Length of stay in the emergency department and its associated factors among pediatrics patients attending at Wolaita Sodo University Teaching and Referral Hospital, Southern, Ethiopia, 2021.

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Abstract

Background

Pediatrics emergency department length of stay; is the time between emergency department arrival and discharge, admission, or referred. Globally, there is a rising in the need for emergency department visits, which is very high in pediatric patients causing a longer length of stay, which is a global challenge and the bottle neck of hospitals that increase the risk of patients, morbidity, mortality, and reduce satisfaction.

Objective

This study aimed to assess the length of stay and its associated factors in the pediatric emergency department, Wolaita Sodo University Hospital, 2021.

Methods

An institution-based cross-sectional study was conducted from March 15 to May 15/ 2021. A Systematic sampling technique was used to select 422 study participants. Semi-structured interviewer-administered questionnaires and chart reviews were used to collect the data. The data were entered in Epi Data version 4.6 and analyzed with SPSS version 26. Descriptive statistics were applied to describe the prevalence, pediatrics, emergency department length of stay with a 95% confidence interval. Bi-variable and multivariable logistic regression analysis were used to identify the factors associated with length of stay and the significant level was declared at $p\text{-value} \leq 0.05$ on AOR and 95% confidence interval

Results

The proportion of prolonged pediatric emergency department length of stay was 79.70% (95% CI; 75.7, 83.6). Night time arrival [AOR = 3.19, 95% CI (1.14, 8.98)], weekend arrival [AOR=4.25 95% CI (1.63,11.12)], ordered imaging study [AOR = 2.82 95% CI (1.49,5.35)], not got ordered medication in the hospital [AOR = 2.05 95% CI (1.04,4.03)] orange triage category [AOR = 4.01, 95% CI (1.60,10.05)], and duration of pain 13-24 hours[AOR = 0.29, 95% CI (0.89,0.98)], were significantly associated with length of stay

Conclusion

The proportion of prolonged pediatrics emergency department length of stay was high. To decrease the length of stay, it is better to support the investment of resources on solving these benchmarks.

Background

Pediatrics emergency department (ED) length of stay (LOS): is the time between ED arrival and ED discharge, admission, or referral to another health facility (1). ED in the hospital is designed for rapid assessment and stabilization with the patient arriving at the hospital in need of immediate care must be accessible 24 hours a day and timeliness is considered an essential component in the quality of ED care (2–4). ED has become an increasingly important unit in the healthcare delivery system and nowadays it is considered the primary doorway for inpatient admissions, discharge, and referrals (5, 6).

Prolonged pediatrics ED length of stay are universal problem with differing prevalence across the globe, for instance, 31.3% in Guangzhou, China, 25.7% in north Taiwan, and 16.4% in Calabar Southern Nigeria (7–9). Globally in the last 20 years, there is an imbalance between emergency service supply and demand, and annual ED visits increased faster than the growing population, leading to an increase in the number of ED visits resulting in prolonged ED stays (10, 11).

Prolonged pediatrics emergency department LOS is not only associated with reduced quality of care, but also having an impact on socio-economic problems to the parents, hospital occupancy rate, increased constrictions on health service resources, more over it has a significant effect on patient safety by an increased risk of hospital-acquired diseases, morbidity, mortality, and reduce patient satisfaction (6, 12–14).

Different works of literature reported that prolonged ED stay leads to an increased mortality rate by 15%–30% and showed as evidence of poor hospital performance, it also an independent risk factor for pneumonia and each hour increases the risk by approximately 20%, regarding this and many other consequences of prolonged LOS is a global challenge (15–17). Moreover shorter hospital stays reduce unnecessary medical costs and increase bed turnover rate that helps to raise the profit margin of the institution, in addition to reducing total social-related charges (5, 9, 18).

Even though there is variability in the emergency department LOS, several factors contributed to prolonged pediatrics ED length of stay. Of these restricted capacities of the health care system, professional inabilities to correctly triage, lack of decision, utilization of health care such as imaging or laboratory investigations, and increased flow of non-urgent cases to EDs are the most common predisposing factors for prolonged pediatric ED length of stay. (5, 19, 20).

