What’s New with Flu Vaccine in 2013-14?
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New Vaccines on the Market: Quadrivalent, Cell-based, and Recombinant

There are many new developments on the vaccine front for the 2013-14 influenza season! We will have vaccines that may provide better coverage, vaccines are safer for individuals with egg allergies, and vaccines that should be more effective in older persons. Many of these new products will be in limited supply this season and not available yet at Children’s, but as demand grows, we should see more availability in future seasons.

The new quadrivalent influenza vaccines should offer major advantages. Quadrivalent vaccines contain two influenza A strains and two B strains (Yamagata and Victoria lineage) whereas the trivalent products have only one influenza B strain. Quadrivalent formulations should provide better coverage when influenza B is prominent and both lineages circulate, as happened last winter, although it is difficult to predict. Only FluMist® is offered solely in quadrivalent form.

Nomenclature for the variety of vaccines has also expanded due to the new choices. We now have:
- IIV=Inactivated Influenza Vaccine;
- IIV₃=Inactivated Influenza Vaccine, Trivalent;
- IIV₄=Inactivated Influenza Vaccine, Quadrivalent;
- RIV=Recombinant Influenza Vaccine
- LAIV=Live-Attenuated Influenza Vaccine

The second new development is availability of cell-based (IIV₃) and recombinant hemagglutinin (RIV₃) influenza vaccines. These products contain no or very small amounts of egg protein and should be safer for individuals with egg allergies. The RIV₃ vaccine FluBlock® contains no ovalbumin and is recommended for patients ≥ 18 years of age who have a severe allergy to eggs. The cell based Flucelvax® from Novartis is not entirely an egg fee product but contains only a small amount of total egg protein (less than 50 femtograms or 5x10⁻¹⁴ grams per 0.5 mL dose) of which only a small fraction is ovalbumin.

COMPOSITION OF VACCINE

The composition of the seasonal 2013-14 influenza vaccine will be

Trivalent Vaccines:
- an A/California/7/2009 (H1N1)-like virus;
- an H3N2 virus antigenically like the cell-propagated prototype virus A/Victoria/361/2011 (H3N2) (A/Texas/50/2012)
- a B/Massachusetts/2/2012- like virus (from the B/Yamagata lineage of viruses).

Quadrivalent vaccines will contain the above, plus a B/Brisbane/60/2008–like virus (Victoria lineage).

Influenza Vaccination Formulations for Children, 2013-14

<table>
<thead>
<tr>
<th>Ages</th>
<th>Trade Name</th>
<th>Mfg</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-35 mo</td>
<td>Fluzone®</td>
<td>sanofi pasteur</td>
<td>0.25mL single dose syringe</td>
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<tr>
<td>2-49 yrs</td>
<td>FluMist®</td>
<td>MedImmune</td>
<td>0.2mL intranasal sprayer</td>
</tr>
<tr>
<td>≥3 yrs</td>
<td>Fluzone®</td>
<td>sanofi pasteur</td>
<td>0.5mL single-dose vial 0.5mL single-dose syringe 5.0mL multidose vial 0.5mL single dose vial 0.5mL single dose syringe</td>
</tr>
<tr>
<td>≥ 3yrs</td>
<td>Fluarix®</td>
<td>GSK</td>
<td>0.5mL single dose syringe 0.5mL single dose syringe</td>
</tr>
<tr>
<td>≥ 4yrs</td>
<td>Fluvirin®</td>
<td>Novartis</td>
<td>0.5mL single-dose syringe 5.0 mL multidose vial</td>
</tr>
<tr>
<td>≥9yrs*</td>
<td>AFLuria®</td>
<td>CSL/ Merck</td>
<td>0.5mL single dose syringe 5.0mL multidose vial</td>
</tr>
</tbody>
</table>

*Licensed for 5 years and older, ACIP recommends 9 and older.
### Vaccine Formulations for Adults, 2013-14

<table>
<thead>
<tr>
<th>Ages</th>
<th>Trade Name</th>
<th>Mfg</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥18 yrs</td>
<td>Flucelvax®</td>
<td>Novartis</td>
<td>0.5mL single-dose syringe</td>
</tr>
<tr>
<td>≥18 yrs</td>
<td>FluLaval® ID</td>
<td>ID Biomedical</td>
<td>5.0mL multidose syringe</td>
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<td>18-49 yrs</td>
<td>FluBlock ®</td>
<td>Protein sciences</td>
<td>0.5mL single-dose syringe</td>
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<tr>
<td>18-64 yrs</td>
<td>Fluzone ® Intradermal</td>
<td>sanofi pasteur</td>
<td>0.1mL microinjection system</td>
</tr>
<tr>
<td>≥65 yrs</td>
<td>Fluzone® High Dose</td>
<td>sanofi pasteur</td>
<td>0.5mL single-dose syringe</td>
</tr>
</tbody>
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### Frequently Asked Questions

