

Research Article

Prevalence, Aetiologies and Outcome of Paediatric Medical Emergencies at the Buea and Limbe Regional Hospitals

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Abstract

Background: Worldwide and particularly in Africa paediatric emergencies are a public health priority. Deaths in hospitals frequently occur within the early hours following admission. The aim of our study was to provide data on the prevalence, aetiologies and outcome of medical paediatric emergencies of children admitted at the emergency, paediatric and intensive care units of the Buea and Limbe Regional hospitals.

Methodology: We carried out a hospital-based cross-sectional of patients aged 1 month to 15 years admitted at the emergency, paediatric and intensive care units of Buea and Limbe Regional Hospitals from January and March 2023 who had a medical pathology and at least one emergency sign according to the WHO ETAT (convulsion, coma, severe dehydration, respiratory distress, shock, severe anemia). Data was analyzed using Statistical package for social sciences (SPSS) version 25.

Results: A total of 294 children were enrolled out of 597 paediatric admissions giving a hospital prevalence of medical paediatric emergencies of 49.2%. The sex ratio was 1.4:1 with male predominance. The mean age was 2.7 years and 83% of the children were less than 5 years old. Almost half of the emergencies were convulsion (41.2%), respiratory distress and severe dehydration represented 32.3% and 30.3% respectively. Severe malaria accounted for 61.9% of the aetiologies. The death rate from paediatric medical emergencies was 9.9% and represented 69% of total paediatric deaths in both regional hospitals. Renal injury ($p=0.014$), severe community acquired pneumonia ($p=0.026$) and poisoning ($p=0.027$) were associated with mortality.

Conclusion: Paediatric medical emergencies constitute a significant proportion of admissions; the most common emergency is convulsion and the main aetiology was severe malaria. Renal injury, poisoning and severe community acquired pneumonia were associated with mortality.

Keywords: Prevalence; Aetiologies; Outcome; Paediatric Emergencies; Buea and Limbe Regional Hospitals

Introduction

Paediatric emergency is defined as a state threatening the child's life in a more or less short time and requiring fast and adequate management [1]. Child mortality rates remain high globally [2]. Sub-Saharan Africa still has the highest under-five mortality rate in the world [3]. The magnitude and severity of child mortality are exacerbated by different factors, including delays in seeking assessment and treatment [4]. It is often difficult to differentiate between a mild and severe morbid condition especially in children under 30 months, where a common ailment can easily become complicated [5].

Many child deaths occur within early hours of admission, whereas they could be prevented if very sick children are identified shortly after arrival and management commenced immediately [1]. The emergency care needs of children differ from those of adults; hence the planning of an emergency care service for children should address these differences. This aspect has received substantial attention in resource-rich countries [6,7], but remains neglected in the developing world [8]. In most of the developing countries children are generally taken to the nearest available community hospital Emergency Department (ED) irrespective of whether they have specific facilities for children. Thus, there is often a deficiency in the initial triage as well as a delay in recognizing patients requiring urgent attention. Non-availability of trained staff, inadequate drugs and equipment, and non-standardized treatment guidelines, further contribute to the morbidity and mortality of these critically ill children. To plan cost effective service delivery systems within these constraints, it is essential to have baseline data on pediatric emergencies. Data on pediatric emergencies could help in the identification of the more common serious illnesses that are likely to present themselves to an ED and that may benefit from early interventions [9]. The aim of this study will be to provide the prevalence, aetiologies and outcome of pediatric medical emergencies of children consulting at the emergency department.

Methodology

We conducted a hospital based cross-sectional, descriptive study with prospective collection of data over 3 months from January to March 2023, at the emergency, paediatric and intensive care units of the Buea and Limbe Regional Hospitals. We included children aged 1 month to 15 years within the study period presenting a medical pathology and at least one emergency sign (convulsion, coma, respiratory distress, severe dehydration, shock, severe anemia) according to the WHO ETAT (World Health Organization Emergency, Triage, Assessment and Treatment) on admission to the emergency, pediatric and intensive care units. We excluded patients with known chronic disease, surgical pathologies and neonates.

The socio-demographic characteristics of the parents: age, marital status, level of education, and profession.

The socio-demographic characteristics of the patients: age and sex.

The clinical characteristics of the patient: reason for consultation, physical signs, type of paediatric medical emergency, aetiological diagnosis, emergency measures, time of treatment. Evolutionary characteristics: number of hours spent in the emergency room, length of hospital stay in days, hospital mortality rate. Statistical Package for Social Sciences (SPSS) version 25 software was used for data analysis. Categorical variables were analyzed using the Chi-square test or Fisher's exact test and p-value ≤ 0.05 was considered significant. Mean, median, and mode as well as ranges, ratios and proportions were employed in analysis.

