

Review Article

An Update of Bronchiolitis - A Review

Md Atiar Rahman*

Associate Professor, Section of Respiratory Medicine, Department of Pediatrics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

Abstract

Bronchiolitis is one of the most common respiratory infections in children under 2 years of age predominantly caused by Respiratory syncytial virus and other viruses like influenza, Para influenza, and Adenovirus. Rhinovirus, etc. Most children have mild symptoms however bronchiolitis has also been well linked to severe morbidities and mortalities. Even though bronchiolitis has been well recognized for many years, there are still very few therapeutic strategies available beyond supportive management. There are many controversies about therapeutic management in bronchiolitis published in standard guidelines and research in this area. Management can be divided into pharmacological and supportive therapy. Evidence suggests that the current management of bronchiolitis is purely supportive consisting of oxygen supplementation, frequent suctioning, and maintaining good hydration and nutrition. Regarding pharmacological therapy, neither bronchodilators nor corticosteroids have significant efficacy in the treatment of bronchiolitis. However, some studies suggest that adrenaline and nebulizer 3% saline showed some benefit only in terms of outcome. The current recommendation also supports the use of Palivizumab as prophylaxis in certain groups of infants and young children.

Introduction

Bronchiolitis is one of the most common respiratory infections in children under 2 years of age predominantly caused by the Respiratory syncytial virus (RSV) responsible for about 60% - 85% of cases of bronchiolitis [1]. Other viruses like influenza, Para influenza, and Adenovirus. Rhinovirus, metapneumovirus par influenza virus, *Mycoplasma pneumonia* [2]. Bronchiolitis is characterized by acute inflammation, edema, and necrosis of the epithelial cells lining the small airways, and increased mucus production [3]. Most children have mild symptoms like rhinorrhea, fever, cough, and wheezing and some have severe respiratory distress, apnea, and hypoxemia and need hospital management. Most children with bronchiolitis are managed at home with supportive care but Children with more severe symptoms need hospital admissions in the first 12 months of life for management mainly supportive, consisting of fluid management and respiratory support [4]. There is no evidence to benefit with the medication like salbutamol, glucocorticosteroids and antibiotics. Because of the lack of effective treatment, the reduction of morbidity must depend on preventive measures [5-7]. Well-prepared implementation strategies are needed to standardize care and improve the management protocol. Infants with pre-existing risk factors (i.e., prematurity, bronchopulmonary dysplasia, congenital heart diseases, immunodeficiency, neuromuscular diseases, cystic fibrosis, and Down syndrome) present a significant risk

of severe bronchiolitis and should be carefully assessed [8-10]. This revised manuscript, based on international and national research articles, reinforces the current recommendations and takes an effective strategy for the prevention of acute bronchiolitis.

Methods

Data extraction

By performing a search in Pub Med and the Cochrane Library and EMBASE with the keywords: Bronchiolitis AND update of diagnostic approach and treatment.

Limited for international guidelines, clinical trials, or systematic reviews of bronchiolitis. Relevant study areas were identified, and, for each area, a literature search was carried out based on a predefined series of key clinical questions. And the strategies included filters to limit the results by study type (guideline, reviews, randomized controlled trials, and other types of experimental research) [11-13].

The present manuscript was organized into two main sections: diagnostic approach and treatment of Bronchiolitis.

Results

Natural History [14-16]

- Organisms- RSV (most common), Influenza, Parainfluenza, Adenovirus, Rhinovirus, etc.

More Information

*Address for correspondence:

Md Atiar Rahman, Associate Professor, Section of Respiratory Medicine, Department of Pediatrics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, Email: atiar777@yahoo.com

Submitted: December 04, 2023

Approved: December 21, 2023

Published: December 22, 2023

How to cite this article: Rahman MA. An Update of Bronchiolitis - A Review. Arch Case Rep. 2023; 7: 077-079.

