Influenza, Seasonal, in Children and Adolescents

Description/Etiology

Seasonal influenza is a contagious respiratory disease caused by several strains of influenza type A and B viruses (for more information, see Quick Lesson About ... Influenza, Seasonal). The most common A subtypes involved in seasonal influenza are H1N1 and H3N2, which cause recurrent annual epidemics, especially during the winter season. In 2009 a new influenza virus emerged, Pandemic (H1N1) 2009, which spread worldwide, causing a public health emergency that was declared to be resolved in August of 2010. Pandemic (H1N1) 2009 has continued to circulate in a seasonal pattern along with other strains of H1N1 and H3N2 influenza A subtypes (for more information, see Quick Lesson About ... Influenza, Pandemic (H1N1) 2009).

Transmission occurs by inhalation of large droplets that are expelled when an infected person coughs or sneezes or by direct contact of mucous membranes (e.g., inner membranes of the eyes, nose, or mouth) with a surface that has been recently contaminated with the influenza virus. Signs and symptoms typically appear 1–4 days after exposure, are sudden in onset, and are self-limiting, usually resolving in 3–7 days. Infected adults can transmit the virus 5–10 days after signs and symptoms develop, but are most contagious during the peak of signs and symptom presentation. Children have a longer period of viral shedding and spread the virus for 10 or more days after onset of signs and symptoms, which plays an important role in influenza transmission.

Rates of influenza are highest among children. The risk of complications and death is increased in children who are under 2 years of age; children who are younger than 6 months of age and children with a chronic health condition (e.g., heart abnormalities, neurologic disorders, metabolic disorders) are at highest risk. Otitis media is the most common complication of influenza in children. Other potential complications in children and adolescents include pneumonia, croup, febrile seizures, meningitis, bacterial infections, post-influenza asthma, apnea (in neonates), myocarditis, dehydration, exacerbations of preexisting conditions (e.g., asthma, diabetes mellitus), and death.

Antiviral medications are typically effective in minimizing the severity and duration of signs and symptoms if taken within 48 hours of onset, and can be prescribed in children with suspected or confirmed influenza infection who are hospitalized, who are at high risk for complications, or when there is suspicion of lower respiratory tract compromise. Treatment includes pharmacotherapy (e.g., antipyretics, analgesics) and intensive supportive care to prevent or manage complications. Vaccination is the preferred method for preventing influenza. Constant monitoring and adjustment to the composition of influenza vaccines is necessary because influenza viruses mutate to different strains with minor changes; this is referred to as antigenic drift.

Facts and Figures

In the United States, influenza is responsible for more than 200,000 hospitalizations and about 36,000 deaths each year. Only 5% of children and adolescents who have influenza are hospitalized. Eighty percent of children who are hospitalized for influenza each year are under 2 years of age and 50% of those are younger than 6 months of age. The most common circulating influenza virus during the 2015/2016 influenza season was influenza A (H3N2), but cases of influenza B and Pandemic (H1N1) 2009 were also reported. A total of...
11 influenza-associated pediatric deaths occurred in the U.S. during the 2015/2016 influenza season; during the period 2004–2015, the total influenza-associated pediatric death toll ranged from 37 to 358 per season.

**Risk Factors**
Crowded and close environments increase the risk of influenza epidemics. Risk factors for acquiring influenza include being newborn to 5 years of age; being a student; being developmentally handicapped; being in day care; and residence in a long-term care facility. Children and adolescents with malignancy, immunosuppression, asthma, neuromuscular disease, spinal cord injury, metabolic disease (e.g., diabetes mellitus), hemoglobinopathies, or chronic pulmonary or cardiac disease are at increased risk for influenza complications.

**Signs and Symptoms/Clinical Presentation**
Signs and symptoms of uncomplicated influenza in children typically include the sudden onset of cough, high fever, and rhinorrhea. Rhinorrhea is more common in infants who are under 6 months of age, and sore throat is more common in children who are over 5 years of age. Clinical presentation can also include malaise, myalgia (i.e., muscle pain), headache, sneezing, chills, diarrhea, nausea, and vomiting. Otitis media might be present if the child complains of ear pain. Complicated or severe disease is characterized by lower respiratory tract abnormalities, secondary infection and sepsis, encephalopathy, dehydration, and multiorgan failure. Progressive disease is defined by evidence of cardiovascular insufficiency, neurological complications, severe dehydration, or sustained bacterial/viral proliferation.

