



St. Paul Hospital Millennium Medical College
Graduate Study Program

Treatment outcome of acute exacerbations of bronchial asthma and associated factors Among Patients Visiting Saint Paul's Hospital Millennium Medical College Adult Emergency Department; one year cross sectional study

Investigator Dr Tsegaye Alem (EMCC Resident)

Addis Ababa, Ethiopia

December, 2023

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Investigator Dr Tsegaye Alem (EMCC Resident)

Advisors: Dr. Haimanot (Assistant Professor of ECCM, MPH)

Dr. Melaku Endale (Assistant Professor of ECCM)

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ABSTRACT

Background: Acute asthma attack is one of the most common reasons for emergency department visits, hospitalization, and death rate. Asthma is a heterogeneous disease that results from a complex interaction between genetic, immunological and environmental factors. Globally, asthma has currently affected an estimated 339 million people and the number may increase to 400million people by the year 2025In spite of this, relapse rates in patients treated and discharged from the remain as high as .

Objective: To assess treatment outcome of acute asthma and identify associated factors among Acute Asthma patients attending Emergency department at SPHMMC Addis Ababa, Ethiopia, from October 1, 2022 to October 1, 2023

Methods: An institutional based cross-sectional study design was used. A systematic random sampling was held and the total sample size was 259 acute asthma patients attending Emergency department. The data was collected on open data kit and exported to Statistical Package version 26. Both Bivariable and Multivariable logistic regression analyses were conducted to determine the factors that are associated with thinness and stunting. P values below 0.05 at the 95% Confidence interval were considered indicative of a statistically significant association.

Result: Of the total 259 client, 142(54.8%) were male, and 117(45.2%) were Female. The mean age of the participants was 45.38 year. The prevalence of good treatment outcome at emergency was 73%. The finding of this study showed that patient those demanded antibiotic were 6.6 times more odd of having poor outcome than their counterpart. The other finding of the study was those patients with triage category of yellow had 7.6 times more odds of having good outcome than those with triage category of red

Conclusion and recommendation: The prevalence of good treatment outcome among asthmatic patient was 73%. Factors associated with poor outcome were triage category of red and those who demand antibiotics. More research is needed to better understand the association of antibiotic use and poor outcome. It needs further study to identify antibiotic use and patient outcome in acute asthma exacerbations.

Key words: Treatment outcome, Acute Asthma, Emergency department, Saint Paul hospital, Ethiopia.

Acronyms and Abbreviation

AaBET	Addis Ababa Burn emergency and Trauma Hospital
AOR	Adjusted Odd Ratio
CI	Confidence Interval
COR	Crude Odd Ratio
COVID.19	Corona virus disease 19
ED	Emergency Department
ER	Emergency room
FEV1	Forced expiratory volume1
FMOH	Federal minster of health
GCS	Glasgow coma scale
GINA	Global Initiative for asthma
HMIS	Health Management Information System
ICU	Intensive care unit
IQR	Interquartile Range
IRB	Institutional Review Board
NIV	Noninvasive ventilation
PEFR	peak expiratory flow rate
SD	Standard Deviation
SOB	Shortness of breath
SPHMMC	St. Paul’s Hospital Millennium Medical Collage
SPSS	Statistical Package
WHO	World health organization

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Chapter One: INTRODUCTION

1.1 BACKGROUND

Asthma is described as a multifactorial respiratory condition that can necessitate hospitalization and is characterized by bronchial hyper responsiveness and chronic airway inflammation.(1–4) An asthma exacerbation is characterized by a steady rise in the symptoms of wheezing, coughing, or shortness of breath to the point that a change in treatment is necessary.(3–5) A complicated combination between genetic, immunological, and environmental variables leads to the diverse disease of asthma.(3,6). Asthma exacerbations can be classified as mild, moderate, severe, or life threatening.(7,8) Triggers that cause the release of inflammatory mediators, such as viruses, aspirin, cold weather, allergens and physical exertion are what cause these exacerbations.(2–4,6,8–11)

Acute asthma attack is one of the most common reasons for emergency department (ED) visits, hospitalization, and death rate.(9,12) Acute asthma is also responsible for a significant amount of time off work, and lost productivity.(13).Asthma is a major source of morbidity and mortality worldwide, putting a large financial and health burden on nations. (5,6) If asthma is not well managed, it has been shown to have an impact on everyday activities, cause serious physical and socioeconomic hardship, and increase the expense of healthcare.(2) Acute asthma frequently necessitates pricey ED visits and hospital stays. Many asthmatics have a poor quality of life and are vulnerable to relapse for weeks after receiving acute asthma treatment, which is frequently unpredictable. (5,14,15)

The main objectives of treating an acute asthma exacerbation are to quickly identify the airflow obstruction and reverse it in order to prevent future episodes and relapses.(13) Acute asthma is treated differently in the ICU than it is in an outpatient setting. Different therapy approaches have been researched to enhance outcomes in patients with severe or life-threatening exacerbations.(5) Many asthmatics treated symptomatically with only oral bronchodilators such as Salbutamol and aminophylline – usually under self-supervision(10). Additionally, obtaining a brief history at the patient's initial examination as part of the clinical assessment will help to identify the patient who is more likely to have serious morbidity and mortality from asthma soon(16)

