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Epidemiological Profile and Role of Medical Imaging in Pediatric Emergencies at Ignace Deen Teaching Hospital, Conakry

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Abstract

Introduction: Pediatric emergencies represent a major public health challenge in developing countries, where delayed consultation and limited technical resources often compromise patient management. The objective of this study was to assess the contribution of medical imaging in the management of pediatric emergencies at Ignace Deen National Hospital. **Methods**: This was a six-month prospective descriptive study conducted from February 1 to July 31, 2024, including all children aged 1 month to 15 years admitted to the pediatric emergency department. **Results**: Among 1910 children seen in consultation, 188 (9.84%) were admitted for pediatric emergencies. The most affected age group was 1 - 4 years (45.2%). Fever was the leading presenting complaint (92%). All cases required hospitalization, with most patients classified as stages 3 to 5 according to the modified Clinical Classification of Emergency Patients (CCMU). Medical imaging—mainly ultrasonography (73 examinations, 93% pathological) and radiography (40 examinations, 80% pathological)—played a key role in diagnosing thoracic and abdominopelvic conditions. Clinical outcomes were favorable in 86.1% of cases, while 26 deaths (13.9%) were recorded, predominantly due to severe malaria and meningitis. **Conclusion**: Pediatric emergencies account for a substantial proportion of hospital admissions, mainly affecting children under five years of age. Although performed in a limited number of patients, medical imaging plays a crucial role in diagnostic orientation and clinical decision-making.

Keywords

Pediatric Emergencies, Management, Medical Imaging, Childhood Morbidity

1. Introduction

Pediatric emergencies encompass all pathological conditions that threaten a child's vital prognosis in the short or medium term and require rapid and appropriate management [1].

According to the World Health Organization (WHO), more than 10 million children under the age of five die each year in developing countries before reaching their fifth birthday, mainly from preventable diseases such as acute respiratory infections (particularly pneumonia), diarrhea, malaria, measles, meningitis, anemia, and HIV/AIDS, with increased vulnerability in children with sickle cell disease [2]. Sub-Saharan Africa bears the highest burden of global childhood mortality [3].

In developed countries, pediatric emergencies account for less than 10% of hospital admissions, whereas they represent the main mode of admission for children in healthcare facilities in developing countries [4]. In France, a national survey conducted in 2008 showed that pediatric consultations accounted for 25% - 30% of all emergency department visits.

In sub-Saharan Africa, children presenting with medical or surgical emergencies often arrive at healthcare facilities in advanced stages of life-threatening distress, contributing to high pediatric mortality rates [5]. In Dakar, Gueye *et al.* reported in 2004 that half of pediatric emergencies were associated with management difficulties, mainly due to shortages of emergency medications and inadequate evacuation resources [6].

In this context, prevention remains a key strategy to reduce the burden of pediatric medical and surgical emergencies. However, African hospital systems, particularly in Guinea, continue to face shortages of appropriate equipment, advanced diagnostic tools, and adequate infrastructure. Optimizing diagnostic resources, especially medical imaging, therefore appears essential to improve the timeliness and quality of care.

The objective of this study was to evaluate the contribution of medical imaging to improving the management of pediatric emergencies in the Pediatric Department of Ignace Deen National Hospital, Conakry Teaching Hospital.

2. Materials and Methods

This was a prospective descriptive study conducted over a six-month period from February 1 to July 31, 2024. The study population included children aged 1 month to 15 years admitted to the pediatric emergency department.

The study was carried out in the pediatric department of Ignace Deen National Hospital, located in the Kaloum district of Conakry. This department serves as a national referral center for pediatric care in Guinea.

All pediatric patients admitted to the department during the study period for a medical emergency, regardless of the reason for consultation, were included in this study. Patients over 15 years of age, and those admitted for surgical or traumatic emergencies, were not included in this study. Variables analyzed included

sociodemographic characteristics (age, sex, parental occupation), clinical findings, paraclinical investigations (biological tests and imaging), therapeutic management, and outcomes (favorable or unfavorable).

The clinical severity of patients was assessed upon admission using the Emergency Department Clinical Classification of Patients (CCMU), adapted for the pediatric context. This classification stratifies patients into five severity levels (CCMU 1 to 5), ranging from a stable condition without immediate risk to life-threatening distress, as well as a level D corresponding to deceased patients. The assessment is based on the analysis of vital functions, particularly respiratory, circulatory, and neurological, as well as the level of consciousness and the risk of progression.

Results were presented in tables and figures, analyzed, discussed, and compared with current literature. Data processing was performed manually, and text, tables, and figures were prepared using Microsoft Word and Excel 2007, as well as Epi Info version 3.5.4.

