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The Bronchiolitis in Paediatric Emergencies at the University Teaching Hospital of Gabriel Touré

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Abstract

Introduction: Bronchiolitis is a generally benign condition characterised by acute inflammation, oedema and necrosis of the epithelial cells lining the small airways, and increased mucus production. Symptoms usually begin with rhinitis and cough, which may progress to tachypnoea, wheezing, and rales. The most common etiology is a respiratory syncytial virus (RSV). Bronchiolitis occupies an important place among Acutes Respiratory Infections (ARI) and represented the fifth cause of hospitalisation in the paediatric emergency department of the Gabriel Touré University Hospital in 2008 with a frequency of 10% and a mortality rate of 3.2%. This shows that we are constantly confronted with the management of this pathology. The objective of our study was to study the epidemiological, clinical, and therapeutic aspects of bronchiolitis in the paediatric emergency room of the Gabriel Touré University Hospital. **Materials and Method:** This was a prospective cross-sectional and descriptive study from April 1, 2018, to March 31, 2020, *i.e.* 2 years in infants aged 1 to 23 months. Data were collected using an individual survey form by questioning parents and physically examining patients. **Results:** During the study period, we were able to collect 342 patients meeting our inclusion criteria out of 4207 hospitalized patients, or a frequency of 8.1%. The age range of 1 to 5 months represented 64.9%. The sex ratio was 1.2. The most common reason for consultation was respiratory discomfort (86.8%). Most patients (46%) were hospitalised during the period from September to November. In the majority of cases (74%), patients consulted within five days of the onset of symptoms. The physical examination was mainly dominated by signs of respiratory struggle, fever (51.8%), and sibilants (37%) on ausculta-

tion. Complications associated with bronchiolitis were mainly respiratory infections with 57.6% of cases. The main management steps were: nasopharyngeal decontamination (78.9%), oxygen therapy (72.5%), nebulisation with β2 mimetics (69%), and infusion of solution (76.3%). However, 89% of patients received antibiotic therapy using Amoxicillin + clavulanic acid in 37% of cases. The average stay of the patients was 5.5 days. The evolution was marked by 12% of deaths and respiratory infections were the main cause of death (41.5%). **Conclusion:** Bronchiolitis is a frequent pathology whose peak is in September in our country. Its seriousness lies in the complications it causes, which can lead to death in the absence of early and adequate treatment.

Keywords

Bronchiolitis, Epidemiology, Clinic, Pediatrics

1. Introduction

Acute bronchiolitis is defined as a viral lower airway infection in infants under 24 months of age. It is usually treated only symptomatically [1]. Specific antiviral treatment, which is very costly, is only recommended for infants with a high-risk background for morbidity and mortality [2] [3]. In France, it affects 500,000 infants under 2 years of age each year, or 30% of this population. It is generally a benign infection. Despite this usual benignity, hospitalisation is frequent, accounting for 1% - 5% of hospitalisations at this age [4] [5]. Bronchiolitis is characterised by acute inflammation, oedema and necrosis of the epithelial cells lining the small airways, and increased mucus production. Symptoms usually begin with rhinitis and cough, which may progress to tachypnoea, wheezing, and rales [6]. Although many viruses infect the respiratory tract causing a similar constellation of signs and symptoms, the most common aetiology of bronchiolitis is the respiratory syncytial virus (RSV) [7]. Other viruses that cause bronchiolitis include human rhinovirus, human metapneumovirus, influenza, adenovirus, human coronavirus, and parainfluenza viruses. Approximately 100,000 bronchiolitis admissions occur each year in the United States with an estimated cost of $1.73 billion [8]. In Mali, acute respiratory infections (ARI) are common in children aged 6 - 11 months and are the third most common cause of consultation in children under 5 years [9]. Bronchiolitis occupies an important place among ARIs and represented the fifth cause of hospitalisation in the paediatric emergency department of the CHU Gabriel Touré in 2008 with a frequency of 10% and a mortality rate of 3.2% [10]. This attests to the fact that we are constantly confronted with the management of this pathology. Thus, we initiated this work to better understand the epidemiological and clinical characteristics and the seasonality of this pathology.