Subsequently, the incidence of communicable and preventable diseases like malaria, diarrheal disease, and pneumonia are high in sub-Saharan African countries and account for 70% of pediatric emergency admissions, this and the rising of the prevalence of non-communicable diseases may increase pediatrics emergency department length of stay (9, 21).

Pediatric emergency subspecialty is not yet well developed in most low and middle-income countries (LMICs) and pediatrics emergency unit care are provided by the general pediatrician and minimal expertise in pediatrics emergency medicine thus, critical gaps in pediatric emergency care exist which may negatively affect patient outcomes and this situation is worse in Ethiopia, where the ratio of pediatricians per population is low and there is no emergency pediatrician (9, 22).

ED overcrowding is an international worry and signifies a global crisis that can influence the quality of service caused by the prolonged length of stay and prolonged LOS also causes overcrowding (9, 23, 24). WHO and FMOH were designing ETAT training and triage standards for health care providers as possible solutions to reduce PED length. However, prolonged pediatrics ED length of stay is still global challenge (14).

There is limited study done in Ethiopia concerning factors associated with LOS in the pediatric ED. Since children are the future of one country and in need of special care have to be emphasized, particularly their health status and providing high-quality care (18). Therefore, this study aimed to assess the pediatric emergency department length of stay and its associated factors among pediatric patients visiting PED of Wolaita Sodo teaching and referral hospital.

Prolonged pediatric ED length of stay is a global challenge that predisposes patients to increased risk of morbidity, mortality, reduced satisfaction, socio-economic burden on the parents, and increased constraints on health facility resources. Prolonged LOS can cause overcrowding and ED overcrowding is an international worry and signifies a global crisis that can influence the quality of service.

ED LOS is a critical component of quality assurance monitoring and is positively associated with patient morbidity, mortality, and reduced patient satisfaction. Children are prone to risks and if they stay longer in the emergency department, the higher the risks are, therefore identification of possible factors for LOS will help to take a targeted intervention to avert prolonged LOS.

Data regarding ED LOS in Ethiopia is scarce. Therefore, the findings of this study will give a snapshot picture for planning to pediatrics ED length of stay, policy-making as well as ED interventions to address problems related to prolonged PED stay. In addition; this study will contribute to the achievement of the Sustainable Development Goal particularly (SDG3). Besides, this study will examine variables like occupation, marital status, prior treatment, and educational status of parents which are not included in other studies, therefore; this study will revise new information on the association of LOS in pediatrics ED.

And, the findings will create awareness in the hospital about the problem and contribute to formulating appropriate interventions to reduce LOS in pediatrics ED. Furthermore, the findings of the study will contribute to battle prolonged LOS.

Methods

Study Design and Setting

An Institutional based cross-sectional study was conducted at Wolaita Sodo University Teaching Referral Hospital in Wolaita Sodo town from March 15 to May15, 2021GC. Wolaita Sodo town is situated at 313 km away from Addis Ababa, Ethiopia, and it is one of the zonal administrative units of towns in the Southern Region of Ethiopia that consist of 10 kebeles. The town is divided in to 4 administrative subcities. According to the 2019 Wolaita Sodo Town administrative health office report, Wolaita Sodo

Town has a total population of 200,450 (2017) comprising 98,221(49%) males and 102,229(51%) females of these 4963 were women in the reproductive age group (15-49 years), 28,499 under-five age children and 4576 infants less than one year of age. Functioning health facilities in the town include two Hospitals (one governmental and one private), 3 health centers, 19 medium and lower level clinics and 17 health posts(25, 26)

WSUTRH was established in 2007Gc and now WSUTRH provides general outpatient and inpatient services including medical, surgical, pediatric, psychiatric, ophthalmic, emergency, gynecology, and obstetrics care. The hospital serves more than three million people in Wolaita and neighboring zones with an average bed capacity of 416 and about 1155 health professionals and other technical and supportive staff (27).