**Which pediatric patients will need 2 doses of influenza vaccine for the 2013-14 influenza season?**

Children ages 6 months through 8 years will need only 1 dose of vaccine in 2013-14 if they received any of the following:

1. 2 or more doses of seasonal influenza vaccine since July 1, 2010;
2. At least 2 doses of seasonal vaccine given before July 1, 2010 and at least 1 dose of monovalent 2009 H1N1 vaccine; or
3. At least 1 dose of seasonal vaccine given before July 1, 2010 and at least 1 dose of seasonal vaccine since July 1, 2010.

The table below can be accessed at www.cdc.gov/flu/professionals/acip/2013-summary-recommendations.htm#figure2

**What does CDC recommend for patients with egg allergies?**

From the ACIP recommendations:

1. Persons with a history of egg allergy who have experienced only hives after exposure to egg should receive influenza vaccine. Because relatively little data are available for use of LAIV in this setting, IIV or RIV should be used. RIV is egg-free and may be used for persons aged 18-49 years who have no other contraindications. However, IIV (egg- or cell-culture based) may also be used, with the following additional safety measures
   - Vaccine should be administered by a healthcare provider who is familiar with the potential manifestations of egg allergy; and
   - Vaccine recipients should be observed for at least 30 minutes for signs of a reaction after administration of each vaccine dose (1).

2. Persons who report having had reactions to egg involving such symptoms as angioedema, respiratory distress, lightheadedness, or recurrent emesis; or who required epinephrine or another emergency medical intervention may receive RIV3, if aged 18 through 49 years and there are no other contraindications. If RIV3 is not available or the recipient is not within the indicated age range, such persons should be referred to a physician with expertise in the management of allergic conditions for further risk assessment before receipt of vaccine.

3. All vaccines should be administered in settings in which personnel and equipment for rapid recognition and treatment of anaphylaxis are available.

4. Some persons who report allergy to egg might not be egg-allergic. Those who are able to eat lightly cooked egg (e.g., scrambled egg) without reaction are unlikely to be allergic. Egg-allergic persons might tolerate egg in baked products (e.g., bread or cake). Tolerance to egg-containing foods does not exclude the possibility of egg allergy (2). Egg allergy can be confirmed by a consistent medical history of adverse reactions to eggs and egg-containing foods, plus skin and/or blood testing for immunoglobulin E antibodies to egg proteins.

* Doses should be administered at least 4 weeks apart.
5. For individuals who have no known history of exposure to egg, but who are suspected of being egg-allergic on the basis of previously performed allergy testing, consultation with a physician with expertise in the management of allergic conditions should be obtained prior to vaccination. Alternatively, RIV3 may be administered if the recipient is aged 18 through 49 years.

A previous severe allergic reaction to influenza vaccine, regardless of the component suspected to be responsible for the reaction, is a contraindication to future receipt of the vaccine.

Flu FAQs for Children’s Hospital Colorado

Which influenza vaccines are available at Children’s? Vaccines were ordered early last spring from our distributor to ensure an adequate supply for patients, families and staff. Since our order some quadrivalent vaccines have been FDA approved but will be in limited supply. We have individual syringes of sanofi pasteur trivalent injectable vaccine for patients 6 months-35 months and > 3 years of age. All LAIV (FluMist) for eligible patients and staff age 2 to 49 years is quadrivalent. Individual syringe trivalent influenza vaccine from GSK is available for staff members via flu captains, mass immunization clinics and occupational health. We will not have high dose Fluzone® available but will have FluBlok ® for our egg allergic staff. Family Flu vaccine binders are on patient units and in clinics and contain information about available influenza vaccines for family members. Epidemiology once again received a grant from the Gift Shop enabling us to purchase vials of vaccine to vaccinate family members without cost. Our family influenza vaccine vials are trivalent influenza vaccine made by sanofi pasteur. We do not have LAIV (FluMist) available for family vaccine.