In order to reduce asthma morbidity and mortality in developing nations, it is important to identify modifiable risk factors. This mortality may be higher in older populations due to a greater number of co-morbidities.(3) Few research have looked at methods for enhancing acute asthma care in this population, despite the fact that there is strong evidence that excessive asthma-related morbidity occurs in adults, is associated with poverty, and is higher in areas with a high concentration of urban residents. (14). Although there is a wealth of information available globally, Ethiopia has very little written about asthma. (10) The purpose of this study is to evaluate the effectiveness of acute asthma medication in adult patients who were monitored at Saint Paul Millennium Medical College in Addis Ababa, Ethiopia.

1.2. Statement of the problem

Globally, asthma has currently affected an estimated 339 million people and the number may increase to 400 million people by the year 2025. The global burden of disease collaboration estimated that at least 400,000 people died prematurely from asthma, and the majority of deaths occur in sub-Saharan countries. The prevalence of asthma varies widely across countries due to differences in genetic make-up, climatic, environmental factors. Acute asthma exacerbation affects patients and their families and could result in shortage of productive hours, frequent hospitalization and poor quality of life. Asthma-related morbidity and mortality may be greater in older population due to greater number of co-morbidities (3,6)

Asthma prevalence in Africa was projected to be 119.3 million in 2010, accounting for 12.8% of the global prevalence population. The estimated incidence of asthma in eastern Africa, including Ethiopia, Somalia, and Kenya, is 4.4%; nevertheless, the majority of prescribers do not adhere to recommended asthma care practices. The prevalence rate in Ethiopia was 9.1%, 4.3% in southern Ethiopia, and 11.4% in Addis Ababa(10). Two studies from the northern part of Ethiopia reported prevalence rates of 10.4% and 29.6%.(2) The study done in Jimma and Addis Ababa, Ethiopia, found that uncontrolled asthma affected 64.5% and 53.3% of the population, respectively.(6,19)

There is increasing evidence that the prevalence of asthma will continue to increase due to their sequential lifestyle changes, rapid urbanization, and increased exposure to environmental and occupational factors (Moyo et al., 2017). The risk and intensity of exposure to these environmental and occupational pollutants continue to increase due to lack of clear

Environmental regulatory policies (Moyo et al., 2017). A study in South Africa found the risk factors for asthma exacerbation to be rural residence, poverty and lack of use of inhaled corticosteroids. (6,19,20)

About 10% of asthmatics experience symptoms and exacerbations despite receiving the maximum amount of standard-of-care controller therapy. (21) Most asthma, 5-10% of asthma patients suffer from a severe form of asthma that is uncontrolled despite maximal pharmacological therapy. (1) According to the severity of the illness, the type of treatment used, and the location, 10% to 20% of patients who visit the emergency room need to be admitted to the hospital. (13) Despite this, relapse rates in patients who have been treated in the ER and then discharged still range from 26 to 30%, indicating a continued need for ER care. (12) But, up to the researcher knowledge there is no similar studies are available that have reported the treatment outcome and associated factor of acute asthma patients in Ethiopia.

1.3. Significance of the study

Appropriate evidence-based therapy for exacerbations is key in an attempt to reduce the burden of these acute episodes and help in the rapid recovery of these patients. (5) Despite the availability of effective therapy for controlling asthma, it continues to be underdiagnosed and undertreated, and its incidence is increasing. There is no similar research done in Ethiopia to assess the outcome of acute asthma and factors associated with among patient with acute asthma at Saint Paul Millennium medical college, Addis Ababa, Ethiopia. This study helps to assess the treatment outcome of acute asthma patients getting treatment at emergency department of at Saint Paul hospitals in Addis Ababa. Determination of the factors associated with the treatment outcome gives insight on the current burden of the problem in the hospital specifically, and at country at large. So conducting this study helps to address the problem which helps to recommend for the respective body.

Chapter Two: LITERATURE REVIEW

A meta-analysis of randomized controlled trials compared the combination of inhaled anticholinergic and beta2 agonists with beta2 agonists alone showed that adding multiple doses of inhaled anticholinergic medication improves lung function and decreases hospitalizations in school-aged children with severe asthma exacerbations.^{24,25} (7) A meta-analysis done on the relation between asthma and COVID-19 treatment showed that the prevalence of asthma was 11.2% among COVID-19 patients who attended the hospitals showed that asthmatic patients had increased risk of endotracheal intubation especially patients aged <50 years.⁽¹¹⁾ A narrative literature review conducted to evaluate the measurement properties to asthma control and exacerbations showed that no single outcome measure can adequately assess asthma control.⁽²²⁾

Another experimental study done on the management of acute Asthma in the emergency department indicated that handheld inhalers are sufficient for most inhaled therapy; all patients on inhalers should be provided with a spacer. The severity of asthma exacerbations is determined by 3 features: (1) clinical presentation, (2) peak expiratory flow rates, and (3) vital signs. Inhaled ipratropium decreases hospitalization rates, and it should be routinely used. Magnesium sulfate may be beneficial in severe asthma exacerbations, but routine use for mild to moderate exacerbations is not indicated.⁽⁴⁾