The pediatrics department has four major wings: pediatric Emergency admission unit, Neonatal Intensive Care Unit (NICU), pediatric surgical admission ward, pediatric medical admission ward, and stabilization center (SC) unit with the total 133patient beds in the five wings and the pediatric emergency department has 29 beds(27).

Participants of the study

All children who are attending the pediatric emergency department of Wolaita Sodo University Hospital were the source population. Children who were attending the pediatric emergency department during the data collection period were included in the study. However, children with immediate death at arrival and critically ill patients were excluded from the study.

Sample size determination and sampling procedure

The sample size was calculated by using a single population proportion formula based on the following statistical assumptions; $P = 50\%$ (Assuming the proportion of pediatrics emergency department length of stay to be 50%, since there is no published study conducted in the study area of interest) 95% confidence level, and 5% margin of error. Based on this formula and after adding a 10% nonresponse rate, the total sample size was 422. Thus, data were collected from 422 pediatric patients attending the pediatric emergency department.

Systematic random sampling technique was used to select the actual study participants in Wolaita Sodo University hospital attending the pediatric emergency department. To select the desired sample of pediatrics patients among attendants of Wolaita Sodo University Teaching and Referral Hospital, the average number of pediatrics patients who visited the pediatric emergency department of Wolaita Sodo University Teaching and Referral Hospital within the last three months before the study was identified from the client registration. On the base of this, the expected client flow rate during the study period (one month) was estimated to be 1200. Then, the sampling interval (k) was calculated by dividing the expected number of mothers visiting the unit during the study period (N) with the determined sample size (n) of respondents ($1200/422=2.8$). Finally, using a systematic random sampling technique, one in every 3 attendant children pairs was selected until the required sample was reached.

Data collection tools and procedures

The required data were collected using face-to-face interview through semi-structured questionnaires and chart reviews, which were adapted and modified from the previous studies (5, 10, 14, 22, 28, 29). The questionnaire contains four parts, the first part contains 13 questions regarding socio-demographic characteristics of the study participants, the second part contains five questions related to time factors affecting length of stay, the third part contains 11 questions related to clinical factors of the participant affecting ED length of stay, and the fourth part contains 16 questions related to organizational factors.

The data was collected through training five nurses for data collection and one nurse for supervision who can speak fluently both Amharic and Wolaitigna languages. The pre-test was done on the twenty one respondents at Arbaminch referral hospital. Inter-observer variability was also checked and adjustment was made based on the results of the pretest.

The study participants' language fluency were asked and either Wolaitigna or Amharic interviews were applied by their choice, then after guarantying, their willingness to take part in the study and verbal consent and assent were obtained. Data were collected by trained data collectors from the patients following presentation, admission, and at the time of discharge from the ED through respondent interview and medical record review. The data collection procedure was illustrated as follows: first, eligible patients were identified by data collectors at the triage room while resident staff triaging patients on arrival. Hence, at arrival, time and other presentation characteristics were recorded at the triage room. Following this, other information such as socio-demographic characteristics and other organizational-related factors were obtained by interviews and chart review at different treatment points, and after the patient the gate stabilized, finally, information such as diagnostic investigations and overall treatment done were recorded from medical records, whereas the overall length of stay at the department and final disposition were recorded right at the time of the patient was discharged, from the ED. Later, the essential time-related factors were ED arrival time and the overall length of stay between presentation and discharge from ED.

Operational Definitions:

Pediatrics emergency department Length of stay (PEDLOS)

it is defined as the time between ED arrival and ED discharge, admission, or referral to another health facility which should not exceed 24 hours according to the Ethiopian federal minister of health (30).

Prolonged length of stay

defined as patient stays in the emergency department more than 24hrs. (30).

Not prolonged length of stay

when a patient stays in the emergency department less than 24 hrs. (30).

