



LENGTH OF HOSPITAL STAY IN PEDIATRICS EMERGENCY DEPARTMENT AND THE ASSOCIATED FACTORS AT SAINT PAUL HOSPITAL MILLENNIUM MEDICAL COLLEGE

By Dr.Sadiya Bezabih(MD and Pediatrics Resident)

A Research Thesis submitted to the Department of Pediatrics and Child
Health in Partial Fulfillment of the Requirements for the Degree in
Pediatrics and Child Health; Saint Paul's Hospital Millennium Medical
College

November, 2022

Addis Ababa, Ethiopia



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■ Pre- Intervention

ABBREVIATIONS and ACRONYMS

ACEM.....	Australian Collage for Emergency Medicine
CAEP.....	Canadian Association of Emergency Physicians
CI.....	Confidence Interval
DTTU.....	Diarrheal Training with Treatment Unit
ED.....	Emergency Department
ETB.....	Ethiopian Birr
ICD.....	International Classification of Disease
G.C.....	Gregorian calendar
LOS.....	Length of Stay
MOH.....	Ministry of Health
PI.....	Principal Investigator
SBFR	System Bottlenecks Focused Reform
SPHMMC.....	Saint Paul's Hospital Millennium Medical College
SPSS.....	Statistical Package for Social Sciences

Abstract

Background: One of the effective indicators for determining the efficiency and optimal use of hospital resources is the hospital length of stay of patients. Prolonged length of stay can impact patients' outcome, parental financial status, hospital costs, and overall performance of health care facility. Despite this fact, there are limited data regarding pediatric emergency length of stay and associated factors. [1,12]

Objective: This study determines length of hospital stay and the associated factors in Pediatric Emergency Department, Saint Paul's Hospital Millennium Medical College, Ethiopia.

Method and Material: An institution-based cross-sectional study has been conducted in the Emergency Department of Saint Paul's Hospital by using a structured questionnaire. The study period which is classified as pre-intervention (June 20- July 17, 2022) and Post intervention period(between July18-September 20, 2022) based on time of System Bottlenecks Focused Reform project implantation in Emergency. Data were analyzed using SPSS version 26.0 to present the descriptive statistics of variables affecting length of hospital stay and identify its determinants using logistic regression model.

Results - In pre-intervention period, 79.5 %of the patients stayed above 24 hours and, 64.9% stayed above 24 hours in the post intervention period. Presence of co morbidity and having respiratory co morbidity were found to be significantly associated with longer emergency length of stay. Lack of early decision making, unavailability of inpatient beds, decision to treat patient in the ER by the primary treating physician, delay in collection of investigations and waiting for sub-specialty consultation are the main statistically significant determinant factors for a prolonged length of stay.

Conclusion

This research has shown that the proportion of prolonged pediatrics emergency department length of stay was high despite initiation of interventions. Therefore, all planned interventions need to be implemented at full scale by emphasizing the aforementioned associated factors.

Keywords: Length of stay, Pediatrics, Emergency, Logistic regression

Introduction

Background

Pediatric Emergency is a department that works 24 hours in a day for managing children with potentially life-threatening illnesses or injuries. It mainly serves unscheduled patient population with anticipated needs of emergency care [1].

There is increasing demand of care at hospitals in emergency department worldwide [17;5]. (Emergency Department (ED) overcrowding is a worldwide worry and signifies global crisis that may affect access to health care and quality of service delivery for patients [5].

Emergency department visits In USA in 2011 rose by 65% from visits in 2001 that increased hospital stay, waiting times and delayed early admissions [9]. Approximately 20% of all ED visits in USA is pediatric age group. In 2015, 17% of children in USA demanded care at emergency at least once. In that year, there was 30 million visits at ED of children of 18 years and younger with a rate of 382.9 per 1000 population [14].

Even though during the COVID-19 pandemic period (March 15, 2020 to August 31, 2020), there was marked decrement in the USA ED visit rates by 45.7%, ED overcrowding is still problematic [16].

In Canada, there are 12 million ED visits per year. From 1992 to 2004, there was increment in ED utilization rate by 6%. In France as well, ED crowding up surged by 64% from 1995 to 2005. In Saudi Arabia, over 15 million ED visits were seen in 2006. In surveys done in 10 EDs in the capital city of Riyadh, overcrowding was one of top problems in 50% of the cases [17].

Efficient working capacity of ED can be assessed by Hospital length of stay [1]. Hospital length of stay is a marker of overcrowding [26]. Shorter hospital stays significantly reduces unnecessary medical costs for patients and increases bed turnover rate that overall increases institutional income [12].

“Access block has been associated with increased in hospital length of stay (LOS) and mortality, increased rates of return visits to the ED, a higher incidence of prolonged pain, patient and/or career dissatisfaction, ambulance diversions and ramping, and reduced ED efficiency [22].”

Emergency length of stay can be affected by different factors that may include overcrowding, delays in decision making and consultation to subspecialty units, inadequate service organization, lack of adequate hospital staff, unfinished investigations, lack of available inpatient beds, lack of affordability of beds by caregivers, lack of plan to discharge and follow up preparations. Furthermore, these needs further studies [10].

ETAT training and triage standards for health care providers had been provided by WHO and FMOH as possible solutions to reduce Pediatric length of stay. However, prolonged pediatrics ED length of stay is still challenge [11].

Ministry of health-Ethiopia in cooperation with regional and city administration has been putting various efforts to advance hospital service delivery system by designing and implementing number of strategies, initiatives and programs. The most important strategic measures taken by the ministry include implementation of Ethiopian Hospital Services Transformation Guide (EHSTG), Health Care Financing Reform, National Hospitals Health Services Performance Monitoring and Improvement framework (HPMI), National Healthcare Quality Strategy (NHQS), National Surgical Care Improvement Program (SaLTs), National Emergency and Critical Care Improvement Strategy and Ten years National Specialty and Sub-specialty Service Road Map. Despite all this practice of these reforms and initiatives have been showing positive results, the overall system organization and improvement of care is not progressing as anticipated. Disintegration and lack of alignment on strategies, initiatives and programs, inefficiencies and lack of proper accountability mechanisms are the most challenging problems.

MOH also launched System Bottlenecks Focused Reform (SBFR) project which is a unique pilot project that mainly focus and intervene on system level bottlenecks while creating clear strategies. Its main goal is to improve hospital's clinical care outcomes

and client satisfaction through introducing noteworthy and measurable positive system changes on access and quality of clinical, diagnostic and pharmaceutical care. This project implementation period is from March-18/2022 to February-30/2023. This project is designed to be tested in selected 38 hospitals across the country and aims in bringing improvements on both accessibility and quality of clinical, diagnostic and pharmaceutical services.

One of the strategic priority areas and interventions for SBFR project is the emergency and critical care. This has six change intervention plans of which one stop shop initial evaluation and decision making practice for all emergency cases is mentioned. This means clients should have initial evaluation by appropriate scope and decision making practice and when needed, all inter-departmental consultation should be made immediately. Overall, the projects' expected plans are to improve quality of care, efficient resource use, decrease waiting time, decrease unnecessary investigation and laboratory tests, rational uses of medications and increase patients' satisfaction.

Saint Paul Hospital is one of the hospitals in which implementation of SBFR project is being undertaken. There are limited data regarding hospital ED length of stay and possible factors that are associated with LOS in Ethiopia especially in pediatric age groups. Therefore, this study aimed to identify gaps creating prolonged LOS and will be helpful in potentiating quality of the hospital management and patient care.

Statement of the Problem

The efficient working capacity of ED can be easily evaluated by patient length of stay [26]. Some publications clarify the association of increased mortality to 30% with overcrowded EDs and is also viewed as an evidence of poor hospital performance [15] Prolonged ED stay is related with increased errors [3] missed laboratory test, missed home medications, more patients leaving the ED without being seen and longer inpatient length of stay [26]. Risk of developing pneumonia is also significantly related to prolonged ED LOS with increasing approximately 20% for each additional hour that patients spent in the ED [4].

In ED working area, Emergency physicians as well other hospital staffs face challenge in giving the maximum care for patients. It creates gaps in appropriate initiation of treatments, unclear patient medical histories and proper documentations on charts, earlier inpatient admissions and lack of differentiation between emergent and urgent cases that may need lifesaving interventions [1].

The more patients stay at the ED, the higher the mortality rate would be. There was found to be mortality increment from 2.5 to 4.5 % comparing length of stay less than 2 hours to greater than 12 hours [21;1].

In ED working area, staffs may face different challenges such as unanticipated states of patients' illness, patient overcrowding and difficulty in the necessity for time-dependent and triage-based judgment creation [22].