2. Methodology

2.1 Study Setting and Location

The study was conducted in the paediatric emergency department of the Gabriel TOURE University Hospital. CHU Gabriel TOURE is a third-level hospital, located in the centre of Bamako (capital of Mali). Due to its accessibility, it receives the majority of patients from the city or the interior of the country. Within it, the paediatric department is composed of a neonatology service to which the URENI (Intensive Nutritional Recovery and Education Unit) is attached, a general paediatrics service, and a paediatric emergency service. The latter was created in 2010 as part of the department's restructuring. It includes a reception hall which is also a triage room, two consultation rooms, an inpatient sector with 20 cots, and 6 beds with two rooms for infants and one room for older children.

2.2 Type of Study and Inclusion Criteria

This was a prospective, cross-sectional, descriptive study that ran from 1 April 2018 to 31 March 2020, a period of two years. We included all infants aged 1 to 23 months hospitalised in the paediatric emergency department for acute bronchiolitis. The following were not included:

- infants under 1 month and over 23 months with bronchiolitis,
- infants aged 1 - 23 months with bronchiolitis but not hospitalised,
- infants aged 1 - 23 months with more than two episodes of bronchiolitis,
- and infants whose parents refused to participate in the study.

Data were collected using a pre-designed individual survey form (See annex). The variables studied were: Socio-demographic and economic data of patients and their parents (age, sex, occupation, educational level, financial power), clinical signs (questioning of parents, physical examination of the patient), therapeutic data (different stages of treatment) and immediate evolution (state of improvement of the patient during and after treatment). We proceeded by selecting infants who met our inclusion criteria. After informed consent from the parents, we completed our survey form by interviewing the parents and physically examining the patients. Data entry and analysis were carried out using World 2010 software for writing and SPSS version 19.2 for analysis. All patients were included after a detailed explanation of the survey form in the local language and their verbal informed consent.

2.3 Conduct of the Survey

During the entire study period, several doctors from the department were requisitioned from all shifts (day and night) to carry out the survey. We had at our disposal survey forms (see appendix) that we filled in from the parents' questioning about the illness, the patient's physical examination, and the first gestures performed. We then continued to follow the patient during hospitalisation and immediately afterward in order to assess the treatment and the evolution. Only patients between 1 and 23 months of age requiring hospitalisation were included. No

patients who could be managed as outpatients were included.

2.4 Operational Definitions

- **Bronchiolitis**

We considered bronchiolitis to be any infant aged 1 - 23 months presenting with dyspnoea with or without fever, sibilance, and/or crackles on auscultation.

- **Respiratory infection**

We considered a respiratory infection to be any infant with dyspnoea, cough, hyperthermia, and crackles on auscultation.

3. Results

During our study period, we were able to collect 342 patients meeting our inclusion criteria out of 4207 patients hospitalised in the department, or a frequency of 8.1%. The age group of 1 to 5 months with 64.9% was the most affected (Table 1). There was a male predominance with a sex ratio of 1.2 (Table 2). The majority of patients' fathers and mothers were uneducated (31.6% and 39% respectively) (Table 1). Socio-economic conditions were considered unfavourable for 57.6% of the parents (Table 1). Parents frequently mentioned respiratory discomfort as the reason for consultation (86.8%) (Figure 1). More than half of the patients came for consultation during on-call hours (4 pm - 8 am) (50.3%) (Table 2). The period of high admissions to the emergency room for bronchiolitis was between September and November, representing 46.6% of hospital admissions for the year (Table 2). In 74% of cases, patients consulted less than five days after the onset of symptoms (Figure 2). The physical examination was dominated by signs of respiratory struggle (among others: nasal flaring with 96.8%, inter-costal pulling with 98.5%, thoracoabdominal rocking with 76.9%, and whining with 49%), fever (51.8%) (Table 3) and auscultatory rales (89.2%), of which sibilants with 37% (Figure 3). The complications frequently associated with bronchiolitis were respiratory infections (57.6%) followed by dehydration (17.8%) (Figure 4). The most urgent action taken in the majority of cases (78.9%) to relieve the patients were nasopharyngeal clearing (Table 4). The main lines of management were: infusion of solution (76.3%), oxygen therapy (72.5%), nebulisation with $\beta 2$ mimetics (69%), and parenteral corticosteroid therapy (61.1%) (Table 4). However, antibiotic therapy was used in 89.2% of cases. The duration of hospitalisation was 1 to 4 days in the majority of cases (76.3%) with an average stay of 5.5 days. Mortality was 12% and respiratory infection was the main cause of death (41.5%) (Table 4).