**Assessment**

› **Laboratory Tests That May Be Ordered**
  - Reverse transcription polymerase chain reaction (RT-PCR) will detect and differentiate influenza viruses from clinical specimens in affected individuals
  - Fluorescent antibody testing (e.g., immunofluorescence microscopy) will identify antibodies from nasal, throat, or sputum specimens in infected individuals, but it does not differentiate between Pandemic (H1N1) 2009 and other seasonal influenza strains
  - Culture of nasal secretions can identify the causative virus but the test does not produce timely results
  - Rapid influenza testing differentiates influenza type A from influenza type B viruses, but test accuracy depends on the prevalence of influenza in a particular season

› **Other Diagnostic Tests/Studies**
  - Chest X-ray can be ordered if primary or secondary pneumonia is suspected

**Treatment Goals**

› **Promote Symptomatic Relief and Reduce Risk of Complications**
  - Monitor vital signs, assess all physiologic systems (especially respiratory), and review laboratory/diagnostic study results; immediately report abnormalities and treat as ordered
  - Follow facility infection control protocols and protocols for mandated reporting of infectious diseases
  - Administer prescribed antiviral drugs (e.g., oseltamivir [Tamiflu], zanamivir [Relenza]) as ordered. Antiviral treatment can be started without laboratory confirmation
  - Consult a drug information resource for current information on dosage by age and weight in children and adolescents
  - Administer prescribed medications for relief of symptoms, including antipyretics (e.g., ibuprofen, acetaminophen) to reduce fever (see Red Flags, below), analgesics if pain is assessed or reported by the patient, decongestants, and agent-specific antibiotics if bacterial infection (e.g., otitis media, bacterial pneumonia) is suspected
  - Monitor for complications and provide intensive supportive care, including oxygen administration, as ordered; monitor treatment efficacy and for adverse effects

› **Educate About Post-Acute Care and Preventing Further Transmission**
  - Encourage family member vaccination, visitation and assistance with patient care, and rooming-in per facility protocol
  - Assess patient (as age-appropriate)/family member anxiety level and coping ability; provide emotional support, educate, and encourage discussion about transmission prevention, potential complications, and risks and benefits of treatment and vaccination
  - Educate that the U.S. Centers for Disease Control and Prevention (CDC) recommends that all children who are 6 months of age and older receive annual influenza vaccination
- The 2015/2016 trivalent influenza vaccine (TIV) contains viral proteins derived from an influenza A (H1N1)-like virus, an influenza A (H3N2)-like virus, and influenza B virus. The quadrivalent vaccine includes the same three vaccine virus plus another influenza B virus. Children can receive either vaccine.
- Children who are 6 months to 8 years of age who received at least two doses of either the TIV or quadrivalent vaccine before July 1, 2015, even if not in the same year, should receive one doses for the 2015/2016 season.
- Healthy children over 2 years of age and adolescents who are not pregnant can receive either the TIV or the live attenuated influenza vaccine (LAIV; e.g., FluMist), which does not contain thimerosal (i.e., a substance that has been the subject of much controversy despite evidence that it is not associated with the development of autism).
- It is important that household contacts and caregivers outside the home receive vaccination if children who are younger than 5 years of age develop influenza, especially children who are under 6 months of age and those with a high risk of developing influenza complications.

**Food for Thought**

› Although both TIV and LAIV are produced in eggs, both vaccines, given in age appropriate doses, are well tolerated in children considered to have an egg allergy, especially if the reaction was hives and did not require treatment with EPINEPHrine (Committee on Infectious Diseases, American Academy of Pediatrics, 2015)

**Red Flags**

› The LAIV is not recommended for individuals who are immunocompromised, have severe life-threatening allergies to any component of the vaccine, have a history of Guillain-Barré syndrome (GBS), or have moderate or severe illness or fever.
› Aspirin is contraindicated in children and adolescents because it can cause Reye’s syndrome.
› CSL seasonal influenza vaccine (Afluria) is no longer recommended for children who are 6 months to 8 years of age because it has been associated with fever and febrile seizures.
› In spite of the reported frequency of resistance among influenza viruses to the antiviral drugs oseltamivir, amantadine, and rimantadine, the CDC recommends consultation of state surveillance data regarding drug resistance during the influenza season.

**What Do I Need to Tell the Patient/Patient’s Family?**

› Provide the parents or other caregiver with written information on influenza, if available, to reinforce verbal education.
› Educate to implement strategies to prevent spreading the virus, including droplet and contact precautions (e.g., covering the mouth and nose with tissue when coughing and sneezing, frequently performing thorough hand hygiene) to prevent transmission; closely monitor for signs and symptoms of complications.
› Educate that the child should rest and drink fluids to prevent dehydration.

**References**