Who can receive LAIV4 (Flumist) vaccination? LAIV4 is indicated for healthy, nonpregnant individual’s age 2 to 49 years of age. We recommend that staff who work on CCBD providing direct care to severely immunosuppressed patients who require a protected environment (i.e. BMT) should receive inactivated injectable influenza vaccine. The rationale for avoiding use of LAIV among health-care personnel of severely immunocompromised patients is the theoretical risk that a live attenuated vaccine virus could be transmitted to the severely immunosuppressed person. In addition, to further reduce the theoretical risk of vaccine virus transmission, ACIP/HICPAC has recommended that health-care personnel who receive LAIV(FluMist) should avoid providing direct care for severely immunosuppressed patients requiring a protected environment for 7 days after vaccination. Healthy nonpregnant persons aged 2 through 49 years, including health-care personnel, who have close contact with persons with lesser degrees of immunosuppression (e.g., persons with chronic immunocompromising conditions such as HIV infection, corticosteroid or chemotherapeutic medication use, or who are cared for in other hospital areas such as neonatal intensive care units) can receive LAIV. Healthcare providers who work outside the CCBD area are able to get LAIV (FluMist).

I would like to give family flu vaccine in my unit. How do I do it? Most units on the Aurora campus and within the Network of Care have already received their Flu Binders for Family Flu Vaccine. This year we are also piloting Family Flu Vaccination in the NICU at Children’s Hospital Colorado at Memorial in Colorado Springs. In most areas of the healthcare organization, family vaccine is ordered from the pharmacy. If you still need a Family Flu Vaccination Binder please contact Carolyn Brock 720-777-6412.

If quadrivalent vaccine includes one additional strain, why isn't it preferred for use over trivalent vaccine? Even though both influenza B viruses are likely to cause disease during an influenza season, traditionally experts have to choose between the two very different B viruses to include with the two A viruses based on what B virus is expected to predominate. This can be difficult to predict. The quadrivalent vaccine that will be available for the 2013-14 season includes both B viruses. However, while quadrivalent vaccines may eventually replace trivalent vaccines, it is anticipated that during the coming season only a limited supply of quadrivalent vaccine will be available. Consequently, ACIP does not express a preference for use of one type of influenza vaccine over another type (that is, live over inactivated, or quadrivalent over trivalent) for persons for whom more than one type of vaccine is indicated and available in this transitional year. Vaccination should not be delayed in order to obtain a specific product.

New Flus

Influenza viruses are unpredictable, so we never know exactly which strains will predominate, the magnitude and severity of the upcoming flu season, and when another pandemic will occur. Three novel influenzas are being closely watched in this regard.

- Variants (v) are influenza A viruses that ordinarily circulate in pigs but can cause disease in humans. In the summer of 2011, a handful of human cases due to vH3N2 influenza A viruses were identified in the US. The next summer, cases rose to over 300 cases, with 16 hospitalizations and one death. Most affected individuals had prolonged exposure to pigs at agricultural events in the Midwest. Fewer cases have been reported so far this summer.
This spring, an outbreak of human infections due to a new avian influenza A (H7N9) virus occurred in China. The source was probably infected poultry or contaminated environments. Most affected individuals had severe symptoms and 44 people so far have died. The outbreak stopped when live animal markets were closed. No evidence of human-human spread was found and no infections have been reported outside of China.

The highly pathogenic influenza A H5N1 “bird flu” first identified in 2003 in China also continues to infect humans at a low rate. Almost 600 cases and over 300 deaths due to H5N1 have been recorded since the virus was identified. Most reported cases are in Asia, the Middle East, and central Europe.

Health agencies are closely monitoring these novel viruses for increased ability to spread person-person. See the sidebar at http://www.cdc.gov/flu/professionals/index.htm for more information and current updates.

References
1. CDC: Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP) August 17, 2012 /61(32); http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6132a3.htm
2. CDC. Influenza Vaccination Coverage Among Health-Care Personnel—United States, 2010-11 Influenza Season. MMWR 2011;60:1073-1077.

Bug Watch
This weekly publication provides up-to-date information on currently circulating respiratory and enteric viruses, *Bordetella pertussis*, and *B. parapertussis* detected by Children's Hospital Colorado Microbiology/Virology Laboratory. Current editions are posted on Planet TCH or the Children’s Colorado external webpage at: http://www.childrenscolorado.org/news/publications/bugwatch.aspx

Contact Carolyn Brock at carolyn.brock@childrenscolorado.org or by phone (720-777-6412) to begin receiving your personal copy via email.

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Both the Contagious Comments and Bug Watch publications are always posted on Children’s Hospital Colorado website at: http://www.childrenscolorado.org/news/publications/index.aspx

Please return your E-mail address to: Carolyn Brock, Children’s Hospital Colorado, Epidemiology – Box B276, 13123 E. 16th Avenue, Aurora, CO 80045 or E-mail address: carolyn.brock@childrenscolorado.org.

Thank you for your interest in our publication.