Results

Prevalence of Medical Pediatric Emergencies at the Buea and Limbe Regional Hospitals

Of the 597 children who were admitted at the emergency, pediatric and intensive care units of Buea and Limbe Regional hospitals within our study period, 294 children had medical emergencies, giving a hospital prevalence of emergencies of 49.2%.

Socio-Demographic Characteristics

The socio-demographic characteristics of study participants are shown on Table 1. Most of the children 120 (40.8%) were between 13 and 36 months of age. Child under 5 years contributed to more than $\frac{3}{4}$ of the children with medical emergencies. The majority of the participants 171 (58.2%) were males. Majority of the fathers 179 (60.9%) were employed in the informal sector. On the other hand, most of the mothers 135 (45.9%) were employed in the informal sector with the majority (Table 1).

Variable	Category	Frequency (n)	Percentage (%)
Hospital admission	BRH	195	66.3
	LRH	99	33.7
Referral	Yes	144	49.0
	No	150	51.0
Level of referring Hospital	Primary	94	65.3

Means of transportation	Secondary	48	33.3
	Tertiary	2	1.7
	Public transport	254	86.4
	Personal car	40	13.6

Table 1: Admission characteristics of medical paediatric emergencies.

Patterns of Presentation

Admission Characteristics

BRH had the highest number of admissions 195 (66.3%), majority of the patients came from their homes 51% and used public transport while 49% came from other hospitals, of which more than half were from primary hospitals (Table 2).

Variable	Category	Frequency (n)	Percentage (%)
Hospital admission	BRH	195	66.3
	LRH	99	33.7
Referral	Yes	144	49.0
	No	150	51.0
Level of referring Hospital	Primary	94	65.3
	Secondary	48	33.3
	Tertiary	2	1.7
Means of transportation	Public transport	254	86.4
	Personal car	40	13.6

Table 2: Admission characteristics of medical paediatric emergencies.

Duration of Symptoms, Auto-Medication

Most of the patients (50.9%) stayed at home between 4-7 days with symptoms before consultation and almost (93.2%) had received previous medications at home. Most of the medications received were antipyretics (92.7%), antimalarial (35.4%) and antibiotics (22.4%) (Table 3).

Variable	Category	Frequency (n)	Percentage (%)
Average duration of symptoms	1-3 days	105	35.8
	4-7 days	149	50.9
	> 1week to month	39	13.3
Auto-medication	Yes	276	93.2
	No	20	6.8
Medication used	Antipyretic	254	92.7
	Antimalarial	97	35.4
	Antibiotics	66	22.4
	Phytotherapy	48	17.5
	Anthelmintics	43	14.6
	Analgesic	13	4.7

Table 3: Duration of symptoms and auto-medication.

Time of Arrival at the Emergency, Attending Physician

Majority of patients (52.4%) consulted during night duty (3 pm-7:59 am) and most were first seen by general practitioners (Table 4)

Variable	Category	Frequency (n)	Percentage (%)
Time of arrival at the emergency	8 am-2:59 pm	140	47.6
	3 pm-7:59 am	154	52.4
Attending physician	Pediatrician	109	37.1
	General practitioner	221	75.2
	Other specialists	8	2.7

Table 4: Time of arrival at the emergency and attending physicians.

Signs and Symptoms on Admission

Fever was observed in (93.2%), lethargy (87.8%), vomiting (67%), convulsion (41.2%), difficulties breathing (32%), and watery stool (29.3%). On physical examination, respiratory distress (32%), mucosal dryness (28.9%), muco-cutaneous pallor (21.4%), cold extremities (9.2%), and wheezing (6.8%) (Table 5).

Variable	Category	Frequency (n)	Percentage (%)
Gastrointestinal System/ General	Fever	274	93.2
	Lethargy	258	87.8
	Vomiting	197	67.0
	Mucosal dryness	85	28.9
	Watery stool	86	29.3
	Muco-cutaneous pallor	63	21.4
Cardiorespiratory System	Cough	97	33.0
	Difficulties breathing	94	32.0
	Intercostal retraction	80	27.2
	Nasal flaring	78	26.5
	Noisy breathing	30	10.2
	Paradoxical breathing	31	10.5
	Cold extremities	27	9.2
	Wheezing	20	6.8
	Lower-limb edema	3	1.0
Genito-Urinary System	Anuria	5	1.7
	Oliguria	3	1.0
	Hematuria	1	0.3
Nervous System	Convulsion	121	41.2
	Bulging or depressed fontanel	6	2.0
	Nuchal rigidity	5	1.7
	Kernig sign	3	1.0
	Brudzinski sign	3	1.0
	Coma	2	0.7

Table 5: Clinical presentation of patients with paediatric medical emergencies.