Waiting time

is a time started from the patient arrived to ED until triaged by health care providers, which should not exceed 5 minutes of arrival to ED. (31)

Data Processing And Analysis

After checking for completeness, data were coded and entered into Epi Data version 4.6 software and then exported to SPSS version 26.0 for further data analysis. Descriptive statistical analyses were computed and important variables were presented by percent frequency tables and figures. The outcome variable pediatrics emergency department LOS was dichotomized and coded as "1" for not prolonged ED length of stay "0" for prolonged ED length of stay. To say not prolonged ED length of stay, the total time of stay in PED should be less than or equal to twenty-four hours (≤ 24 hrs.), and the prolonged LOS is if the total time of stay is greater than twenty-four hours (> 24 hrs.). Standardized residuals were analyzed to check the presence of outliers, as well as multi-Collinearity was checked using the variance inflation factor, and variables with a variance inflation factor greater than ten were removed. Model fitness was tested using the Hosmer-Lemeshow goodness of fit test.

To examine the association between the independent and outcome factors, initially, bivariable logistic regression analysis was conducted. Independent variables with a p-value $\leq$ of 0.25 in the bivariable logistic regression analysis were included in the multivariable logistic regression analysis to control for all possible confounders and identify the significant factors. The strength of the association between the dependent and independent variables was measured using adjusted odds ratios with 95% CI and p-value of 0.05 or less was used for the final interpretation of statistical significance.

Results

Socio-demographic characteristics of the respondents

Out of the total, 422 pediatrics patient-attendant pair participated in the study, of which 408 (96.68%.) were respond. The Median age of the study participants was 2.06 years with an Inter-Quartile Range (IQR) of 0.66-6.23 years. More than one-third (40.4%) of them were under the age group of ≤ 1 year category. More than half (55.4%) of the study participants were female and two hundred thirty-three (57.1%) of the participants were urban dwellers.

Table1: Socio-demographic characteristics of respondents at the pediatric emergency departments in Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia, Jun 2021. (n=408)

Socio-demographic characteristics	Category	Number	Percent
Age	≤1	165	49.40
	1.1-3	69	16.90
	3.1-5	56	13.70
	5.1-6	23	5.60
	6.1-12	66	16.20
	≥12.01	29	7.10
Sex	Male	182	44.60
	Female	226	55.40
Residence	Rural	175	42.90
	Urban	233	57.10
Distance to hospital in km	≤7km	143	35.00
	8-25 km	53	13.00
	>26 km	221	51,70
Religion	Orthodox	178	43.60
	Muslim	33	8.10
	Protestant	134	32.80
	Catholic	53	13.00
	*Other ¹	10	2.50
Marital status	Married	267	65.40
	Single	96	23.50
	Divorced	28	6.90
	Widowed	17	4.20
Educational status	Attending formal education	225	55.10
	No formal education	183	44.90
Formal education level	Primary	93	22.80
	Secondary	52	12.70
	Above	80	19.60

Socio-demographic characteristics	Category	Number	Percent
Occupation	Governmental	93	22.80
	Private	109	26.70
	Farmer	166	40.70
	Delay labor	31	7.60
	Others ²	9	2.20
Language spoken	One	104	25.50
	Two	269	65.90
	Three	31	7.60
	More than three	4	1.00
Monthly income in ETB	≤500	33	8.10
	500-1000	51	12.50
	1001-200	54	13.20
	>2000	270	66.20

5.2 Clinical related characteristics of respondents

Of the total respondents (n=408) one-hundred forty-five (35.5%) of the respondents came with a complaint of respiratory symptom problems. Nearly two-thirds (61.3%) of the respondents was on an alert level of conciseness. Most, 319(54.9%) got prior treatment before arriving at ED. Co- morbid illness were reported by eighty-nine (21.1%) of the respondents. Respiratory problems were the most common initial diagnosis and all responds had the same final diagnosis with initial diagnosis.