4. Discussion

During the study period, 4207 patients were hospitalised in the paediatric emergency department, including 901 cases of low respiratory infection (LRI). Bronchiolitis was diagnosed in 342 infants aged 1 to 23 months, representing a frequency of 8.1% of all hospitalizations and 37.9% of low respiratory infections.

Table 1. Distribution of patients by socio-economic data.

Socio-economic data of parents	Effective	Percentage
Age of patients		
1 - 5 months	222	64.9
6 - 11 months	79	23.1
12 - 17 months	24	7
18 - 23 months	17	5
Gender		
Male	189	55.3
Female	153	44.7
Fathers' education level		
Not in school	108	31.6
Primary	70	20.5
Secondary	87	25.4
Higher	77	22.5
Profession of fathers		
Civil servant	56	16.4
Tradesman	97	28.4
Worker	117	34.2
Craftsman	72	21
Educational level of mothers		
Not in school	133	39
Primary	74	21.6
Secondary	95	27.8
Higher	40	11.7
Mothers' occupation		
Housewife	240	70.2
Civil servant	18	5.2
Craftswoman	50	14.6
Tradeswoman	30	8.8
Other	4	1.2
Parents' economic conditions		
Favourable	50	14.6
Acceptable	95	27.8
Unfavourable	197	57.6

Table 2. Distribution of patients according to periodicity and history.

Periodicity	Effective	Percentage
Admission hours		
08:00 - 16:00	170	49.7
16:00 - 08:00	172	50.3
Month of admission		
January	13	3.8
February	31	9.1
March	17	5
April	15	4.4
May	10	2.9
June	14	4.1
July	19	5.6
August	36	10.5
September	71	20.8
October	44	12.9
November	44	12.9
December	28	8.2
Family atopy		
Yes	66	19.3
No	276	80.7
Notion of familial asthma		
Yes	74	21.6
No	268	78.4
Number of attacks		
1st Episode	291	85.1
2nd Episode	51	14.9

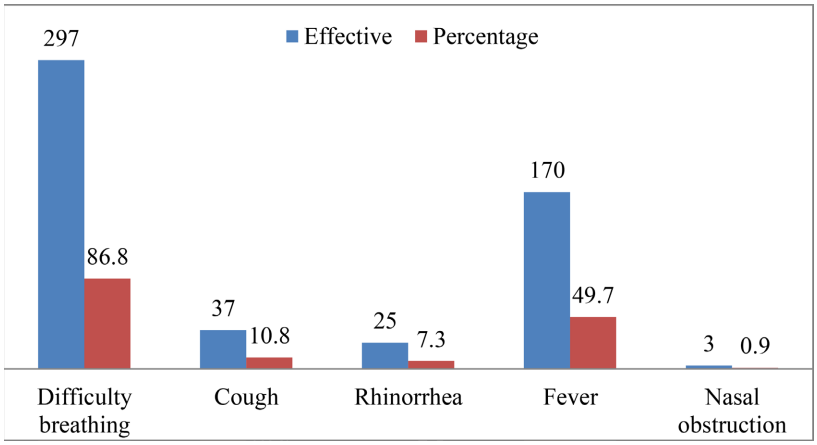

Figure 1. Distribution of patients by reason for consultation.

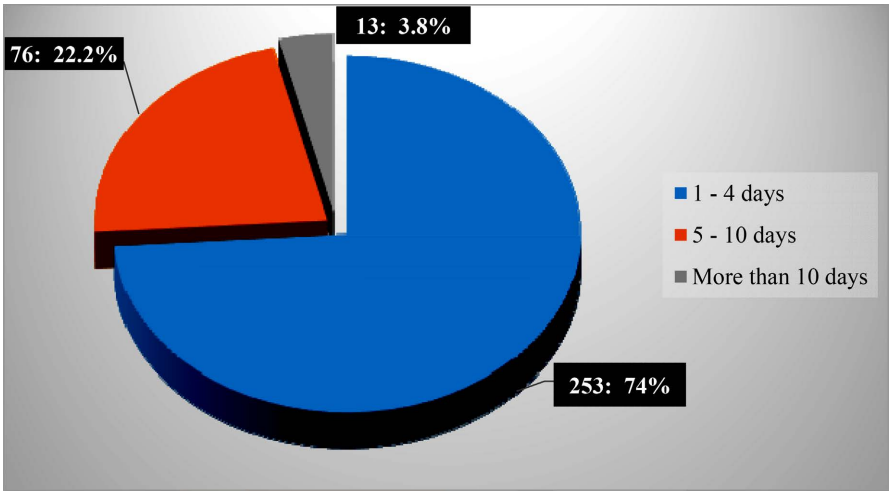

Figure 2. Distribution of patients by time of consultation.