Types of Paediatric Medical Emergencies

Neurological paediatric emergencies (41.8%, 123/294) dominated the picture with convulsion (41.2%, 121/294) and comas (0.7%, 2/294). This was closely followed by respiratory distress (32.3%), severe dehydration (30.3%) and severe anemia (23.8%). Cardiovascular emergencies were recorded in 10.9% of the participants (Fig. 1).

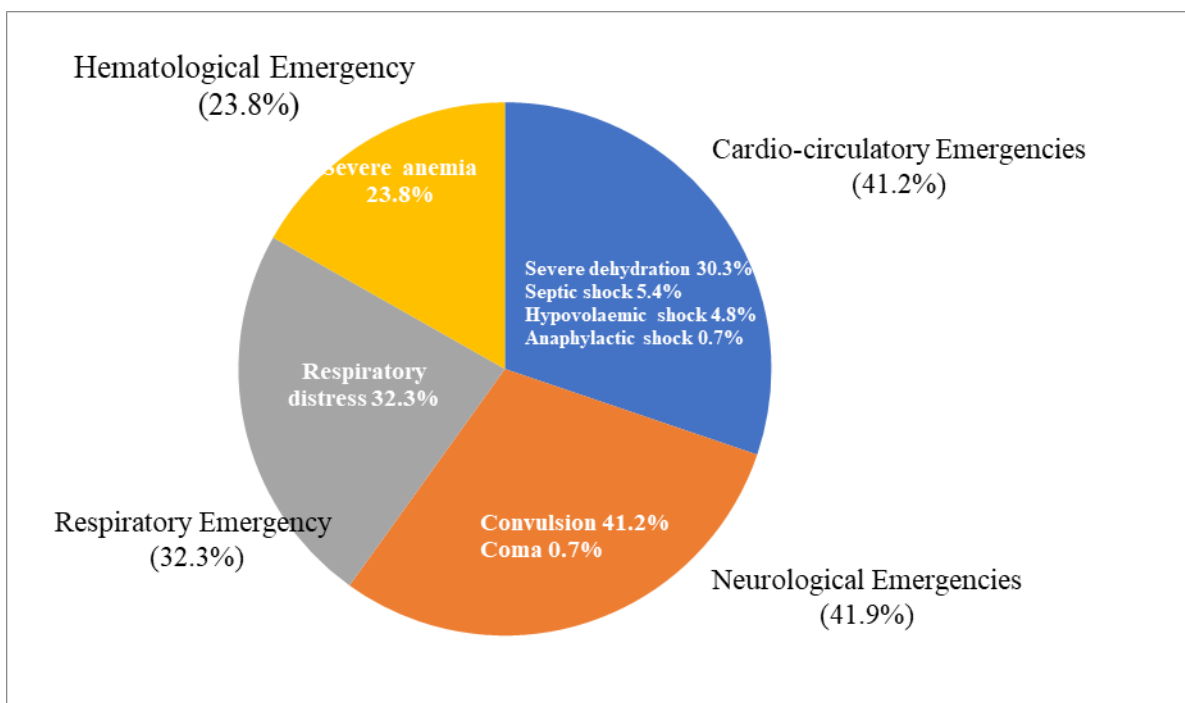


Figure 1: Types of paediatric medical emergencies.

Aetiologies of Medical Paediatric Emergencies

The most frequent aetiology was severe malaria (61.9%), followed by diarrheal disease with severe dehydration (26.9%) and severe community acquired pneumonia (24.5%). Meningitis and bronchiolitis were recorded in 6.8% and 4.1% of the children respectively (Fig. 2).