Table 2
Clinical related characteristics of respondents

Presenting characteristics	Category	Number	Percent (%)
Mode of arrival	By taxi	169	41.40
	By ambulance	37	9.10
	By public transport	167	40.90
	On foot	17	4.20
	*Others ¹	18	4.40
Referral status	Self	250	61.30
	From health center	144	35.30
	From other hospitals	14	3.40
Chief compliant	RS	148	36.30
	CVS	35	8.60
	GI	72	17.60
	CNS	34	8.30
	Trauma	57	14
	Fever	62	15.20
Prior treatment	Yes	319	78.20
	No	89	21.80
Prior treatment place	Home remedy	158	49.50
	Health facility	152	47.60
	Alternative care	5	1.60
	*Other ²	4	1.30
Preexisting comorbidity	Yes	89	21.80
	No	319	78.20
Triage Category	Red	91	22.30
	Orange	132	32.40
	Yellow	112	27.50
	Green	73	17.90

Presenting characteristics	Category	Number	Percent (%)
Mental status	Alert	250	61.30
	Comatose	37	9.10
	Confused	121	31.10

5.3 Time and organizational related factors of respondents

Of the total respondents (n=408), nearly half of them (48.50%) arrived at ED in the morning. Moreover, most respondents 319(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 245(60%) of them had imaging studies.

Time and organizational related factors of respondents (table 3)

Factors	Category	Number	Percent
Time of arrival	Moring	198	48.50
	Afternoon	141	34.60
	Night	69	16.90
Day of arrival	Workday	319	78.20
	Weekend	89	21.80
Waiting time	≤5 minute	211	51.70
	>5 minute	197	48.30
Duration of pain	≤12 hours	49	12.00
	13-24 hours	47	11.50
	25-48 hours	58	14.20
	49-72 hours	100	24.50
	≥73 hours	154	37.70
Ordered investigations	Yes	408	100.00
	No	0	0.00
Laboratory test	Yes	408	100.00
	No	0	0.00
Imaging studies	Yes	245	60.00
	No	163	40.00
Got ordered medication in the hospital	Yes	247	60.70
	No	160	39.30
Number investigations	1	41	10.00
	≥2	367	90.00
Got ordered investigations	Yes	376	92.20
	No	32	7.80
Staff shift exchange experience	Yes	365	89.50
	No	43	10.50
Number shift exchange experience	≤3	100	27.40
	≥4	265	72.60

Outcome of the respondents

More than two-thirds (45.5%) of the respondents were discharged from pediatrics ED by dint of orders of physicians and a few 1.2% of the participant were discharged against medical advice. 2 minutes, 3 minutes, and 10 minutes were the minimum time taken started from the physician ordered till the participants discharge, admitted, and referred, respectively, congruently the maximum time taken to discharge were 60 minutes, 410 minutes to refer and 417 minutes were taken admitted.

Figure 3: **Outcome of pediatric patient from pediatrics emergency department of Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia Jun 2021. (n=408)**

Length of stay in pediatrics emergency department

The proportion of prolonged length of stay was 325(79.70%) of the respondents were stayed more than 24 hours in pediatrics ED and the rest, 83(20.30%) had a length of stay $\leq$ of 24 hours. The minimum length of stay in Wolaita Sodo University Teaching and Referral Hospital pediatrics emergency department 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.

Factors associated with length of stay

The bivariable analysis showed that residency, time of arrival, date of arrival, duration of pain, preexisting comorbidity, triage categories, imaging study, referral status, number of investigations, admission, and, getting the ordered medications in the hospital were significantly associated with length of stay at P-value < 0.2. In the multivariable analysis, date of arrival, time of arrival, duration of pain, triage categories, imaging study, and, getting all order medications in the hospital remained significant.

The odds of a prolonged stay at the PED among respondents who presented to the emergency department during the weekend were 4.25 times (AOR=4.25; 95% CI: 1.63, 11.12) higher than those who presented on workdays. Night-time presentation of the patients to ED was 3.19 times (AOR=3.19; 95% CI: 1.14, 8.98) more likely to have prolonged length of stay than a morning presentation.