DOI: 10.29328/journal.acr.1001083

Copyright license: © 2023 Rahman MA. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Keywords: Bronchiolitis; Respiratory syncytial virus; Nebulized adrenaline; Nebulized 3% saline





- Incubation period- 4- 7 days.
- First 2-3 days, mild upper respiratory symptoms (cough, rhinorrhea, & low-grade fever).
- The acute phase (3rd -7th days) –breathing difficulty, wheezing, persistent cough, tachypnea, chest wall retraction, and nasal flaring.
- Symptoms gradually disappear within the next 2 weeks (cough may take longer to resolve).

Diagnostic approach [17-19]

The diagnosis of acute bronchiolitis is clinical; investigation supports the diagnosis, excludes differential diagnosis, and is done if there is uncertainty in the diagnosis (Table 1).

Investigations [12-16]

- Complete blood count with differential- usually normal unless bacterial superinfection
- CXR- Hyperinflation, hyper translucency, low flat diaphragm, Pulse oximetry.
- Arterial blood gas analysis (when indicated) - evidence of respiratory failure (hypoxemia, hypercapnia).

Management principles onward/HDU [5-7,20-22]

- Hypoxemia/Hypoxia – give supplemental oxygen, maintain oxygen saturations >90% unless congenital heart disease/CHD
- Apnoea monitoring if required (positive history, < 2 months)
- Minimal handling
- Suction nasal secretions if obstructed with mucus- this should be limited to the nares or oropharynx because deep tracheal suctioning does not provide additional benefit.
- Give nasogastric or orogastric tube feeding if oral intake is inadequate.
- Give IV isotonic fluid (if can't tolerate nasogastric feeding/ impending respiratory failure).
- Nebulization by hypertonic saline (3% NaCl) - can

significantly improve the severity of respiratory distress, shorten the hospital stay, and increase night-time sleep quality.

- Adrenaline nebulization along with hypertonic saline- can decrease the length of stay & severity, especially in those who require hospitalization for more than 48 hours
- Response to bronchodilators is unlikely in children younger than 1 year.
- Antibiotics: co-amoxiclav IV: treat empirically if referred for PICU (30% - 40% have bacterial isolates). Consider cefotaxime/ ceftriaxone if apnoea/ neuro concerns or penicillin allergy.
- Consider continuous positive airway pressure (CPAP) in babies and children with bronchiolitis who have impending respiratory failure.

Assessment for ventilatory support & PICU referral [17-22]

- Severe respiratory distress or risk of respiratory failure.
- Lack of clinical improvement or deterioration in non-invasive respiratory support
- O2 requirement > 60% to maintain saturations > 90%
- Persistent or recurrent apnoeas
- Deterioration in level of consciousness
- Neuromuscular patients may not be able to increase their work of breathing- watch for tachycardia, consider blood gas analysis.

Prevention

There are several ways to prevent bronchiolitis: Avoid smoking around the child, as this increases the risk of respiratory illness. Wash hands frequently with soap and water, especially before touching an infant, and immunization against causative viruses, Avoid close contact with sick people, and cover your cough and sneezes. Clean frequently touched surfaces [4,18].

Conclusion

Currently, there is no consensus agreement regarding

Table 1: A complete description containing Clinical Presentation for symptoms, Admission Criteria for illness severity, and High-Risk Groups for groups at increased risk of severe disease

Clinical presentation	Criteria for severe disease (Admission criteria)	High-risk groups
Cough, coryza	Hypoxia (Sp _{o2} < 92%)	Neonates
Difficulty in breathing	RR > 70 breaths/minute	Prematurity
Poor feeding	Signs of severe respiratory distress	Pre-existing respiratory condition
Fever	Apnea	Congenital heart disease
Apnoeas (sp < 2 months)	inability to feed	Neuromuscular conditions
Wheeze	Decreased level of consciousness	Immune deficiency
Crackles	The lower threshold in a high-risk group	



