Infections Due to Respiratory Syncytial Virus (RSV): Strategies to Achieve Optimal Outcomes

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Summary

Respiratory syncytial virus, one of the most common causes of viral infection of the respiratory tract, presents as an upper or lower respiratory tract infection. Acute infections can result in hospitalizations and long-term sequelae. Children born prematurely, children with chronic lung disease or congenital heart disease, the elderly, those with underlying respiratory or cardiac disease, and those with compromised immune systems are at highest risk for severe infections. Infection control procedures are important to limit the spread of RSV. Prevention with immune therapy is effective in high-risk pediatric patients.

Key Points

- Respiratory syncytial virus (RSV) can present as an upper or lower respiratory tract infection.
- It is the most common viral infection of the respiratory tract in pediatrics, and is second to influenza in adults.
- RSV leads to significant inflammation in the lower respiratory tract that can have long-term sequelae (asthma).
- Severe infections can occur in children born prematurely, children with chronic lung disease or congenital heart disease, the elderly, those with underlying respiratory or cardiac disease, and those with compromised immune systems.
- There are no specific treatments for RSV infection.
- Palavizumab (Synagis®) is an effective preventative agent for use in pediatrics.
- Other promising preventative agents are under development.

RESPIRATORY TRACT INFECTIONS ARE the most common infections seen in both the ambulatory and hospital setting. These infections are the most common indication for antibiotics.

Because everything is connected, the respiratory tract can be viewed as a single unit (Exhibit 1). In humans, the oral pharyngeal unit is colonized with bacteria and viruses. Below the glottis, everything should be sterile. Lower respiratory tract infections occur in the larynx and lungs. Upper respiratory tract infections occur in the tonsils, middle ear, maxillary sinuses, or frontal sinuses.

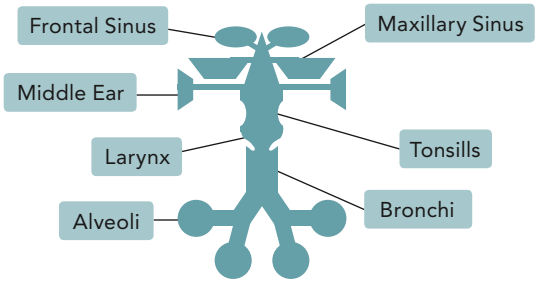
The most common infection of the respiratory tract is viral rhinitis. Commonly, this is caused by rhinovirus (common cold) but respiratory syncytial virus (RSV) also is a cause of upper respiratory tract infections. Because of edema and lack of drainage, it is common for viral rhinitis to be complicated by viral sinusitis. A common dilemma for clinicians is distinguishing viral from bacterial sinusitis, which requires antibiotics. Viral sinusitis will typically resolve within a few days. If tenderness and drainage continues beyond five to seven days, there is likely bacterial sinusitis.

Viral bronchitis is common in all age groups. In children less than 2, RSV is the number one virus causing lower respiratory tract infections. Even in adults, RSV is second behind influenza for causing respiratory viral infections. RSV has been implicated in a large number of COPD exacerbations.

In viral pneumonia in pediatrics, RSV causes more than 50 percent of cases. In adults, 20 to 30 percent of pneumonia cases are viral. Among viral pneumonia cases in adults, influenza is number one and RSV is second.

RSV is the most common respiratory infection in infancy or childhood. Approximately one-half of all infants are infected with RSV during their first year of life, and nearly all children have been infected at least once by the time they reach their second birthday. Children born prematurely, as well as those with chronic lung disease or congenital heart disease, are at highest risk for severe disease and hospitalization due to RSV. Each year, an estimated 125,000 infants in the

Exhibit 1: Respiratory Tract



United States are hospitalized with severe RSV infections, the leading cause of infant hospitalization in the United States. RSV also may cause severe illness in other high-risk groups such as the elderly, those with underlying respiratory or cardiac disease, and those with compromised immune systems (e.g., bone marrow transplant patients).

One episode of RSV does not protect the patient from future episodes. Primary infection usually occurs early in life (before 2) and may present as pneumonia. Subsequent infections are less severe because of immunoglobulins formed in response to previous infections. The first episode will be pneumonia, subsequent infection bronchitis, and third rhinitis. A healthy adult will get mild upper respiratory infections with RSV.

RSV can present as an upper or lower respiratory tract infection. There also can be a superimposed bacterial infection. With RSV, the cytokine response of the body is what produces most of the damage in the lungs. RSV attaches to and destroys the ciliary cells in the respiratory tract. Since the cilia are an important defense mechanism, bacteria can enter the respiratory tract and begin to multiply. Although it has significant effects on the respiratory tract, RSV does not infect other parts of the body. Pneumonia, severe respiratory distress, or apnea, are the reasons patients with RSV may require hospitalization.

RSV can be diagnosed clinically or through diagnostic testing. Like influenza, there is a rapid point of care test for RSV. Results from an oral swab are obtained in 30 minutes. RSV culture also can be used, but this is not widely available. Polymer chain reaction (PCR), which checks for viral DNA, is the more commonly used laboratory test.

In the past, there was only clinical diagnosis of viral infections. As more tests for viruses become readily available, a confirmation of the suspected diagnosis can be made. The epidemiology of various viruses will be better understood with better data.

Beyond the acute problems caused by RSV, long-term sequelae do occur. Asthma can occur after infection with RSV and other viruses. This appears to be the result of chronic airway inflammation.

RSV needs to be considered when patients present with respiratory tract infections. With severe disease, the patient will need hospitalization for respiratory support (i.e., oxygen, bronchodilators). Corticosteroids, ribavirin, and immunoglobulins also are used as nonspecific treatments. In theory, these treatments should help, but there are no good studies to prove that these interventions are beneficial.

RSV prevention, at least in pediatrics, is support by good data. RSV is spread just like influenza thus good hand washing is critical to prevent spread. Children who are immunocompromised should not be attending day care. RSV spreads wildly in day care settings. Additionally, health care workers can spread RSV. Health care workers with a respiratory infection should not be in contact with patients. Although most hospitals do not isolate patients with RSV, infection control procedures are needed to limit the spread of the infection within the hospital setting.

Immunoprophylaxis is the use of immunoglobulin (antibodies) for RSV prevention in patients at risk for severe disease. Palavizumab (Synagis®) is the only monoclonal antibody approved by the FDA to help prevent an infectious disease. It decreases hospitalization and the rate of infection secondary to RSV. Since its licensure in 1998, Synagis has been administered to more than 800,000 infants in the United States and has become the standard of care for infants at high risk for RSV. Motavizumab (Numax®) is an investigational humanized monoclonal antibody in Phase 3 development to prevent serious lower respiratory tract disease caused by RSV in pediatric patients at high risk of disease. Although not yet approved by the FDA, data on this agent appear positive.

Conclusion

RSV is the most common viral infection of the respiratory tract in pediatrics and is second to influenza in adults. It presents as an upper or lower respiratory tract infection but is confined to the respiratory tract. Significant inflammation from a lower respiratory tract infection can have long-term sequelae (asthma). Severe infections requiring hospitalizations can occur in children born prematurely, children with chronic lung disease or congenital heart disease, the elderly, those with underlying respiratory or cardiac disease, and those with compromised immune systems (e.g., bone marrow transplant patients). Infection control procedures are important to limit the spread of RSV. Although there are no specific treatments for RSV infection, there is one effective preventative agent for use in pediatrics. **JMCM**

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