The likely hood of experiencing a prolonged length stay at the PED among those under the orange triage category was four times (AOR=4.01; 95% CI: 1.60, 10.05) higher than those with triage category of green. The probability of experiencing a prolonged length of stay at the PED among participants who did not find all order medications in the hospital was 2.05 times (AOR=2.05; 95% CI: 1.04, 4.03) higher than to those who found the ordered medications in the hospital. The odds of experiencing a prolonged length stay at the PED among those having imaging diagnostic investigation were 2.83 times (AOR, 2.82 95% CI, 1.49-5.35) higher than those having no imaging diagnostic investigation.

Furthermore, the results of this study showed that the length of stay was 71% (AOR=0.29; 95% CI: 0.87-0.98) less in a participant with a duration of pain from 13-24 hours compared to those who had less than 12 hours duration of pain.

Table 4

Bivariable and Multivariable logistic regression analysis of factors associated with length of stay among pediatric patients attending pediatric ED of Wolaita Sodo University Teaching and referral hospital south Ethiopia 2021 (n =408)

Variables		Length of stay		COR (95% CI)	AOR (95% CI)	P-value
		Prolonged N (%)	Not prolonged N (%)			
Residence	Rural	149(85.10)	26(14.90)	1.86(1.12-3.09)	1.14(0.56-2.29)	0.724
	Urban	176(75.50)	57(24.50)	1.0	1.0	
Time of arrival	Moring	141(71.20)	57(28.80)	1.0	1.0	
	Afternoon	121(85.80)	20(14.20)	2.45(1.39-4.30)	1.83(0.92-3.69)	0.086
	Night	63(91.30)	6(8.70)	4.24(1.73-10.35)	3.19(1.14-8.98)	0.028
Date of arrival	Work day	242(75.90)	77(24.10)	1.0	1.0	
	Weekend	83(93.30)	6(6.70)	4.40(1.85-10.45)	4.25(1.63-11.12)	0.003
Duration of pain	≤12 hours	42(85.70)	7(14.30)	1.0	1.0	
	13-24 hours	24(51.10)	23(48.90)	0.17(0.65-0.46)	0.29(0.89-0.98)	0.046
	25-48 hours	43(74.10)	15(25.90)	0.48(0.18-1.29)	0.69(0.20-2.37)	0.559
	49-72 hours	73(73.000)	27(27.00)	0.45(0.18-1.12)	1.09(0.35-3.45)	0.897
	≥73 hours	143(92.90)	11(7.10)	2.17(0.79-5.94)	2.95(0.82-10.54)	0.096
Preexisting comorbidity	Yes	83(93.30)	6(6.70)	4.40(1.85-10.48)	1.98(0.73-5.30)	0.176
	No	242(75.90)	77(24.10)	1.0	1.0	
Triage category	Read	81(89.00)	10(11.00)	5.04(2.25-11.32)	2.51(0.87-7.23)	0.088
	Orange	120(90.90)	12(9.10)	6.22(2.92-13.27)	4.01(1.60-10.05)	0.003

*1 .0 = reference category

Variables		Length of stay		COR (95% CI)	AOR (95% CI)	P-value
		Prolonged N (%)	Not prolonged N (%)			
	Yellow	79(70.50)	33(29.50)	1.49(0.79-2.78)	1.35(0.63-2.88)	0.441
	Green	45(61.60)	28(38.40)	1.0		
Imaging study	Yes	216(88.20)	29(11.80)	3.69(2.22-6.12)	2.82(1.49-5.35)	0.001
	No	109(66.90)	54(33.10)	1.0	1.0	
Got all ordered medication	Yes	179(73.70)	64(26.30)	1.0	1.0	
	No	145(88.40)	19(11.60)	2.73(1.56-4.76)	2.05(1.04-4.03)	0.037
Admit	Yes	154(86.50)	24(13.50)	2.21(1.31-3.73)	1.46(0.78-2.74)	0.236
	No	171(74.30)	59(25.70)	1.0	1.0	
Referral status	Self	188(75.20)	62(24.80)	1.0	1.0	
	From other health institutions	137(86.70)	21(13.30)	2.15(1.25-3.69)	0.82(0.37-1.82)	0.624
Number of investigations	1	27(65.90)	14(34.10)	1.0	1.0	
	≥2	298(81.20)	69(18.80)	2.24(1.12-4.49)	1.28(0.52-3.13)	0.594
*1 .0 = reference category						