The study was conducted after approval by the Chair of Pediatrics of the Faculty of Health Sciences, Gamal Abdel Nasser University of Conakry, and authorization from the head of the pediatric department.

3. Results

During the study period, a total of 1,910 patients were seen in consultation. Among them, 188 patients (9.84%) were admitted for pediatric emergencies.

There was a male predominance, with 106 patients (56.4%). Children aged 1 - 4 years were the most represented group (85 patients; 45.2%). The mean age was 3 years, with extremes ranging from 1 month to 15 years.

Regarding geographic origin, 69 patients were from the Kaloum district, while 29 patients (15%) were referred from outside Conakry. Concerning paternal occupation, manual workers were the most represented (67 cases), followed by civil servants (49 cases) and traders (28 cases) (**Table 1**).

Fever was the most frequent presenting complaint (173 cases), followed by vomiting (83 cases), seizures (45 cases), cough (39 cases), abdominal pain (30 cases), headache (22 cases), and other symptoms (27 cases) (**Table 2**).

Paraclinical investigations included electroencephalography (EEG) in 2 patients. Imaging examinations consisted of chest radiography in 40 patients and abdominal ultrasonography in 73 patients.

The most frequently requested laboratory tests were blood glucose (168 cases), hemoglobin level (164 cases), and thick blood smear for malaria. Blood grouping was performed in 109 patients, with a predominance of blood group O+ (52 cases), followed by B+ (23 cases) and A+ (18 cases) (**Table 3**).

Among imaging studies, 32 radiographs (80%) were abnormal, while 68 ultrasound examinations (93%) showed pathological findings (**Table 4**). The most frequent diagnoses among the 178 patients with established diagnoses were severe malaria (95 cases) and meningitis (31 cases).

All 178 patients received analgesic and antipyretic treatment. Antimalarial therapy was administered to 128 patients, and 141 patients received additional treatments according to the underlying etiology (Table 5).

Clinical outcomes were favorable in 86.17% of cases and unfavorable in 13.82% (Table 6).

Table 1. Socio-demographic characteristics.

Characteristics of Children in Emergency Department	N = 188	Pourcentage %
Sex		
Female	82	43.60
Male	106	56.42
***Age* (*years*)**		
1 - 11 months	43	22.90
1 - 4 years	84	45.20
5 - 9 years	35	18.60
10 - 15 years	25	13.30
Place of residence		
Conakry	69	36.70
Outside of Conakry	29	15.42
***Occupation of the child's guardian* (*Father*)**		
Worker	67	35.63
Civil servant	49	26.06
Trader	28	14.89

Table 2. Clinical characteristics.

Clinical Characteristics	Frequency	Percentage %
Fever	173	92.02
Vomiting	83	45.12
Seizure crisis	45	23.93
Cough	39	20.44
Abdominal pain	30	15.57
Headache	22	11.70
Dyspnea	28	14.89
Physical asthenia	15	7.9
Joint pain	9	4.78
Coma	1	0.53
Confusion/Obnubilation	4	2.12
Others	22	

Table 3. Therapeutic characteristics.

Paraclinical Characteristics	Frequency	Percentage %
ECG	2	1.10
X-ray	40	22
Ultrasound	73	39
Thick blood smear	148	78.72
Blood glucose	168	89.36
Hemoglobin level (Hb)	164	87.23
Leukocytosis rate	1	0.50

Table 4. Paraclinical diagnoses.

Diagnosis	Frequency	Percentage
Bronchiolitis	32	80
Adenolymphitis	47	69.11
Splenomegaly	21	30.88

Table 5. Patient outcomes.

Therapeutic Characteristics	Frequency	Percentage %
Drug treatment		
Analgesic/Antipyretic	178	94.68
Antimalarial	128	68
Other types of treatment		
Blood transfusion	85	30.85
Nebulization	8	4.2
Oxygen therapy	5	2.5

Table 6. Patient outcomes.

Outcome Characteristics	Frequency	Percentage %
Favorable	162	86.17
Unfavorable	26	13.82

4. Discussion

Our study included 1910 patients admitted to our department, among whom 188 cases (9.84%) were classified as pediatric emergencies (PE). This frequency is comparable to that reported by Cissoko N *et al.* in Mali, who found a prevalence of 8.5% [7].

Children aged 1 to 4 years constituted the most affected age group, with 85 cases (45.20%). This predominance of children under four years of age has also been reported by Ahmat O.M. and Mintop A.D. [8] [9], who found respective frequencies of 37.94% and 48.37%.

Regarding geographic origin, 69 out of 177 patients (39%) came from the Ka-

loum district, while 15.80%, 12.40%, and 1.80% originated from Matoto, Matam, and Ratoma, respectively. This overrepresentation of Kaloum can be explained by the location of our study site within this municipality.