Table 3. Distribution of patients according to physical examination data.

Physical examination data	Effective	Percentage
Temperature on admission (in degrees Celsius)		
36 - 37.5	165	48.2
37.6 - 38.4	82	24
38.5 - 39	65	19
>39	30	8.8
Pallor		
Yes	19	5.6
No	323	94.4
Cyanosis		
Yes	17	5
No	325	95
Signs of respiratory struggle		
Nose flapping	331	96.8
Inter-costal pulling	337	98.5
Thoracic-abdominal rocking	263	76.9
Xiphoid funnel	124	36.3
Grunting	170	49.7
Other signs on examination		
Polypnoea	240	70.2
$SaO_2 < 5$	257	75.1
Wheezing	65	19
Rales	305	89.2

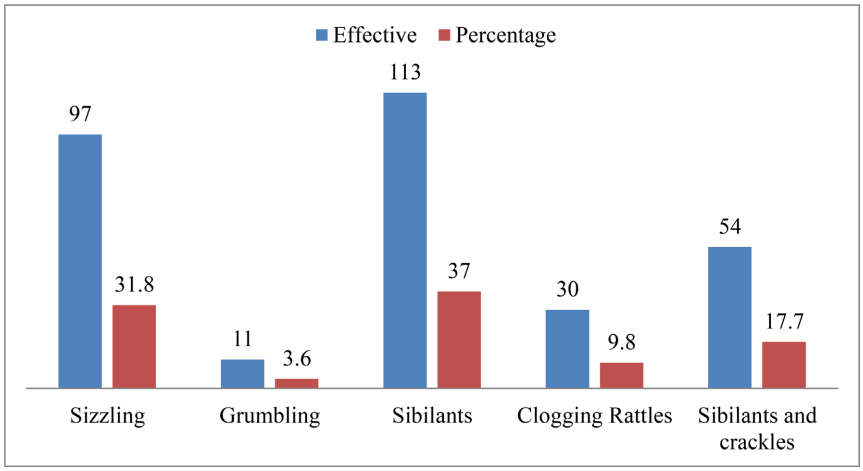

Figure 3. Distribution of patients by type of auscultatory rales.

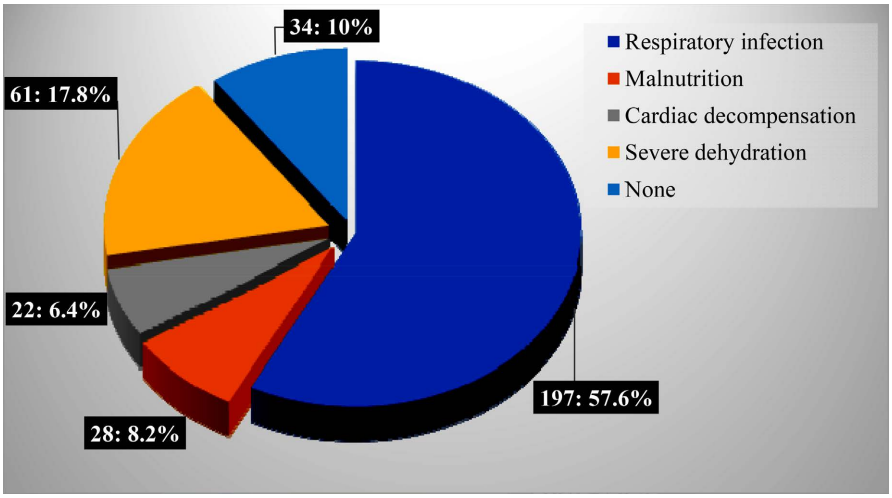

Figure 4. Distribution of patients according to complications associated with bronchiolitis.

Table 4. Distribution of patients according to therapeutic and evolutionary data.

