 2016; 315(8):801–810. Doi: 10.1001/jama.2016.0287. [PMC free article] [PubMed] [CrossRef]

9. Turner D, Hammerman C, Rudensky B, Schlesinger Y, Schimmel MS. The role of procalcitonin as a predictor of nosocomial sepsis in preterm infants.Acta Pediatric. 2006; 95(12): 1571-6[DOI (http://dx.doi.org/10.1080/08035250600767811)][PubMed (http://www.ncbi.nlm.nih.gov/pubmed/17129964)]

11. Matthew O Wiens, Elias Kumbakumba, Niranjan Kissoon, J Mark Ansermino, Andrew Ndamira, Pediatric sepsis in the developing world: challenges in defining sepsis and issues in post-discharge mortality

12. .American Journal of Respiratory and Critical Care Medicine; Global Epidemiology of Pediatric Severe Sepsis: The Sepsis Prevalence, Outcomes, and Therapies

13.Reid W. D. Farris, MD1 ; Noel S. Weiss, MD, DrPH2 ; Jerry J. Zimmerman, MD, PhD1; Functional Outcomes in Pediatric Severe Sepsis: Further Analysis of the Researching Severe 5 Sepsis and Organ Dysfunction in Children: A Global Perspective Trial*

14. Vincent, J.L.; Marshall, J.C.; Namendys-Silva, S.A.; Francois, B.; Martin-Loeches, I.; Lipman, J.; Reinhart, K.; Antonelli, M.; Pickkers, P.; Njimi, H.; et al. Assessment of the worldwide burden of critical illness: The intensive care over nations (ICON) audit. Lancet Respir. Med. 2014, 2, 380–386. [CrossRef :)

15. Zurich J1*, Varian M1 and Fedora M1 1 Department of Pediatric Anesthesiology and Critical Care, University Children´s Hospital Brno, Czech Republic *Corresponding author: Jiri Zurich, Department of Pediatric Anesthesiology and Critical Care, University Children´s Hospital, Cernopolni 9, Brno, Czech Republic.

16.Akaninyene Otu1, & James Elston2, Emmanuel Nsutebu; Pan African Medical Journal. 2015; 21:323 doe: 10.11604/pamj.2015.21.323.6462.

.17. EXECUTIVE BOARD EB140/12 140th session 9 January 2017 Provisional agenda; Improving the prevention, diagnosis and clinical management of sepsis

18. Gemechu Jofiro (BSC Nurse); an audit of pediatric emergency unit of Tikur Anbesa specialized hospital in Addis Ababa city Ethiopia 2017 GC..

19.Hartman ME, Linde-Zwirble WT, Angus DC, et al. Trends in the epidemiology of pediatric severe sepsis. Pediatr Crit Care Med. 2013; 14(7):686–693. Doi: 10.1097/PCC.0b013e3182917fad. [PubMed] [CrossRef].

20. Balamuth F, Weiss SL, Neuman MI, et al. Pediatric severe sepsis in U.S. children's hospitals. Pediatr Crit Care Med. 2014; 15(9):798–8017.

21.UNICEF. Committing to ChildSurvival: A Promise Renewed.Progress Report 2015. New York, NY: UNICEF; 2015.

22: Dr. Jaya Shankar Kaushik, Department of Pediatrics, Pt. B D Sharma Postgraduate Institute of Medical Sciences, Rohtak - 124 001, Haryana, India. E-mail: jayashankarkaushik@gmail.com

23.Taís da Costa São Pedro, Departamento de Pediatria da Faculdade de Ciências Médicas da Universidad Estradiol de Campinas, Rua Tessália Vieira de Camargo, 126, Cidade Universitária Zeferino Vaz, Zip code: 13083-887 - Campinas (SP), Brazil. E-mail: taiscsp@yahoo.com Received 2015 Mar 11; Accepted 2015 Jul 25

24.Am J Respire Crit Care Med. 2015 May 15; 191(10): 1147–1157. Published online 2015 May 15. Doi: 10.1164/rccm.201412-2323OC17.

25. Berkley JA, Maitland K, Mwangi I, et al. Use of clinical syndromes to target antibiotic prescribing in seriously ill children in malaria endemic area: observational study. BMJ. 2005; 330(7498):995. [PMC free article] [PubMed]

26. Matthew O Wien's, Elias Kumbakumba, Niranjan Kissoon, J Mark Ansermino, Andrew Ndamira, and Charles P Larson Pediatric sepsis in the developing world: challenges in defining sepsis and issues in post-discharge mortality Clin Epidemiol. 2012; 4: 319–325. Published online 2012 Nov 22. Doi: 10.2147/CLEP.S35693.