the diagnosis of bronchiolitis, risk factors for severe disease, hospital admission criteria, treatment, and discharge criteria. The diagnosis of bronchiolitis is based on the clinical history and physical examination. Laboratory and instrumental investigations are not routinely recommended. Most children with acute bronchiolitis may be adequately managed in the outpatient setting by primary care pediatricians, parents, or caregivers able to provide assistance and monitoring. Deep nasal aspiration, chest physiotherapy, inhaled bronchodilators; nebulized adrenaline, nebulized and systemic corticosteroids, antibiotics, and other therapies are not routinely recommended in treating bronchiolitis. When supplementary O₂ is indicated, High Flow Nasal Cannula (HFNC) should not be used as a primary treatment modality but considered if standard sub-nasal supplemental O₂ fails in hypoxic infants. If respiratory failure develops it requires ventilator support given by (CPAP), or sometimes a conventional ventilator. The most suitable treatment for bronchiolitis is still debated. This review showed that supportive therapy, maintenance of nutrition, clearance of air passage by nebulization with 3% NaCl solution, frequent suctioning, and oxygen supplementation are the present modalities of treatment.

Ethics approval and consent to participate

Since it is a review paper, the study did not need ethical committee approval.

References

- Centers for Disease Control and Prevention. RSV in infants and young children. 2020. <https://www.cdc.gov/rsv/high-risk/infants-young-child-ren.html>.
- Public Health England. Respiratory syncytial virus (RSV): symptoms, transmission, prevention, treatment. 2008. <https://www.gov.uk/government/publications/respiratory-syncytial-virus-rsv-symptoms-transmission-prevention-treatment/respiratory-syncytial-virus-rsv-sympt-oms-transmission-prevention-treatment>.
- Linssen RS, Teirlinck AC, van Boven M, Biarent D, Stona L, Amigoni A, Comoretto RI, Leteurte S, Bruandet A, Bentsen GK, Drage IM, Wang X, Campbell H, van Woensel JBM, Bont L, Bem RA. Increasing burden of viral bronchiolitis in the pediatric intensive care unit; an observational study. *J Crit Care.* 2022 Apr;68:165-168. doi: 10.1016/j.jcrc.2021.07.009. Epub 2021 Jul 23. PMID: 34304966.
- Azzari C, Baraldi E, Bonanni P, Bozzola E, Coscia A, Lanari M, Manzoni P, Mazzone T, Sandri F, Checucci Lisi G, Parisi S, Piacentini G, Mosca F. Epidemiology and prevention of respiratory syncytial virus infections in children in Italy. *Ital J Pediatr.* 2021 Oct 2;47(1):198. doi: 10.1186/s13052-021-01148-8. PMID: 34600591; PMCID: PMC8487331.
- Bakel LA, Hamid J, Ewusie J, Liu K, Mussa J, Straus S, Parkin P, Cohen E. International Variation in Asthma and Bronchiolitis Guidelines. *Pediatrics.* 2017 Nov;140(5):e20170092. doi: 10.1542/peds.2017-0092. PMID: 29070533.
- Japanese Society for Pediatric Infectious Diseases Pediatric respiratory infection clinical practice guidelines. 201. <http://www.jspid.jp/pub/sguideline.html>.
- Verstraete M, Cros P, Gouin M, Ouilic H, Bihouée T, Denoual H, Barzic A, Duigou AL, Vrignaud B, Levieux K, Vabres N, Fleurence E, Darvot E, Cardona J, Guittery MA, Marot Y, Picherot G, Gras-Le Guen C. Prise en charge de la bronchiolite aiguë du nourrisson de moins de 1 an : actualisation et consensus médical au sein des hôpitaux universitaires du Grand Ouest (HUGO) [Update on the management of acute viral bronchiolitis: proposed guidelines of Grand Ouest University Hospitals]. *Arch Pediatr.* 2014 Jan;21(1):53-62. French. doi: 10.1016/j.arcped.2013.10.020. Epub 2013 Dec 8. PMID: 24321867.
