

# Updates on Influenza Vaccination in Children



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## KEYWORDS

• Influenza vaccination • Vaccine effectiveness • Immunogenicity • Safety • Antiviral

## KEY POINTS

- Routine annual influenza vaccination is recommended for all persons without contraindications 6 months of age and older.
- Influenza is a source of substantial illness burden among children, especially younger children and those with certain chronic medical conditions.
- Vaccines licensed for children in the United States include various intramuscular inactivated influenza vaccines. Live attenuated influenza vaccine (LAIV) is licensed for children 2 years of age and older but as of “the 2017-18 influenza season”, it is not recommended for use.
- Effectiveness of influenza vaccines varies from season to season.
- Influenza antiviral medications are an important adjunct to vaccination, particularly for children at high risk of severe illness.

Influenza viruses cause illness in millions of children annually. Although most infected children will recover without complications, influenza can cause serious illness, particularly among young children and those with chronic medical conditions. Since 2008, influenza vaccination has been recommended by the US Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) for all children 6 months of age and older who do not have contraindications.<sup>1</sup>

## EPIDEMIOLOGY

Seasonal influenza is an important cause of morbidity and mortality in children, with an estimated 600,000 to 2,500,000 influenza-associated outpatient medical visits and

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6000 to 26,000 hospitalizations per year among children younger than 5 years old during recent US seasons.<sup>2</sup> Since 2004, 37 to 171 influenza-associated deaths among children younger than 18 years have been reported during nonpandemic seasons, with 358 deaths reported during the 2009 pandemic.<sup>3</sup>

Children less than 5 years, and particularly those less than 2 years, are at higher risk for severe outcomes due to influenza, including influenza-associated hospitalizations and death.<sup>4–7</sup> Several studies have estimated that younger children, particularly infants and those younger than 5 years of age, are more likely to be hospitalized than older children.<sup>4,7–9</sup> Complications of influenza in children include pneumonia, asthma exacerbations, dehydration, and, less commonly, lung abscess/empyema, bacteremia/sepsis, acute renal failure, myocarditis, and neurologic complications such as encephalopathy and encephalitis.<sup>10–12</sup> Bacterial coinfection may occur, most commonly with *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Streptococcus pyogenes*.<sup>10,11,13</sup> Children with underlying medical conditions, such as immunosuppression; prematurity; and pulmonary, cardiac, hematologic, or neurologic/neuromuscular disorders are at higher risk for influenza complications.<sup>14–16</sup> However, many influenza-associated hospitalizations and deaths occur in healthy children without known high-risk conditions.<sup>5,6,17</sup>

## HISTORY OF INFLUENZA VACCINES AND VACCINE RECOMMENDATIONS IN CHILDREN

In the United States, routine vaccination of healthy children has been recommended only relatively recently (**Table 1**). Vaccination of persons of any age with certain chronic medical conditions has been recommended as early as publication of US guidance for the use of influenza vaccines in the civilian population in 1960.<sup>18</sup> The description of conditions considered to confer risk of severe illness due to influenza has evolved over time (**Box 1**).

The recommendation to vaccinate healthy individuals in the United States (those without recognized risk factors for severe illness) was largely focused on persons aged 65 years of age and older from the early 1960s through the late 1990s (adults aged 50 through 64 years were added in 2000).<sup>19</sup> Routine vaccination was encouraged when feasible for all children 6 through 23 months of age starting with the 2002–03 season.<sup>20</sup> A full recommendation for vaccination of healthy children in this age group (as well as contacts and caregivers of children 0 through 23 months of age) was made for the 2004–05 season by ACIP<sup>21</sup> and the American Academy of Pediatrics.<sup>22</sup> This recommendation followed the 2003–04 influenza season, during which

**Table 1**  
History of childhood influenza vaccination recommendations in the United States

Year	Child Group of Interest	Comment
1960	Those with chronic conditions considered as risk factors for severe influenza	US guidance for the use of influenza vaccines in the civilian population was published <sup>18</sup>
2002	6–23 months of age	Routine vaccination encouraged when feasible for this age group <sup>20</sup>
2004	6–23 months of age	Full vaccination recommended for healthy children in this age group, and household contacts and caregivers <sup>21</sup>
2006	6–59 months of age	<sup>23</sup>
2008	6–18 months of age	<sup>1</sup>

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