Therapeutic and evolutionary data	Effective	Percentage
Emergency procedures		
Nasopharyngeal clearing	270	78.9
Aspiration	17	5
Manual ventilation	7	2
Cardiac massage	7	2
Specific management		
Respiratory physiotherapy	144	42.1
Nebulisation with $\beta 2$ mimetic	236	69
Nebulisation with corticosteroid	7	2
Parenteral corticosteroid	209	61.1
Oral corticosteroid	128	37.4

Continued

Antibiotic therapy	305	89.2
Oxygen therapy	248	72.5
Infusion of solute	261	76.3
Length of hospital stay		
1 - 4 days	261	76.3
5 - 10 days	63	18.4
More than 10 days	18	5.3
Evolution		
Cured	287	83.9
Escaped	14	4.1
Died	41	12
Complications associated with deaths		
Respiratory infection	17	41.5
Cardiac decompensation	14	34.1
Severe dehydration	5	12.2
Malnutrition	5	12.2

According to Ag Ghedira B L *et al.* [11] the prevalence of bronchiolitis is 67/1000. At the Bangui paediatric complex, bronchiolitis accounted for 20.9% of low-grade ARI (Acutes Respiratory Infections) [12]. Infants aged 1 - 23 months were selected for this study, corresponding to the target population according to the classical definition of bronchiolitis. The 1 - 5-month age group represented 64.9% of our sample (**Table 1**). This result is consistent with the literature [7]. According to Zariat M [13] in Ile de France, the frequency of emergency room admissions for bronchiolitis decreases after the age of 6 months. Males were in the majority with a sex ratio of 1.2 (**Table 1**). This male predominance was also reported by Ouédraogo O [14] in Burkina Faso in 2011 (sex ratio: 3.38). In 2012 in Nancy, Jeckel S [15] found 51% of males in his study on the management of bronchiolitis. However, no study could establish a formal link between gender and the occurrence of bronchiolitis. The majority of patients were children of housewives (70.2%), not educated (38.9%), and financially dependent on their husbands who, in 83.6% of cases, worked in the informal sector with a low income. These unfavourable socio-economic conditions (57.6%) made it difficult to care for the patients, putting the vital prognosis at risk (**Table 1** illustrates all these socio-economic data). Bronchiolitis occurs throughout the year but we recorded the peak between September (20.80%) and November (12.9%) (**Table 2**). Doumbia A [16] recruited the majority of his cases between September and December with a peak in November (33%). As for Ouédraogo O [14], the peak of bronchiolitis was observed in October (48.6%). All these studies attest to the

frequent occurrence of bronchiolitis during the same period in our countries (the end of the rainy season and the beginning of the dry season in our countries). The hours of admission were between 4 pm and 8 am in the majority of cases (50.3%) (**Table 2**), which correspond to on-call hours. This result is different from those reported by Haidara N [12] and Doumbia A [16], in whom patients generally arrived at the hospital between 8 am and 4 pm. Our result can perhaps be explained by the precariousness of the parents. Indeed, the expenses of care are generally borne by the fathers. In our study, fathers working in the informal sector represented 83.6% of the workforce, and were therefore paid at the end of the day, hence the late hours of admission. The most frequent reason for consultation was respiratory distress with 86.8% (**Figure 1**). This result is similar to those of Ag Ghedira B L *et al.* [11] in Tunisia (98.3%), Haidara N [12] (80.67%), Doumbia A [16] (86.6%), and Ouédraogo O [14] (80%). This can be explained by the parents' concern about this symptom. In fact, the pathophysiology of the disease itself leads to bronchial hypersecretion which, in turn, hinders gas exchange at the alveolar level, hence the dyspnoea. Almost three-quarters of the cohort (74%) consulted a doctor between 1 and 4 days (**Figure 2**) after the onset of the disease. This result is similar to that of Haidara N [12] (77.33%). Doumbia A [16] reported an average consultation time of 6 days. This result can be explained by the parent's lack of knowledge, which means that the decision to consult generally comes after the appearance of palpable emergency signs such as respiratory distress and high fever. According to the literature, the notion of a genetic component is not spared in the occurrence of bronchiolitis. Thus, in our series, the notion of familial asthma was found in 21.6% of patients (**Table 2**). A similar result was reported by Haidara N [12] and Doumbia A [16], respectively 20% and 18%. Jeckel S [15] observed 15% of allergy or familial asthma. The appearance of signs of respiratory struggle (nasal flaring, intercostal pulling, thoracoabdominal rocking, xiphoid funneling, whining) indicates the severity of bronchiolitis. All of our cohorts had at least two of the signs of respiratory struggle, especially intercostal pulling (98.5%) and nasal flaring (96.8%) (**Table 2**). This is consistent with the data of Jeckel S [15] who found signs of respiratory struggle in 83.3% of cases. The pathognomonic auscultatory sign of bronchiolitis is the sibilant rattle. Its presence leaves little doubt as to the diagnosis of proven bronchiolitis. In our study, lung auscultation was abnormal in 89.2% of patients, and sibilants were found in 54.7% (**Figure 3**). In the series by Ouédraogo O [14], sibilants predominated in 97.1% of cases. This difference can be explained by the delay in consultation during our study (average: 5.5 days). Indeed, sibilants, which are generally heard at the very beginning of the disease, disappear during the secretory phase of bronchiolitis. Cyanosis is one of the signs that indicate the severity of bronchiolitis. Its appearance is a major criterion for hospitalisation. In our study, only 5% of patients had cyanosis (**Table 2**). In Ag Ghedira B L *et al.* [11], Doumbia A [16], and Haidara N [12], cyanosis was observed in 9.9%, 3.6%, and 5.33% of cases respectively. Rhinopharyngeal clearing/aspiration of secretions, or washing of the nose with physiological serum was performed in 83.9%

