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ORIGINAL ARTICLE

Evaluation of the use of non-indicated therapies for the treatment of acute viral bronchiolitis in a secondary hospital in the state of Ceará: are we committing excesses?

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Abstract

Introduction: Acute viral bronchiolitis (AVB) is a common respiratory infection in infants, and its recommended treatment is based on supportive measures. However, the prescription of non-indicated therapies remains frequent in clinical practice. **Objective:** To evaluate the frequency of use of non-recommended therapies in the management of AVB in a secondary hospital in Ceará, Brazil. **Methods:** Observational, cross-sectional, and retrospective study conducted through the analysis of medical records of children under 24 months hospitalized with a diagnosis of AVB between January and July 2023. Demographic, clinical, and therapeutic data were collected. Results: A total of 172 children were included, with a mean age of 5.7 months. Nebulization with bronchodilators was performed in 97.7% of cases, with a mean duration of 6.8 days. Corticosteroids were prescribed in 48.3% of patients, and antibiotics in 82.6%, with a mean duration of 4.8 days. Azithromycin was the most frequently used antibiotic. Use of hypertonic saline solution (33.1%) and other drugs without proven benefit was also observed. **Conclusion:** The study revealed a high use of non-recommended therapies in the treatment of AVB, contrary to current guidelines. These findings highlight the need for implementing evidence-based clinical protocols and educational strategies to promote the rational use of medications, aiming for greater patient safety and more efficient use of health resources.

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INTRODUCTION

Acute viral bronchiolitis (AVB) is a lower respiratory tract infection that predominantly affects infants and is characterized by an acute inflammatory process of the small airways, with neutrophilic infiltration, edema, and necrosis of bronchiolar epithelial cells. Clinically, in most cases, it presents as the first episode of wheezing in children younger than two years, with the highest incidence between two and six months of age[1]. It is worth noting that the definition of AVB in relation to age varies across guidelines. Some institutions define AVB as the first episode of wheezing in infants up to 24 months of age, whereas others restrict this classification to children younger than 12 months. These variations reflect differences in diagnostic criteria adopted worldwide[2,3].

The main etiologic agent of AVB is respiratory syncytial virus (RSV), a nonsegmented, enveloped, single-stranded RNA virus belonging to the family *Paramyxoviridae*. This pathogen is responsible for acute respiratory tract infections in individuals of all age groups[4]. Although RSV is the leading cause of AVB, accounting for approximately 34 million new cases annually, as well as approximately 3.5 million hospitalizations and around 100,000 deaths in children under 5 years of age, other viruses may also be involved. These include parainfluenza viruses, coronaviruses, adenovirus, and rhinovirus, the latter being identified in more than 30% of coinfections[5,6,7].

Bronchiolitis is seasonal, with the season starting in late October in the Northern Hemisphere, peaking between January and February, and ending in April. Globally, RSV occurs in annual or biennial outbreaks following a regional pattern, although with variations in duration and peak timing. Increased viral circulation may be associated with crowding in enclosed environments and reduced ciliary function and immune response[8].

Therapeutic management of AVB still lacks a definitive consensus and is generally based on supportive measures. Management includes adequate hydration, appropriate nutrition, optimization of airway patency, and ventilatory support in cases of hypoxemia, defined as oxygen saturation below 90–92%[4].

It is important to emphasize that bronchodilator administration is not recommended as routine therapy for children with AVB, as there is no evidence of significant clinical benefit. Studies show that the use of bronchodilators, alone or combined with other therapies, does not reduce the incidence of wheezing after RSV infection[5]. In addition, several studies have evaluated the role of corticosteroid therapy in the treatment of AVB. Although, in practice, some clinicians may consider a personal or family history of atopy when deciding to prescribe corticosteroids, there is no evidence that this approach provides benefits in these cases. Likewise, there are no data supporting an association between the presence or absence of RSV infection and a favorable response to corticosteroids[8].

Furthermore, as AVB is a viral infection, antibiotic use is not recommended. Overuse of these drugs in children with AVB may often be driven by concerns related to fever, young patient age, difficulty distinguishing atelectasis from infectious consolidation on chest radiographs, and fear of undiagnosed secondary bacterial infections. However, the viral etiology of bronchiolitis is well established, and the incidence of secondary bacterial infections is low, with a risk of bacteremia or meningitis below 1%[9].