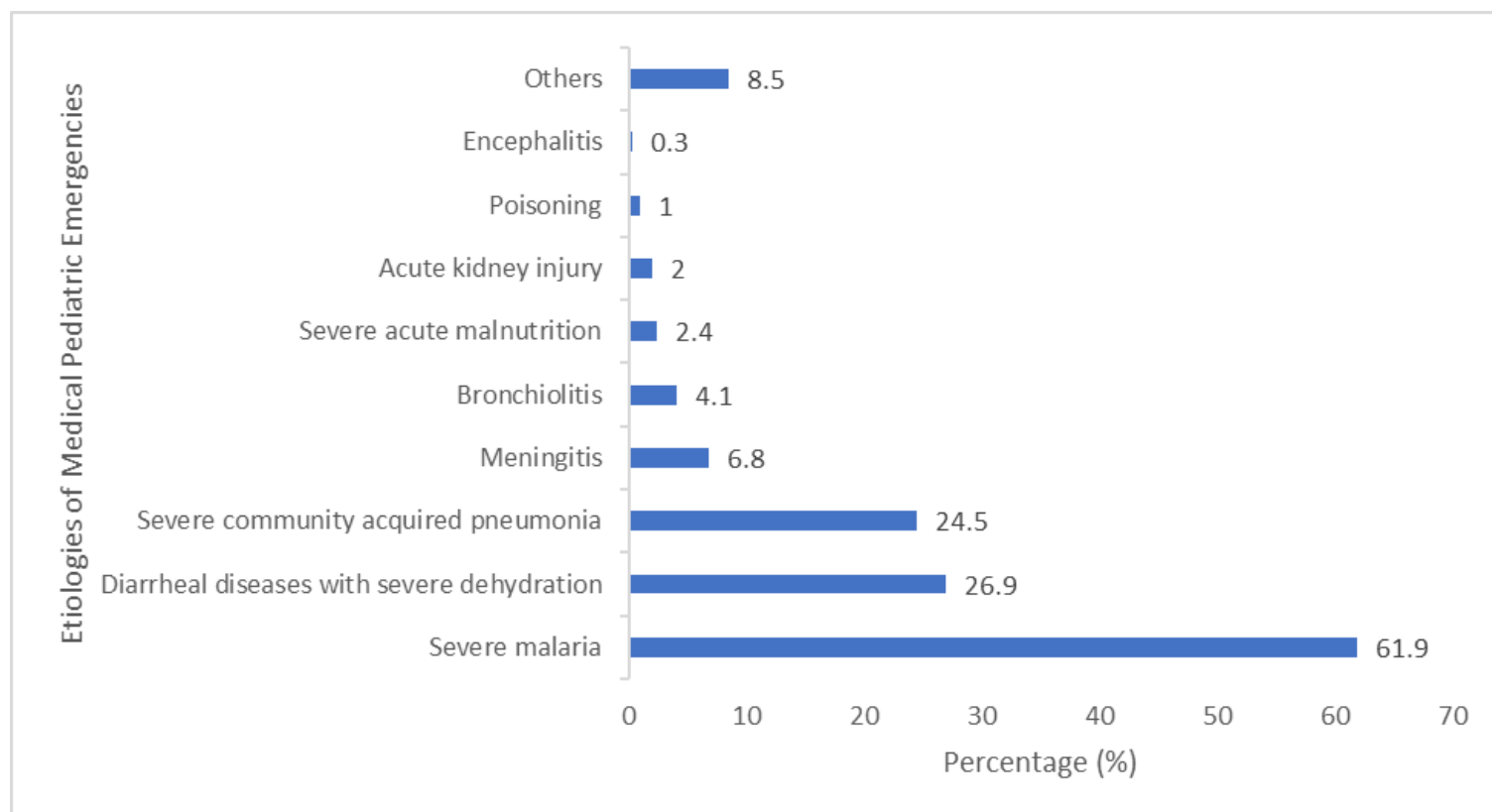


Figure 2: Distribution of aetiologies of paediatric medical emergencies.

Management of Paediatric Medical Emergencies

Medications Used

Almost all patients received I.V fluids (98.3%) and antipyretics (91.5%), more than half received antimalarial and antibiotics, 28.8% had oxygenotherapy, 21.8% received blood transfusion (Fig. 3).

