

Epidemiological, Clinical and Therapeutic Aspects of Acute Respiratory Distress in Children in Medical Emergencies at the Bangui Pediatric University Hospital

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Abstract

Introduction: Respiratory distress is a clinical condition accompanied by an increase in work of breathing, with the respiratory accessory muscles brought into play to ensure normal arterial oxygenation. It is a major cause of morbidity and mortality in pediatrics. The aim of our study was to investigate the epidemiological, clinical and therapeutic aspects of respiratory distress in children aged between 1 month and 15 years seen in the emergency department of the Bangui paediatric university hospital. **Methodology:** This was a 3-month descriptive cross-sectional study, from January 1 to March 31, 2023. All children aged 1 month to less than 15 years presenting with respiratory distress were included. **Results:** A total of 3021 children were admitted to the emergency medical services of Bangui's pediatric university hospital. Of these, 164 were included in the study. The predominance was male, with a sex ratio of 1.09. The 0 - 2 age group was the most represented, with 67 patients (42.85%). The majority of patients came from Bangui, accounting for 146 (89.02%) of cases. Respiratory difficulty (59.15%), characterized by dyspnea and cough, associated with fever, vomiting, physical asthenia and diarrhea, were the main reasons for consultation. The main pathologies noted were respiratory 92 (56.10%), followed by cardiac pathologies 21 (12.8%). Antibiotic administration (76.82%) was the most common therapeutic procedure used in the management of respiratory distress. **Conclusion:** Respiratory distress remains an important cause of infant mortality in our context, with major management problems.

Keywords

Respiratory Distress, Medical Emergencies, Pediatric University Hospital, Bangui

1. Introduction

Respiratory distress (RD) is an emergency, characterized by an increase in work of breathing with the engagement of accessory respiratory muscles to ensure normal arterial oxygenation [1]. Respiratory distress in children is one of the most frequent and worrying emergencies in everyday paediatric practice [2]. It is characterized by the inability of the respiratory system to supply the body with the required amount of oxygen (O₂) and/or the inability to eliminate CO₂ under normal metabolic conditions [3]. Acute respiratory distress syndrome (ARDS) corresponds to rapidly progressive acute hypoxemic respiratory failure, following a mechanism of direct or indirect pulmonary aggression, by alveolar filling linked to alteration of the alveolocapillary barrier [4]. The mortality rate due to acute respiratory distress syndrome in pediatrics varies from 18% to 63%, depending on the study location, while a recent systematic review and meta-analysis of 2274 patients concluded that the overall mortality rate in acute respiratory distress syndrome is around 24% [5]-[7].

In the Central African Republic, very few studies have been carried out on children's acute respiratory distress in emergency departments. More comprehensive data and more detailed statistics on hospitalizations for respiratory distress in children are needed to understand the overall burden of these diseases. The aim of this study was to assess the epidemiological, clinical and therapeutic profile of respiratory distress in children seen in medical emergencies and hospitalized in the wards of the Bangui Pediatric University Hospital.

2. Patients and Methods

This was a cross-sectional, descriptive study involving children who consulted the pediatric medical emergency department and were then referred for hospitalization for 3 months, from January 1 to March 30, 2023. All children aged between 1 month and 15 years were included in the study for respiratory distress defined by a change in respiratory rate (tachypnea or bradypnea) associated with signs of struggle with or without cyanosis. Not all children hospitalized without respiratory distress were included. Epidemiological (age, sex), diagnostic (consultation time, mode of admission, reasons for consultation, physical signs, signs of severity) and therapeutic variables were studied. Data collection was based on a pre-established survey form, tested on a representative sample. Voluntary, free and informed consent was obtained from the parents in all cases. The data collected in strict compliance with confidentiality and anonymity were analyzed using Epi-info 7 software. We obtained the agreement of the Medical Directorate of the

Bangui Pediatric University Hospital before the start of the study.

3. Results

A total of 3021 children were admitted to the emergency medical services of the Bangui pediatric university hospital. Of these, 164 were included in the study. Hospital incidence was 5.43%.

Table 1. Characteristics of children with respiratory distress.

Features	Effective (n = 164)	Percentage
Age range in years		
0 - 2	67	40.85
3 - 5	49	29.88
6 - 10	31	18.91
11 - 15	17	10.4
Sex		
Male	86	52.44
Female	78	47.56
Place of residence		
Urban	146	89.02
Rural	18	10.98

The age group 0 to 2 years was the most represented (42.85%). The predominance was male with a sex ratio of 1.09. The majority of patients came from Bangui (89.02%) as shown in **Table 1**.

Table 2. Distribution of patients according to clinical characteristics.