The use of non-recommended therapeutic interventions may result in negative impacts for the patient and increase health care-related costs. In the context of AVB, prescription of therapies lacking robust scientific evidence is still observed in clinical practice, despite guidelines recommending a predominantly supportive approach[7]. Therefore, this study aims to identify which non-recommended therapies are used in the treatment of AVB in a secondary hospital in the state of Ceará and to analyze the frequency of their prescription, contributing to the assessment of the appropriateness of clinical management and encouraging the adoption of evidence-based practices.

METHODS

This is an observational, cross-sectional, retrospective study based on secondary data obtained through review of medical records of patients admitted to the general pediatric ward of a secondary hospital located in Fortaleza, Ceará. The study was submitted to and approved by the Research Ethics Committee of the Institute of Health and Hospital Management, ensuring compliance with ethical guidelines for research involving human subjects (CAAE: 79461524.1.0000.5684).

The study population consisted of children younger than 24 months diagnosed with AVB and admitted to the pediatric ward of a secondary hospital in Fortaleza between January and July 2023, a period that approximately corresponds to the seasonal peak of the disease. The diagnosis of acute viral bronchiolitis was defined according to criteria established in the literature, characterized as the first episode of wheezing in infants accompanied by influenza-like symptoms.

Patients with significant comorbidities were excluded, including congenital heart disease, chronic lung disease, severe kidney disease, genetic syndromes, and immunodeficiencies, as these conditions may interfere with clinical course and therapeutic management. In addition, children transferred to another hospital unit for continuation of treatment and those discharged with a diagnosis other than acute viral bronchiolitis were excluded. Patients with previous episodes of wheezing were also excluded, since by definition acute viral bronchiolitis refers exclusively to the first episode of wheezing in infancy in an infectious context.

For patients included in the analysis, demographic and clinical variables were collected, including sex and age, as well

as therapeutic strategies used during hospitalization, total length of stay, and implementation of viral isolation. The main interventions assessed included antibiotic therapy, oxygen therapy, nebulizations (with specification of the medications used), and corticosteroid therapy, as well as the total duration of these therapies.

Data were initially organized and tabulated in Microsoft Excel for subsequent statistical analysis. Data analysis involved descriptive statistics to characterize the sample, with calculation of absolute and relative frequencies. Results were presented in tables and graphs to facilitate interpretation of findings.

RESULTS

During the study period, 185 children were admitted to the hospital unit with a diagnosis of acute viral bronchiolitis (AVB). After applying the exclusion criteria, 172 children were included in the data analysis: 110 males (64%) and 62 females (36%). The mean age was 5.7 months, with a standard deviation of 6.4 months. Age ranged from 1 to 24 months, with the highest concentration of cases among younger infants.

Regarding viral isolation performed through the respiratory panel, in most cases (64.53%) the test was not performed or no result was available during hospitalization. Among patients with a defined result, RSV was the most frequently identified agent, isolated in 57 patients (33.14%). Coinfection with RSV and coronavirus, as well as negative results, were rare events, each occurring in only 2 cases (1.16%).

With respect to therapeutic strategies used in AVB management, oxygen therapy was widely used, administered to 94 patients. Likewise, nebulization was part of the approach in the vast majority of cases. Corticosteroid use showed a balanced distribution among patients, without a marked predominance. In contrast, antibiotic administration was highly frequent, with 142 patients receiving this therapy. Data on the use of these therapies are detailed in Table 1.

Regarding the duration of therapeutic interventions, nebulization had the longest mean administration time, followed by antibiotic therapy and corticosteroid therapy. Detailed information on the number of patients who received each intervention, mean duration of use, respective standard deviations, observed range, and most frequent duration are presented in Table 2.

Among the 142 patients who received antibiotic therapy during hospitalization, azithromycin was the most frequently used antimicrobial, appearing in 109 prescriptions, both alone and in combination with other agents. Ceftriaxone was the second most prescribed antibiotic, administered in 57 cases. The combination of ceftriaxone plus azithromycin was the most common regimen, identified in 32 patients. Other antibiotics used included ampicillin (8 cases), amoxicillin (7 cases), and amikacin (7 cases). More restricted-use antimicrobials, such as sulfamethoxazole–trimethoprim, piperacillin–tazobactam (Tazocin), and meropenem, were used in three patients each. Vancomycin, oxacillin, cefepime, and gentamicin were prescribed in only one case each.

