Bronchiolitis is a condition of the lower respiratory tract that is common in infants and young children. This article outlines the treatment and prophylaxis of severe bronchiolitis in these patients.

Treatment of childhood bronchiolitis

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Bronchiolitis is an acute seasonal viral illness characterised by fever, nasal discharge and dry wheezy cough. On examination, fine inspiratory crackles or high-pitched expiratory wheeze may be heard. Around one third of children develop bronchiolitis in the first year of life.

The symptoms of mild disease are similar to those of a cold. About one in 10 infants with mild bronchiolitis will require admission to hospital because of progression to severe bronchiolitis or pneumonia. Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis. However, the condition can also be caused by the parainfluenza viruses, influenza virus and human metapneumovirus.

RSV-associated bronchiolitis may be associated with short-term and long-term complications, including wheeze and asthma. Characteristics that increase the risk of severe RSV-associated bronchiolitis in infants and children include preterm birth, cyanotic or complicated coronary heart disease, pulmonary hypertension, chronic lung disease and congenital or acquired immunodeficiency. Lower socioeconomic status is also a risk factor for severe RSV-associated disease.

As people get older the likelihood of a viral infection progressing to bronchiolitis is reduced (because airway size increases, the immune system is more mature and there is less transmission since older children have fewer close contacts with infected infants).

Nevertheless, RSV can cause repeated infections throughout life and cause severe bronchiolitis in older children and adults, especially immunocompromised patients, elderly patients and patients with heart disease. This article will focus on the prevention and treatment of severe bronchiolitis in childhood.

Treatment

The surface glycoproteins of RSV lack neuraminidase activity leaving the neuraminidase inhibitors oseltamivir and zanamivir ineffective against RSV. Inhaled ribavirin is licensed for the treatment of severe RSV bronchiolitis; at least one study has reported a reduction in post-bronchiolitic asthma and recurrent wheeze in six-year-old children treated with nebulised ribavirin during RSV bronchiolitis.

Ribavirin is teratogenic and therefore cannot be administered as an aerosol to, or in the presence of, women who are pregnant or may become pregnant. Infants and young children with viral bronchiolitis do not benefit from treatment with antibiotics.

A recent Cochrane review concluded that inhaled bronchodilators (beta2-agonists and antimuscarinics) can reduce clinical symptom scores in the short term but do not reduce the rate of hospital admissions for infants and children with moderate-to-severe bronchiolitis. Most studies that have investigated the use of oral corticosteroids failed to demonstrate significant reduction in length of hospital stay or clinical symptom score for infants and young children. The results of recent studies indicate that for infants aged between six weeks and 12 months with moderate-to-severe bronchiolitis, treated in the emergency department, combined therapy with a corticosteroid (oral dexamethasone) and a bronchodilator (nebulised adrenaline) reduced the number of hospital admissions (P=0.02).

Although recent research does not support the routine use of bronchodilators or corticosteroids, further investigation is needed to explore the combination of these treatments.

Another recent and promising development is the use of nebulised hypertonic saline; treatment with 3% saline resulted in a 26% reduction in duration of hospital stay for infants with viral bronchiolitis. Further studies are necessary to investigate more fully the effectiveness of nebulised hypertonic saline and its place in therapy.

Supportive measures include supplementation of oxygen (increasing to nasal bi-level positive-airway pressure or intubation and mechanical ventilation if required), enteral feeding and intravenous fluids.

OBJECTIVES

Studying this article will help you gain a better understanding of:

- The clinical features of bronchiolitis and the risk factors for developing moderate-to-severe disease
- The treatment of moderate-to-severe bronchiolitis in infants and children
- The prophylaxis of bronchiolitis caused by RSV
Prophylaxis
Palivizumab is a humanised murine monoclonal anti-F glycoprotein with neutralising and fusion inhibitory activity against RSV. It is administered intramuscularly at a dose of 15 mg/kg once every 30 days during the peak infection period to those at high risk of infection. The efficacy of palivizumab was established in two randomised, placebo-controlled trials.

The Impact-RSV study evaluated the effectiveness of palivizumab for infants with chronic lung disease and also for infants who were premature at birth and below six months of age during the RSV season (from October through to March in the UK). In this study, prophylaxis reduced the number of RSV cases requiring hospital admission by 55% (P < 0.001). The second study involved administration of palivizumab to infants with coronary heart disease; RSV-associated bronchiolitis. In these two studies, it is believed that infants born prematurely will benefit the most from prophylaxis with palivizumab.

No clinical trials of palivizumab have reported a reduction in deaths caused by RSV-associated bronchiolitis.

Motavizumab, an anti-RSV antibody, has been evaluated in phase III clinical trials for the prophylaxis of RSV-associated bronchiolitis and observational prospective studies are currently under way.

Measures to prevent viral transmission are also important (eg, reducing contact between infants, reducing exposure of at-risk infants to infected individuals and use of hospital infection-control policies). Infants should not be exposed to tobacco smoke — especially those known to be at high risk of developing bronchiolitis. It is unclear whether or not breastfeeding can prevent RSV infection.

Clinical and cost considerations
The Joint Committee on Vaccination and Immunisation (2005) advised prophylaxis using palivizumab for:

- Children under two years of age with chronic lung disease
- Infants less than six months of age who have left-to-right cardiac shunt, haemodynamically significant congenital heart disease or pulmonary hypertension
- Children under two years of age with severe congenital immunodeficiency

The American Academy of Pediatrics recommends the use of palivizumab for RSV prophylaxis in premature infants (up to age 90 days or for up to three doses, whichever comes first) if they attend childcare or if at least one other child aged under five years lives permanently in the household.5

In the new NHS climate of productivity and efficiency clinical pharmacists can assist in assessing the effectiveness of high-cost treatments (such as palivizumab) and can advise multidisciplinary committees on how to make best use of pharmaceutical resources. Clinical pharmacists can help develop guidelines for the prophylaxis and treatment of RSV infection. Guidelines need to address the dose and reconstitution procedures, treatment of adverse reactions, duration of treatment and administration of doses in special situations (eg, for infants who undergo coronary bypass surgery, since serum levels of palivizumab are reduced in the postoperative period). Pharmacists can also have input into hospital infection-control policies aimed at containing outbreaks of RSV infection.

References
3 Guttmann AM, Bhaseal AL. Bronchodilators for bronchiolitis. Cochrane Database of Systematic Reviews 2006; issue 3.