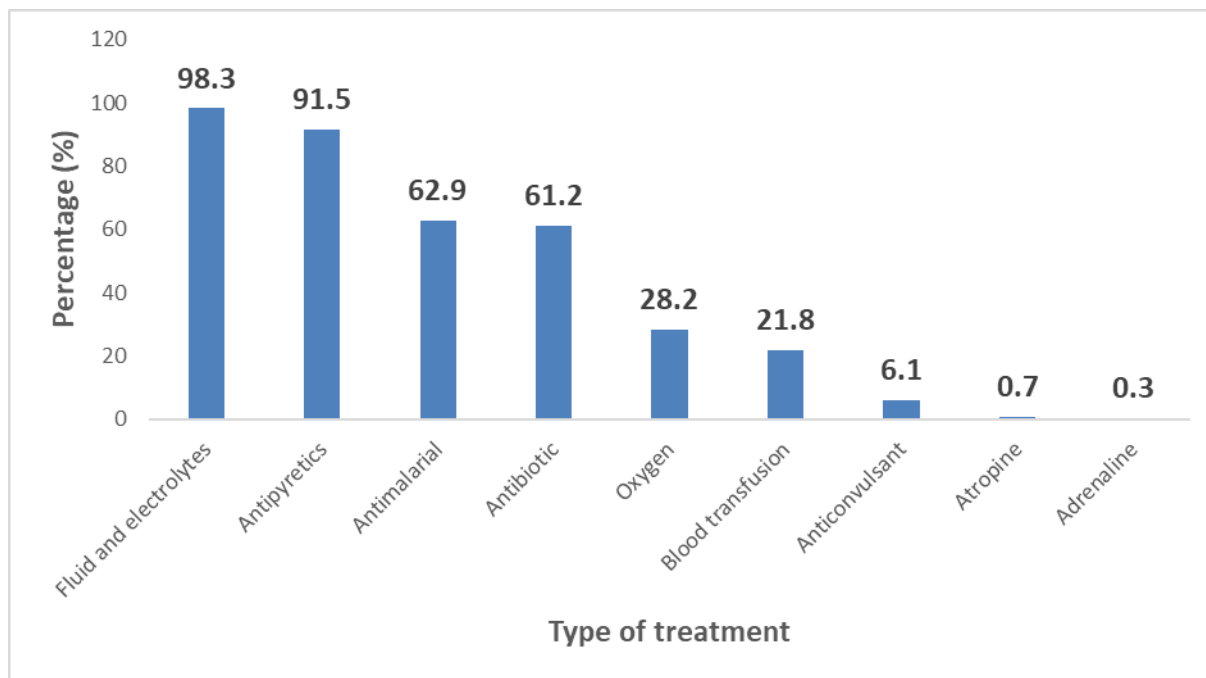


Figure 3: Management of paediatric medical emergencies.

Outcome of Medical Emergencies

Treatment Outcome

Survivors were 90.1% (265), improved 89.8% (264), and referred 0.3 % (1) to see a specialist and deaths 29(9.9%). Causes of death were respiratory distress (41.4%), sepsis (31%), severe anemia (24.1%), acute renal failure (13.8%) and other causes (6.9%). Almost all deaths (72.4%) occurred in less than 48 hours and 27.6% after 2 days (Fig. 4).

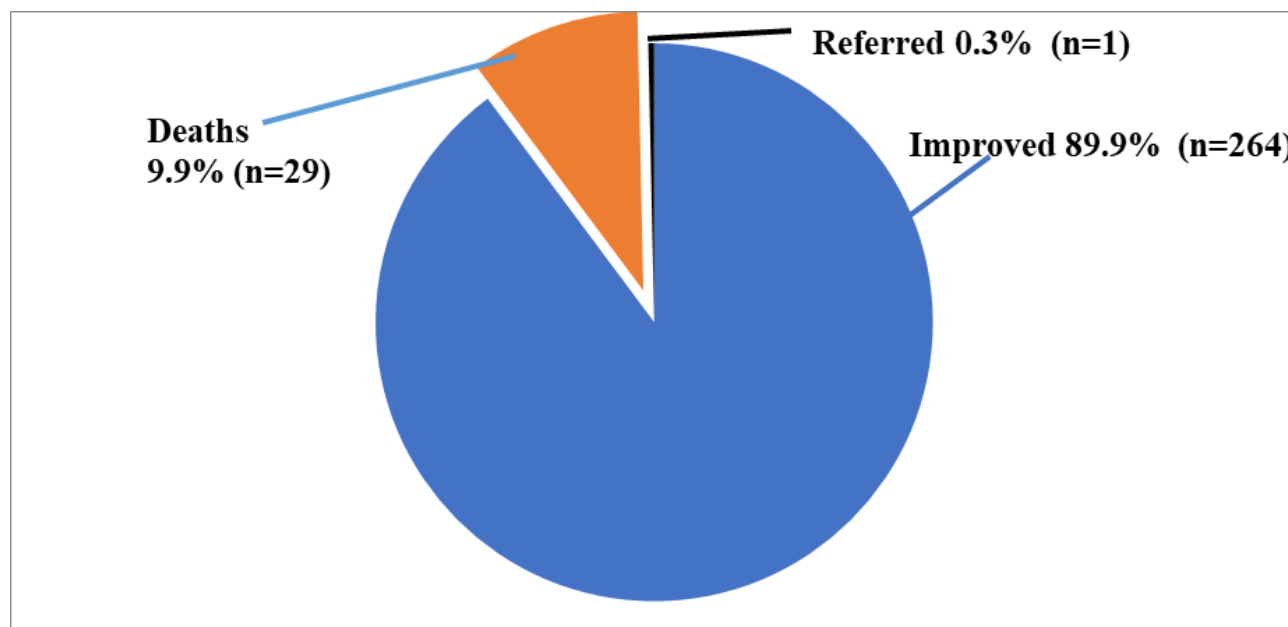


Figure 4: Treatment outcome of paediatric medical emergencies.

Interval Between Admission and Definitive Management, Length of Stay at the Emergency, Duration of Hospitalization

Almost all patients stayed at the emergency for less than 1 day (98.3%), received definitive management between 1 to less than 3 days (97.6%) and stayed hospital between 4-7days (59.2%) (Table 6).

Variable	Category	Frequency (n)	Percentage (%)
Interval between admission and definitive management	<24 hrs	5	1.7
	1-<3 days	289	98.3
Length of stay at the emergency	<1 day	5	1.7
	1-3 days	289	98.3
Duration of hospitalization	<4 days	37	12.6
	4-7 days	174	59.2
	>7-30 days	83	28.2

Table 6: Time of definitive management, length of stay at the emergency, duration of hospitalization.

