



Evidence Based Clinical Practice Guideline

For medical management of Bronchiolitis in infants less than 1 year of age presenting with a first time episode^a

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August 15, 2005

New search May, 2006 (see Development Process section)

Target Population

Inclusion: Intended primarily for use in children:

- age less than 12 completed months and presenting for the first time with bronchiolitis typical in presentation and clinical course

Exclusion: Not intended for use in children:

- with a history of cystic fibrosis (CF)
- with a history of bronchopulmonary dysplasia (BPD)
- with immunodeficiencies
- admitted to an intensive care unit
- requiring ventilator care
- with other severe comorbid conditions complicating care

Target Users

Includes but is not limited to (in alphabetical order):

- Attending physicians
- Community physicians and practitioners
- Emergency department physicians
- Patient / family
- Patient care staff
- Residents

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Introduction

References in parentheses (). Evidence strengths in []. (See last page for definitions.)

Bronchiolitis is an acute inflammatory disease of the lower respiratory tract, resulting from obstruction of small airways. It is initiated by infection of the upper respiratory tract by any one of a number of seasonal viruses, the most common of which is respiratory syncytial virus (RSV) (Williams 2004 [C], Andreoletti 2000 [C], Hall 2001 [S], Stark 1991 [S]).

There is considerable confusion and variability with respect to the clinical management of infants with bronchiolitis. Typical bronchiolitis in infants is a self-limited disease, usually due to an acute viral infection that is little modified by aggressive evaluations, use of antibiotics or other therapies. The median duration of illness for children < 24 months with bronchiolitis is 12 days; after 21 days approximately 18% will remain ill, and after 28 days 9% will remain ill (Swingler 2000 [C]). Most infants who contract bronchiolitis recover without sequelae; however, up to 40% may have subsequent wheezing episodes through five years of age and approximately ten percent will have wheezing episodes after age five (van Woensel 2000 [B]).

Hospitalizations for bronchiolitis in U.S. infants less than one year of age have been increasing over the past decade (Shay 1999 [O]). The average duration of hospitalization is 3 to 7 days (Wang 1995 [C], Green 1989 [D]). RSV-associated deaths account for less than 500 infant deaths per year in the U.S.; most of these children did not have concurrent cardiac or pulmonary disease (Shay 1999 [O]).

Several studies on the use of clinical guidelines for the management of infant bronchiolitis have shown a reduction in unnecessary resource utilization with a streamlining of medical care for these infants (El-Radhi 1999 [C], Harrison 2001 [D], Perlstein 2000 [D], Liebelt 1999 [D], Perlstein 1999 [D], Muething 2004 [O], Kotagal 2002 [O]).

In the target population, the objectives of this guideline are to:

- decrease the use of unnecessary diagnostic studies
- decrease the use of medications and respiratory therapy without observed improvement
- improve the rate of appropriate admission
- decrease the rate of nosocomial infection
- improve the use of appropriate monitoring activities
- decrease length of stay

Guideline Recommendations

Prevention

General

Infants less than three months of age, premature infants (<35 weeks gestation), and infants with chronic lung disease, congenital heart disease, or immune deficiency syndromes who are diagnosed with bronchiolitis may be at particular risk for hospitalization and significant morbidity (Shay 2001 [D], Boyce 2000 [D], Joffe 1999 [D], Church 1984 [D], Shay 1999 [O]). Prevention of hospitalization and significant morbidity is a high priority in the management of this lower respiratory tract infection.

Prevention Measures

- It is recommended that measures to prevent acute bronchiolitis be reviewed with parents of newborns prior to discharge from the hospital and at follow-up visits in the first years of life. These specific measures include:
 - eliminating exposure to environmental tobacco smoke (Mahabee-Gittens 2002 [O])
 - limiting exposure to contagious settings and siblings (e.g. daycare centers)
 - an emphasis on handwashing in all settings
 - preventive medical therapies such as palivizumab (Synagis®, MedImmune); may be considered for selected high-risk patients (IMPact-RSV Study Group 1998 [A], Celedon 1999 [C], Aitken 1998 [C], Wald 1991 [C]).

Note: A large, multicenter double-blind, randomized, controlled trial has shown that palivizumab (Synagis®, MedImmune) reduced the rates of hospitalization (not acute infection) for all infants studied, premature infants (<35 weeks) less than six months of age, and infants with BPD by 55%, 78%, and 39% respectively. The use of palivizumab has not been shown to be cost-effective in children regardless of prematurity or the presence of congenital heart disease due to the high cost of the medication and persistently low mortality rates associated with RSV-bronchiolitis (IMPact-RSV Study Group 1998 [A], Heikkinen 2005 [C], Wegner 2004 [C], Shay 2001 [D], Yount 2004 [Q], Joffe 1999 [Q]).
- It is recommended, in patients with documented bronchiolitis, that masks covering the nose and eyes be worn and that contact isolation, including vigorous handwashing, be performed before and

after entering the exam room (Hall 1981 [C], Hall 2001 [S], Local Expert Consensus [E]).

Note 1: Viral transmission occurs by direct inoculation of contagious secretions from the hands or by large-particle aerosols into the eyes and nose, but rarely the mouth (Hall 1981 [C], Hall 2001 [S], Local Expert Consensus [E]).

Note 2: Nosocomial infection may place medically fragile infants and children at increased risk for morbidity and mortality upon exposure to the hospital environment (Langley 1997 [C]).