Research Problems

From the problem analysis, the following research questions could be drawn:

1. How long is the Pediatric patients stay at the ED of St. Paul hospital millennium collage?
2. What are the factors that affect Pediatric patients' hospital stay at St. Paul hospital millennium collage?
3. What should be done to reduce hospital stay and improve the medical service at the ED of the hospital?

OBJECTIVES

General Objective

- To assess length of Hospital stay and associated factors in Pediatric Emergency Department of Saint Paul Hospital Millennium Medical College

Specific Objectives

1. To assess the length of stay of patients admitted in pediatric emergency department of St Paul Millennium College;
2. To identify factors that affect the length of stay in the pediatric emergency department; and
3. To assess and compare the length of stay before and after SBFR project implementation.

Significance of the Study

This study investigates and analyzes the length of hospital stay at the ED of the Saint Paul hospital. The output of the study will be helpful to:

- ✓ know the extent of the problem;
- ✓ design evidence-based problem solving mechanisms;
- ✓ act in possible preventable associated factors;
- ✓ give an input for hospital by assessing changes after SBFR project is being implemented; and
- ✓ improve efficiency of service delivery that can increase patient satisfaction, reduce unnecessary medical costs for patients and increase bed turnover rate that overall increases institutional income.

Therefore, this study aimed to assess ED LOS and associated factors among patients visiting the Pediatric ED of SPHMMC. Therefore, the Hospital can use the results in the revision of admission policy of the Liaison and quality improvement policies.

Literature Review

Prolonged ED LOS is defined by CAEP as ED length of stay more than 6 hours and uses this as an assessment of quality of care and LOS more than 6 hours is related with increased mortality [18]. ACEM states that patients should have an access to an appropriate hospital beds within 8 hours of time [5]. There is clear evidential link between increased mortality to the level of 15-17% with waiting at the ED for inpatient bed for greater than 8 hours [7]. Ethiopian hospital services transformation guidelines (EHSTG) states that length of stay at emergency department should not exceed more than 24 hours.

Since prolonged LOS is being a big concern in both developed and developing countries, many Countries developed emergency OPD strategies and guidelines in order to prevent prolonged LOS. In 2000, United Kingdom announced “Four Hour rule” target Goal. This rule significantly improved patient care. In 2005, 95% of emergency patients either got treated and discharged or admitted to their wards within 4 hours [12].

In 2009, West Australian government also introduced the “four hour rule” by taking the experience from United Kingdom by initially targeting 85% of patients to fulfill these guidelines. After 2 years of implementation, this rule was adopted across the whole Australia naming it as National Emergency Access Target (NEAT). This applied a 90% target of all ED patients to be admitted, discharged or transferred within 4 hours of ED stay by 2015 [16].

In the year of 2007-2008, New Zealand faced ED overcrowding that became problematic requiring attention. Therefore, in 2009 the ‘Shorter Stays in ED’ target was applied by District Health Boards (DHBs) targeting 95% of patients to stay at emergency

for 6 hour as a rule. “The rationale behind targets was that health organizations would incentivize to develop their own solutions and initiatives to meet the target, and therefore alleviated problems of ED crowding and timeliness of treatment.” After applying 6 hour rule, New Zealand was successful in reducing ED length of stay from 2009 to 2011 [24]. Many studies tried to identify determinant factors for prolonged length of stay in pediatric emergency, so that preventive or corrective measures can be applied.

A retrospective observational study in 1 year period from October 1, 2011 to September 30, 2012 was done at Kantonsspital Winterthur, Switzerland; a secondary and tertiary care teaching hospital in pediatric emergency. There was no clear cutoff to define prolonged LOS but used range of 4 to 12 hours. Time of admission and LOS in minutes was calculated. Furthermore, predictors of LOS like ICD- 10 code, triage score, demographic data were assessed. In this study, 4885 patients from which 43.9% were female were analyzed in the study period and 0.5% received triage as category 1 to be seen immediately by physician and 16.7% were triaged as in level 5 as non-urgent. In this study, 1% of patients came by ambulance [14].

The most common admission diagnosis (based on ICD- 10) were 31.5 % of upper airway infection, 16.3%- Gastrointestinal infection and 9.5% being lower airway infection. The median LOS was 124 minutes. Among those patients whose length of stay was longer than 275 minutes (4.5 hours), morning admissions specially before noon, arrival of children on Fridays, and gastrointestinal infections were the associated factors. Younger age children especially less than 3 months, triage level 5 patients, patients with upper and lower respiratory infections were factors associated with short length of stay [14].

Population-based retrospective cohort study during April 2010 to March 2015 was done in University of Alberta, Edmonton, Canada. The study was done on Alberta's 15 EDs with highest volume. In the study, 465,709 children were enrolled and from these 53.6% were male and the median age was 5 years. Patients ending in admission had longer LOS than those discharged. The median of the LOS in those admitted was 6.4 hours. A total of 63,695 patients were admitted and of those, 23,380 (36.7%) had LOS

more than 8 hours. Regional hospitals had shorter times than urban and academic/teaching hospitals [19].

Retrospective case-control study was done from January 1, 2001, to June 30, 2003 in 30 months period in Washington University School of Medicine and St Louis Children's Hospital, USA. LOS more than 10 hours was randomly selected and 486 visits were analyzed. In this study, the identified median age was 9.8 years and 53% were female. Factors associated with prolonged LOS were night shift arrival, those who came with chief complaint of abdominal pain, laboratory tests and radiological studies, procedures and sedations. In this study, the most frequently done procedures were incision and drainage, arthrocentesis (hip or ankle), and lumbar puncture. Overall, 83% of sedations were given for procedures, 74% involved intravenous medications, 77% of which involved both ketamine and midazolam. Other factors related with prolonged LOS were subspecialty consultation. From those consultations, surgery service was the most frequent consult service, with the highest relative odds of LOS more than 10 hours. Appendicitis takes 10% of the ED diagnosis and associated with LOS more than 10 hours. [11]

Prospective cross-sectional, study was conducted at the University of Calabar Teaching Hospital, Nigeria from 1st January–31st December 2014. Prolonged LOS was defined as stay above 72 hours in this study. Of the 2023 children that were included in the study period, 633 children were enrolled in the study, 1,195 (59.1%) were discharged home. The sample covered 77.5% under 5 year old children with a median age of 2 years. The minimum and maximum length of stay was 0.5 hours and 456 hours respectively while the median length of stay was 48 hours. The study further found out that 16.4% of children had prolonged hospital stay being associated with admission diagnosis of sepsis/ meningitis followed by malaria and sickle cell anemia while surgical cases had the least hospital stay. Also, admissions during the afternoon shift were about 1.6 times more likely to have prolonged stay as compared to morning shift admissions [26].

An institution-based cross-sectional study was conducted in Wolaita Sodo University Teaching and Referral Hospital pediatrics emergency department from March 15 to May

15/ 2021. A total of 422 pediatrics patient-attendant pair participated in the study, of which 408 (96.68%) responded. The Median age was 2.06 years and 40.4% were ≤ 1 year of age. About fifty five percent of participants were female and 57.1% of them were urban dwellers. About fifty six percent came with a complaint of respiratory symptom problems while 61.3% had alert level of consciousness, 54.9% got prior treatment before arriving at ED. Co-morbid illness was reported by 21.1% of the respondents, 48.50% arrived at ED in the morning time and 78.10% came to ED on workdays. All of the respondents had ordered an investigation and from those, all of them had laboratory investigations and 60% of them had imaging studies [25].

The proportion of prolonged length of stay (>24 hours) was 325 (79.70%). The minimum length of stay was 1 hour which accounts for 1% of the participants, the median length of stay was 50.50 hours and the maximum ED length of stay was 384 hours accounting 0.2% of the respondents. Among the study sample, 45.5% of the respondents were discharged and a few (1.2%) of the participants were discharged against medical advice. Night time arrival, weekend day arrival, triage categories, duration of pain, imaging study, and getting ordered medication in the hospital were found to be significantly associated with pediatrics emergency department length of stay [25].

Methods and Materials

Study area

The study is conducted in SPHMMC, pediatrics emergency department. St. Paul's Millennium Medical College is a leading public hospital and medical college in Addis Ababa, Ethiopia. It was inaugurated in July 1947, which was furnished with 250 beds. The hospital can accommodate inpatient service by 700 beds, 2000 outpatient and emergency clients visiting the health facility daily.