Discussion

Patient length of stay is a major indicator reflecting how well an ED is working, and the overall efficiency and quality of service of an ED(32).Prolonged length of stay is positively associated with morbidity, mortality, and negative satisfaction, also length of stay is a reasonable substitution for resource consumption and is vital for the planning and management of care(22).This study attempted to determine the magnitude and factors associated with pediatric emergency department length of stay among patients attending the pediatric emergency department of Wolaita Sodo University Teaching referral hospital.

This study demonstrated that an appreciably high 79.7%(95% CI; 75.7, 83.6) of pediatrics patients stay for greater than 24 hours in the pediatric emergency department. High proportion of prolonged pediatrics

emergency department length of stay is a universal problem and variations regarding such length of stay in terms of prevalence vary across the globe; 31.3%, 25.7%, 22%, 10.2%, 16.4% in Guangzhou China, northern Taiwan, Boston USA Iran, and Nigeria respectively (4, 7–9, 33). The possible reason for these discrepancies might be due to the difference in health care system level, or advancements in medical health services, the difference in the number of health professionals in Guangzhou, China ED has 5 general physicians, 16 senior pediatric residents and 22 nurses (7) while in the current study the ED have 4 pediatrician, 5 general physicians, and 7 nurses (27) the study in Boston Children's Hospital USA includes study participant only pediatrics emergency case with mental illness (33) in contrast the current study includes all emergency cases in wait Sodo pediatrics emergency department.

In addition, variation of criteria used across settings, for instance, the study done in Nigeria used a garter ≥ 72 hours for a prolonged length of stay (9) nevertheless the current study used >24 hours based on Ethiopian hospital services transformation guidelines criteria for length of stay (34). The aforementioned might be the possible reason for an increased prevalence of prolonged pediatrics ED length of stay in the current study.

The present study showed that night-time arrival to PED was significantly associated with prolonged length of stay at PED. This is in accordance with other studies conducted in China, Indonesia, and the USA (3, 35, 36).

The possible explanation could be due to the fact that the hospital may not admit to inpatient or discharge patients during the night shift; night shift arrivals to ED need to wait until daytime to be admitted or discharged (34). In addition, expert consultation and diagnostic or therapeutic modalities are less available at night compared to daytime. However, this is contradicted with studies done in Egypt and Switzerland which stated that morning arrival is a factor for a prolonged length of stay in pediatrics ED (14, 37). This discrepancy might be due to the difference in population characteristics, distinct arrival patterns, and staffing policy for each hospital or region. This information can be valuable at the administrative level for planning providers.

Similarly, the findings of this study showed that weekend arrival to PED was significantly associated with prolonged PED length of stay. This finding is in agreement with other studies was conducted in Taiwan and China (8, 38). This might be due to decreased number of health professionals on weekends and experts (senior physicians, radiologists) may not be available on a weekend compared to workdays.

This study showed that triage category (orange) was significantly associated with prolonged length of stay. The same is true in the findings of the studies conducted in Indonesia, USA, China, Switzerland (3, 7, 14, 36). This might be due to the patients on triage level II are on a high level of acuity when the acuity level of the disease is increased, the patients come in need of lots of care, and the emergency intervention's required more time, intensive treatment was given, likewise, the nature of the disease in the pediatrics population by itself is challenging to manage easily for health professionals, and the higher the acuity level the more challenged and physicians require more time to decide the appropriate place for the patient's whether inpatient ward, refer to other hospital or discharge. In addition, patients with high

acutely level may need experts (pediatrician) and more investigation modalities, this this thing may contribute to prolonged LOS by increased time to wait for the pediatrician and found ordered investigation.