A cohort study done in on the effectiveness of acute asthma care, among the total 309 participants in the study revealed that systematic corticosteroid had significantly effective for increasing percentage peak expiratory flow rate change at 2 and 3 week follow up for all asthma exacerbation severity level and severity level by the national asthma education prevention guideline.⁽¹⁴⁾

One study reviewed 51 consecutive asthma deaths in 1 state in Australia, and it found that 33% of the patients who died had a history of trivial to mild asthma, 32% had never been hospitalized, only 22% had an ICU admission in the past, and 11% were reported to be symptom-free prior to their terminal hospitalization. Only 1 patient met criteria for severe uncontrolled asthma.¹² Thus,

like many diseases presenting to the ED, a lack of risk factors does not necessarily confer a lack of risk. (4)

A study done in Brazil on the early prediction of poor outcome in patients with acute asthma in the emergency room showed that all patients were treated with 2.5 mg albuterol delivered by nebulization every 20 min in the first hour and 60 mg of intravenous methylprednisolone. Patients were reevaluated after 60 min of treatment. Sixty-five patients (73.9%) were successfully treated and discharged from the emergency room (good responders), and 23 (26.1%) were hospitalized or were treated and discharged with relapse within 10 days (poor responders). It was possible to predict outcome in the first hour of management of acute asthma in the emergency room when the index score was 0 or 2.(12)A systematic review done in Netherlands on the medication adherence and the risk of severe asthma exacerbations: showed that good adherence tended to be associated with lower risk of severe asthma exacerbations.

A guideline on management of the acute asthma attack in children by Italian Society of Pediatrics revealed that inhaled β_2 agonists are the first line drugs for acute asthma attack in children. Ipratropium bromide should be added in moderate/severe attacks. Early use of systemic steroids is associated with reduced risk of ED visits and hospitalization. Intravenous magnesium sulphate could be used in children with severe attacks and/or forced expiratory volume₁ (FEV₁) lower than 60% predicted, unresponsive to initial inhaled therapy. Heliox could be administered in life-threatening attacks.(9)

A Three-year Retrospective Observational Study done in Rural South-Western Nigeria on prevalence, Risk Factors and Treatment Outcomes of Acute Asthma Exacerbations showed that the prevalence of asthma exacerbation was 5.1%, and its risk factors were family history, tobacco smoking, keeping pets, co-morbidity, numbers of co-morbidities, hypertension, obesity, obstructive sleep apnea, COPD, Diabetes mellitus, and gastro-esophageal reflux disease. The

treatment outcomes showed that 85.3% of the patients were discharged, and 2.9% died on admission. The study strengthens the argument that asthma exacerbation morbidity and mortality are higher in older age population.(3)

An experimental study done in Egypt on acute severe asthma in emergency department revealed that of the total, Fifty-five percent of patients suffered from severe and life-threatening asthma exacerbations. The most important predictors for severe exacerbations were $SO_2 < 90\%$ at baseline, PEF after 1 h, and uncontrolled asthma. Predictors for hospitalization were old age, uncontrolled asthma, PEF after 1 h, and $SO_2 < 90\%$ at baseline.(17)

A retrospective study conducted at Nemmh Chest Clinic in Hadiya Zone, Southern Ethiopia on the assessment of Asthma Treatment Outcomes among Adult Outpatients revealed that there is a strong effect of social drug abuse with disease improvement.(10)