The Pediatric ED is located in an academic hospital, located in Addis Ababa, Ethiopia. The ED delivers a 24-hour service with available 33 beds. It consists of a triage area, medical resuscitation area (1 bed), Red admission area (5 beds), Orange admission

area (6 beds), Yellow- Green (21 beds) and Procedure room (1 bed). 40 nurses are employed on a permanent basis in the ED. Between 10-15 patients are admitted daily, varying from urgent to non-urgent medical cases based on the triage level. It is among the top pediatric health care provider with 9-11 nurses and 3 doctors' work taking 24 hours and 12 hours shift respectively in the ED. Approximately 30-40 patients, awaiting management and/or disposition, are handed over to the nursing staff and doctors at each new shift.

Study period

The study has been conducted over consecutive 3 months' period from June 20- September 20, 2022. The study period is classified as pre-intervention (June 20- July 17, 2022) and Post intervention period (between July 18- September 20, 2022). Post-intervention period is the time period where intervening group select patients that stayed above 24 hours in the emergency department and took measures.

Study design

A Hospital based cross-sectional prospective study is conducted by using a structured questionnaire.

Source population

All pediatric patients that visited pediatric emergency department during the study period

Study population

All pediatric patients admitted at pediatric emergency department at SPHMMC and who fulfill the eligibility criteria during study period.

Study unit

All pediatric patients from the age of 8 days to 14 years admitted at pediatric emergency department.

Sample Size Determination and Sampling Technique

Sample size

Over the past 12 month, 4,156 children were seen in the pediatric emergency department of the college. The sample size was determined based on this figure.

The sample size for the study was determined following a single population proportions formula and a conventional statistical sampling procedure. Statistically sound sample size depends on three parameters: confidence interval, degree of variability and level of precision. The level of precision (e) is the range in which the true value of the population is estimated to be. The sample size varies inversely with the square of the precision (e^2). The confidence interval is represented by Z statistic (Z) corresponding to the precision level: The value for Z is found in statistical tables which contain the area under the normal curve. The sample size increases as Z value increases. Degree of variability is the expected proportion (P).

$$n = \frac{Z^2 p(1-P)}{e^2} \quad - \quad \text{Equation 1}$$

Where n = sample size,

Z = Z statistic for a level of confidence,

P = expected prevalence or proportion, and

e = margin of error.

For this evaluation, the precision level was assumed to be 5% ($e = 5\%$), confidence interval of 95% which implies Z value of 1.96 and degree of variability $P = 79\%$. Considering 10% non-response rate, total sample size will be 359 patients that fulfill the inclusion criteria during the study timeline.

Sampling Technique

A systematic random sampling technique was used with inclusion of study units that happened to be available at the time of data collection.

1 out of 3 patients was selected up on collection of the data.

Inclusion criteria

Pediatric patients admitted at the pediatrics emergency unit within the study timeline.

Exclusion criteria

No exclusion criteria

Dependent and independent variables

Dependent Variables

Emergency length of stay

Independent variables

It is classified in three categories. Table 1 displays the variables in each of the three categories.

Table 1. Independent variables

Socio-demographic	Clinical characteristics	Organizational factors
Age	Mode of arrival	Presentation time
Sex	Mental status	Day of the week
Residence	Triage level	Diagnostic Imaging
Marital status of primary care givers	Mental status	Laboratory Investigation
Occupation of Primary care giver	Co morbid illness	Shift changes experience

Literacy status of Primary care giver	Need of oxygen	Care received in the ED
	Need of IV medications	Application SBFR measures

Data Collection

A structured questionnaire was developed through a review of published literatures and considering the objectives of the study (Annex 1). Data collection was undertaken by interviewing the sample by a well-trained pediatric nurse before the planned study period. Nurses were assigned to follow the patient from triage till discharge. Data were collected through interview, observation and medical record review. The researcher supervised the data collection process to ensure data quality.

The data collection procedure includes identification of the eligible patients by data collectors at the triage room on arrival. Data on arrival time, presentation, socio-demographic characteristics and other organizational-related factors filled by interviews, chart review and observation of patients at different treatment points. Information such as diagnostic investigations and overall treatments done is reviewed on medical records overall length of stay at the department and final disposition is recorded right before the patient is discharged from the ED. Diagnosis is made by international classification of disease, 10th Revision (ICD-10).

Data processing and analysis

Data processing

After data collection, each questionnaire was checked for completeness based on the code given during data collection. The data were checked for consistency and completeness. Some data were categorized to enable proper analysis and use in the analytical model. The data were analyzed using SPSS version 26.

Data analysis

1. Assessment of Length of Stay

- Descriptive analysis was used to describe the independent variables.
- Mean, median, standard deviation and correlation between groups was done. Statistical difference between essential variables was tested using Chi-square test.

2. Assessment of the Determinant Factors

Bivariable and Multivariate analysis was done to see the association between factors and length of hospital stay at hospital. Logistic regression model was specified to analyze the determinants of length of hospital stay. The dependent variable in the model was defined as a dummy variable which takes a value of 1 if the hospital stay is ≥ 24 hrs and 0 otherwise. The independent variables are as defined in Table 1, above. The general model used in this research is given in Equation 2.

Equation 2. $Y = f(\text{Se}_i, \text{Ci}_i, \text{Org}_i)$

Where Y is dummy variable dependent variable

Se_i are socio-economic factors

Ci_i are clinical variable factors

Org_i are organizational factors

Data Quality Assurance

- The principal investigator provided supportive supervision to the data collector to make sure that it was performed according to the protocol.
- Each day the collected data were checked for accuracy and completeness.
- The participant's names were not collected and the data were de-identified after the questionnaire was completed.
- The collected data were stored in a secure location and only the lead investigator had the access to this location.

Result Dissemination Plan

After the data were analyzed, the results of the research are presented to SPHMMC's department of pediatrics and child health. The findings will be sent for publication on relevant scientific journals and disseminated online so that they can be of use for other academic researchers and clinical practitioners. The data can also serve as a baseline for future studies.

Ethical Consideration

The proposal was submitted and clearance was sought from the ethical committee of SPHMMC. Respondents were given a written consent prior to their participation in the study. A written consent form was developed that stipulated clearly that their participation was voluntary, they had the freedom to refuse to respond to any of the questions, and also they had a full freedom to withdraw from the evaluation at any time. It was made clear from the beginning that no payment was made to individuals in return for participating in the study and confidentiality & storage of data was explained to the participants. It was made clear that the answers provided during the course of the interview would be treated with utmost confidentiality and used for study purpose only.

Results

Socio-demographic characteristics of respondents

A total of 359 pediatric patients were included in the study with full response rate. The socio-demographic data have been described as follows:

Age: The age of the sample patients ranges from 7 days-18 year with median age of 16 months and mean age of 2.94 years.

Sex: The majority of patients i.e. 59.3% (N=213) were male patients. Figure 1 shows the distribution of the sample by sex of the patients.

Other socio-demographic factors: These include Table 2 presents the frequency distribution of socio-demographic variables analyzed in this study.