The findings of this study also showed that having an ordered an imaging study was significantly associated with prolonged PED length of stay, this is in line with a study conducted in Taiwan (36). The possible explanation might be because imaging investigations are important for accuracy and confirming diagnosis of the patient, which is vital for making decisions by physician whether the patient is referred to another hospital, discharged or admitted. In addition, most imaging investigations take more time than other investigations; those things may lead to raised pediatrics ED length of stay.

This study also showed that patients who did not find ordered medications in the hospital were significantly associated with prolonged PED length of stay. The possible justification could be due to that not getting the medications in the hospital could result in increased time for finding medications outside the hospital, and result in a late intake of the prescribed medication, and delayed recovery.

Moreover, this study also showed that duration of pain had a significant effect on PED length of stay. The odds of PED length of stay were 71% less likely in a patient who came with the duration of 13-24hours compared to patients with duration of pain $\leq$ of 12 hours. This might be due to that patients with duration of pain 13-24 hours might come to less acute life treating emergencies, which can be easily manageable. Likewise, less acute cases may not need intensive care, the diagnosis modality for confirmation of a suspected cases to provide appropriate treatments, and those could be possible justifications. There this implicated that the less acute cases are short stay in PED who were coming with short duration of pain.

Limitations of the study

Limitation

Variables like duration of pain, time taken from ordered by physician until discharge, referred, and admitted were prone to recall biased, to overcome this the data were collected at the point of treatment .

Conclusion

This research has demonstrated the proportion of prolonged pediatrics emergency department length of stay was high. Night time arrival, weekend day arrival, triage categories, duration of pain, imaging study, and getting ordered medication in the hospital were found to be a significantly associated with pediatrics emergency department length of stay. Therefore, appropriate interventions are warranted to be designed and implemented emphasizing the aforementioned associated factors.

Declarations

Ethics approval and consent to participate

Ethical clearance was issued from the School of Nursing Research ethical Review Committee on behalf of the University of Gondar in a letter Ref. No. S/N/2013/0/2021. A formal ethical and cooperation letter was delivered to Wolaita Sodo University Teaching and referral hospital head officer (research officer), then the head of the facility permit, and directed a permission letter to the ED unit team leader/coordinator. Informed consent was obtained from the study participants on the right of participation or refusal to the study. Confidentiality of the information was kept for each study participant by coding the data.

Consent for publication

Not applicable

Availability of data and materials

All data and materials relevant to this study are available from the corresponding author whenever required.

Competing interests

The authors declare that they have no any competing interests for publication.

Authors' contributions

NT: Made a great contribution in designing and shaping the study methodology, ensuring the appropriateness of the tool, supervised and extensively involved in the analysis, writing up, and interpretation of the data. **A.T:** considerably involved in the proposal development process and tool modification, assisting data analysis and interpretation. **MG:** ensured the appropriateness of the tool, supervised and extensively involved in the analysis written up.

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Abbreviations

ED	Emergency Department
EM	Emergency Medicine
ETAT	Emergency Triage Assessment and Treatment
ETB	Ethiopian Birr
FDMOH	Federal Minister of Health
IMNCI	Integrated Management of Newborn and Childhood Illness
LMICs	Low and Middle-Income Countries
LOS	Length of Stay
PEDLOS	Pediatrics Emergency Department Length of Stay
PLOS	Prolonged Length of Stay
SPSS	Statistical Package for Social Sciences
WSUTRH	Wolaita Sodo University Teaching and Referral Hospital

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Figures

Figure 1

Reasons for not got the ordered investigation in pediatrics emergency department of Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia Jun 2021.

Figure 2

Outcome of pediatric patient from pediatrics emergency department of Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia Jun 2021. (n=408)

Figure 3

Prevalence of pediatrics emergency department length of stay in Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia Jun 2021. (n=408)