

The Diagnostic and Therapeutic Approach to Acute Bronchiolitis in Hospitalized Children in Israel: A Nationwide Survey

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Abstract

Background: Bronchiolitis caused by respiratory syncytial virus is one of the major causes of hospitalization in young children, especially during the winter. Recent evidence has shown that pharmacological treatment, especially nebulized epinephrine, in addition to the traditional supportive treatment, can alleviate symptoms and shorten hospitalization, but this approach is not yet widespread.

Objectives: To determine whether the management of bronchiolitis in Israel is moving toward a stronger emphasis on pharmacological care.

Methods: A questionnaire on the diagnosis and management of bronchiolitis was completed by 27 heads of pediatric departments throughout Israel. The questionnaire dealt with the frequency of usage of diagnostic and selected therapeutic procedures.

Results: Chest X-ray and arterial blood gases are commonly used as a diagnostic aid in more than 75% of the departments, and antibiotics are prescribed routinely in 24%. Corticosteroids are still in use: 48% use systemic steroids, and 19% nebulized steroids. Nebulized epinephrine is used in 22% of the departments, while nebulized beta-agonists are used frequently in two-thirds of the departments.

Conclusions: Despite convincing data that beta-agonists and steroids have no positive effect on the outcome of bronchiolitis on the one hand, and that nebulized epinephrine has advantages in children on the other, we found significant use of the former two agents and sparse use of the latter. Greater awareness is needed among pediatricians, and measures should be introduced to incorporate the new recommendations, with further study of the effect of the old and new drugs on bronchiolitis.

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Acute respiratory diseases are the leading cause of emergency room visits and hospitalization in children under the age of 4 years. One of the major diagnoses in this group is bronchiolitis due to respiratory syncytial virus. Almost all children contract RSV infections by the age of 3 years.

RSV = respiratory syncytial virus

Of those infected before the age of 1 year, 25% to 40% will have involvement of the lower respiratory tract [1].

Approximately 1% of infected children require hospitalization, usually because of hypoxemia. The mortality rate of hospitalized children with RSV bronchiolitis is 0.1% in industrialized countries [1,2]. Because the infection is common, these figures translate into a significant morbidity and mortality.

Until about 10 years ago, pharmacological agents were believed to have little impact on the outcome of bronchiolitis, and supportive care was the mainstay of treatment. Evidence has recently been provided, however, that the use of sympathomimetics can alleviate symptoms, prevent hospitalization, shorten hospital stay, and reduce outpatient visits. Nevertheless, implementing changes in health management protocols is a lengthy process [3,4]. The aim of the present study was to determine whether the management of bronchiolitis in hospitalized children in Israel is moving toward a stronger emphasis on pharmacological care.

Materials and Methods

At the end of winter 1997, a questionnaire on diagnostic procedures and treatment options for bronchiolitis was sent to the 27 heads of all pediatric inpatient departments throughout Israel.

The diagnostic options included chest X-ray and arterial blood gas sampling. The treatment options were divided into supportive measures (e.g., oxygen and mist) and pharmacologic agents, specifically antibiotics, glucocorticosteroids by nebulization or by the systemic route, ribavirin and beta-agonists or epinephrine by nebulization. Each option was rated on a four-point scale by frequency of use: 1 = always, 2 = often, 3 = rarely, and 4 = never.

Results

All 27 physicians completed the questionnaire and a few of them (about 10%) did not answer all the questions.

Diagnosis

Chest X-ray is currently performed for suspected bronchiolitis always or often in 25 of the 27 departments (93%) and rarely in 2 (7%) [Figure 1]. Considerable differences were found in arterial blood gas sampling, a test per-

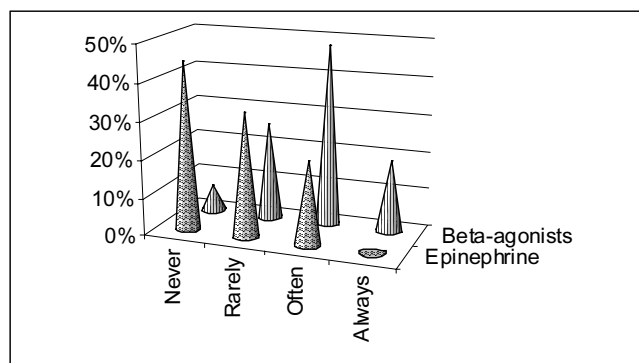


Figure 1. Use of chest X-ray for hospitalized children with bronchiolitis (% of departments)