Figure 1. Percentage distribution of age category by gender

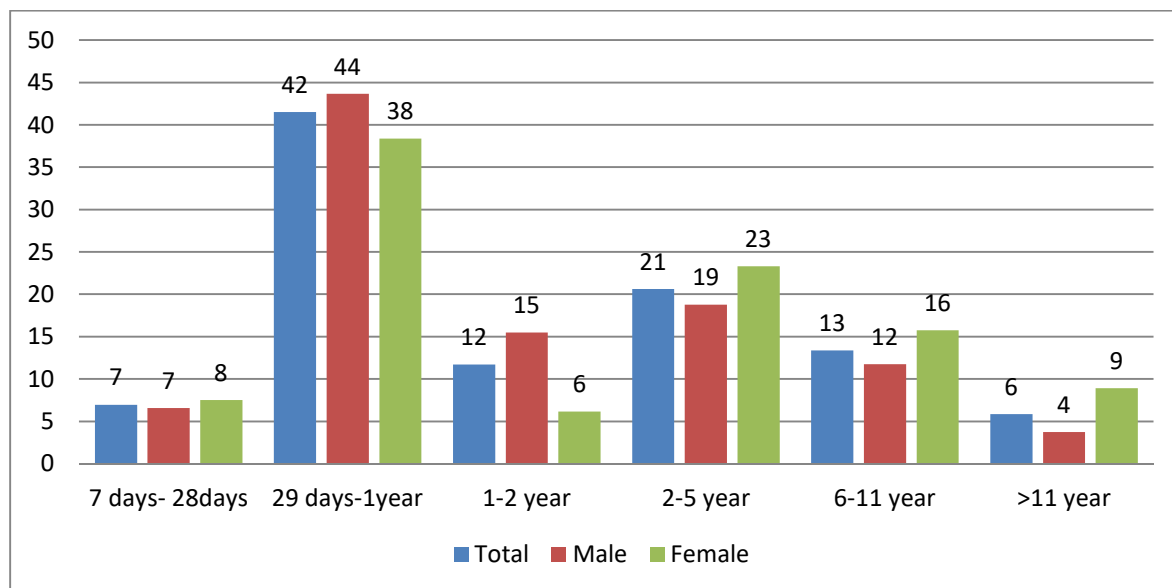


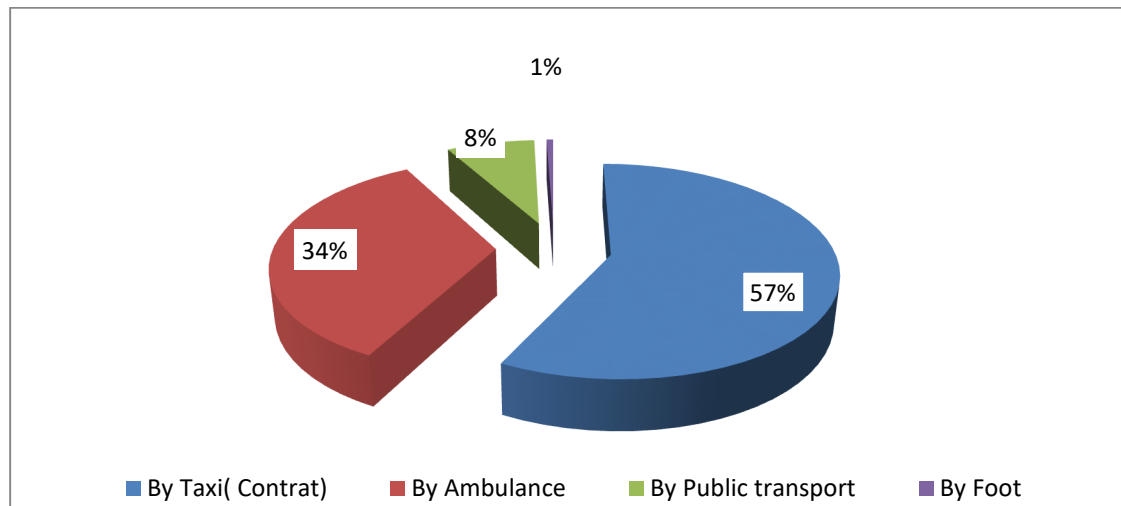
Table 2. Socio-demographic characteristics of respondents

Socio-demographic factors	Categories	Frequency	Percentage
Distance from Saint Paul in km	<10 km	148	41.2
	10-25 km	132	36.8
	>26 km	79	22.0
Residence	Addis Ababa	181	50.4
	Oromia	159	44.3
	Amhara	8	2.2
	SNNPR	6	1.7
	Harari	1	0.3
	Somalia	2	0.6
Marital status of primary care givers	Married	344	95.8
	Single	9	2.5
	Divorced	5	1.4
	Widowed	1	0.3
Occupation	Farmer	11	3.1
	Private	172	47.9
	Government	38	10.6
	NGO	21	5.8
	Wedge work	47	13.1
	No job	70	19.5
Literacy status of Primary care giver	No formal education	56	15.6
	Primary school	129	35.9
	Secondary school	91	25.3
	Diploma	7	1.9
	Degree	76	21.2

Clinical related characteristics of respondents

The means of arrival of the patients to the hospital is given in Figure 2. The results show that 57% of the patients arrived by Taxi where are 34% arrived by Ambulance.

Figure 2. Percentage distribution of mode of arrival



Among the sample patients, 42.9% (N=154) came to the hospital as self-referral, 42.1% (N=151) and 12.3% (N= 44) were referred from health centers and government hospitals, respectively. Only 2.8% (N=10) came to the hospital from private health facilities.

About 57.7% of patients had previous treatment, of which 55.2% is treated from health facility, 2.5% had received home remedies, 0.3% went to religious facility & 0.3% visited traditional health facilities prior to coming to Saint Paul hospital. The majority of the patients i.e. 46% (N=165) were admitted in Yellow-Green, 28.4% (N=102) in Red & 25.6%(N=92) were admitted in Orange. Among the patients, 43.5% (N=156) of patients had illness for more than 3days while 37.9% (N=136) had co morbidity. Figure 3 presents diseases for which the patients were diagnosed and the proportion of patients affected. Figure 4 shows the comorbidity and the proportion of patients.

Figure 3. Percentage distribution of disease categories diagnosis

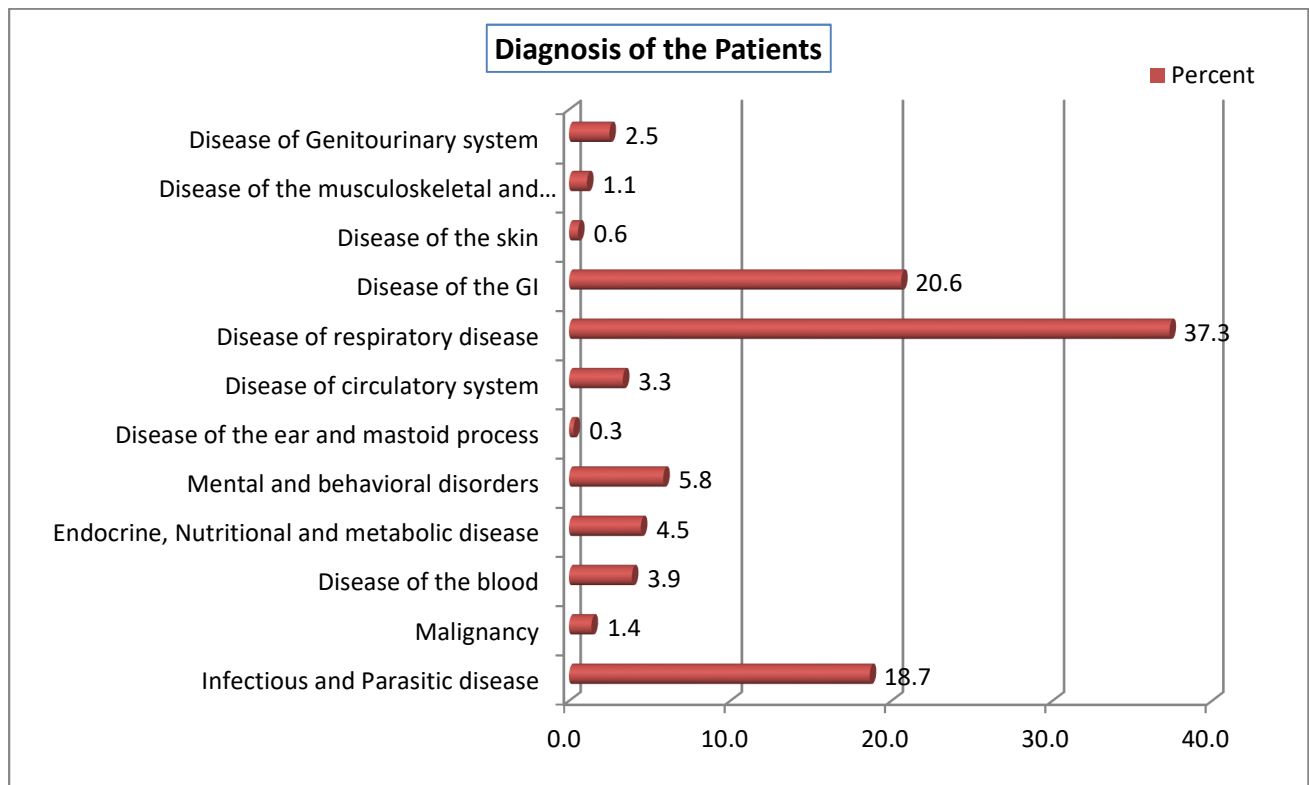
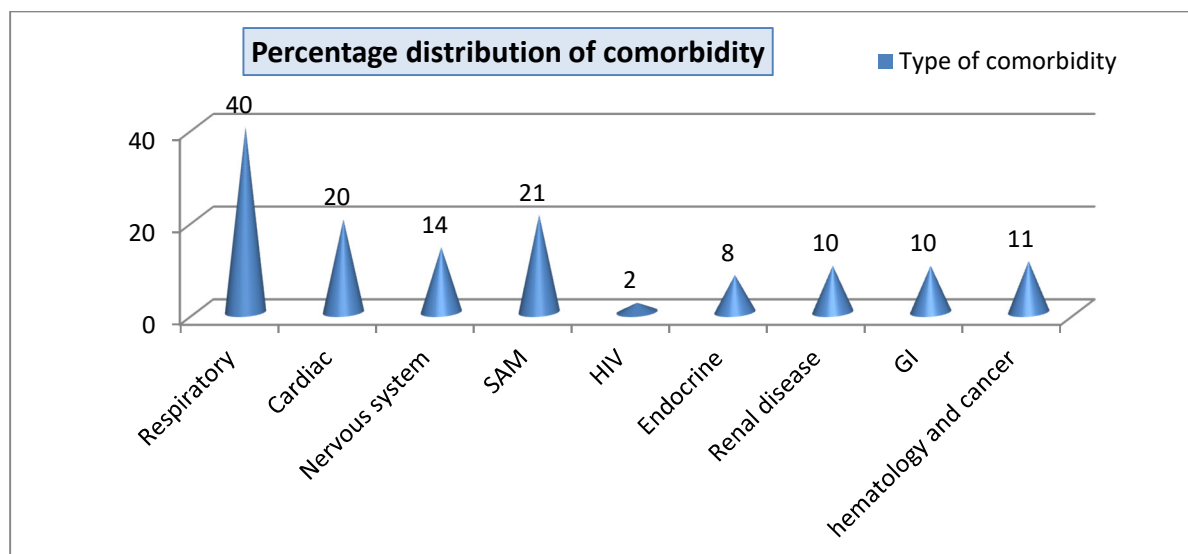