Interval Between Admission and Death

Most patient died within the first 48 hours 21(72.4%) and 8(27.6%) after 2 days following admission (Fig. 5).

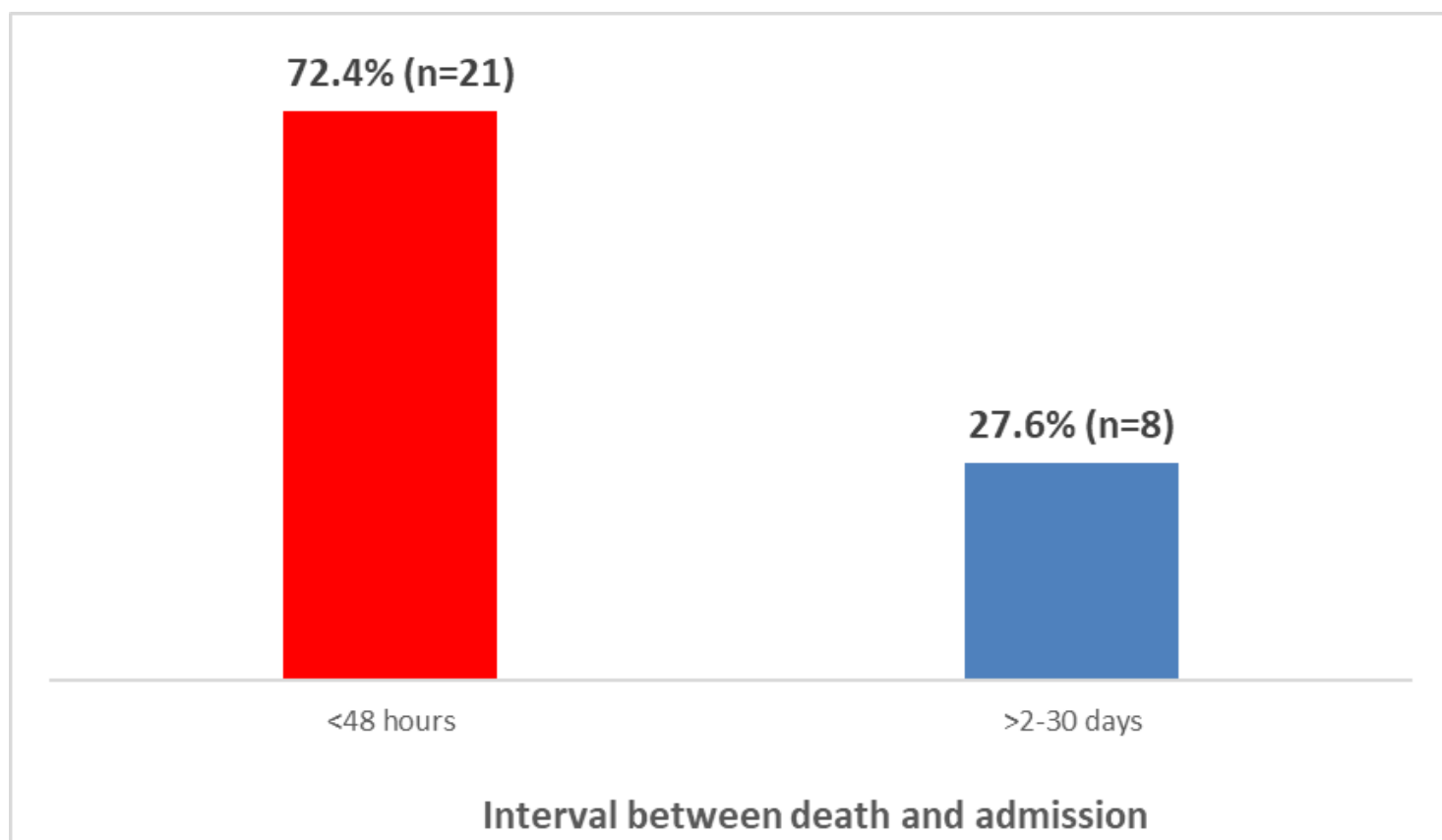


Figure 5: Interval between death and admission.

Association Between Aetiology and Mortality Among Patients Presenting with Medical Pediatric Emergencies

Severe acquired pneumonia was significantly associated with the treatment outcome, with 12 (41.4%) of the children admitted with the disease resulting to the death of the child ($p=0.026$). Poisoning was significantly associated with the treatment outcome, with 2 (6.9%) of the children admitted with the condition resulting to the death of the child ($p=0.027$). Renal injury was significantly associated with the treatment outcome, with 3 (10.3%) of the children admitted with the disease resulting to the death of the child ($p=0.014$) (Table 7).