- Nagakumar P, Doull I. Current therapy for bronchiolitis. *Arch Dis Child.* 2012 Sep;97(9):827-30. doi: 10.1136/archdischild-2011-301579. Epub 2012 Jun 25. PMID: 22734014.
- Zamora-Flores D, Busen NH, Smout R, Velasquez O. Implementing a clinical practice guideline for the treatment of bronchiolitis in a high-risk Hispanic pediatric population. *J Pediatr Health Care.* 2015 Mar-Apr;29(2):169-80. doi: 10.1016/j.pedhc.2014.10.002. Epub 2014 Nov 22. PMID: 25454385.
- Haas LE, Thijsen SF, van Elden L, Heemstra KA. Human metapneumovirus in adults. *Viruses.* 2013 Jan 8;5(1):87-110. doi: 10.3390/v5010087. PMID: 23299785; PMCID: PMC3564111.
- Da Dalt L, Bressan S, Martinolli F, Perilongo G, Baraldi E. Treatment of bronchiolitis: state of the art. *Early Hum Dev.* 2013 Jun;89 Suppl 1:S31-6. doi: 10.1016/S0378-3782(13)70011-2. PMID: 23809346.
- American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Diagnosis and management of bronchiolitis. *Pediatrics.* 2006 Oct;118(4):1774-93. doi: 10.1542/peds.2006-2223. PMID: 17015575.
- Hsieh CW, Chen C, Su HC, Chen KH. Exploring the efficacy of using hypertonic saline for nebulizing treatment in children with bronchiolitis: a meta-analysis of randomized controlled trials. *BMC Pediatr.* 2020 Sep 14;20(1):434. doi: 10.1186/s12887-020-02314-3. PMID: 32928154; PMCID: PMC7489028.
- Bronchiolitis in children. Scottish Intercollegiate Guidelines Network-SING. 2006.
- Bronchiolitis in children: diagnosis and management [Internet]. National Institute for Health and Care Excellence. 2023; 1–27. www.nice.org.uk/guidance/ng9
- Pereira RA, Oliveira de Almeida V, Zambrano M, Zhang L, Amantéa SL. Effects of nebulized epinephrine in association with hypertonic saline for infants with acute bronchiolitis: A systematic review and meta-analysis. *Health Sci Rep.* 2022 Apr 18;5(3):e598. doi: 10.1002/hsr2.598. PMID: 35509393; PMCID: PMC9059211.
- Nagakumar P, Doull I. Current therapy for bronchiolitis. *Arch Dis Child.* 2012 Sep;97(9):827-30. doi: 10.1136/archdischild-2011-301579. Epub 2012 Jun 25. PMID: 22734014.
- Blom DJ, Ermers M, Bont L, van Woensel JB, Van Aalderen WM. WITHDRAWN: Inhaled corticosteroids during acute bronchiolitis in the prevention of post-bronchiolitic wheezing. *Cochrane Database Syst Rev.* 2011 Jan 19;2011(1):CD004881. doi: 10.1002/14651858.CD004881.pub3. PMID: 21249665; PMCID: PMC10658823.
- Fernandes RM, Bialy LM, Vandermeer B, Tjosvold L, Plint AC, Patel H, Johnson DW, Klassen TP, Hartling L. Glucocorticoids for acute viral bronchiolitis in infants and young children. *Cochrane Database Syst Rev.* 2013 Jun 4;2013(6):CD004878. doi: 10.1002/14651858.CD004878.pub4. PMID: 23733383; PMCID: PMC6956441.
- Plint AC, Johnson DW, Patel H, Wiebe N, Correll R, Brant R, Mitton C, Gouin S, Bhatt M, Joubert G, Black KJ, Turner T, Whitehouse S, Klassen TP; Pediatric Emergency Research Canada (PERC). Epinephrine and dexamethasone in children with bronchiolitis. *N Engl J Med.* 2009 May 14;360(20):2079-89. doi: 10.1056/NEJMoa0900544. PMID: 19439742.
- Spurling GK, Doust J, Del Mar CB, Eriksson L. Antibiotics for bronchiolitis in children. *Cochrane Database Syst Rev.* 2011 Jun 15;(6):CD005189. doi: 10.1002/14651858.CD005189.pub3. Update in: *Cochrane Database Syst Rev.* 2014;10:CD005189. PMID: 21678346.
- Zhang L, Mendoza-Sassi RA, Wainwright C, Klassen TP. Nebulised hypertonic saline solution for acute bronchiolitis in infants. *Cochrane Database Syst Rev.* 2013 Jul 31;(7):CD006458. doi: 10.1002/14651858.CD006458.pub3. Update in: *Cochrane Database Syst Rev.* 2017 Dec 21;12:CD006458. PMID: 23900970.