Figure 4. Percentage distribution of type of co morbidity



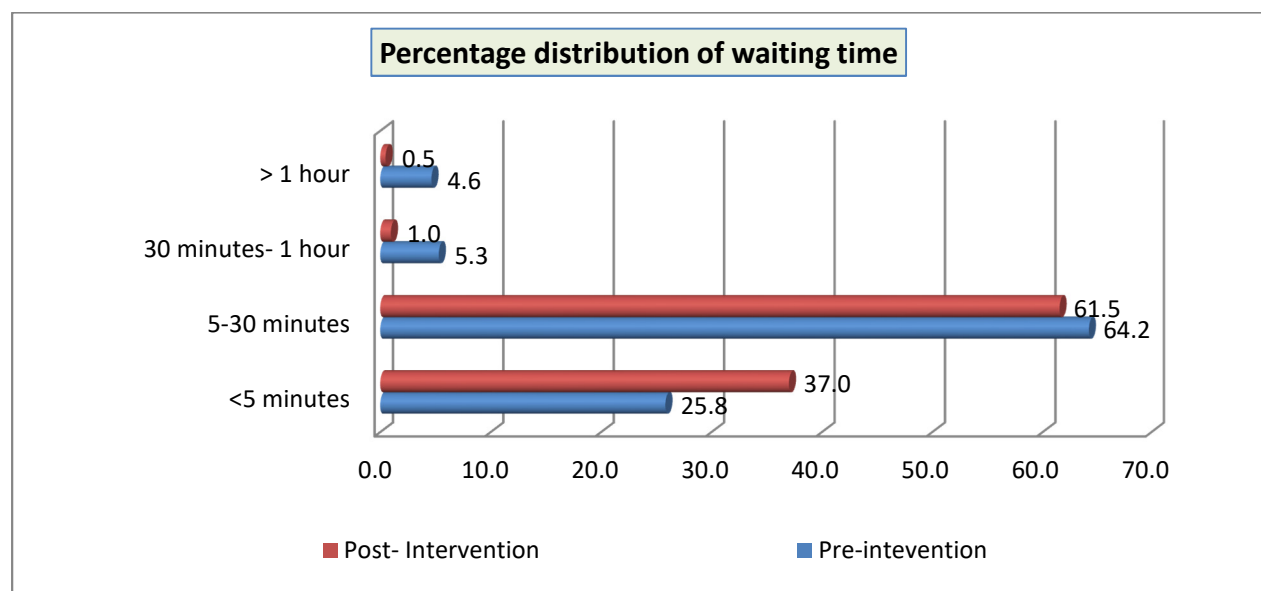
From the total patients that visited ED during the study period, 10.9% (N=39) patients had altered mentation. The majority of patients, i.e. 52.6% (N=189) needed oxygen support. About 23.7% (N=85) received IV fluid and 73.5%(N= 264) took IV drugs. The result also shows that 90.3% (N=324) had received the ordered medications within 24 hours. From 35 patients, the reason for not receiving the ordered medication in 21(5.8%) of the cases was due to lack of the drugs in the hospital and 1.4% was due to lack of affordability of the prescribed drugs.

Time and Organizational related factors of respondents

From total respondents of 359 patients, nearly half of them 48.5% (N=174) arrived at ED in afternoon. About 30.1% were night time admissions. Moreover, most patients 277 (77.2%) came to the hospital on working days.

Waiting time at the hospital: The majority of patients waited for 5-30 minutes during the pre- and post-intervention. Figure 5 shows the distribution of patients by the waiting time at the hospital.

Figure 5. Percentage distribution of patients by waiting time pre- and post-intervention



Waiting time >5 minutes and coming in the morning time were significantly correlated with $\chi^2=26.21$. Therefore, patients that come in the morning were strongly correlated with prolonged waiting time. Comparing the prolonged waiting time >5 minutes in the pre-intervention and post intervention, there was no statistically significant difference with $\chi^2= 0.273$.

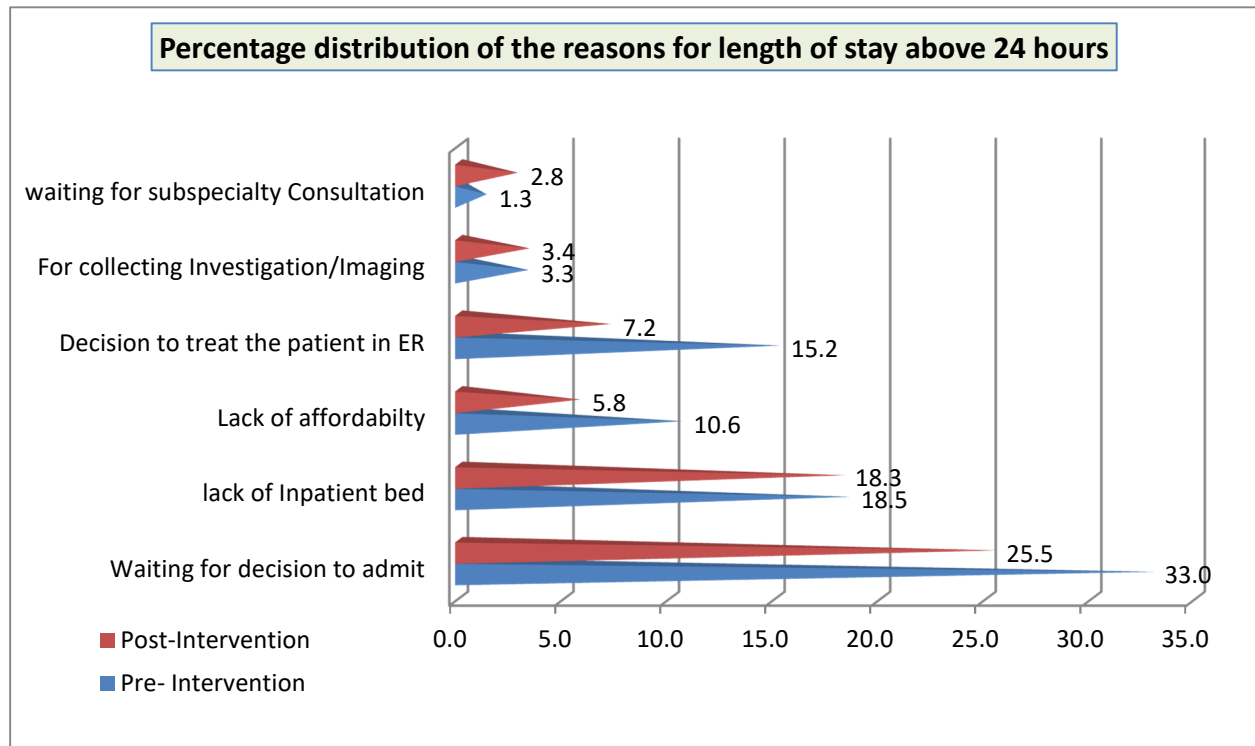
Most of the respondents 96.1% (N=345) had at least 1 laboratory investigations and 40.9%(N=147) have undergone imaging studies. During the pre-intervention period, 28 patients (N=18.5%) had shift experience of which 13.2%(N=20) complained of delayed triage, 3.3%(N=5) delay in getting bed in ER, 2% (N=3) had delay in evaluation by intern or physician. In post-intervention period, the shift experience has decreased to 9(4.3%) of which 2.9 %(delay in triage and 2 patients (1%) had delay in physician or intern evaluation.

