

BRONCHIOLITIS

Viral bronchiolitis in children

Meissner HC. New England Journal of Medicine 2016; 374:62-72

Risk factors for respiratory syncytial virus associated with acute lower respiratory infection in children under five years: systematic review and meta-analysis

Shi T, et al. Journal of Global Health 2015; 5: 020416

- **What viruses are known to cause bronchiolitis?**
RSV (50-80%), Human rhinovirus, parainfluenza virus, Human metapneumovirus, coronavirus, adenovirus, influenza virus, enterovirus.
- **What are the risk factors for severe RSV bronchiolitis?**
Prematurity, low birth weight, passive smoking (i.e. a parent who smokes), lack of breast feeding, crowding, chronic lung disease, congenital heart disease, immunodeficiency, low concentrations of maternal antibodies.
- **What is the pathogenesis of RSV in the lungs and why does it get worse over the first 2-3 days?**
The virus has an incubation period of 4-6 days. The virus first replicates in the nasal epithelium leading to congestion, coryza, irritability and poor feeding, with fever in 50% of cases. Nasopharyngeal cells are sloughed and aspirated, carrying RSV to the lower respiratory tract. When the virus enters mucosal epithelial cells in the lower respiratory tract (bronchioles and alveoli) the virus replicates. Viral replication initiates an influx of T lymphocytes and activated granulocytes. This leads to cellular infiltration of the peribronchial tissue, oedema, increased mucous secretion, sloughing of infected epithelial cells, and impaired ciliary function causing intraluminal obstruction of the small airways. During inspiration negative intrapleural pressure is generated and air flows past the obstruction. During expiration the positive pressure of further narrows the airways, producing greater obstruction, and obstructing air flow, causing wheeze. Absorption of trapped air in the alveoli distal to obstruction leads to localised atelectasis. This leads to a mismatch of ventilation and perfusion (i.e. segments of the lung that have blood flow with deoxygenated blood but no air flow). This causes hypoxaemia (low oxygen levels in arterial blood), because the blood returning to the left heart has not been in contact with aerated alveoli. Regeneration of the bronchial epithelium begins within 3-4 days with the resolution of symptoms.
- **Why is hospitalisation for bronchiolitis most common between 30 and 90 days of age?**
This is the period that is associated with the declining concentration of transplacentally acquired maternal antibodies. It may also be because of the narrowness of the airways in infants; they are more easily blocked causing airflow obstruction than in older children.
- **After one episode of RSV bronchiolitis can a child get it again?**
Yes, RSV reinfections occur throughout life. This is despite the development of antibodies and T-cell responses after the primary infection.
- **What treatments are recommended in the management of bronchiolitis?**
Oxygen therapy recommended if the $SpO_2 < 90\%$. Antibiotics are not recommended unless there is a strong suspicion of bacterial infection. WHO recommends that antibiotics can be withheld from children who have wheeze and fast breathing but no danger signs. High fever ($T > 39^\circ C$) increases the risk that there is bacterial infection. Chest x-ray should not be routinely done:

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infiltrates and atelectasis are common, but do not predict bacterial infection, so are not an indication for antibiotics. Minimal handling; breast feeding or nasogastric feeding will often calm an unsettled infant. Nebulized hypertonic saline may improve symptoms of moderate bronchiolitis.