Regarding the use of complementary therapies or antivirals, oseltamivir was administered to 108 patients, making it the most frequently used intervention in this group. Probiotics and zinc gluconate, alone or in combination, were identified in 27 patients.

DISCUSSION

Acute viral bronchiolitis (AVB) is a respiratory infection that predominantly affects children under two years of age and is considered one of the leading causes of pediatric hospitalization. In most cases, it is self-limited with a benign course, and treatment is based on supportive measures such as adequate hydration and oxygen therapy[1,2,8]. Despite current recommendations, studies indicate that non-indicated practices are still frequently used in the clinical management of AVB, which may negatively affect length of stay, clinical outcomes, and health care resource use[10–12].

Table 1. Distribution of therapeutic interventions in patients with AVB in a secondary hospital in the state of Ceará (n = 172).

Therapy	Value (%)
Nebulization	168 (97.7)
Salbutamol	168 (97.7)
Hypertonic saline	57 (33.1)
Ipratropium bromide	33 (19.2)
Epinephrine	2 (1.2)
0.9% saline	1 (0.6)
Corticosteroid therapy	83 (48.3)
Oxygen therapy	94 (54.7)
Nasal cannula	70 (40.7)
Venturi mask	17 (9.9)
Invasive ventilation	7 (4.1)
Antibiotic therapy	142 (82.6)

Table 2. Duration of use of pharmacological interventions in patients diagnosed with acute viral bronchiolitis in a secondary hospital in the state of Ceará.

Medication intervention	Number of patients (N)	Mean duration ± SD	Range (days)	Most frequent duration (mode)
Antibiotic therapy	142	4.8 ± 2.6	1–15	5 days
Corticosteroid therapy	83	3.4 ± 1.9	1–9	5 days
Nebulization	168	6.8 ± 4.7	1–31	4 days

Inhaled bronchodilators, such as salbutamol and fenoterol, continue to be widely prescribed in AVB management despite the lack of consistent evidence supporting routine use. Recent studies report that up to 60.6% of hospitalized AVB patients received bronchodilators as the first therapeutic option[10]. In the present study, consistent with the literature, nebulization with bronchodilators was prescribed in 97.7% of cases, with a mean administration time of 6.8 days, highlighting its widespread use. Although some studies report transient improvement in clinical scores, no significant impact has been observed on the need for hospitalization or length of stay. This practice persists despite guidelines discouraging systematic use in most cases, reinforcing prolonged management approaches that are not supported by current recommendations[13–15].

It should be emphasized that indiscriminate use of bronchodilators may lead to unnecessary exposure to adverse effects such as tachycardia, tremors, and irritability, in addition to increasing hospital costs. The American Academy of Pediatrics (AAP) guidelines contraindicate routine use of these drugs in AVB management. However, low adherence to recommendations among health professionals continues to sustain this practice, as shown in national and international studies[1,10,11].

Nebulization with 3% hypertonic saline (HS) has been widely studied as a therapeutic alternative in AVB, aiming to improve mucociliary clearance and reduce bronchial obstruction. Systematic reviews indicate that HS use is associated with a moderate reduction in symptom severity and a mean decrease of 0.54 days in length of stay. However, the clinical relevance of this reduction remains debated, and some guidelines do not support its use[16,17]. Accordingly, AAP guidelines recommend its use only in hospitalized children and not in outpatient or emergency settings, despite the apparent safety of the therapy[1,11,16,18]. Despite these recommendations, HS continues to be used in contexts without scientific support, which may result in unnecessary resource use and unrealistic expectations regarding efficacy[16,19]. In the present study, 33.1% of patients received nebulization with hypertonic saline, indicating that its use remains common.

Corticosteroids, both inhaled and systemic, are commonly used in patients with AVB; however, no significant impact has been identified in reducing hospital admission or readmission rates. Their use is also associated with adverse effects such as oral candidiasis[20–22]. Persistence of this practice may be related to difficulty distinguishing viral bronchiolitis from asthma, resulting in indiscriminate corticosteroid use. However, even in atopic patients, corticosteroids in AVB are not associated with significant improvement in clinical outcomes. From an economic standpoint, their cost-effectiveness is considered low, with no justification for routine prescription[4,20,23]. In the present study, 83 of 172 patients (48.3%) received corticosteroids during hospitalization, demonstrating continued use in clinical practice despite recommendations to the contrary.