In our series, manual workers and civil servants were the most represented parental occupational groups, accounting for 40.87% and 29.87%, respectively.

Fever was the most frequent presenting complaint (92%), followed by vomiting (44%) and seizures (23%). These findings differ from those reported by Brehima C. [4] in Mali in 2006, where fever ranked third among presenting complaints, with a frequency of 15.18%.

In our study, 122 of the 188 patients (64.90%) sought medical care more than three days after symptom onset, while only 35.10% presented within the first 72 hours. These results are consistent with those reported by Mintop A.D. [9] and Ahmat O.M. [8], who found that 70% and 54% of patients, respectively, consulted after more than 72 hours.

Infectious and parasitic diseases were the most prevalent pathological category, accounting for 89.30% of cases, followed by neurological disorders, respiratory and ENT diseases, digestive diseases, endocrine and nutritional disorders, and surgical emergencies, with respective frequencies of 17.60%, 12.80%, 9.60%, 7.40%, and 2.14%.

According to the modified Clinical Classification of Emergency Patients (CCMU), 69.51% of patients were classified as CCMU 4, 23.52% as CCMU 3, and 6.95% as CCMU 5. These findings contrast with those reported by Four R. *et al.* [10] in the pediatric emergency department of Lenval Hospital in Nice, France, where the distribution was predominantly CCMU 1 (48.8%) and CCMU 2 (48.5%), with very low proportions of higher severity levels.

In our series, blood glucose testing, hemoglobin measurement, and thick blood smear for malaria were the most frequently performed laboratory investigations, with respective rates of 89.36%, 87.93%, and 78.70%. These tests are readily available in emergency settings and provide valuable diagnostic guidance.

Severe malaria accounted for the leading diagnosis in our patients (50.53%), followed by meningitis (16.48%). Sangaré A. *et al.* [1] similarly reported malaria as the predominant diagnosis, with a frequency of 38.2%.

In our cohort, 85 patients out of 188 (45.21%) received blood transfusions. Oxygen therapy was administered to 5 patients (2.65%), and nebulization to 8 patients (4.25%). However, none of the patients benefited from airway suctioning due to the lack of appropriate equipment. These findings differ from those reported by Bréhima C. [4], who observed higher rates of oxygen therapy (59.52%), suctioning (14.29%), and warming (9.52%) as emergency interventions.

Among the 40 patients who underwent chest radiography, 32 (80%) showed imaging findings consistent with bronchiolitis (**Figure 1**). On abdominal ultrasonography, performed in 68 patients, 47 cases (69.11%) revealed lymphadenitis (**Figure 2**), while 21 patients (30.88%) presented with splenomegaly (**Figure 3**). These data confirm the central role of X-rays and ultrasound in the diagnostic

guidance of pediatric emergencies. They are consistent with observations reported in sub-Saharan Africa, particularly in Mali, where bedside ultrasound allows for a rapid and significant change in therapeutic management.

In our setting, imaging thus contributed to redirecting both diagnosis and treatment. Chest X-rays allowed for better differentiation of respiratory involvement, avoiding inappropriate treatments, while abdominal ultrasound helped to clarify the etiology of clinical presentations, particularly in the frequent contexts of infection. These results confirm that, beyond diagnosis, radiography and ultrasound are valuable tools for therapeutic decision-making in resource limited settings.

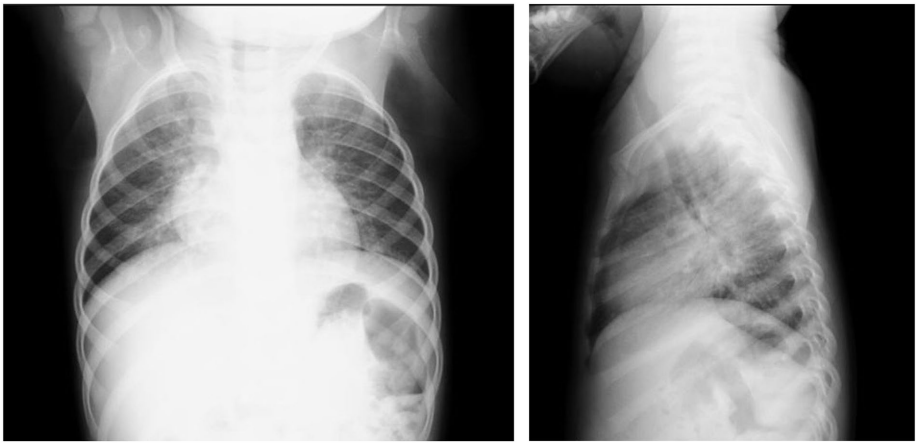

Figure 1. Frontal and lateral chest radiographs showed diffuse bilateral bronchial wall thickening, consistent with an inflammatory or infectious bronchial process.