Clinical signs	N	%
Reasons for consultation		
Difficulty breathing	97	59.15
Other symptoms associated with breathing difficulty	67	40.85
Physical signs		
Dyspnea	164	100
Signs of struggle	146	89.02
Cyanosis	2	1.22
Pulmonary signs	136	82.92
Fever	56	34.15
Pallor	37	22.56
Convulsive seizures	23	14.02
Hypothermia	11	6.71
stiff neck	9	5.49
severe dehydration	22	13.41
obtundation	19	11.58
jaundice	7	4.27
Type of respiratory distress		
DR without signs of severity	153	93.29
DR with signs of severity	11	6.71

Continued

O ₂ saturation			
SaO ₂ ≤ 95%	144	87.8	
SaO ₂ ≥ 95%	20	12.2	

Respiratory difficulty (59.15%) characterized by dyspnea, cough, associated with fever, vomiting, physical asthenia and diarrhea were the main reasons for consultation (Table 2). Physical signs were dominated by dyspnea, signs of struggle, cyanosis, pulmonary signs, fever, pallor. Children had severe respiratory distress in 93.29% with SaO₂ ≤ 95% in 87.80%.

Table 3. Distribution of patients according to the main causes of hospitalization.

Settings	Effective	Percentage
Respiratory	92	56.1
Neurological	9	5.48
Cardiological	21	12.8
Hematological	13	7.92
Digestive	11	6.71
Infectious	14	8.54

The main pathologies noted were respiratory (56.10%), cardiac (12.8%), infectious (8.54%), hematological (7.92%) and digestive (6.71%) as indicated in Table 3.

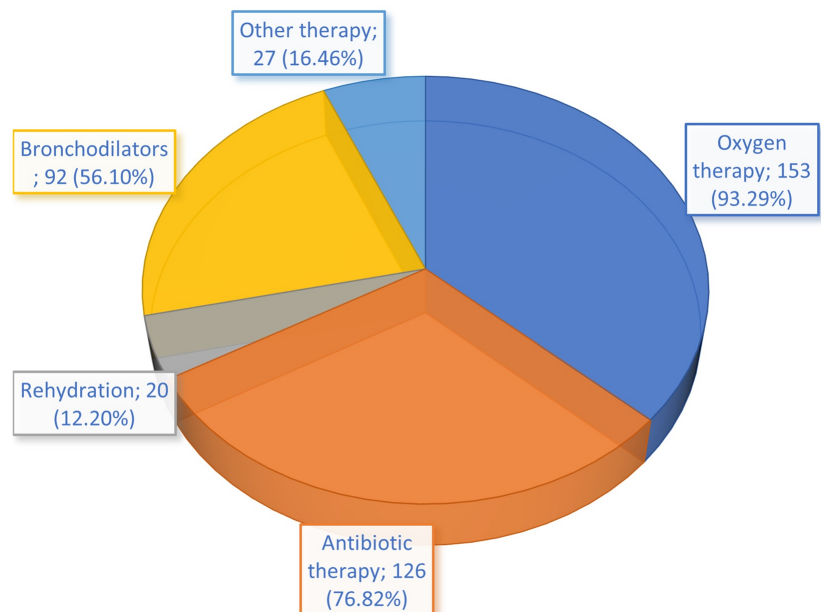


Figure 1. Management of respiratory distress cases.

Figure 1 shows us that oxygen therapy (93.29%), antibiotic administration (76.82%), use of bronchodilators (56.10%) and rehydration in the case of severe dehydration were the most commonly used therapeutic procedures during the management of respiratory distress.

4. Discussion

Respiratory distress is a frequent reason for hospitalization in our department, with a hospital incidence of 5.46%. This result is in line with that of some authors in sub-Saharan Africa, with an incidence of 5.41% [8]. However, other series have shown higher percentages, with incidences of 30.25% and 17.32% [9] [10].

The 0 - 2 age group was the most represented (42.85%). The high incidence of respiratory distress in this age group is thought to be linked, on the one hand, to the immaturity of their immune system and, on the other, to the particular anatomical configuration of the bronchial respiratory tree. The lungs are immature at birth, with an air-alveolus interface of 3 m² compared to the 70 m² interface in adults. Consequently, the child's respiratory deterioration will be more rapid, as the lung territory available for recruitment is smaller [11]. The predominant sex was male, with a sex ratio of 1.09. Male predominance has been reported by several authors [10] [12]. No explanation has been found in the literature to explain this male predominance.