A total of 151 patients in pre-intervention period was studied and from this 20.5% (N=31) had length of stay of less than 24 hours and 79.5 %(N=120) stayed above 24 hours. The minimum length of stay is 5 hours and maximum 360 hours(15 day), the mean length of stay is 71 hours. During the post intervention period, 208 patients were studied and from this, 35.1% (N=73) had length of stay <24 hours and majority of patients, 64.9% (N=135) stayed above 24 hours. In this period, the minimum length of stay is 1 hour and maximum is 168 hours (7 days) and mean length of stay is 46.7 hours.

The results also show that 56% (N=203) of the patient can afford inpatient beds of their respective places of admission and 20.9% (N=75) of the sampled patients have health insurance. Outcome of the respondents was 27.9% (N=100) were admitted to inpatient department, 66.9%(N=240) were discharged, 5%(18) were referred to other hospitals and 0.3%(N=1) has died.

Determinant factors of length of stay

Figure 6. Percentage distribution of the reasons of length of stay above 24 hours



Approximately, 49.4% (N=177) of the patients in the study over the study period, didn't have decision to admit before 24 hours by the treating physician. Comparing this finding between pre-intervention and post-intervention, the decision making increased from 46.4% to 52.4% although this change is statistically insignificant with $\chi^2=1.279$.

Table 3. Association of prolonged length of stay with associated factors

Factors related to prolonged length of stay	P-value	AOR (CI- 95%)
Waiting for decision	0.000	7.434 (3.812- 14.495)
Lack of bed	0.000	4.651 (2.347 - 9.214)
Lack of affordability	0.570	1.247 (0.582- 2.669)
Decision to treat in ED	0.025	2.289 (1.108- 4.728)
Collection of investigation	0.003	1.434 (1.338- 1.537)
Sub-specialty consultation	0.003	1.434 (1.338- 1.537)

The result shows the existence of strong statistically significant association between late decision making, unavailability of inpatient beds, and decision of treating the patient in the ED by the primary treating physician with prolonged ED LOS. There is also strong statistically significant correlation between longer ED stay and delay in collection of investigations and waiting for sub-specialty consultation. In this study, there is no any statistically significant association with lack of affordability.

Table 4. Bivariable and multivariable logistic regression analysis of socio-demographic factors associated with length of stay

Socio-demographic factors	Categories	P-value	COR(95% CI)	AOR (95% CI)
Age	7-28 days	0.631	1.562(0.254-9.615)	
	29 days-1year	0.276	2.406(0.495-11.682)	
	1-2years	0.036**	6.261(1.132-34.635)	1.449 (0.557-3.767)
	2-5 year	0.064*	4.653(0.917-23.608)	
	6-11 year	0.294	2.466(0.457-13.295)	

Socio-demographic factors	Categories	P-value	COR(95% CI)	AOR (95% CI)
	>11 years	0.367	0.428(0.068-2.707)	
Sex	Male	0.727	1.104(0.632-1.929)	
	Female	0.671	0.840(0.375-1.879)	
Region	Oromiya	0.036**	0.184(0.038-0.894)	0.439(0.081- 2.375)
	Amhara	0.717	1.484(0.175-12.570)	
	Addis Ababa	0.026**	0.15490.030-0.797)	0.459(0.078-2.703)
Distance	B/n 10-23 km	0.595	1.233(0.570-2.666)	
	above 23 Km	0.099*	0.467(0.189-1.153)	0.639(0.218- 1.875)
Educational Status	No formal education	0.05*	0.436(0.187-1.020)	0.481(0.189- 1.223)

The bivariate analysis shows that toddlers and those patients who came from Oromiya region and Addis Ababa have statistically significant relation with length of stay above 24 hours. In addition to the above, those patients who came from a distance >23 km and preschool patients are not strongly correlated with prolonged length of stay. Lack of formal education of the care takers has also statistically significant relation with length of stay above 24 hours. But on multivariate analysis, none of the socio-demographic factors have statistically significant association with prolonged LOS, implying that the factors associated with LOSS are more associated with institutional and clinical factors.

On top of the above associative factors, morning time admissions are 4.39x (AOR-2.365(0.949 - 5.896))more likely to have longer hospital stay than night time admissions. The likelihood of prolonged length of stay for patients that came on morning is 1.9x more than night time admissions. There is statistically significant relation to prolonged length of stay with those patients who came with public transport with probability of 5x more (AOR-0.204(0.020-2.070) than those patients who come with

ambulance indicating that arrival with ambulance attracts attention of the physicians as also those arriving with ambulance could be in a more critical condition than those coming with public transport. Even though there is no strong correlation between prolonged LOS and weekend admission, the probability of patients to stay longer is 1.8x more than patients who came on week days.

Table 5. Bivariable and multivariable logistic regression analysis of Clinical related factors associated with length of stay

Clinical related characteristics	Categories	P-value	COR (95% C.I)	AOR (95% CI)
Triage Time	Morning	0.073**	2.133 (0.932-4.883)	2.365(0.949 - 5.896)
	Afternoon	0.748	1.108 (0.593-2.072)	
	Night	0.140	0.538(0.236- 1.226)	
Waiting time	5-30 minutes	0.847	0.939(0.498- 1.771)	
	30minutes-1 hour	0.856	1.168 (0.219-6.242)	
	Above 1 hour	0.126	0.146 (0.012-1.719)	
Day of the week	Weekend	0.077*	0.548 (0.281- 1.068)	
	Weekday	0.922	1.041 (0.464-2.338)	
Mode of arrival	Ambulance	0.903	1.049(0.491-2.238)	
	Public transport	0.009***	0.046(0.005-0.465)	0.204(0.020-2.070)
	Taxi	0.954	0.981(0.511-1.881)	
Source of referral	Self	0.241	0.566 (0.219-1.465)	
	Non- Self	0.807	1.059(0.668- 1.678)	
Prior treatment	Yes	0.414	0.694(0.289-1.666)	
Triage Category	Red	0.444	1.332(0.639- 2.775)	
	Orange	0.816	0.863(0.250- 2.983)	

Clinical related characteristics	Categories	P-value	COR (95% C.I)	AOR (95% CI)
	Yellow	0.756	0.887(0.416-1.891)	

On this study, there is also statistically significant correlation between prolonged length of stay and malignancy but weak correlation between prolonged length of stay and gastrointestinal disease. The probability of prolonged LOS in those patients who are diagnosed with Gastrointestinal disease is 1.1x more (AOR-1.745 (0.750- 4.057) than that of malignancy. The results of the multivariate logistic regression show that, the presence of co morbidity and the presence of respiratory co morbidity are associated with prolonged length of stay.

Table 6. Bivariable and multivariable logistic regression analysis of clinical related factors associated with length of stay

Clinical related factors		P-value	COR(95% CI)	AOR(95% CI)
Disease Category	Infectious Disease	0.11	7.400 (0.636- 86.133)	
	Malignancy	0.047**	39.471 (1.053-1479.355)	1.556 (0.107- 22.543)
	Disease of Blood	0.784	1.568(0.063-38.905)	
	Endocrine, Nutritional and metabolic disease	0.374	0.136(0.002-10.992)	
	Mental and behavioral disorder	0.515	2.471(0.162-37.673)	
	Disease of Circulatory system	0.168	8.550 (0.405-180.427)	
	Respiratory Disease	0.325	3.401(0.297-38.914)	
	Gastrointestinal disease	0.083*	8.878	1.745 (0.750- 4.057)

Clinical related factors		P-value	COR(95% CI)	AOR(95% CI)
			(0.752-104.868)	
	Genitourinary disease	0.68	2.013(0.072-56.137)	
Presence of Comorbidity	Yes	0.001*	0.201(0.039-1.047)	0.241(0.108-0.542)
Type of Co morbidity	Respiratory	0.049**	5.947(1.006-35.159)	3.284 (0.997- 10.814)
	Cardiac	0.891	0.849(0.082-8.805)	
	CNS	0.701	0.590(0.040-8.691)	
	SAM	0.135	4.597(0.621-34.020)	
	HIV	0.441	3.665(0.135-99.553)	
	Endocrine	0.043**	67.826(1.151-3995.47)	12.247(0.033-4552.208)
	Renal	0.516	2.597(0.146-46.306)	
	Hematology and malignancy	0.206	0.262(46.306-2.092)	
Mental Status	Altered	0.671	0.791(0.268-2.336)	

