Prevention of Influenza in Children

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KEYWORDS

• Influenza • Vaccine • Antivirals • Treatment • Chemoprophylaxis

KEY POINTS

- Vaccination remains the best available preventive measure against influenza.
- Annual seasonal influenza vaccine is recommended for all people 6 months and older, including children and adolescents.
- Vaccine effectiveness can vary based on the match or mismatch of circulating viruses with vaccine strains, vaccine product, and age and immune state of patients.
- Antiviral medications are important in the control of influenza, but are not a substitute for influenza vaccination.
- The neuraminidase inhibitors, oseltamivir and zanamivir, are the only antiviral medications recommended for chemoprophylaxis or treatment of influenza in children.

INTRODUCTION

Influenza causes significant morbidity and mortality every season. The 50 to 60 million cases each year result in approximately 25 million physician visits, 117,000 to 816,000 hospitalizations, and between 3,300 and 48,000 deaths. Mortality secondary to the influenza virus has been reported in chronically ill and previously healthy children. Invasive secondary infections or coinfections with group A streptococcus, *Staphylococcus aureus* (including methicillin-resistant *S aureus*), *Streptococcus pneumoniae*, or other bacterial pathogens can result in severe disease and death.

Most cases of influenza are resolved without serious complications for healthy persons between the ages of 2 and 65. However, these individuals can increase a community's disease burden and put vulnerable populations in danger of complications

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from infection leading to hospitalization or even death. Vulnerable pediatric populations include children with high-risk conditions, such as hemoglobinopathies, chronic lung disease, asthma, cystic fibrosis, malignancy, diabetes mellitus, chronic renal disease, and congenital heart disease. Many complications, including death, may be prevented by annual influenza immunization.

INCIDENCE AND MORTALITY RATES

Influenza infects approximately 5% to 20% of children annually with school-aged children having the highest attack rates during pandemic and nonpandemic influenza seasons.[1,2] Children are the primary introducers of influenza into households with a secondary attack rate of 15% to 25% and are important vectors of influenza transmission in the community.[3] School holidays may impact transmission with secondary peaks in infection occurring once school resumes.

Pediatric mortality caused by influenza infection has been a nationally notifiable condition since 2004. On average, influenza causes 100 pediatric deaths per influenza season (**Table 1**). However, during the 2009 H1N1 influenza pandemic, which lasted from April 15, 2009 to October 2, 2010, a total of 348 pediatric deaths were reported to the Centers for Disease Control and Prevention (CDC).[4] In one study of 794 US children who died from influenza (median age, 7 years) between 2004 to 2005 through the 2011 to 2012 influenza seasons, 43% had no high-risk condition. Among the 57% that had one or more high-risk medical conditions, neurologic disorders were the most common condition reported (33%), followed by pulmonary disorders including asthma (26%), chromosome or genetic abnormalities (12%), and congenital or other type of cardiac disease (11%).[5] This study emphasizes that previously healthy children and those with underlying high-risk conditions are at risk for influenza death.

PATIENT HISTORY

Influenza is typically spread from person to person by large-particle respiratory tract droplets that are transmitted via coughing or sneezing. Contact with contaminated surfaces is another possible mode of transmission. Symptoms of influenza typically

Table 1
Pediatric deaths and hospitalizations by season and predominant strain

Influenza Season	Predominant Strain	Pediatric Deaths	Hospitalizations (0–4 y Old) Per 100,000	Hospitalizations (5–17 y Old) Per 100,000
2014–2015[a]	H3N2	145	58.3	16.9
2013–2014	pH1N1	111	47.3	9.4
2012–2013	H3N2	171	67	14.6
2011–2012[a]	H3N2	37	16	4
2010–2011	H3N2	123	49.5	9.1
2009–2010	pH1N1	288	77.4	27.2
2008–2009	H1N1	137	28	5
2007–2008	H3N2	88	40.3	5.5
2006–2007	H1N1	77	34.6	2.3
2005–2006	H3N2	46	28	4

[a] Vaccine strains did not change from previous influenza season.

From Centers for Disease Control and Prevention. FluView 2014–2015. Available at: http://www.cdc.gov/flu/weekly/fluviewinteractive.htm. Accessed August 14, 2015.