of our patients to free the airways (**Table 4**). In the series by Haidara N [12] and Doumbia A [16], it was 78.67% and 50.9% respectively. Jeckel S [15] performed nasopharyngeal deobstruction in all patients. Rehydration is an important part of the management of bronchiolitis and 76.3% of the patients had received infusions of fluids (**Table 4**). Unger *et al.* [17] did not use intravenous fluids, but nutritional support by tube feeding was given in 82% of cases. Bronchodilators were widely used in our patients by nebulisation (69%) (**Table 4**). In the study by Haidara N [12], nebulisations with bronchodilators accounted for 84.67%. The majority of Canadian paediatricians (80%) prescribe a bronchodilator for the treatment of bronchiolitis in hospitals [18]. The consensus conference recalls that none of the currently available bronchodilators (adrenaline, theophylline, synthetic anticholinergics, and beta 2 mimetics) has a Marketing Authorisation for the treatment of bronchiolitis and concludes that "these drugs have no place in the strategy for the management of the first bronchiolitis" [19]. In a clinical trial of 1992 infants, oxygen saturation did not improve with bronchodilators compared to the placebo group. In the same series, outpatient bronchodilator treatment did not reduce the rate of hospitalisation (11.9% in the bronchodilator group versus 15.9% in the placebo group), nor did it reduce the length of hospitalisation in hospitalised infants [19]. Some authors argue against the use of bronchodilators on the grounds that, before the age of 18 months, the bronchial tubes contain little or no smooth muscle and that beta2-receptors have little or no function at this age [20]. Others, on the contrary, argue that there is smooth muscle hypertrophy in some infants at risk (bronchopulmonary dysplasia in particular) and that beta 2-adrenergic have a preventive action on the "bronchospasm" frequently observed during this pathology [20] [21]. However, careful monitoring of ventilatory function is necessary when this treatment is prescribed, given the side effects of these products. The use of epinephrine is becoming increasingly common in some settings. This treatment is not part of the protocol in our department, but some authors have noted the effectiveness of epinephrine in improving oxygen saturation and respiratory rate in the first hour of treatment compared to placebo [22]. Nebulised hypertonic saline solution also appears to be an alternative in the management of respiratory distress for some authors [23]. It is not included in our protocol. Hypertonic saline (HS) can act favourably in this situation by combating dehydration. Because of its osmotic action, HS attracts water from the epithelial cells and improves mucociliary clearance [23]. The use of corticoids is common practice in the paediatric emergency department of the Gabriel Touré University Hospital in Bamako in the management of bronchiolitis. Thus, 61.1% of patients included in our study received parenteral corticosteroids (**Table 4**). Haidara N [12] and Doumbia A [16] reported 87.33% and 91.1% respectively. The data in the literature clearly seem to be against systemic corticosteroids. Despite the lack of formal proof of its efficacy, systemic corticosteroid therapy is still widely used, especially in "at-risk" infants [20]. A cohort conducted in Lisbon in 2013 found that glucocorticoids did not significantly reduce the rate of hospitalisation in outpatients