The presence of co morbidity, as well as the type of co morbidity, being respiratory and endocrine have statistically significant correlation with prolonged LOS. Patients having Respiratory co morbidities had 3.8x (AOR- 3.284 (0.997- 10.814) and 5.5x higher probability to stay longer than cardiac and CNS co morbidities respectively. (Table6)

Table7.Bivariable and multivariable logistic regression analysis of organizational factors associated with length of stay

Organizational factors	Categories	P- Value	COR (95% CI)	AOR (95% CI)
Need of Oxygen	Yes=1; otherwise 0	0.094*	1.863 (0.900-3.856)	1.447 (0.670- 3.126)
Need of IV fluid	Yes=1; otherwise 0	0.319	1.458 (0.694-3.063)	1.513 (0.662- 3.458)
Need of medications	Yes=1; otherwise 0	0.089*	0.477 (0.203-1.120)	

Organizational factors	Categories	P- Value	COR (95% CI)	AOR (95% CI)
Not received the prescribed drugs within 24 hours	Not Received=1; 0 otherwise	0.216	0.520 (0.184-1.465)	
Need of at least 1 Laboratory investigation	Yes=1; otherwise 0	0.114	0.184(0.023-1.499)	
Imaging	Yes=1; otherwise 0	0.916	1.037(0.526-2.043)	
Not receiving all investigations within 24 hours	Not Received=1; 0 otherwise	0.578	0.774(0.315-1.907)	
Shift change experience	Yes=1; otherwise 0	0.655	1.283(0.430-3.829)	
Health Insurance	No=1; otherwise 0	0.146	1.872(0.803-4.360)	
Decision to admit	No=1; otherwise 0	0.000***	0.003(0.000-0.026)	0.003(0.000-0.025)

In addition to this, the need of oxygen and IV medications, not receiving medications and collecting investigations before 24 hours had no statistically significant relation between prolonged LOS .There is strong association of prolonged LOS with lack of decision in this study but altered mental status, the need of imaging, shift change experience, lack of health insurance are not statistically significantly associated factors (Table 7).

Discussion

Since prolonged LOS is being a big concern in both developed and developing countries, many countries developed emergency OPD strategies and guidelines in order to prevent prolonged LOS.

This study demonstrates that 79.5%(N=120) of the patients visiting the ED of the hospital stayed above 24 hours in the pre-intervention period and 64.9% (N=135) stayed above 24 hours in post- intervention period. This figures are lower than the findings of the study done in WolaitaSodo University Teaching and Referral Hospital pediatrics emergency department 79.70% (N=325) [25] but significantly higher than the findings of Kantonsspital Winterhur in Switzerland [11] and University of Alberta in Canada[19].This is because of the implementation of different guidelines in limiting time for emergency length stay in Canada. [19].

The minimum length of stay was 5 hours and the maximum was 360 hours(15 days) which was slightly lower than the figures of WolaytaSodo[25], which was384 hours with the mean length of stay of 71 hours. In the Post intervention period, 208 patients were studied and 35.1% (N=73) of them had length of stay <24 hours and the majority of patients, 64.9% (N=135) stayed above 24 hours. In this period, the minimum length of stay was 1 hour, the maximum was 168 hours (7 days) and mean length of stay was 46.7 hours. The median LOS was 48 hours in both pre and post intervention period which was slightly lower than that of WolaitaSodo (50 hours) [25].

In this study, the majority of patients (42%) were in the age between 29 days to 1 year which was similar to the study done in WolaitaSodo [25]. The median age in this study was 16 months which was lower than the study done in Canada (5 years) [19] and USA(9.8 years) [14] and comparable with the study done in Nigeria(2 years) [26] and WolaytaSodo(2.06 years) [11]. Age group between 1-2 years was associated with

prolonged LOS in the study which was different from the study done in Switzerland, where age <3 month had shorter stay [11].

In this study, the majority (59%) were male but in Wolaita Sodo [25], 55.4% were female. Education wise, 35.9% of the primary care givers attended primary school and 15.6% had no formal education. Having no formal education was associated with prolonged LOS in the study. Most (50.4%) of the patients came Addis Ababa whereas 41.2% came from distant places. Coming from urban or rural area didn't affect the length of stay in this study. This is different from the studies done in Canada where patients who came from urban stayed longer than those coming from rural areas [19].

Regarding the motivation to come to the hospital, 42.9% were self-referral cases. The majority (57%) of the patients came with taxi and only 34% came with ambulance which was a similar case in Wolaita Sodo. Less proportion of patients (25.8% in pre-intervention and 37% in Post intervention period) had waiting time of 5 minutes which was lower than the study done in Wolaita Sodo (51%) [25].

Regarding the admission status, 46% were admitted to Yellow green and only 28.4% were admitted to Red. Among the patients, 37.3% came with complaint of respiratory symptom which was also comparable to the study done in Switzerland [11] and Wolaita Sodo [25]. Being respiratory case was associated with shorter length of stay and being GI disease was related with longer stay in the study done in Switzerland [11] but in this study malignancy was associated with longer stay. In the study done in USA [14] and Nigeria [26], disease categories related with longer stay were surgical cases and infectious followed by sickle cell anemia. In this study, triage category didn't affect the length of stay but in study conducted in Wolaita Sodo, patients admitted in orange were 4x more likely to stay longer than patients admitted on green [25].

In this study, 37.9% had co-morbidities, of which 40% was respiratory comorbidity. This had strong correlation with prolonged length of stay but not in the study done in Wolaita Sodo [25]. The majority of the cases (52.6%) required oxygen but this was not associated with prolonged LOS. In this study, nearly half of them 48.5% (N=174) arrived

at ED in the afternoon but morning admissions were 4.39x more likely to had longer hospital stay than those arriving in the night. This may be due to the round activities in morning in the ED and there was strong association between morning time presentation and longer waiting time. In the study done in Switzerland, there was also an association between morning admission and longer stay [11]. This finding was different from the study done in Nigeria where afternoon shift were about 1.6 times more likely to have prolonged LOS [26].

The fact that, most of the patients (77.2%) in the study came on week days, coming in weekend didn't significantly affect the length of stay unlike the study in WolaitaSodo that increased the probability by 4.2x [25].

In study done in WolaitaSodo, need of imaging study and not getting ordered medication in the hospital were found to be significantly associated with pediatrics emergency department length of stay. But in this study, neither of the factors were associated factors. This may be due to the availability of imaging studies 24 hours a day and better number of nursing staff in Saint Paul, since WolaitaSodo had only 7 nurses allocated in ED during their study [25].

From major reasons for LOS >24 hours in this study, 30.5% in pre-intervention period and 25.5% in post- intervention period of patients, was due to decision waiting for admitting to inpatient department. There is strong statistically significant association between late decision making, unavailability of inpatient beds, and decision of treating the patient in the ED by the primary treating physician with prolonged ED. There was no statically significant correlation between prolonged length of stay and lack of health insurance in this study. Subspecialty consultation was one of the reasons accounting for 3.5% of the cases and this was also statistically significant which is consistent with a study done in the USA, which justified it as one of the main reasons for prolonged length of stay [14]. There was also strong statistically significant correlation between longer ED stay and delay in collection of investigations and lack of affordability to lesser level in comparison with the other determinant factors.

Therefore, lack of early decision to admit plays main role in the length of stay. Comparing the decision making practice between pre-intervention and post-intervention,

there was increment from 46.4% to 52.4% although this change was statistically insignificant with $\chi^2=1.279$. This shows that, there is still a need for more intensified measures to be done in the emergency department.

Conclusion

This research has shown that the proportion of prolonged pediatrics emergency department length of stay was high despite initiation of interventions. Presence of co morbidity, having respiratory co morbidity and public transport use were found to be significantly associated with longer stay at the emergency department. Lack of early decision making, unavailability of inpatient beds, decision to treat patient in the ED by the primary treating physician, delay in collection of investigations, waiting for sub-specialty consultation and lack of affordability are the main statistically significant determinant factors associated to prolonged LOS at the ED. Therefore, appropriate interventions should be intensively implemented by emphasizing on the aforementioned associated factors.

Recommendations

1. To the hospital management:
 - a. To intensify the SBFR project and create a guideline of “24 hour rule” at ED that specifically targets on reduction of prolonged ED length of stay
 - b. To strengthen decision making practice
 - c. Automating the medical records system so that details of patients with longer stay in ED can be easily recorded by quality team and intervention can be facilitated.
 - d. Working on expansion of inpatient beds
 - e. Allocate specific runners for collecting investigations
 - f. Assign more number of physicians attending emergency cases during the morning sessions on rotation bases
2. Facilitate interdepartmental and subspecialty consultation as soon as patient is admitted in the ED that can be aided by quality team leaders.