2.2. Conceptual framework

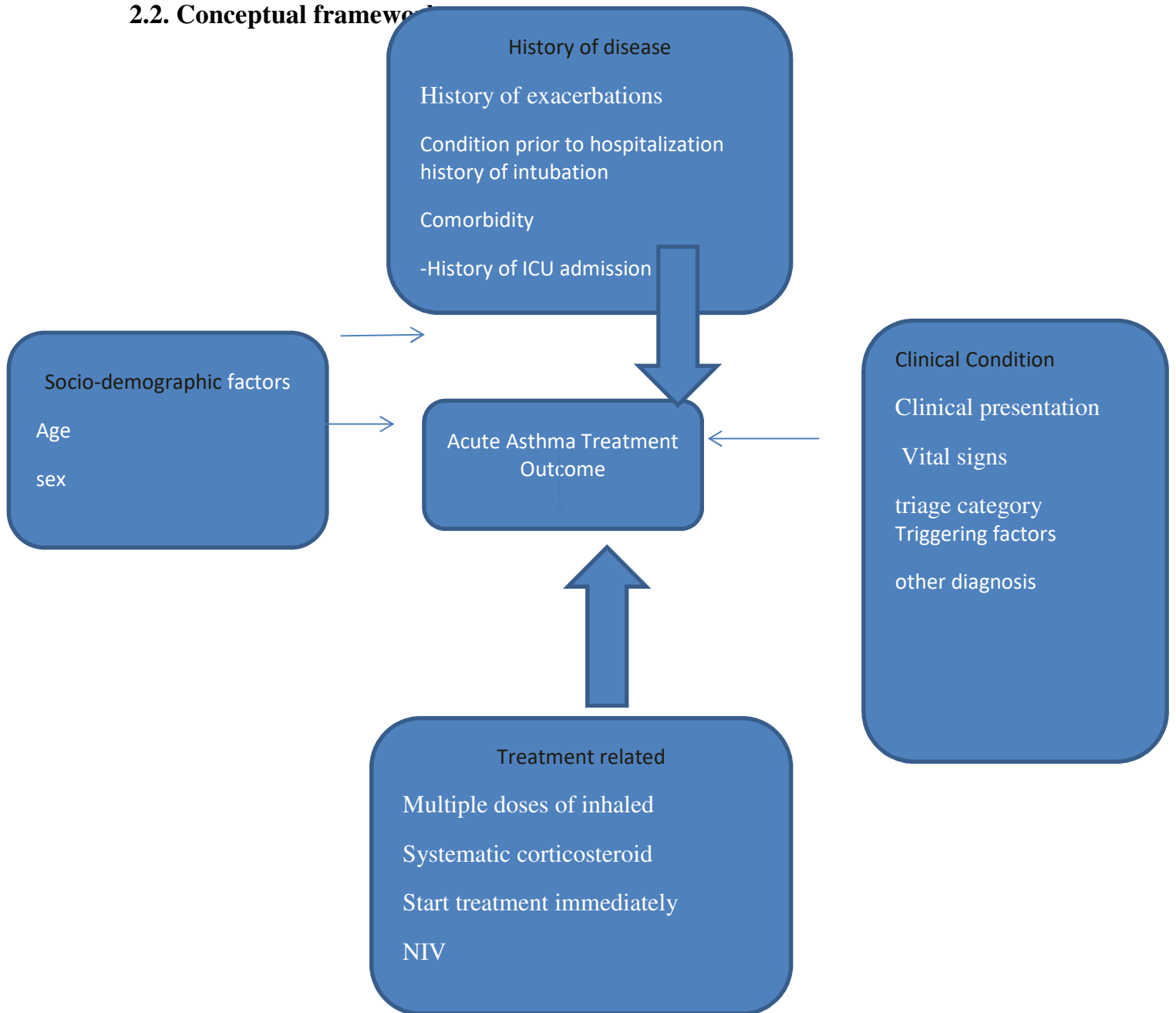


Figure 1: Conceptual framework on acute asthma treatment outcome and factors associated with at emergency department(3,4,17,7,9,11–16)

Chapter Three: OBJECTIVE

3.1 General objective

- To assess treatment outcome of acute asthma and identify associated factors among Acute Asthma patients attending Emergency department at SPHMMC Addis Ababa, Ethiopia, 2023 from October 1,2022 to October 1,2023

3.2. Specific objectives

- To assess the treatment outcome of acute asthma among Patients attending adult emergency department at SPHMMC Addis Ababa, Ethiopia, 2023.
- To identify factors associated with treatment outcome of acute asthma among Patients attending adult emergency department at SPHMMC Addis Ababa, Ethiopia, 2023.

Chapter Four: METHODOLOGY

4.1 Study area

St. Paul's Millennium Medical College is situated in Addis Ababa, Ethiopia, at latitude 9.047974 and longitude 38.727557. St. Paul's Millennium Medical College was formed in 2010 by a resolution of the Council of Ministers. Saint Paul Hospital Millennium Medical College, which has grown from 3 to 250 faculty members in the last 6 years, is currently extending its teaching spaces and rapidly increasing its capacity within a short period of time. Every day, the College sees 1200 patients in outpatient and emergency situations. Emergency department receives nearly 10,000 patients yearly and has the capacity of more than 20 beds organized into Red, Orange, Yellow and Green. According to the hospital HMIS report, there are around 3 adult asthma patient attended the emergency department on daily basis, which mean around 1000 acute asthmatic patients attending the emergency over one year. This study conducted at SPHMMC Emergency department.

4.2. Study Period:

This research conducted from October, 10 2023 October10, 2023

4.3 Study Design:

A one year institutional based cross-sectional study was applied.

4.4 Study Population:

4.4.1. Source population

All adult patients who visited the SPHMMC Emergency Department during the study period

4.4.2 Study pupation

All adult patients with a diagnosis of acute asthma visited the SPHMMC Emergency Department during the period.

4.4.3. Study Unit

Individual patients

4.5. Eligibility Criteria

4.5.1. Inclusion criteria

- Patients who are 18 years old and above (including geriatric age) who have acute asthma

4.5.2. Exclusion criteria

- Patients with incomplete chart information
- Patients left against medical advice

4.6. Sampling method and Sample size

A single population proportion formula used to estimate the sample size of acute asthma treatment outcome amongst asthmatic patients attending emergency department and the following assumptions was made: proportion of treatment outcome of acute asthma patients attending emergency department 50.0% ($p = 0.5$) (Since the prevalence of the problem in the study is not well known in our setting), level of significance to be 5% ($\alpha = 0.05$), 95 % confidence level ($Z_{\alpha/2} = 1.96$) and absolute precision or margin of error to be 5% ($d = 0.05$).