Aetiologies	Total	Survived	Death	Chi-square	p-value
Acute renal failure	6	3(1.1)	3(10.3)	11.098	0.014*
Severe community acquired pneumonia	72	60(22.6)	12(41.4)	4.963	0.026
Poisoning	3	1(0.4)	2(6.9)	10.999	0.027*
Meningitis	20	17(6.4)	3(10.3)	0.637	0.425
Severe malaria	182	165(62.3)	17(58.6)	0.147	0.701
Diarrheal diseases with severe dehydration	79	72(27.2)	7(24.1)	0.122	0.727
*-Fisher exact test p-value					

Table 7: Association between aetiology and mortality among patients presenting with medical paediatric emergencies.

Discussion

The prevalence of paediatric medical emergencies in our study is 49.2%. This high prevalence in our study could be explained by the fact that it was carried out in two regional hospitals in the South West Region of Cameroon which serve as the highest level of referral within the region.

The prevalence observed in our study is similar to that observed by Penda, et al., (42.4%) in Cameroon, this is due to the fact our population is same [10]. Our results were higher than those recorded by Sagnes [5] in France (20.5%), Gravel, et al., in Canada (30%), Guedenon, et al., in Togo (21.1%), Azoumah, et al., in Togo (22.7%), Kingwengwe, et al., in Democratic Republic of Congo (DRC) (21.4%), this could be explained by the fact that they are retrospective studies where many files were eliminated due incomplete information and were carried out in single hospitals [10-14]. Our observation is less than other African studies that we found. Studies conducted by Atanda, et al., in Congo-Brazzaville, Dan V, et al., in Benin Fatou, et al., in Senegal who found respectively 70%, 60% and 57.2% of cases among paediatric consultations in their various study environments [15-17]. This high frequency of paediatric emergencies in other African studies is evident by the difference in case definition as they included neonates in their studies. These other African studies did not distinguish between perceived and actual emergencies. Therefore, in order to decrease the overestimation of paediatric emergencies, the WHO sorting scale must be widely adopted by the health care systems within our continent.

There was a male predominance of 1.4:1. A high male to female proportion is reported in several studies of paediatric emergency [16,17]. The assumption that male sex is more susceptible to female sex in the early age of life to infections is supported by the preponderance of the male sex [14]. In our study, 60.9% of fathers were informal sector workers and 34.0% of mothers were unemployed. A Similar result was recorded by Fatou, et al., in Senegal reflecting a low socioeconomic level [17]. The mean age was 2.7 years, and children less than 5 years accounted for majority (83%) of patients. This result was higher than that obtained by Nsame, et al., in Gabon, Fatou et al, in Senegal and Ejlaidi, et al., in Morocco, whose proportions varied from 68.8% to 72.7% [17-19]. The vulnerability to infections, the rapid evolution and the early complications of childhood illnesses common in this age group could explain this situation.

Most of our patients came directly from the house while 49% came from other smaller health structures. This result was similar to that reported in a previous study by Thiongane, et al., in Senegal this is due to the fact that many parents considered illnesses in children to be mild and only the persistence and severity of the illnesses prompted consultation in health facilities [20]. Patient transport was nonmedicalized (taxi and personal cars) for all our patients (100%). This is a significant factor in mortality. However, a large proportion of the patients came directly from home, which explains the predominance of non-medicalized transport. Similar data are noted in other Africa countries Atanda, et al., in Congo Brazzaville, Koueta, et al., in Burkina Faso, Thiognane, et al., and Fatou, et al., Senegal [20-22]. On the other hand, in developed countries, the ambulance is used in 80 to 90% of emergency cases [23,24]. Optimal management of emergencies also involves a good medical transport system with equipped ambulances and well-trained personnel. Emergency measures should be initiated as soon as the clinical situation is diagnosed and recognized. Any delay in management increases the risk of death. Most of our patients 93.2% had self-medicated before consultation. These results were superior to those reported by Penda, et al., in Cameroon and Enyuma, et al., in Nigeria where 87.4%, 74.1% had taken medications at home before admission to the emergency unit, respectively [10,25,26]. The mean time to consultation after the onset of symptoms was 5 days and more than half of the patients with medical paediatric emergencies were admitted between 3 p.m-7:59 am. This delay was greater than that found by Penda et al, however it was

multiplied by two in the study conducted by Ndukwu, et al., [27]. Transportation difficulties, certain beliefs, traditional practitioners and many treatment days of the sick children at home led to a delay in seeking medical attention as parents considered the illnesses of their children to be less severe, hence delay in the diagnosis of the emergency situations and early onset of complications. Regarding admission times, our results were consistent with those of Enyuma, et al., and Fatou, et al., Where paediatric emergencies mostly came in at night [25]. The most frequent reasons for consultation were fever, convulsion, and difficulties breathing. These data were comparable to that found by a previous study [25].