Table 1. Use of certain treatments for acute bronchiolitis in hospitalized children *

Treatment	Route	Always	Often	Rarely	Never
Antibiotics	Any	0	6/25 (24%)	10/25 (40%)	9/25 (36%)
Glucocorticoids	Systemic	1/27 (4%)	12/27 (44%)	10/27 (37%)	4/27 (15%)
Glucocorticoids	Inhaled	1/26 (4%)	4/26 (15%)	9/26 (35%)	12/26 (46%)
Epinephrine	Inhaled	0	6/27 (22%)	9/27 (33%)	12/27 (45%)
Beta-agonists	Inhaled	5/27 (19%)	13/27 (48%)	7/27 (26%)	2/27 (7%)

* Data are presented as number (%) of inpatient pediatric departments in Israel. Denominators represent the number of responders to specific questions.

formed in all cases in 7 of the 27 departments (26%), often in 8 departments (30%), and rarely in 12 (44%).

Treatment [Table 1]

Oxygen is used always or often in 25 of the 27 departments (93%), and mist — never proven efficacious in bronchiolitis — is always or often used in 9 of the 27 departments (33%) and never in 16 (59%). Antibiotics are prescribed often in 6 of 25 departments (24%) and rarely or never in 19 (76%).

Systemic glucocorticosteroids are given always or often in 13 of the 27 departments (48%) and rarely or never in 14 (52%) [Table 1], whereas inhaled glucocorticosteroids are used often in 5 of 26 departments (19%), rarely in 9 (35%) and never in 12 (46%) [Figure 2]. Ribavirin is rarely used (7 of 25 departments, 26%) or never prescribed (18 departments).

Nebulized epinephrine is often applied in 6 of 27 departments (22%), rarely in 9 (33%) and never in 12 (45%). None of the pediatric departments use epinephrine routinely for patients with bronchiolitis [Figure 3]. Beta-agonists by nebulization are always or often used in 18 of the 27 departments (67%), rarely in 7 (26%) and never in 2 (7%) [Figure 3].

Discussion

The present study shows that despite the high incidence of bronchiolitis in the pediatric emergency room population, especially during wintertime, the treatment protocols currently in use in Israel are diverse and inconsistent. Furthermore, many hospital policies have not incorporated the more recent recommendations for bronchiolitis

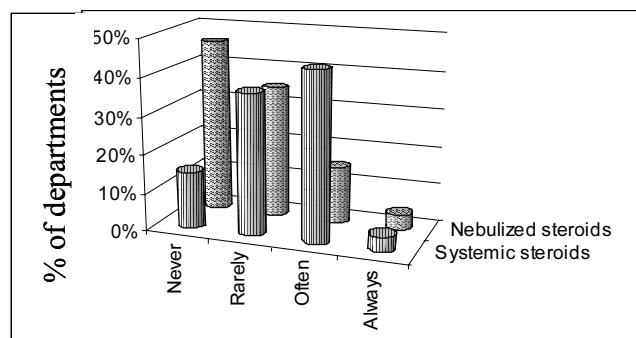


Figure 2. Use of glucocorticosteroids by nebulization or systemic route in hospitalized children with bronchiolitis (% of departments)

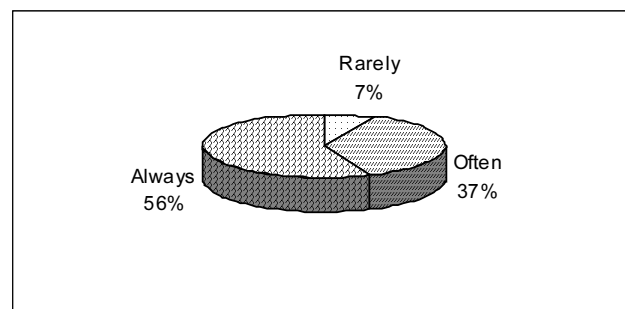


Figure 3. Use of nebulizations of epinephrine compared to beta-agonists in hospitalized children with bronchiolitis (% of departments)

treatment. Israel, however, is not alone. In 1995, members of the European Society for Paediatric Infectious Diseases (ESPID) completed a questionnaire on the treatment of all bronchiolitis patients versus high risk patients. Their results were similar to those found by us, with only 20% advocating epinephrine inhalation and 61% prescribing other bronchodilators [5]. Ribavirin was recommended only for high risk patients in accordance with the American Academy of Pediatrics ("The Red Book").