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

Where, n = sample size

p = proportion of treatment outcome of acute asthma (50%)

Z = standard normal distribution curve value for the 95% confidence interval

(1.96)

d = the margin of error or accepted error

$$n = \frac{(1.96)^2 0.5(1-0.5)}{(0.05)^2} = 384$$

Since the source population is 1000, which is less than $< 10,000$, population correction formula is used to determine adjusted minimum sample size.

$$n_f = \frac{n}{1 + \frac{n-1}{N}}$$

$$1 + n/N$$

Where n= initial sample size was 384

N= total number of patients admitted during the study period

n f – minimum sample size

$$\text{Thus, } nf = \frac{n}{1 + n/N} = \frac{384}{1 + 384/1000} = 277$$

There were 259 patients used for analysis

4.7. Sampling procedure

A systematic random sampling was held. So, Kth for this study took by taking the ratio of average patient number over the year divided to the calculated sample size. So K was $850 / 305 \approx 3$. Then the first eligible individual selected by simple random sampling using the lottery method as n was selected by listing 1,2,3... then finally we continued with Kth interval until we were contact the calculated sample size.

4.8. Variables

4.8.1. Dependent Variables

Outcome of acute asthma exacerbations (Good, Poor)

4.8.2. Independent Variables

- **Socio-demographic variables:** Age, sex, monthly income, Residency
- **History of disease:** History of recurrence, Condition prior to hospitalization, History of ICU admission, Duration of illness, durations of symptoms, Frequency of exacerbation
- **Clinical Condition:** Mode of arrival, Clinical presentation, Vital signs, Comorbidity, triage category, Current treatment
- **Treatment related factors:** Multiple inhaled drug, systematic corticosteroid, Start treatment immediately, Time of evaluation, Length of stay in ED

4.9. Operational definition

- Good outcome: Patient disposition from emergency department either improved or admitted to ward
- Poor outcome: Patient disposition from emergency department either died or transfer to intensive care unit
- Length of stay: is defined as a time interval from patient arrival to leaving emergency department.

4.10. Data Collection tool

All data was collected from SPHMMC emergency department log book, patient's chart, Health Management Information System (HMIS), referral papers and death reports. The demographic characteristics of the respondent (identity, marital status, and education level), factors relating to

the clinical condition such as Vital sign, interventions provided in the hospital, outcome of patients, and other necessary data were assessed

4.11. Data Quality Assurance

The instrument will be developed from the literature review, as published and instruments tested on the topic because the standardized tool was not available for this study. The questionnaire checked for clarity, comprehensiveness and validity before actual data collection started.

4.12. Data Processing and Analysis

Data checked for completeness and cleaned, coded, entered and analysis using SPSS version 26 software package for Incomplete and inconsistent data were excluded from the analysis. A descriptive statistics used to describe the data. The results of the descriptive statistics expressed as percentages and frequencies. The Chi-square and crosstab analyses were carried out to calculate the relationship between the demographic factors, clinical factor, treatment option, and treatment outcome of acute asthmatic patient attending adult Emergency Departments. Associations between independent and dependent variables were first analyzed by using bivariate binary logistic regression analysis to identify factors associated with the outcome variable. Those variables which found to have an association with the outcome variable at $P < 0.25$ in the bivariable logistic regression were eligible for the multivariable regression model to see the association between the independent and the outcome variable. P-values less than 0.05 were considered to be statistically significant. Hosmer and Lemeshows fitness model used to check the model fitness. Multicollinearity checked by using variance inflation factor.

4.13. Ethical consideration

This study approved by the Institutional Review board of St. Pauli Millennium Medical College before it begun to conduct. According to Article 32 of the Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects, the research can be done only after consideration and approval of a research ethics committee in situations where consent would be impossible or impracticable to obtain. As a result, consent to review medical records of patients was not required by the ethical review committee. Patient-related data were kept confidential throughout the study.. Additionally, the objective of the study explained to the hospital administrators, medical director, and card room staffs. Confidentiality of the patient's

information contained within their registration books, cards, and referral papers assured by using code numbers and by keeping questionnaires locked.

4.14. Dissemination of the result

The result will be presented in emergency and critical care department as a defense. The copies of final results will be submitted to St. Pauli millennium medical college and will distribute to library, to postgraduate office and AaBET's administration office and Federal Ministry of Health. The findings are expected to present in different seminars, meetings and workshops as well as further effort will make to publish the findings on national and international peer reviewed journal. Hard and soft copies will be available in the library of Saint Paul Millennium Medical College, for graduate students as well as for other researchers and readers.

Chapter Five: RESULTS

5.1. Socio-demographic

Among the total 850 patients attending the facility during the study period, 259 were involved with the response rate of 85 %. Of the total 259 client, 142(54.8%) were male, and 117(45.2%) were Female. The mean age of the participants was 45.38 year $\pm$ SD 17.0, minimum of 18 year and maximum of 90 year. Among the total patients 130(50.2%) were in the age group of above

44 year, 126(48.6%) of them were arrived to the facility by ambulance, and 133(51.4%) of them had triage category of yellow. From the total patients, majority 151(58.3%) of them had no comorbidity, 194(74.9%) of them had no known allergy history, and 218(84.2%) of them had asthma exacerbation in the last one year.