compared to placebo. There was no benefit for hospitalised patients [24]. Despite several studies showing the lack of benefit of antibiotics in bronchiolitis, they continue to be prescribed, notably because of fever, young age, and fear of bacterial infection. 89.2% of our patients received antibiotic therapy (**Table 4**). In Ouédraogo O [14] and Bobossi-Serengbe G *et al.* [25], all patients had received antibiotic therapy. Nasal oxygen therapy (spectacles) is always indicated in severe acute bronchiolitis. In our study, 72.5% of patients received oxygen therapy. In the studies by Ag Ghedira B L *et al.* [11], more than 84% of patients (**Table 4**) received oxygen. Haidara N [12] reported 59.33% and Doumbia A [16], 70.5%. Respiratory physiotherapy was quite common in the study of Jeckel S [15], representing 95% of hospitalised patients. With these different management measures, we recorded 83.9% of favourable evolution in our cohort (**Table 4**). This result is close to those of other authors, namely: Ouédraogo O [14], Doumbia A [16], and Ag Ghedira B L *et al.* [11] who respectively reported 100%, 98.6%, and 98.2% favourable outcomes. Mortality was 12% (**Table 4**), a rate significantly lower than that obtained by Bobossi-Serengbe G *et al.* [25], which was 20%. Deaths in our cohort were mainly related to the lack of adequate technical resuscitation facilities and the combination of other conditions including respiratory infections (57.6%), severe dehydration (17.8%), and malformation (8.2%) (**Figure 4**).

5. Limitations of the Study

Since our technical facilities do not allow us to perform PCR tests for respiratory syncytial virus (RSV), we systematically associated antibiotics with the treatment of any case of fever > 38.5˚C + a pulmonary focus on chest radiography.

6. Conclusion

Bronchiolitis is a frequent pathology that occurs throughout the year. However, the maximum number of cases was recorded at the end of the winter and the beginning of the dry season, with a peak in September. The seriousness of this condition in our context is based on the complications it causes, which can be fatal in the absence of early and adequate treatment.

Conflicts of Interest

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

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Survey Form

Q1—File number: .....

Q2—Time of admission / / 1 = 08H - 16H; 2 = 16H - 08H

I—Patient's Identity

Q3—Age / / 1 = 1 - 5 months; 2 = 6 - 11 months; 3 = 12 - 17 months; 4 = 18 - 23 months;

Q4—Sex / / 1 = Male; 2 = Female

Q5—Ethnicity / / 1 = Bambara; 2 = Malinké; 3 = Sarakolé; 4 = Diawando; 5 = Peulh; 6 = Mianianka; 7 = Senoufo; 8 = Sonrhai; 9 = Bobo; 10 = Dogon; 11 = Others

Q6—Family history:

1—Father:

a—Age / / in years

b—Level of education / / 1 = No schooling; 2 = Primary; 3 = Secondary; 4 = Higher

c—Profession / / 1 = Civil servant; 2 = Tradesman; 3 = Worker; 4 = Craftsman; 5 = Other

2—Mother:

a—Age / / in years

b—Level of education / / 1 = No schooling; 2 = Primary; 3 = Secondary; 4 = Higher education

c—Profession / / 1 = Housewife; 2 = Civil servant; 3 = Artisan; 4 = Other

Q7—Socio-economic status (SES)

Q8—Address / / 1 = CI; 2 = CII; 3 = CIII; 4 = CIV; 5 = CV; 6 = CVI; 7 = Outside Bamako,

Q9—Reason for consultation / / 1 = Cough; 2 = Fever; 3 = Respiratory discomfort; 4 = Rhinorrhea; 5 = Nasal obstruction; 6 = Other...