Smoking history was not clearly reported in our study, given that attendants change at the patient's bed and, above all, maternal smoking is still taboo in our society. Passive smoking, especially in children, is a major public health problem. The deleterious consequences of passive inhalation of tobacco smoke (PITS) are greatest during childhood, and are not confined to the respiratory sphere. Smoking during pregnancy is capable of inducing changes in developmental programs by interacting with the transcription levels of genes modulating the functioning of a wide range of systems.

Respiratory difficulty characterized by dyspnea, cough, associated with fever, vomiting, physical asthenia and diarrhea were the main reasons for consultation. Physical signs were dominated by dyspnea, signs of struggle, cyanosis, pulmonary signs, fever and pallor. Diagnosis of lung infection is made by physical examination, including checking for abnormal breathing patterns and listening to the child's lungs. A chest X-ray or blood test may also be used to establish the diagnosis.

Malnutrition increases the risk of developing common childhood respiratory illnesses, notably asthma and respiratory tract infections, and worsens disease progression. At the Bangui paediatric hospital, the management of malnutrition cases is well codified. All cases of severe acute malnutrition are referred to a specialist department as soon as they reach the triage department. Thus, our study does not take into account malnourished children. Children had severe respiratory distress in 93.29% with SaO₂ ≤ 95% in 87.80%. Maiga B. *et al.* [9] in 2016 reported dyspnea (96.22%) as the main physical signs, followed by signs of struggle (93.66%) and cyanosis. These same signs are reported by most authors in their studies of respiratory distress in children [13]-[15]. Concerning oxygen saturation, Maitland K. *et al.* in 2018 in Kenya, had found a majority (80%) of patients with saturation ≤ 94% on reception [16]. This high rate of hypoxemic patients could be explained by the fact that, at their reception, our patients were already in

acute respiratory failure.

The main pathologies noted in this study were respiratory (56.10%), cardiac (12.8%), infectious (8.54%), hematological (7.92%) and digestive (6.71%). Maiga B. *et al.* [9] found pulmonary diseases to be the main cause (68.95%), followed by severe malaria (47.06%).

Rare causes of respiratory distress such as heart failure (HF) constitute a diagnostic trap: symptomatology associates signs of pulmonary congestion (left HF: crackling/sibilant, tachycardia, sweating, superficial polypnoea, on exertion: bottle-feeding) to signs of venous congestion (right CI: HMG, edema, jugular turgor) with variable clinical presentation sometimes associating digestive signs (bottle refusal, failure to gain weight) and inconstantly a heart murmur. Cardiomegaly should prompt a cardiac ultrasound. CI should be suspected in the event of respiratory distress associated with hemodynamic disorders, and a hepatomegaly should be sought prior to vascular filling [17]. Diabetic ketoacidosis is the main cause, and the clinical signs to look for are polyuro-polydipsia, weight loss and Kussmaul dyspnea. Dextro and urine dipstick tests should be performed systematically. Some of our patients did not benefit from all these examinations, given the urgency of their management, apart from the chest X-ray performed on all children. Blood cultures are not systematically prescribed in our context, in view of the time required to obtain results and the requirements of such tests. Symptomatic treatment was dominated by oxygen therapy (93.29%), which is necessary to effectively combat the oxygen deficit caused by respiratory distress. Oxygen therapy involves the supply of oxygen for therapeutic purposes. The main aim is to improve blood oxygenation and treat or prevent tissue hypoxia, particularly in cases of acute or chronic respiratory failure.

Curative treatment in our series consisted of antibiotic administration (76.82%), bronchodilators (56.10%) and rehydration in the case of severe dehydration, anti-malarial drugs and blood transfusion were the therapeutic procedures most frequently used in the management of respiratory distress. In 2013, Trésor in Congo used antibiotics in 63.40% of cases [18]. The clinical course in our study was marked by a reduction in signs of respiratory distress in 51.52%. Regular follow-up of monitoring parameters. Monitoring criteria were specified in writing and recorded on an hourly or tri-hourly basis according to clinical severity: respiratory and heart rates, signs of struggle, SpO₂, signs of severity. We recorded a case-fatality rate of 19.87%. In contrast, other authors have found low case-fatality rates [19] [20]. The high case-fatality rate in our study could be explained by the fact that it included all causes of respiratory distress, whereas comparative studies have focused exclusively on pneumonia.

5. Conclusion

Respiratory distress in children is one of the most frequently encountered emergencies in daily practice. The main risk is exhaustion in decompensated forms, which can lead to cardiorespiratory arrest through asystole as a result of profound

hypoxemia. It is therefore essential to recognize it, based on questioning and clinical examination, to identify its topography and mechanism according to the child's age and background, to find its cause, and to look for signs of severity and poor tolerance.

Authors' Contributions

All authors have contributed to this manuscript and have read and approved the final version.

Conflicts of Interest

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

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