Table 1: Socio-demographic and triage characteristics of asthmatic patients attending emergency service at Saint Paul Hospital, Addis Ababa, Ethiopia, 2023.(n=259)

Variables	Category	Frequency	Percentage (%)
Sex	Female	117	45.2
	Male	142	54.8
Age in year	18-24	26	10.0
	25-34	53	20.5
	35-44	50	19.3
	>44	130	50.2
Mode of arrival	Ambulance	126	48.6
	Private car	56	21.6
	Public transport	27	10.4
	Walking	49	18.9
Triage category	Orange	53	20.5
	Red	73	28.2
	Yellow	133	51.4
Comorbidity	No	151	58.3
	Yes	108	41.7
History of allergy	No	59	22.8
	Not known	194	74.9
	Yes	6	2.3
Hx of exacerbation in the past 1 year	No	41	15.8
	Yes	218	84.2

5.2. Clinical characteristics of asthmatic patients

Among the total patients, majority 209(80.3%) of them were on reliever or controller treatment, and 228(88.0%). Most 231(89.2%) of them had no history of intubation. The mean duration of symptom was 20 years with minimum of new onset to maximum of 74 years, and 95(36.7%) of them had less than of 10 years duration of the symptom. From the total 246(95.0%) of them had no smoking habit.

Table 2: Clinical characteristics of asthmatic patients attending emergency service at Saint Paul Hospital, Addis Ababa, Ethiopia, 2023.(n=259)

Variables	Category	Frequency	Percentage (%)
On maintenance or reliever treatment	No	50	19.3
	Yes	209	80.7
Medication worsen asthma	No	228	88.0
	Yes	31	12.0
Hx of intubation	No	231	89.2
	Yes	28	10.8
Duration of symptom	<10 years	95	36.7
	10-20 years	71	27.4
	>20 years	93	35.9
Smoking habit	No	246	95.0
	Yes	13	5.0
Time of ED arrival	Day	200	77.2
	Night	59	22.8

5.3. Treatment related factors

From the total participants, 52(20.1%) were put NIV on current admission. 236(91.1%) were not intubated in the current admission and 13(5.0%) of participants had complication during treatment. When we see length of stay at the emergency service, 76(29.3%) were stayed less than six hours and only 6(2.3%) was stayed more than 3 days. From the total participant, more than half of them 162(62.5%) were admitted for the treatment of asthma, and 233(90.0%) of the total participants had GCS score of 15.

Table 3: Clinical factors and treatment response of asthmatic patients attending emergency

Variables	Category	Frequency	Percentage (%)
Has referral	No	180	69.5
	Yes	79	30.5
The patient on niv at current ED admission	No	207	79.9
	Yes	52	20.1
The patient intubated at ED current admission	No	236	91.1
	Yes	23	8.9
Length of stay in ED in hour/day	up to 6 hrs	76	29.3
	6- 12 hrs	46	17.8
	12 -24 hrs	67	25.9
	2 days	64	24.7
	3 days	6	2.3
Complication during treatment	No	246	95.0
	Yes	13	5.0
Other diagnosis during the same admission	No	162	62.5
	Yes	97	37.5
Antibiotic use	No	162	62.5
	Yes	97	37.5
GCS	13 and less	10	3.86
	14	16	6.2
	15	233	90.0

5.4. Prevalence of outcome variables

The treatment outcome for patient with acute asthma at emergency department was assessed. The prevalence of good treatment outcome at emergency service used was 73%, with 95%CI, (68%, 79%), and the prevalence of patient discharged alive was 99.2%. This mean among the total 100 patients with asthma at emergency department, only 73 patients had good treatment outcome.

5.5. Factor affecting the treatment outcome of patient with asthma

Bivariate and multivariate binary logistics regression analysis were done. We use a p value of <0.25 were applied as a cut point from bivariate to multivariate binary logistics regression analysis. So variables such as antibiotic use, triage category, comorbidity, history of exacerbation's with in last year, on maintenance or reliever treatment, medications worsen asthma, previous ED admission, history of intubation, the patient has referral, the patient on niv at current ED admission, the patient intubated at ED, current admission, complication during treatment, and their diagnosis during the same admission were factors fit for multivariable binary logistics regression.

Finally variables statistically significant for the treatment outcome for asthma management were those patients who demanded antibiotic and triage category of yellow were factors statistically significant with the outcome. The finding of this study was patient those demanded antibiotic were **6.6 times** more odd of having poor outcome than their counterpart (**AOR=6.65, 95% CI, (1.99, 22.26), P=0.002**). The other finding of the study was those patients with triage category of yellow had **7.6 times** more odds of having good outcome than those with triage category of red. (**AOR=7.60, 95% CI, (2.40, 24.04), P=0.001**).

