

Treatment of Status Asthmaticus in Paediatric Emergency Departments: A Retrospective Study in a Country with Limited Resources

Amadou Sow^{1*}, Yaye Joor Dieng², Dieynaba Fafa Cissé³, Aliou Thiongane², Djibril Boiro¹, Guilaye Diagne³, Mohamed Swalha¹, Ndeye Fatou Sow², Aminata Mbaye¹, Awa Kane¹, Modou Gueye², Abou Ba⁴, Idrissa Ba¹, Ousmane Ndiaye¹

¹Abass Ndao Hospital, Dakar, Senegal

²Albert Royer National Children's Hospital, Dakar, Senegal

³Pikine Hospital Center, Dakar, Senegal

⁴Dalal Jaam Hospital, Dakar, Senegal

Email: *amadousow@hotmail.com

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Abstract

Introduction: Asthma is the most common chronic disease in children. The aim of our study was to describe the therapeutic and evolutionary aspects of severe status asthmaticus in paediatric emergency departments. **Methods:** This was a retrospective study conducted over a 12-month period and included children aged 2 months to 15 years hospitalised for severe asthma attack. **Results:** We included 54 patients in our study. The prevalence of severe asthma attack was 3.99%. The sex ratio was 1.34. The mean age of the patients was 54.31 months. Respiratory difficulty (90.7%) and cough (83.3%) were the main reasons for consultation. All patients had received nebulized salbutamol and intravenous corticosteroids. The majority of patients (72.2%) had received ipratropium bromide. Magnesium sulphate was administered to 11.1% of patients. All patients had a favourable outcome, with an average hospital stay of 2.83 days (1 day to 7 days). No deaths were reported. **Conclusion:** The management of severe asthma attacks remains well codified and the outcome is favourable in the majority of cases, despite certain difficulties in countries with limited resources.

Keywords

Asthma, Crisis, Severe, Treatment, Senegal

1. Introduction

Asthma is the most common chronic disease in children. It is defined by a history

of respiratory symptoms such as wheezing, breathlessness, chest tightness and cough that vary in time and intensity, as well as variable expiratory airflow limitation [1]. A severe asthma attack is one that does not respond to treatment or is unusual in its course or symptomatology [2]. The frequency of severe asthma attacks in paediatric hospitals is rising significantly, from 0.18% (2005-2015) to 3.6% (2011-2016) [3] in Dakar (Senegal), due to rapid urbanisation and increased air pollution. The main objective of this study was to describe aspects of the management of these severe attacks in paediatric emergency departments, as well as the evolutionary and epidemiological aspects.

2. Methodology

This was a retrospective study conducted over the period from 1 January to 31 December 2021 (1 year). It was carried out in the emergency department of the Centre Hospitalier National d'Enfants ALBERT ROYER (C. H. N. E. A. R) in Dakar. This is a level III national paediatric reference centre. All children aged 2 months to 15 years hospitalized for a severe asthma attack were included in the study. We eliminated patients whose records could not be used. Data were collected on a survey from hospital records. We studied the therapeutic, epidemiological, clinical and evolutionary parameters. The data were entered and processed using Sphinx Plus² (Version 5) and Microsoft Excel.

3. Results

- **Epidemiological data:** During the study period, 1629 patients were hospitalized, including 65 for a severe asthma attack, a prevalence of 3.99%. We included 54 patients in our study and eliminated 11 patients. The sex ratio was 1.34. The mean age of the patients was 54.31 months (10 months - 156 months) with a standard deviation of 38.98. The age range from 30 months to 60 months was the most represented with 22 patients (40.7%). The majority of patients (70.3%) were under 5 years of age. There was a peak in hospitalisation in January, with 16 patients (29.6%), followed by November (13.0%) and December (11.1%).

- **Clinical data:** In 13 patients (24.1%), symptoms were nocturnal and in 04 patients (7.4%), they occurred during the day. Triggering factors were respiratory viral infections (16 cases), intense physical effort (1 case), smoke inhalation (1 case) and dust (1 case). Respiratory difficulty was the main reason for consultation, present in the majority of patients (90.7%), followed by cough, present in 83.3% of patients. The majority of patients (50 or 92.6%) presented with tachycardia. Hypoxia was present in 72.2% of patients. Signs of respiratory struggle were present in 87% of cases. Hyperthermia was present in over a third of patients (35.2%). More than a quarter of patients (27.8%) had upper and lower respiratory tract infections, broken down as follows: rhinitis (12 cases), laryngitis (3 cases), pharyngitis (3 cases) and tonsillitis (2 cases).

