Respiratory Syncytial Virus

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Key Points

- Respiratory syncytial virus (RSV) causes annual seasonal epidemics and is transmitted by contact with contaminated secretions.
- Palivizumab, a humanized monoclonal antibody, may be used for the prophylaxis of RSV infection in certain high-risk infants.
- Infants at high-risk for RSV infection should avoid crowds, tobacco smoke, daycare, and individuals with upper respiratory tract infections.
- Hospitalized infants with RSV infection should be placed in contact precautions and scrupulous adherence to hand hygiene practices should be enforced.
- Parents with signs and symptoms of upper respiratory tract should be excluded from the newborn nursery or neonatal intensive care unit.

Definition, Assessment, and Diagnosis

Definition

- Respiratory syncytial virus (RSV) is the leading cause of serious lower respiratory infections and hospitalizations in infants and young children.[1]
- RSV is an RNA virus with two identified subtypes, A and B. The two subtypes frequently circulate concurrently. Evidence suggests that antigenic differences can affect susceptibility to infection, and there are some strains that are more virulent than others.

- RSV infection only offers limited protective immunity; therefore, children can be infected repeatedly throughout life. Almost all children are infected at least once before they are 3 years old.

Assessment and epidemiology

- RSV is transmitted directly by close contact with contaminated secretions via large droplets or indirectly via RSV-contaminated hands or fomites. Good hand washing hygiene helps prevent transmission.
- The season generally starts in the late fall and lasts until early spring, but sporadic infection can occur throughout the year.
- The incubation period ranges from 2 to 8 days with the most common being 4 to 6 days. Viral shedding is usually 3 to 8 days, but can last as long as 3 to 4 weeks in young infants and immunocompromised individuals.
- Clinical manifestations
    - Neonates infected with RSV present with non-specific symptoms such as poor feeding, apnea, irritability, and difficult or rapid breathing.

Diagnosis

- Laboratory methods available to diagnose RSV
    - Rapid diagnostic immunoassays for detection of viral antigen in nasopharyngeal specimens. These are generally reliable in infants and young children during the annual epidemic and commercially available. Lower sensitivity is observed in older children and adults.
    - Polymerase chain reaction assay is more sensitive and rapid than cell culture and is available at Arkansas Children's Hospital.
    - Cell culture isolation from nasopharyngeal secretions requires 3 to 5 days, but because methods of isolation are exacting, results can vary among laboratories. It is of limited use in the management of infected infants.

Management

Prevention/Prophylaxis

- The available product for prophylaxis is palivizumab, a humanized monoclonal antibody. It is administered monthly at the beginning of RSV season: November in Arkansas. The Section of Infectious Diseases at Arkansas Children's Hospital in conjunction with pediatric groups in the state will give recommendations about the date for initiation of palivizumab immunization. Generally, 3 to 5 doses, depending on gestational age, will provide protection during the RSV season. Palivizumab is dosed at 15 mg/kg intramuscularly (IM) once a month. In Arkansas, administration of palivizumab normally starts November 1 with the last dose given by March 31.

2015 Recommendations by the AAP for Use of Palivizumab

The 2015 recommendations by the American Academy of Pediatrics for palivizumab use are as follows:

Infants born at < 29 weeks, 0 days' gestation with chronic lung disease (CLD) or congenital heart disease

(CHD)

Infants born < 29 weeks, 0 days' gestation who are 1 year of age or younger at the start of RSV season may receive palivizumab. A maximum of 5 monthly doses is recommended for infants in this category. Infants born during RSV season will require fewer than 5 doses. RSV prophylaxis is not recommended during the second year of life.

Preterm infants born at ≤ 32 weeks, 0 days with CLD

Palivizumab can be administered to infants younger than 12 months of age who develop CLD of prematurity defined as receiving > 21% oxygen for at least the first 28 days of life. During the second year of life prophylaxis is only recommended for infants meeting the definition of CLD of prematurity and continue to require supplemental oxygen, diuretic or chronic corticosteroid therapy within 6 months of the start of their second RSV season. Patients should receive a maximum of 5 doses.