Table 4: Bivariate and multivariate binary logistics regression analysis of the treatment outcome and factor associated among patient with asthma attending emergency service at Saint Paul Hospital, Addis Ababa, Elthiopia, 2023.(n=259)

Variable		Treatment outcome		COR with 95% CI	AOR with 95% CI	P value
	Category	Good	Poor			
Antibiotic use	Yes	143	19	8.01(4.30, 14.92)	6.65(1.99, 22.26)	0.002**
	No	47	50	1	1	
Triage category	Yellow	126	7	24.39(10.0, 59.47)	7.60(2.40, 24.04)	0.001**
	Orange	33	20	2.23(1.08, 4.61)	0.71(0.25, 2.04)	
	Red	31	42	1	1	
Comorbidity	Yes	68	40	1	1	
	No	122	29	2.47(1.41, 4.34)	0.77(0.30, 1.94)	0.578
History of exacerbation's with in last year	Yes	150	68	1	1	
	No	40	1	18.13(2.44, 134.64)	2.50(0.28, 22.36)	0.413
On maintenance or reliever treatment	Yes	146	63	0.32(0.13, 0.78)	0.79(0.23, 2.71)	0.709
	No	44	6	1	1	
Medications worsen asthma	Yes	14	17	1	1	
	No	176	52	4.11(1.90, 8.89)	3.25(0.80, 13.13)	0.099
Previous ED admission	Yes	131	64	1	1	
	No	59	5	5.76(2.21, 15.06)	2.09(0.56, 7.85)	0.273
History of intubation	Yes	7	21	1	1	
	No	183	48	11.44(4.59, 28.49)	4.49(0.99, 20.31)	0.051
The patient has referral	No	142	38	2.41(1.36, 4.29)	1.43(0.57, 3.60)	0.449
	Yes	48	31	1	1	
The patient on niv at current ED admission	No	172	35	9.28(4.72, 18.27)	2.19(0.72, 6.63)	0.166
	Yes	18	34	1	1	
The patient intubated at ED current admission	No	188	48	41.12 (9.32, 181.5)	6.99(0.95, 51.28)	0.056
	Yes	2	21	1	1	
Complication during treatment	No	187	59	10.56(2.81, 39.67)	1.08(0.09, 13.49)	0.953
	Yes	3	10	1	1	

Other diagnosis during the same admission	No	144	18	8.87(4.72, 16.68)	1.49(0.45, 4.94)	0.513
	Yes	46	51	1	1	

***: P value <0.05, **: p value < 0.01, The Hosmer Lemeshow goodness of fit test: 0.871, and The VIF was between 1 and 3.**

Table 5: Bivariate and multivariate binary logistics regression analysis of the treatment outcome and factor associated among patient with asthma attending emergency service at Saint Paul Hospital, Addis Ababa, Elthiopia, 2023.(n=259)

Chapter Six DISCUSSION

The prevalence of good treatment outcome among asthmatic patient attending Saint Paul hospital emergency service was 73%, with 95%CI, (68%, 79%). This mean among the 100 asthmatic patients those attending the emergency service, 73 of them had good outcome, and the rest 27 had poor outcome. This finding is similar with a study done at Brazile(73.8%) (1), Chile(73.2%)(2)

But our finding is lower than the study done in Nigeria(85.3%)(3), The difference could be difference in sample size, a study done in Nigeria they included 102 patient which is half of our sample size(3). Our study finding is higher than study done at 67.3% and 66.8% reported in another Nigeria study and UK audit respectively (Desalu et al., 2009; Lindsay and Heaney, 2012)., Hadiya(43.8%)(4), and Addis Ababa(50.4%)(5). The difference could be difference in study population, a study done in Hadiya they included asthma patient attending outpatient which is different from ours.(4)

One of the finding of our study was patient who demand antibiotic had poor outcome for asthma management. Those who demand antibiotic were 6.6 times more odds of having poor outcome than those who did not demand antibiotic. (**AOR= 6.65, 95% CI, (1.99, 22.26), P=0.002**). **The possible reason could be** the bad outcomes observed in asthmatic patients who demand antibiotics could be attributed concomitant infection. It's possible that these patients may have severe exacerbations, and then poor overall asthma control. It needs further study to identify the association of antibiotic use and poor outcome

In this study, 37% of asthmatic patients' precipitants for asthma exacerbation were lower and upper respiratory infection. This was supported by the study done in the United States which found that 22% of the patients with acute asthma were treated with an antibiotic. This suggests that the most precipitating diseases are infection related. This might be due to patients who demonstrated to have bacterial received antibiotics as most cases have pneumonia.

The other finding of our study that contributes for good treatment outcome was triage category. Those patients that had triage category of yellow were 7.6 times more odds of having good treatment outcome than those who had red triage category. (**AOR=7.60, 95% CI, (2.40, 24.04), P=0.001**). **The possible explanation might be** the triage category assigns patients based on the severity of their symptoms and the urgency of medical intervention required. A patient with a

yellow triage category likely has a milder asthma exacerbation, whereas those with a red triage category have more severe symptoms.