Despite its viral origin and the low occurrence of secondary bacterial infections, antibiotics continue to be widely prescribed in AVB, even in the absence of evidence supporting their use. Studies indicate that 32.2% to 62.1% of bronchiolitis patients received antibiotics without laboratory confirmation of bacterial infection, and this practice has been associated with a significant increase in length of stay. Similar to other reports, antibiotic therapy was initiated in 142 of 172 patients (82.6%) in the present study—an exceedingly high proportion—reinforcing the persistence of this practice in routine care. Inappropriate antimicrobial use contributes to the development of bacterial resistance and increases the risk of adverse events such as diarrhea and allergic reactions. In this context, probiotics and zinc gluconate, alone or in combination, were also identified in 27 patients, often used in the management of diarrheal conditions, suggesting a possible relationship with antibiotic-related adverse effects[9,11].

AAP guidelines recommend restricting antibiotic use in AVB to situations with evidence of secondary bacterial infection. However, in clinical practice, antimicrobial prescriptions often occur even in the absence of objective signs of infection. This approach may be related to clinician insecurity regarding potential complications, fear of undertreatment, and difficulty distinguishing the natural evolution of viral illness from bacterial overlap[1,11].

Moreover, azithromycin was the most frequently prescribed antibiotic in this study. Although its use remains common, evidence supporting this practice is limited. A multicenter study in the United States showed that in children aged 12 to 72 months with a history of recurrent and severe lower respiratory tract infections, early azithromycin administration reduced progression to more severe disease. However, it was unclear whether the clinical conditions evaluated corresponded to bronchiolitis or to other pathological processes. Thus, based on currently available evidence, routine use of macrolides such as azithromycin is not recommended in AVB management[23–25].

Frequent use of medications without solid evidence of clinical benefit exposes infants to iatrogenic risks without corresponding therapeutic gain[4,11,23]. In addition, continued use of non-recommended practices represents a significant cost to health systems[26,27]. Some initiatives aim to reduce low-value interventions, whose persistence reflects inefficient allocation of available resources. Regarding length of stay, lack of clinical response to inappropriate treatments may increase medical uncertainty, prolonging hospital observation. This negatively affects not only patient and family well-being, but also costs and health service organization[23,28].

A study conducted in developing countries showed that medications accounted for more than 30% of the total cost of hospitalizations for RSV-related respiratory infection. Alarmingly, more than 85% of prescribed medications were considered inappropriate, indicating a prescribing pattern misaligned with clinical guidelines[29]. Therefore, AVB treatment should be guided by evidence-based protocols to avoid

interventions without proven clinical benefit and to ensure safe, effective, and sustainable care.

The findings of this study demonstrate a pattern of medication use that partially diverges from current recommendations for AVB management. The high frequency of antibiotic therapy in a predominantly viral context suggests possible indiscriminate use. Prolonged nebulization was also observed, with a mean duration of 6.8 days, suggesting routine use until hospital discharge. Corticosteroid use showed lower frequency and shorter mean duration, which may reflect greater adherence to current recommendations that do not support routine use of this drug class.

This study has limitations that should be considered when interpreting the results. As a retrospective study based on medical record review, it is subject to biases related to incomplete documentation. Lack of clinical follow-up after discharge also limited assessment of long-term outcomes, such as symptom recurrence or need for reinterventions. Future prospective, multicenter studies may provide a deeper understanding of guideline adherence and the impact of educational interventions within health services.

CONCLUSION

The findings of this study show a significant frequency of non-recommended medication use in the management of acute viral bronchiolitis in a secondary hospital in the state of Ceará. This practice, which is not aligned with current clinical guidelines, may compromise patient safety and generate unnecessary costs for the health system. The results highlight the importance of implementing evidence-based care protocols and continuous educational strategies aimed at improving pediatric care. Aligning clinical practice with current recommendations is essential to ensure safer, more effective, and more sustainable care for children affected by this condition.

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