The 100% response to our survey with as many as 90% answering each question make any bias unlikely.

In Israel, humidified air (mist) is still the treatment of choice in one-third of the departments. There is no convincing data supporting its efficacy, except for the general benefit of humidified air over dry air for any respiratory disease.

The effectiveness of glucocorticoids remains controversial. The rationale in favor of glucocorticoids is the potential importance of inflammatory changes in the bronchioles. Several recent randomized trials of bronchiolitis as a distinct clinical entity (in contrast to all other wheezy baby syndromes) have noted no significant improvement in children treated with glucocorticoids by any route of administration [3]. Nevertheless, about one-half (48%) of the pediatric departments in Israel continue to apply glucocorticoids always or often, and 19% use nebulized glucocorticoids.

Some clinicians favor the use of epinephrine based on the notion that alpha-receptor stimulation reduces capillary and postcapillary microvascular leakage, mainly by constricting the precapillary bronchial arterioles. This, in turn, reduces capillary and postcapillary hydrostatic pressure, reversing the fluid leakage to resorption, thereby reducing bronchial mucosal edema [6].

Several randomized placebo-controlled trials have shown that nebulizations of racemic or regular epinephrine (at a dose of 2–5 ml of 1:1,000 epinephrine) have a significant effect on clinical scores and pulmonary resistance, enabling a more rapid discharge of bronchiolitis patients from the emergency room [3]. Most of these studies included a control group of patients treated with nebulized beta-agonists who did not show the same clinical improvement. No significant systemic side effects to epinephrine were noted [3,4,6–8]. Nevertheless, nebulized beta-agonists are still used in most cases (67%) in pediatric departments in Israel [Figure 3].

The response to nebulized epinephrine has been studied in infants (<18 months old) with recurrent wheezing. No clinically significant effect on lung function was found during an asymptomatic interval [9]. This finding indicates that the effect of nebulized epinephrine cannot be applied in general to all wheezing children, but was shown in bronchiolitis. In the present study we found that nebulized epinephrine is often given in only 22% of the departments [Figure 3].

A recently published study investigated the effect of nebulized albuterol, a beta-agonist, on the physiological and clinical recovery of hospitalized infants with moderate bronchiolitis. No significant improvement was found in oxygen saturation or other discharge criteria when compared to a placebo group [10].

According to strong and consistent evidence in the studies mentioned above, epinephrine is the preferred pharmacological agent for bronchiolitis, compared with salbutamol or placebo. What remains unknown is whether epinephrine remains effective when inpatients are treated over days and how often it should be administered in this context. It should be noted that nebulization of beta-agonists is still recommended in the textbooks as a trial drug for bronchiolitis, since they elicit short-term improvement in some cases.

In conclusion, there is convincing data that pharmacological treatment in addition to the traditional supportive treatment may reduce the complications of bronchiolitis and, consequently, hospitalization. Despite the known connection between bronchiolitis and wheezing later in

childhood, beta-agonists and glucocorticosteroids are apparently ineffective in the young pediatric age group with bronchiolitis [5]. On the other hand, nebulized epinephrine has been shown to alleviate symptoms and accelerate clinical improvement.

The major findings of the present study are the common use of glucocorticosteroids and beta-agonists, which are less recommended in bronchiolitis and, on the other hand, the rare use of epinephrine inhalations, which are lately being recommended by more and more studies [3].

Greater awareness is needed among pediatricians, and new measures should be introduced to incorporate the new recommendations into hospital policies in order to raise the standard of care. Treatment guidelines, written by experts, may be helpful.

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The greatest of all faults, I should say, is to be conscious of none.

Thomas Carlyle