Neurological medical paediatric emergencies were (convulsion and coma) predominant followed by respiratory distress, severe dehydration. These results were comparable to those found by Gajoui, et al., in Morocco and Penda, et al., in Cameroon where the first two emergencies were convulsion and respiratory distress [10]. The more frequent urgent consultations in our series could be attributed to the convulsions' spectacular clinical presentation and respiratory distress. The vulnerability of children in our setting to diseases such as malaria is thought to be one of the causes of the early development of this type of complications. These results were different from those recorded by Kingwengwe, et al., in Democratic Republic of Congo where severe dehydration was the main emergency sign [14]. This is due to the fact that their study extended to the rainy season where children are more likely to suffer from diarrheal diseases causing severe dehydration.

Severe malaria was the main aetiology of medical paediatric emergencies (61.9%). These results are similar many other African studies which is not strange as we are in a malaria endemic zone [14,18,21,28]. Severe malaria continues to be the primary cause of death, especially in children less than 5 years. The second most common etiology was pulmonary infections (28.6%) with severe community pneumonia 24.5% and bronchiolitis 4.1%. These results are comparable to those recorded by Penda, et al., in Cameroon and Enyuma, et al., in Nigeria [10,25]. These results are different from those of Kingwengwe, et al., in DRC where diarrheal diseases was the second aetiology of medical paediatric emergencies [14]. Almost all patients (98.3%) received definitive management between 1-3 days this was different with results of Penda, et al., where 75.6% of patients received treatment in 30 minutes after admission [10]. This could be explained by the fact that in our study we measured definitive management, that is when the diagnosis of the patients was known after release of laboratory and review of clinical signs and symptoms and not symptomatic management.

Most of our participants spent less than 24 hours at the emergency unit unlike other studies where patients stayed at the paediatric emergency unit for days [10,25]. This could be explained by the fact that our setting does not have a paediatric emergency unit which can receive patients from admission till stabilization.

More than half of our patients who presented with emergency signs in our study had a duration of hospitalization of greater than 4-7 days. This duration of hospitalization justifies the treatment time for our common aetiologies; severe malaria, pulmonary infections and diarrheal diseases. This was different from results reported by Kingwengwe, et al., where half of the patients stayed for less than four days [14]. However, other paediatric emergency studies concentrated on the number of days spent at the emergency unit. Notwithstanding creating a paediatric emergency unit at the Buea and Limbe Regional hospitals can help reduce inappropriate hospitalizations among children.

Our study recorded a mortality of 9.9%. The high mortality in our study could be explained by late consultation time, long therapeutic course of ill children at home, certain beliefs and visits to traditional practitioners before reaching the hospital. These results are comparable to that of Dan, et al., (10.8%), superior to that of Atanda (3.9%) but lower than those of 12.6% and 17.3% respectively [14,16,21,27]. Deaths due to medical paediatric emergencies accounted for (69%) of all paediatric death at the Buea and Limbe Regional hospitals. Similar results were obtained by Penda et al, in Cameroon, Kingwengwe et al, in Democratic Republic of Congo and Guedenon, et al., in Togo but higher in the study conducted by Gajoui, et al., in Morocco [10,12,14,29]. Majority of the deaths (72.4%) occurred in less than 48 hours from admission. This short duration between admission is due to the fact most of these patients are brought in a critical state when all other means of treatment at home failed and also because after diagnosis they are sent to the ward where they are mixed with non-emergency cases and monitoring is not intensified as it would have been in a pediatric emergency unit. These results are identical to that of Ndukwu, et al., 2015 in Nigeria and WHO, 2005 where many patients died shortly after admission [27].

Renal injury ($p=0.014$) was significantly associated with mortality; this is explained by the fact that peritoneal dialysis which is indicated in children with renal failure due to difficulties in vascular access is not done in our setting due to lack of paediatric dialysis equipment. Poisoning ($p=0.026$) and severe community acquired pneumonia (0.027) were also significantly associated with mortality. They also led to renal injury either directly (poisoning) by causing nephrotoxicity or indirectly (severe community acquired pneumonia) through sepsis.

Conclusion

Paediatric medical emergencies constitute a significant proportion (49.2%) of pediatric admissions with more than 80% being under 5 children. The main emergencies were convulsion (41.2%), respiratory distress (32.3%), and severe dehydration (30.3%) with primary etiology being severe malaria (61.9%). High survival rate (90.1%) was observed and 9.9% died. Renal injury, poisoning and severe community acquired pneumonia were associated with mortality.

Conflict of Interests

The authors have no conflict of interest to declare.

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