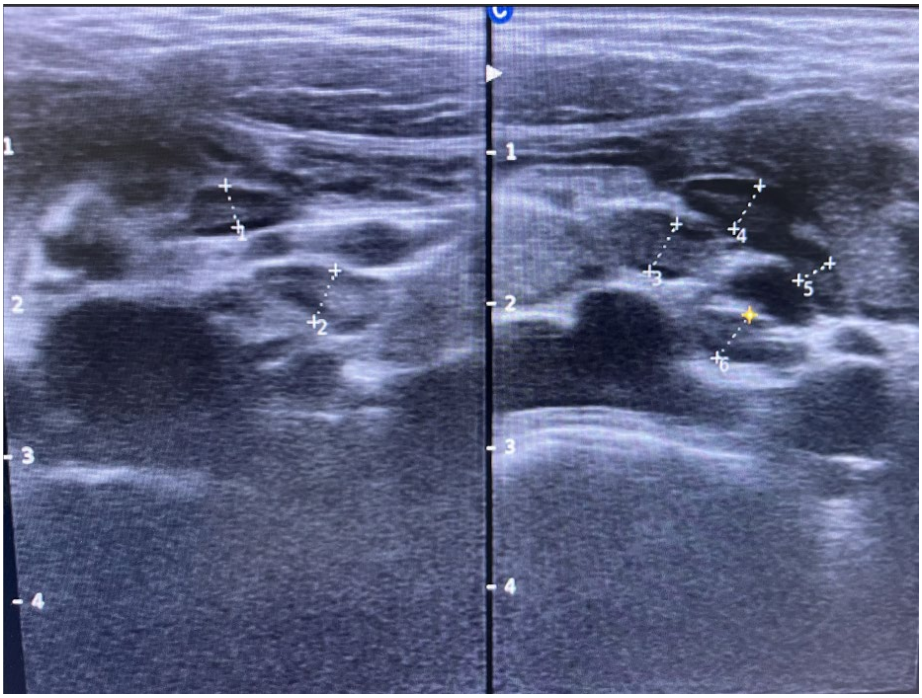

Figure 2. Abdominal ultrasound demonstrated a cluster of mesenteric lymph nodes suggestive of mesenteric adenolymphitis.

Figure 3. Abdominal ultrasonography performed in a 3-year-old child demonstrated a homogeneous enlargement of the spleen (homogeneous splenomegaly).

Among the 85 transfused patients, 72 (84.71%) obtained the blood unit within 6 to 12 hours after the request, whereas 10 patients (11.76%) received transfusion after more than 12 hours.

The most frequently administered medications in our series were analgesics and antipyretics (92.02%), antimalarials (68.09%), antibiotics (37.23%), corticosteroids (28.19%), antiemetics (24.49%), sedatives (11.70%), and hypertonic solutions (5.85%). These findings are comparable to those reported by Sangaré A. *et al.* [1], who found high rates of injectable paracetamol (68.6%), injectable artemether (25.6%), and antibiotic therapy (34.2%), as well as by Bréhima C. [4], who reported frequent use of paracetamol (47.38%), artemether (67.60%), and antibiotics (62.69%).

During the study period, 187 of the 188 patients were hospitalized, while one patient refused admission. Among hospitalized patients, outcomes were favorable with recovery in 161 cases (86.10%), while unfavorable outcomes resulting in death occurred in 26 cases (13.90%). Of these deaths, 23 occurred in the pediatric department, and 3 were recorded among the four referred surgical emergencies.

This mortality rate is close to that reported by Mariama [11], who observed 75% favorable outcomes and 25% unfavorable outcomes.

Furthermore, our study highlights that delays in obtaining imaging were associated with increased mortality, underscoring the importance of early access to examinations. These results confirm that radiography and ultrasound are valuable tools for therapeutic decision-making, and their rapid availability is essential for improving prognosis in resource-limited settings.

5. Conclusion

Pediatric emergencies accounted for a substantial proportion of hospital admissions, predominantly affecting children under five years of age. Infectious diseases, mainly severe malaria and meningitis, were the leading causes of hospitalization. Although medical imaging was performed in a limited number of patients, it played a crucial role in guiding diagnostic orientation and clinical management. Despite comprehensive care, mortality remained high, reflecting the severity of clinical presentations and existing organizational constraints. These findings highlight the need to strengthen the accessibility and availability of emergency imaging in pediatric settings, alongside improvements in therapeutic resources, in order to optimize patient management and improve outcomes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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