Note 3: Follow Respiratory/Contact precautions as described for bronchiolitis in the CCHMC Infection Control Manual (ICRM-735) (Local Expert Consensus [E]).

Assessment and Diagnosis

Clinical History and Physical Examination

- It is recommended that the clinical history and physical examination be the basis for a diagnosis of bronchiolitis.

The diagnosis of bronchiolitis and its severity is rooted in the clinician's interpretation of the constellation of characteristic findings and is not dependent on any specific clinical finding or diagnostic test (Bordley 2004 [M]). Infants with acute bronchiolitis may present with a wide range of clinical symptoms and severity, from mild upper respiratory infections (URI) to impending respiratory failure.

Diagnostic criteria for bronchiolitis include, but are not limited to, the following:

- preceding upper respiratory illness and/or rhinorrhea
- signs of respiratory illness which may include the following common URI symptoms:
 - wheezing
 - retractions
 - shortness of breath
 - low O₂ saturation
 - tachypnea
 - color change
 - nasal flaring
- signs of dehydration
- exposure to persons with viral upper respiratory infection.

Laboratory and Radiologic Studies

- It is recommended that routine diagnostic studies (RSV swab, chest X-rays, cultures, capillary or arterial blood gases, rapid influenza or other rapid

viral studies) **not** be performed to determine viral infection status or to rule out serious bacterial infections. Such studies are not generally helpful and may result in increased rates of unnecessary admission, further testing, and unnecessary therapies (Bordley 2004 [M], Swingler 1998 [A], El-Radhi 1999 [C], Kuppermann 1997 [C], Liebelt 1999 [D], Antonow 1998 [D], Schwartz 1995 [S], Chiocca 1994 [S], Lugo 1993 [S], Stark 1991 [S]).

Note 1: Chest X rays may be obtained as clinically indicated when the diagnosis of bronchiolitis is not clear (Swingler 1998 [A], El-Radhi 1999 [C]).

Note 2: Capillary or arterial blood gases and pulse oximetry may be obtained as clinically indicated for individual patients (Local Expert Consensus [E]).

Note 3: In selected very young infants, establishing a source through rapid viral testing may prevent unnecessary additional workup (Bordley 2004 [M]).

Management

General

The basic management of typical bronchiolitis is anchored in the provision of therapies that assures that the patient is clinically stable, well oxygenated, and well hydrated. The main benefits of hospitalization of infants with acute bronchiolitis are:

- the careful monitoring of clinical status,
- maintenance of a patent airway (through positioning, suctioning, and mucus clearance),
- maintenance of adequate hydration, and
- parental education

(Klassen 1997 [S], Lugo 1993 [S], Panitch 1993 [S], Nicolai 1990 [S], Local Expert Consensus [E]).

Medications and Oxygen

5. It is recommended to consider starting supplemental oxygen when the saturation is **consistently** less than 91% and consider weaning oxygen when **consistently** higher than 94% (NIH 1997 [E], Local Expert Consensus [E]).

Oxygen therapy is frequently required in the treatment of bronchiolitis. See Monitoring section for recommendation regarding oxygen saturation monitoring to maintain blood oxygen levels within a normal range. This range is variable in definition and patient-specific.

6. It is recommended that scheduled or serial albuterol aerosol therapies **not** be **routinely** used (Kellner 2005 [M], Flores 1997 [M], Kellner 1996 [M], Goh

1997 [A], Dobson 1998 [B], Chowdhury 1995 [B], Lugo 1998 [C], Lenney 1978 [D]).

Note 1: Although in some cases bronchiolitis may be a prelude to asthma (Martinez 1995 [C], Stark 1991 [S]), in the majority of cases the use of inhalation therapies and other treatments effective for treating the bronchospasm characteristic in asthma will not be efficacious for treating the airway edema typical of bronchiolitis (Hall 2001 [S], Klassen 1997 [S]).

Note 2: Two meta-analyses of randomized, controlled trials have not shown dramatic effects on clinical scores or hospitalization rates from therapy with nebulized albuterol in children with bronchiolitis (Flores 1997 [M], Kellner 1996 [M]).

Note 3: Deterioration and desaturation has been associated with inhalation therapies (Flores 1997 [M], Ho 1991 [B]).

7. It is recommended that a single administration trial inhalation using epinephrine or albuterol may be considered as an option, particularly when there is a family history for allergy, asthma, or atopy (Hartling 2003 [M], Klassen 1997 [S]).

Note 1: Nebulized racemic epinephrine was shown to result in better improvement in pulmonary physiology and clinical scores compared with albuterol or placebo in several studies and one systematic review. These effects predominated in mildly ill children and were transient (30 to 60 minutes) in duration (Hartling 2003 [M], Wainwright 2003 [A], Numa 2001 [O]).

Note 2: See Respiratory Care Therapy section regarding the **importance of suctioning** before any inhalation therapy.

Note 3: The expected disposition of a patient may influence the choice of beta-agonist when a single administration trial is given. There is a lack of research regarding the appropriateness of routine epinephrine use outside the acute care setting (Local Expert Consensus [E]).

8. It is recommended that inhalation therapy **not** be repeated nor continued if there is no improvement in clinical appearance between 15 to 30 minutes after a trial inhalation therapy (Klassen 1997 [S], Bausch & Lomb Pharmaceuticals 1999 [O]).

Note: In order to determine appropriateness of repeated therapy, use the [Bronchiolitis Respiratory Sheet](#) to record pre- and post-clinical score (Conway 2004 [C]).

