

ID Snapshot

A panoply of influenza vaccines: which one to use?

by **H. Cody Meissner, M.D., FAAP**

Multiple influenza vaccines will be available during the 2013-'14 season. The first five vaccines listed below have been licensed by the Food and Drug Administration and will be available for the first time during the upcoming influenza season for specific age groups.

Only one of the following vaccines should be administered routinely to a healthy 11-month-old child. Which one?

- Cell culture-based trivalent inactivated vaccine (ccIIV3, Flucelvax, Novartis Vaccines)
- Trivalent recombinant hemagglutinin influenza vaccine (RIV3, Flublok, Protein Sciences Corp.)
- Live attenuated influenza vaccine quadrivalent (LAIV4, FluMist quadrivalent, MedImmune LLC)
- Quadrivalent inactivated vaccine (IIV4, Fluarix quadrivalent, GlaxoSmithKline)
- Quadrivalent inactivated vaccine (IIV4, Fluzone quadrivalent, Sanofi Pasteur Inc.)
- Intradermal trivalent inactivated vaccine (Fluzone Intradermal, Sanofi Pasteur Inc.)

Answer: (e) IIV4 Fluzone quadrivalent (Sanofi Pasteur) is the only vaccine on this list that may be administered to a child younger than 36 months of age.

IIV4 Fluarix quadrivalent (GlaxoSmithKline) is licensed for administration to children 36 months of age and older.

Routine annual influenza vaccination is recommended for all persons 6 months and older. The number of influenza vaccines appears bewildering, but it is important to understand the indications for each vaccine. Licensed trivalent vaccines contain antigen from one B virus strain plus two A strains. Quadrivalent vaccines will be available for the first time during the 2013-'14 season and include antigens from two B strains plus two A strains and may increase overall vaccine efficacy. Trivalent inactivated influenza vaccine (IIV3) is provided by five manufacturers, each with different age indications.

The cell culture-based inactivated influenza vaccine (ccIIV3) is licensed for persons 18 years of age and older. This vaccine is one of two licensed influenza vaccines prepared in cell culture rather than in embryonated chicken eggs. RIV3 is a trivalent recombinant hemagglutinin vaccine for use in people ages 18 through 49 years. By cloning the hemagglutinin gene into insect cells, it is possible to prepare large amounts of purified hemagglutinin protein in a short period of time.

The intranasal, quadrivalent LAIV (LAIV4) is approved for healthy,

non-pregnant individuals ages 2 through 49 years. This vaccine will replace trivalent LAIV (LAIV3) and has the same restrictions as LAIV3 in regard to a history of wheezing. Results from some clinical trials suggest that the live intranasal vaccine may offer greater protection against influenza in young children than killed influenza vaccines. However, data are insufficient to justify a specific recommendation for any vaccine at this time.

The inactivated, trivalent intradermal influenza vaccine is licensed for a single 0.1 mL intradermal injection for adults 18 through 64 years.

Novel viruses

Each respiratory virus season, there is concern that novel influenza strains not included in the seasonal influenza vaccine may emerge and cause widespread disease. One example is influenza A (H7N9), which emerged as a pathogen in southeastern China in early 2013, although the number of reported cases appears to be abating. As of July, 133 human cases and 43 deaths due to this strain had been reported to the World Health Organization.

A second example is influenza A (H3N2) variant virus (H3N2v), which infected several hundred people in this country in 2011 and 2012. Several additional cases have occurred in 2013 following close contact between humans and pigs, especially at county agricultural state fairs. Serologic studies suggest children have greater susceptibility to H3N2v infection than do adults. The 2013-'14 seasonal vaccine will not protect against infection by either of these two influenza strains.

A third respiratory virus of concern is the Middle East Respiratory Syndrome Coronavirus (MERS-CoV), which was first reported in Saudi Arabia in 2012. As of July, MERS-CoV had not been reported in the United States, but 45 of 81 patients with this infection were reported to have died in the Middle East and Europe.

Most of the world population lacks immunity to these three novel viruses. In the event one of these viruses acquires the ability for efficient and sustained human-to-human transmission, the potential will exist for high rates of severe illness and mortality worldwide.



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1918 'Spanish Flu' takes toll worldwide

In March 1918, some of the first U.S. cases of the influenza pandemic were reported at Camp Funston, Kansas, where new recruits were trained before being deployed to Europe to fight in World War I.

Spain remained neutral during World War I, and as the outbreak rampaged through the country, the government publically announced the epidemic and did not censor health reports as

did countries fighting in the war. Because many people first heard about the severity of the pandemic in Spain, the outbreak was named "Spanish Flu."

Estimates suggest that 3% to 5% of the world's population were killed during this pandemic, making it one of the deadliest natural disasters in history.

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Photo courtesy of the Centers for Disease Control and Prevention

This photo of ill soldiers at a hospital ward at Camp Funston, Kansas, was taken during the height of the influenza epidemic in 1918.



Photo courtesy of the Centers for Disease Control and Prevention

A street car conductor in Seattle refuses to allow passengers aboard without a mask during the 1918 influenza pandemic.