Limitations and Strength

Limitation

- Single academic institution may limit the ability to apply the study conclusions to another hospital with a different patient population and capacity.
- Study design cannot account for possible seasonal variations of the disease.
- There may be prone to recall bias upon collection of the data while research is known to be done on emergency setup. To overcome this, data is taken on 3 time lines which were at admission, on 24 hours of admission and at discharge.

Strength

- Prospective study
- Good base for further revision and intensification of measures by looking at the results
- Practical implication to improve the health care service delivery which is economically and socially beneficiary.

Operational Definition

1. Emergency department length of stay (ED LOS) is patient stay from time of admission to the unit to patient's time of discharge or admission to hospital ward or PICU or transfer to other institution.
2. Prolonged emergency length of stay – according to ETHIOPIAN HOSPITAL SERVICES TRANSFORMATION GUIDELINES, Volume 1 published on September 2016 is length of stay greater than 24 hours. Then transfer to ward or PICU has to be facilitated for proper inpatient admission if necessary [22].
3. Access Block is defined as “the situation where patients are unable to gain access to appropriate hospital beds within a reasonable amount of time [21].
4. ‘Overcrowding’ refers to “the situation where ED function is impeded by the number of patients waiting to be seen, undergoing assessment and treatment, or waiting for departure, exceeding the physical or staffing capacity of the department” [21].
5. Waiting time- is the time started from the patient arrived to ED until triaged by health care providers, which should not exceed 5 minutes of arrival to ED [27].

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Annex1: Questionnaire

Assessment of the length of Hospital stay and the determinant factors Pediatric Emergency department in SPHMMC

Introduction

Hello! Dear Participants, this Questionnaire is prepared by Dr. Sadiya Bezabih, Pediatric resident at SPHMMC to assess the length of Hospital stay and the determinant factors; a Prospective Study at SPHMMC.

The objective of this study is to identify the determinant factors for the emergency length of stay and come up with proper identification and solutions of prolonged length of stay. This may help patients have satisfiable service and overall increase the quality of service of this hospital.

So your honesty is clearly needed to get accurate information and your responses will be kept confidentially. There is no visible risk with you or your child for your participation. There is no payment for your participation but I am greatly thankful for your participation and you have the right to refuse from participation at any time.

Are you voluntary to participate?

1. Yes, I have understood the above information and I am volunteer to participate in the study conducted in the collage to assess the length of stay and the determinant factors in the emergency department at SPHMMC, A.A, Ethiopia

Signature..... Date.....

Data collector's Signature.....Date.....

2. No, If not voluntary please stop here. If you are voluntary to participate in the study; we kindly request you to provide your genuine response for the interview.

Thank you for Your Volunteer participation!!!

Questionnaire number

Part1 – Information to be filled On Triage

Part 1-Socio-Demographic Characteristics

1. Age
 - A. 7-28 days
 - B. 29 day-1year
 - C. 1-5 year
 - D. 6-11 year
 - E. >11 year
2. Sex
 - A. Male
 - B. Female
3. Residence
 - A. Addis Ababa
 - B. Oromiya
 - C. Amhara
 - D. Tigray
 - E. South Nations
 - F. Harari
 - G. Somali
 - H. Gambella
 - I. BenishangulGumuz
4. Distance from Saint Paul in kilometer
 - A. <10km
 - B. 10-25 km
 - C. >26 km
 - D. Uncertain
5. Religion
 - A. Muslim
 - B. Orthodox
 - C. Protestant
 - D. Catholic
 - E. Other
6. Marital status of primary care giver
 - A. Married
 - B. Single
 - C. Divorced
 - D. Widowed
7. Literacy status of Primary care giver

- A. Attended formal education
 - B. No Formal education
- 8. If attended formal education, what is the educational level?
 - A. Primary school
 - B. Secondary school
 - C. Above
- 9. Occupation of Primary care giver
 - A. Farmer
 - B. Private
 - C. Governmental
 - D. Daily labor
 - E. Other
- 10. Monthly income in ETB of the primary care giver
 - A. < 500 Birr
 - B. 500-846 Birr
 - C. 847-1455
 - D. >1500

Part 2. Presenting Characteristics of Patients Who Visited the Pediatric ED

- 1. Date of admission.....
- 2. Time of Triage
 - A. Morning
 - B. Afternoon
 - C. Night
- 3. Waiting time
 - A. <5 minutes
 - B. 5-30 minutes
 - C. 30 min- 1 hour
 - D. >1 hour
- 4. Day of the week at admission
 - A. Weekday
 - B. Weekend
- 5. Mode of arrival
 - A. By taxi
 - B. By ambulance
 - C. By public transport
 - D. By foot
 - E. Other
- 6. Referral status
 - A. Self
 - B. From health center
 - C. From other hospitals
- 7. Prior treatment?
 - A. Yes
 - B. NO
- 8. If there is prior treatment place, can you specify?

- A. Home remedy
 - B. Health facility
 - C. Traditional facility
 - D. Religious facility
 - E. Other
9. If the patient has been treated in health facility, what is the type of health facility?
- A. Clinic
 - B. Health Center
 - C. Hospital
 - D. Health Post
10. Triage Category
- A. Red
 - B. Orange
 - C. Yellow/ Green
11. Duration of illness
- A. <12 hours
 - B. 13-24 hours
 - C. 25-48 hours
 - D. 49- 72 hours
 - E. >73 hours
12. Diagnosis of the patient
- A. Infectious and parasitic disease
 - B. Malignancy
 - C. Disease of the blood
 - D. Endocrine, Nutritional and metabolic disease
 - E. Mental and behavioral disorders
 - F. Disease of eye
 - G. Disease of the ear and mastoid process
 - H. Disease of circulatory system
 - I. Disease of respiratory disease
 - J. Disease of the GI
 - K. Disease of the skin
 - L. Disease of musculoskeletal and connective tissue
 - M. Disease of Genitourinary system
13. Presence of Comorbid Illness
- A. Yes
 - B. No

14. If yes, and what type of comorbidities does the patient has?
- A. Respiratory
 - B. Cardiac
 - C. CNS
 - D. SAM
 - E. HIV
 - F. Endocrine
 - G. Renal disease
 - H. Other
15. Mental status
- A. Fully alert
 - B. Altered mental status
16. Is there a need of Oxygen support?
- A. Yes
 - B. NO
17. Is there need of IV fluid administration?
- A. Yes
 - B. NO
18. Is there need of IV drug administration?
- A. Yes
 - B. NO

Information to be filled at 24 hour of admission

19. Did the patient receive all the ordered medications within 24 hours?
- A. Yes
 - B. No
20. If the patient didn't get the ordered medications, what is the reason?
- A. Lack of the drugs in the hospital
 - B. Didn't receive the drugs despite being bought
 - C. Can't afford the prescribed drugs
 - D. Reason is Uncertain
21. Does the patient have at least one laboratory investigation?
- a. Yes
 - B. No
22. Any imaging studies done?
- A. Yes
 - B. No
23. Did the patient get ordered investigation within 24 hours of admission?
- A. Yes
 - B. No
24. Any Shift change experience?
- A. Yes
 - B. No
25. If Yes, can you specify?
- A. Delay in triage
 - B. Delay in getting ER bed

- C. Delay in physician/intern evaluation
 - D. Delay in phlebotomy take samples
 - E. Other
26. If patient is kept at ED, is the decision to admit made in <24 hours of admission by treating physician?
- A. Yes
 - B. NO
27. If the patient is not admitted in <24 hours, What is the reason behind?
- A. Lack of bed inpatient bed
 - B. Lack of affordability
 - C. For collecting Investigations/Imaging
 - D. Waiting for Sub-Speciality consultation
 - E. Lack of Portable O2 for transferring
 - F. Lack of decision
 - G. Waiting for decision
 - H. Decision to treat the Child in the ER
28. Does the patient have Health Insurance?
- A. Yes
 - B. No
29. Does the attendants afford for inpatient bed admission?
- A. Yes
 - B. No

Information to be filled at discharge

30. Outcome of patients discharge
- A. Admitted
 - B. Discharged
 - C. Transferred
 - D. Died
31. If admitted, what was the duration of ED length of stay?
- A. <24 hour
 - B. 24-48 hour
 - C. 48-72 hour
 - D. 3-7 days
 - E. >7 days
32. What is the length of stay in the emergency in hours?