27.Benjamin Louis Moresco, Clinton Woosley, Morris Sauter, and Utpal Bhalala Poor Compliance with Sepsis Guidelines in a Tertiary Care Children's Hospital Emergency RoomFront Pediatrics. 2018; 6: 53. Published online 2018 Apr 5. Doi: 10.3389/fped.2018.00053

28. Kristina E. Rudd, Leonard K. Tutaryebwa, T. Eoin West Presentation, management, and outcomes of sepsis in adults and children admitted to a rural Ugandan hospital: A prospective observational cohort studPublished: February 15, 2017 https://doi.org/10.1371/journal.pone.0171422

29.Teresa Bleakly Kurtz, Hendry R. Sawe, Brittany Murray, Wayne Enanoria, Michael Anthony Matthay, and Teri Reynolds Clinical Presentation and Outcomes among Children with Sepsis Presenting to a Public Tertiary Hospital in Tanzania Front Pediatrics. 2017; 5: 278. Published online 2017 Dec 22. Doi: 10.3389/fped.20

30. Watson RS, Carcillo JA, Linde-Zwirble WT, et al. The epidemiologyof severe sepsis in children in the United States. Am J Respir Crit Care Med. 2003; 167(5):695–701. Doi: 10.1164/rccm.200207- 682OC. [PubMed] [Cross Ref

CHECKLIST

I .demographic data				
So no				
1	101. C0de…….,	102. Age ------	103. Sex -----A. male B. female	
	104. Triage date and time	Time----------	Date---------	
I **II .status of patients**				
	105. Malaria status	Positive ----------	Negative-------	none
1.	106. HIV status	Positive----------	Negative ------	none
2.	107. Immunization status	Fully immunized--	Partially --------	none --------
3.	108. MUAC	.>11.5cm----------	<11.5cm	none

III Illness severity and Level of consciousness				
1	109. Lamebrain organ dysfunction score	LODS 0 ___ LODS 1-------	LODS 2__	LODS 3_
2	110. Types of organ dysfunction	A. Cardiovascular B. Renal	C. Hematologic D. Neurologic E. Others	F. None
3	111. AVPU score	112. Alert A. Yes B. No 115 .Un responsive A. Yes B. No	113. Respond to verbal A. yes B. No	114. Respond to pain A. Yes B. No
4	1116. No of SIRS criteria met	A.1 B.2	C.3 D.4	E. None
5	Vital signs	117. Temprature A. Normal	A. Hypothermia	B. Hyperthermia

		118. Heart rate	A. Normal	B. Bradycardia	C. Tachycardia
		119. Respiratory rate	A. Normal	B. Tachypnea	C. Bradypnea

IV. Any concomitant medical conditions

1.	120. Any chronic disease	A.Epilepsy E. Others	B. Diabetes mellitus F. None	C. down syndrome	D. cardiac diseases
		121. Number of comorbidity		A. >2…….. B. 1…… C. none	
2.	122. Clinical presentation during admission	A .Airway compromise	B. Breathing	C. Shock	D.Arrhythmia
		E. loss of consciousness	F. none	G. other ……	
3.	123. Focus of infection ----------				
4.	124. Diagnosis of patients during admission ……..				

V. Laboratory results

1	125. Hemoglobin ---------- 126. WBC count ---------- 127. Serum creatinine ----------		128. Platelet count---------- 129 .Coagulation profile pt….. ptt……. INR…… 130. Serum bilirubin ----------		
2	Sepsis work up done	131. blood culture result----------	132. urine culture result----------	133. CSF analysis result----------	134. others---------
3	135. Types of microbial found……				

VI. How was management?

1	136. Iv fluid A. Yes B.NO	137. If yes how much? A. over 6 hours B. over 12 hours C. over 72 hours

2		138. Blood transfusion A. Yes B. No	139. If yes how much?			
3		140. Duration of time after triage for first antibiotics given ------				
4		141. Types of first antibiotics given ----------				
VII. Outcomes of child who had admitted in emergency department						
1		142. outcomes A. Discharge without complication B. Discharge with complication C. Death D. disability E. LAMA F. None				
	1.1.	143. If complication	A. ARDS D. Others B. ARF F. cardiac failure G. None C. CNS dysfunction			
	1.2.	144. If death	A. Within 48 hours	B. Above 48 hours		
	1.3.	145. If disability	A. Sever	B. Moderate		
18		146. Length of stay in days	----------			