Infants with Hemodynamically Significant CHD < 12 Months of Age at the Start of the RSV season

- Infants with moderate to severe pulmonary hypertension, and acyanotic heart disease who require medication to control congestive heart failure and will require cardiac surgical procedures are included in this category.
- For infants with cyanotic heart defects, decisions regarding prophylaxis in the first year of life may be made in consultation with a pediatric cardiologist.
- Other forms of acyanotic heart disease such as secundum atrial septal defect, small ventricular septal defect, pulmonic stenosis, uncomplicated aortic stenosis, mild coarctation of the aorta and patent ductus arteriosus, or infants whose cardiac lesion has been corrected by surgery and no longer require medical therapy, or infants with mild cardiomyopathy who do not require medication are generally not candidates for prophylaxis.
- RSV prophylaxis is not recommended during the second year of life.
- Infants and toddlers < 2 years of age undergoing cardiac transplantation during RSV season should be considered as candidates for palivizumab.
- Children < 2 years of age receiving palivizumab prior to a surgical procedure that will involve cardiopulmonary bypass and who will continue to require prophylaxis following surgery should receive a postoperative dose of palivizumab (15 mg/kg) following cardiac bypass or extracorporeal membrane oxygenation.

Infants with Significant Anatomic Abnormalities of the Airway or a Neuromuscular Condition

- Infants with significant anatomic abnormalities of the airway or a neuromuscular condition that compromises the handling of respiratory tract secretions may be considered for immunoprophylaxis in their first year of life. These infants should receive up to 5 doses of palivizumab.

Immunocompromised-Children

- Palivizumab prophylaxis has not been evaluated in randomized trials in immunocompromised children. However, children < 24 months of age who are profoundly immunocompromised during RSV season may be considered for prophylaxis.

Infants who Experience Breakthrough RSV Infection

- Infants who experience breakthrough RSV infection while receiving palivizumab should not continue receiving prophylaxis.

Infants with Cystic Fibrosis (CF)

- A diagnosis of CF by neonatal screening is not sufficient to warrant RSV prophylaxis with palivizumab.
- Infants < 1 year of age with CF and CLD and/or nutritional compromise may be considered for prophylaxis with palivizumab.
- During the second year of life continued palivizumab prophylaxis may be considered for infants with severe lung disease as manifested by a previous hospitalization for pulmonary CF exacerbation during the first year of life or chest ray/chest computed tomography or weight for length < 10^{th} percentile.

Infants with Down Syndrome

- Current data does not support the use of palivizumab in this population of infants.

Infants who are Hospitalized

- Infants who are hospitalized should receive their first dose of palivizumab 48 to 72 hours prior to discharge or promptly after discharge.

Risk Factors

- Exposure to tobacco smoke is a controllable risk factor and prevention is more cost effective than the palivizumab prophylaxis. Therefore, some insurance carriers and state departments of health do not pay for prophylaxis, although cigarette smoke is an environmental pollutant.
- High-risk infants should be kept away from large crowds.
- Participation in daycare should be discouraged.

Cost Effectiveness

- The cost effectiveness of palivizumab has not been proven, and most studies do not support an economic advantage of palivizumab, except in certain high-risk populations (e.g., ex-preterm children with chronic lung disease). However, cost should not be the sole determinant of effectiveness.

Control Measures

- Educate parents/caregivers about the risks of RSV infection and its prevention.
- Emphasize hand washing.
- Keep high-risk infants away from tobacco smoke. Encourage smoking cessation for family members who are smokers.
- Keep high-risk infants away from crowds and anyone who has an upper respiratory tract infection.
- Participation in daycare should be avoided, if possible.
- In the high-risk setting, such as the PICU or NICU, infants with RSV should be identified as soon as possible and isolated with contact precautions (gown and gloves) and careful attention to hand washing. Other methods of control include laboratory screening using PCR of all infants, cohorting, gown and glove isolation, visitor screening, and staff screening for RSV. Rapid assays should not be used for screening of asymptomatic infants.

Treatment

- After the diagnosis is made, treatment is supportive. This includes hydration, close observation

of respiratory status, and use of supplemental oxygen and ventilation if needed.
- Infants hospitalized with RSV should be cared for with contact precautions and should be placed in a single room or in a cohort.

Other Measures

- Corticosteroids – not recommended
- Beta-adrenergic agents – not recommended for routine care of wheezing associated with RSV
- Antimicrobial therapy – not indicated unless there is evidence of secondary bacterial infection
- Ribavirin- not recommended for routine use, but may be used in selected patients.

This guideline was developed to improve health care access in Arkansas and to aid health care providers in making decisions about appropriate patient care. The needs of the individual patient, resources available, and limitations unique to the institution or type of practice may warrant variations.

References

References

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