Q10—Provenance / / 1 = CSCOM; 2 = CSRéf; 3 = Pouponnière; 4 = Other structures; 5 = Home

Q11—Admission period / / 1 = January; 2 = February; 3 = March; 4 = April; 5 = May; 6 = June; 7 = July; 8 = August; 9 = September; 10 = October; 11 = November; 12 = December

II—Clinical Examinations

A—Interrogation

Q12—Term of pregnancy/ / 1 = term; 2 = not term

Q13—Birth weight / / 1 = normal; 2 = below normal

Q14—Neonatal respiratory distress / / 1 = Yes; 2 = No

Q15—Feeding mode / / 1 = Exclusive breastfeeding 2 = Mixed breastfeeding; 3 = Formula feeding

Q16—Vaccination / / 1 = Up to date; 2 = Not up to date; 3 = Never vaccinated

Q17—Family atopy / / 1 = Yes; 2 = No

Q18—Family asthma / / 1 = Yes; 2 = No

Q19—Episode/ / 1 = 1st episode; 2 = 2nd episode

Q20—Time to consultation/ / 1 = 1 - 4 days; 2 = 5 - 10 days; 3 = More than 10 days

B—Physical Examination

General examination:

Q21—Temperature/ / 1 = 36 - 37.5; 2 = 37.6 - 38.4; 3 = 38.5 - 39; 4 ≥ 39

Q22—General condition/ / 1 = Good, 2 = Poor

Q23— Pallor: / / 1 = Yes; 2 = No

Q24— Jaundice: / / 1 = Yes; 2 = No

Q25—Cyanosis: / / 1 = Yes; 2 = No

Cardiac examination

Q26—Cardiac auscultation / / 1 = Murmur; 2 = No murmur

Q27—Heart rate / / 1 = Normal; 2 = Tachycardia (HR =); 3- Bradycardia,

Pulmonary examination

Q28—Respiratory rate / / 1 = Normal; 2 = Polypnea (RF =); 3 = Apnea;

Q 29—Nose flutter / / 1 = Yes; 2 = No

Q30—Intercostal pull / / 1 = Yes; 2 = No

Q31—Thoracoabdominal swing / / 1 = Yes; 2 = No

Q32—Xiphoid funnel / / 1 = Yes; 2 = No

Q33—Geignment / / 1 = Yes; 2 = No

Q34—Wheezing / / 1 = Yes; 2 = No

Q35—Rales/ / 1 = Yes; 2 = No

Q36—If Rales specify / / 1 = Sibilant; 2 = Hoarseness; 3 = Crackles; 4 = Congestional Rales; 5 = Other

Q37—SaO2 <95% / / 1 = Yes; 2 = No

C—Associated Complications

Q38—Respiratory infection/ / 1 = Yes; 2 = No

Q39—Malnutrition/ / 1 = Yes; 2 = No

Q40—Cardiac decompensation / / 1 = Yes; 2 = No

Q41—Hypotonia / / 1 = Yes; 2 = No

Q42—Convulsions/ / 1 = Yes; 2 = No

Q43—Dehydration / / 1 = Yes; 2 = No

Q44—Anemia / / 1 = Yes; 2 = No

Q45—AOM / / 1 = Yes; 2 = No

III—Management

Emergency procedures

Q46—Nasopharyngeal obstruction / /1 = Yes; 2 = No

Q47—Aspiration / / 1 = Yes; 2 = No

Q48—Manual ventilation / / 1 = Yes; 2 = No

Q49—Cardiac massage / / 1 = Yes; 2 = No

Treatments:

Q50—Respiratory physiotherapy / / 1 = Yes; 2 = No

Q51—Beta 2 mimetic nebulisation / / 1 = Yes; 2 = No
Q52—Corticosteroid nebulisation / / 1 = Yes; 2 = No
Q53—Parenteral corticosteroid therapy / / 1 = Yes; 2 = No
Q54—Oral corticosteroid therapy / / 1 = Yes; 2 = No
Q55—Antibiotic therapy / / 1 = Yes; 2 = No
Q56—Oxygen therapy / / 1 = Yes; 2 = No
Q57—Infusion / / 1 = Yes; 2 = No
Q58—If infusion what product / / 1 = G10; 2 = G5; 3 = RL; 4 = Salted; 5 = G10 + RL.
Q69—Education of parents / / 1 = Yes; 2 = No
Q60—Duration of hospitalization in days / / 1 = 1 - 4 days; 2 = 5 - 10 days; 3 = More than 10 days

IV—Evolution

IV—Evolution / / 1 = Cured; 2 = Evaded; 3 = Decided