Chapter Seven CONCLUSION

The prevalence of good treatment outcome among asthmatic patient attending Saint Paul hospital emergency service was 73%. This mean that the remaining 27% had poor outcome, which is very high number of patient had poor outcome. The clinician and hospital administrative staffs should give emphasis to intervene and increase the good outcome. Factors associated with good outcome were triage category of Yellow and those who demand antibiotics.had poor outcome

Chapter Eight STRENGTH and LIMITATION

8.1. Strength of the study

Up to the researcher knowledge, this is the first study done specific to asthma treatment outcome at emergency service in Addis Ababa. The study showed the magnitude of the problem. It also assessed the predictors of treatment outcome for asthma management.

8.2. Limitation of the Study

The possible limitation of this study is the study design we applied.Because of the study was cross-sectional design, it can only show a temporal effect and not show the causal effect of the study. The study done at one federal hospital in Addis Ababa, so it cannot be representative of other federal hospitals and other facilities at country level ..

Chapter Nine RECOMMENDATION

WE recommend for

- **FMOH:** The ministry of health should give attention for the specific management given for asthmatic patient at facility level and update the guideline if necessary.
- **Saint Paul hospitals:** Hospitals should work in order to follow the treatment outcome of asthma patient and intervene based on the findings. The facility might facilitate training on triaging of asthma patient and improve the service quality which are important for infection such as chest x ray, ultrasound
- **For clinicians:** The health care provider should continue the level of care they gave so far to help their patient have good outcome. It is also better if healthcare providers give more attention and initiate the treatment for patient with red triage category and those who demand antibiotic medication.
- **For researcher:** The study used a cross-sectional study to assess the outcome variable and its predictors, so the researcher should consider assessing these variables with different study design. Better to incorporate the qualitative data which help us to identify where the gap is for the treatment outcome.

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Chapter Eight: Annex

Annex-I Informed Consent

Saint Paul Hospital Millennium Medical College Department of Emergency and critical care
Consent form for participation in a research study

You are welcome to participate in a research study conducted by Tsegaye Alem, who is final year EMCC at Saint Paul Hospital Millennium Medical College. The purpose of this study is to assess the treatment outcome and factors associated with among Acute asthmatic patients attending Emergency department. This is a research will be conducted for Partial Fulfillment of the Requirements of Specialty training in Emergency Medicine and Critical care. All the patients information will kept confidential. Patients' identity will not be revealed at any stage of this study. This study will benefit health policy makers, patient who visit emergency department, nurses working there and other researchers.

Annex II

Sociodemographic data

- Age in years: _____
- Sex : A) Male B) Female
- Address: A) Addis Ababa B) Oromia C) Amhara, D) SNNP
- Clinical Presentation
 - Mode of arrival to ED: A) ambulance B) public transport C) walking D) private car
 - Triage category : A)red , B) orange, C) Yellow D) green
 - Previous ED admission: A) Yes B) No
 - Smoking history A) yes B) NO
 - Condition prior to hospitalization: _____
 - Duration of symptom: _____
 - Did you have a history of recurrence: A)Yes B)No
 - If yes, How many time of recurrence A)once B) twice C) three D four E five or more
 - previous ICU admission A)once B) more than one
 - Comorbidity: A) yes B) No
 - If yes for above question mention _____
 - Triggering factors : A) cold wether B) pollen ,dust c bad or strong smell
D) infection E)
 - F) Other (mention if any)

- Primary complaint: A) cough B) shortness of breath c fever
D) chest tightness E) altered mental status F) wheezing
F) Other (mention if any) _____
- Time of ED arrival:_____
- Length of stay in the ED (hours/days): _____
- Current treatment you used:
 - A) Oxygen
 - B) Systemic corticosteroid
 - C) Single dose Inhaler
 - D) Multiple inhaled drug
 - E) Other_____
- Emergency department intervention? _____
- Outcome of patients
 - Outcome of patient; A)died **B) alive**
 - If alive patient disposition A) discharged B)admitted

Table III: Vital sign at admission

Variables		
SBP		
DBP		
HR		
RR		
GCS		

Annex III tables showing cross tabulation of patients NIV at ED and intubated at ED

Did the patient on niv at current ED admission/Yes * 26 is the patient intubated at ED current admission Crosstabulation

Count

	26 is the patient intubated at ED current admission		Total
	no	Yes	
000000 Did the patient on niv at current ED admission/Yes	36	16	52
Total	36	16	52

Did the patient on niv at current ED admission/Yes * OUTCOME VARIABLE Crosstabulation

Count

	OUTCOME VARIABLE		Total
	Poor	Good	
000000 Did the patient on niv at current ED admission/Yes	34	18	52
Total	34	18	52

26 is the patient intubated at ED current admission * OUTCOME VARIABLE Crosstabulation

Count

	OUTCOME VARIABLE		Total
	Poor	Good	
26 is the patient intubated at no	19	17	36
ED current admission yes	15	1	16
Total	34	18	52

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 report 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: Dr Tsegaye Alem ECCMR

Signature: _____

Date: _____

Approval of the Primary Advisor

Name of the primary advisor: (Assistant Professor of ECCM)

Signature: _____

Date: _____

Approval of the Co-Advisor

Name of the primary advisor:

Signature: _____

Date: _____