- **Therapeutic and evolution data:** More than a third of patients (22 or 40.7%) had started treatment at home. The most common types of treatment were sal-

butamol spray (17 cases), oral corticosteroids (9 cases), analgesics/antipyretics (7 cases), antibiotics (5 cases) and antihistamines (3 cases). All patients had received three one-hour sessions of salbutamol nebulisation on admission. The majority of patients (72.2%) had also received ipratropium bromide. All patients had received IV corticosteroids. Betamethasone was administered to the majority of patients (66.7%). Magnesium sulphate was administered IV in 11.1% of patients. The majority of patients (63%) had received antibiotic therapy. The different types of inhaled and non-inhaled therapy are shown in **Table 1**. All patients had a favourable outcome with no complications. The mean length of hospital stay was 2.83 days (extremes 1 day and 7 days), with a standard deviation of 1.24. The 2 to 4 day range was the most common with 37 patients (68.5%).

Table 1. Different treatment.

Treatments	Worforce	Pourcentages (%)
IV corticosteroid		
Methylprednisolone	12	22.2
Betamethasone	36	66.7
Salbutamol Nebulization	54	100
Discontinuous	54	100
Continous	0	0
Ipratropium bromide	39	72.2
Hydrocortisone	06	11.1
Magnesium sulfate	06	11.1
Antibiotics	34	63.0
Non invasive ventilation	48	88.9
Invasive ventilation	0	0

4. Discussion

- **Therapeutic and evolutionary aspects:** The treatment of acute asthma attacks has been the subject of numerous publications and expert recommendations [1] [4]. The emergency department has an emergency protocol which is available to all nursing staff. In accordance with these recommendations, all patients had received three sessions of a short-acting bronchodilator, specifically salbutamol by nebulisation over a period of one hour. Ipratropium bromude was prescribed in 72.2% of patients. Magnesium sulfate was administered intravenously in 11.1%. Oxygen therapy was recommended between nebulisations in 88.9% of patients. Corticosteroid therapy was administered early by injection. Betamethasone was prescribed in 66.7% of patients, in contrast to the series by Sow [5] where methylprednisolone was prescribed in 47.20% of patients. We noted some unavailability of the glucocorticoids started, which necessitated a change of molecule

during treatment. Early initiation of systemic corticosteroids would considerably reduce the length of hospital stay [6]. More than half of the patients, 63.0%, had received antibiotic therapy, which is a higher prescription rate than that obtained by Sow (48.31%) [5] in the same department and lower than that obtained by Tanoh *et al.* (84.05%) [7]. Coulibaly obtained a low prescription rate of 4.8% [8]. There is a high rate of antibiotic prescriptions, even though antibiotic therapy is only recommended in cases of bacterial superinfections [4]. The question arises as to whether they are all justified. The average length of hospital stay was 2.83 days, similar to other series [5]-[9]. In our study, the majority of patients (68.5%) were hospitalised for between 2 and 4 days. It was longer in patients under 5 years of age, contrary to the data of Fuhrman *et al.* [10] where it increased with age. The outcome was favourable in all our patients, with zero mortality, as reported in numerous series [6] [9] [10]. However, some studies have noted a low mortality rate, specifically Sow in Senegal and Tanoh *et al.* in Côte d'Ivoire, who obtained mortality rates of 1.15% [5] and 1.45% [7] respectively.

- **Epidemiological aspects:** In our study, we noted a prevalence of 3.99% of severe acute seizures, similar to the result obtained by Ba *et al.* 3.6% [3] and much higher than that reported by Sow 0.18% [5] in the same department. However, this prevalence is higher than that reported in other African series. Compared with other studies conducted in the same department [3] [5], there was a marked increase in the prevalence of asthma. This could be explained by the increase in air pollution due to galloping urbanisation, and would imply that the prevalence is much higher than that observed. In our study, the mean age of patients was 4.52 years. However, this result contrasts with those of Coulibaly in Mali [8] and Fuhrman in France [10], who reported ages of 9 and 7.1 years respectively. The majority of patients were less than 5 years old, corresponding to 70.3% of our patients. Our results are similar to those found in several African studies, particularly in Senegal and Morocco, where 65% [5] and 51% [11] of children were hospitalised. In view of these results, young age seems to be a predictive factor for hospitalisation. Palma *et al.* [12] concluded in their study analysing factors predictive of hospitalisation in children receiving standard treatment in emergency care units that young age was a factor predictive of hospitalisation. Others suggest that the frequency of hospitalisation in young children may be explained by the early onset of respiratory distress due to the small size of the airways [6] [10].

5. Conclusion

The management of severe acute asthma attacks remains well codified, and the majority of cases have a favourable outcome, despite certain difficulties in countries with limited resources.

Conflicts of Interest

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

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