Why should transplant patients get influenza vaccine?

Pediatric solid organ transplant recipients are at risk for influenza-related complications, including pneumonia, sepsis, CNS disease, acute graft rejection, and death. Vaccination can help prevent these serious complications.

Who should get annual influenza vaccine?

1. All transplant candidates and listed patients >6mo should receive annual vaccination
2. All household members >6mo should receive annual vaccination. Vaccinated household members will form a protective “cocoon” around the patient.
3. All recipients >6mo should receive annual vaccination.
   - Vaccination can start at 1 month post-transplant.
   - For the first influenza season after transplant, recipients should receive 2 doses one month apart. 2 doses can be given during subsequent influenza seasons if missed.
   - For patients who were treated with increased immunosuppression (e.g. thymoglobulin, rituximab, other monoclonal antibody medications) during the year prior to influenza season, 2 doses should be given one month apart for that influenza season.

What influenza vaccines are available?

There are 2 types of influenza vaccines.

1. Intramuscular influenza vaccines (IIV) are inactivated preparations of viral components. These have killed virus and therefore are safe for all individuals including those with suppressed immune systems. It is licensed for use in people >6mo.
2. Intranasal live attenuated influenza vaccine (LAIV) is a cold-adapted live-attenuated vaccine. It is licensed for use in people 2-49yrs. Since the vaccine contains live virus (although weakened through attenuation) it is contraindicated in immunosuppressed people.

Both vaccines are available as a trivalent (3 influenza strains) and quadrivalent (4 influenza strains) form, which include for 2014-2015. The quadrivalent influenza vaccine is the preferred vaccine for transplant patients and their family members, if easily available. However, either quadrivalent or trivalent influenza vaccine can be used.

The strains included in the 2014-2015 vaccines include:
- An A/California/7/2009 (H1N1)-like virus (against 2009 pandemic H1N1 influenza)
Pediatric Infectious Diseases Program for Immunocompromised Hosts

- An A/Texas/50/2012 (H3N2)-like virus
- A B/Massachusetts/2/2012-like virus (Yamagata lineage)
- A B/Brisbane/60/2008-like virus (Victoria lineage, included in the quadrivalent vaccines only)

**What vaccine should the transplant candidate get?**

The transplant candidate may receive either IIV or LAIV vaccines, preferably quadrivalent.

**What vaccine should the transplant recipient get?**

- Transplant patients can NOT receive the nasal spray vaccine (LAIV: live-attenuated influenza vaccine)
- Transplant recipients should receive the quadrivalent IIV if available, if not trivalent.

**Can family members of transplant patients get the nasal spray influenza vaccine?**

1. Family members can receive any of the vaccine choices. The nasal spray vaccine (LAIV) is not contraindicated for family members of transplant patients. The CDC recommends LAIV as the preferred vaccine for healthy children ages 2-8 years old. Families should talk to their physicians.
2. Shedding of the weakened LAIV influenza virus has been documented. It is not known whether or not a transplant patient can be severely infected with the weakened LAIV influenza virus. No serious illness was observed in children (with normal immune systems) who inadvertently became infected with the weakened LAIV influenza virus (please see CDC statement in appendix for further details).
3. Family members who receive the nasal spray vaccine can reduce potential transmission of the weakened virus to the patient by practicing preventive practices, such as good hand washing, covering sneezes/coughs, and reducing close contact (e.g. kissing the mouth and eyes) for one week (see CDC handout for details).
4. For transplant patients who have received increased immunosuppression (e.g. for allograft rejection), family members may want to avoid nasal spray vaccine for that influenza season just as a precaution.

**What if a patient’s school is vaccinating students with the nasal spray vaccine (LAIV)?**

1. Transplant patients do not necessarily need to miss school if the school is vaccinating students with the nasal spray vaccine. A discussion with the family is necessary.
2. Shedding of the weakened LAIV influenza virus has been documented. It is not known whether or not a transplant patient can be severely infected with the weakened LAIV influenza virus. No serious illness was observed in children (with normal immune systems) who inadvertently became infected with the weakened LAIV influenza virus (please see CDC statement in appendix for further details).

3. Transplant patients should try to avoid situations at school where s/he would be heavily exposed to the weakened LAIV influenza virus. Some examples of situations: the students in the patient’s classroom are all vaccinated at the same time with LAIV; a school-wide indoor assembly on the same day that the majority of students were vaccinated with LAIV.

4. The highest amount of shedding of the weakened LAIV influenza virus is in the first 2 days after LAIV. The mean duration of shedding of weakened LAIV influenza virus is 7 days. A transplant patient could miss anywhere from zero to 7 days of school, depending on how heavily exposed s/he is to the weakened LAIV influenza virus during school-based LAIV vaccination events. The transplant patient should always practice good hand-washing and preventive practices.

5. Transplant patients will likely be exposed to more of the weakened LAIV influenza virus in the community because of the new CDC guidelines. This type of exposure is similar to being exposed to wild-type (non-vaccine) influenza virus. Community exposure is not the same as the “heavy” exposure found in certain situations during school-based LAIV vaccination events. After-school activities and other extracurricular activities would be considered community exposures.

6. The transplant patient increases his/her protection against any influenza virus by getting an influenza vaccination, by all family members getting influenza vaccinations and by practicing good hand-washing and preventive practices.

**Can influenza vaccine cause allograft rejection?**

There is no evidence that influenza vaccination causes allograft rejection. In small studies, vaccination did not affect allograft function or cause rejection episodes in recipients of kidney transplants, heart transplants, or liver transplants. A recent literature review concluded that there is no convincing epidemiologic link between vaccination and allograft dysfunction (REF 1-5).

**Why can a transplant patient still get influenza infection even if they are vaccinated?**

1. After vaccination, anti-influenza immunity takes about 2 weeks to develop.

2. With a suppressed immune system, the transplant patient may not develop a strong anti-influenza immune response from the vaccine. However, if infected, the severity of the infection and the complications from the infection are likely to be reduced because the transplant patient has some immunity due to vaccination.
Appendix

A. Below is an excerpt from the CDC
http://www.cdc.gov/flu/healthcareworkers.htm

**Influenza Vaccination Information for Health Care Workers**

_Nearly all healthy, non-pregnant health care workers, may receive nasal spray vaccine if eligible, including those who come in contact with newborn infants (e.g., persons working in the neonatal intensive care unit, or NICU), pregnant women, persons with a solid organ transplant, persons receiving chemotherapy, and persons with HIV/AIDS._

_However, health care providers should not get the nasal spray vaccine if they are providing medical care for patients who require special environments in the hospital because they are profoundly immunocompromised, for example if they work in bone marrow transplant units. This is intended as an extra precaution and is not based on reports of vaccine virus transmission in those settings. The flu shot is preferred for vaccinating health care workers who are in close contact with severely immunocompromised patients who are being cared for in a protective environment. These health care workers may still get nasal spray vaccine, but they must avoid contact with such patients for 7 days after getting vaccinated._

B. Below is an excerpt from the CDC
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6207a1.htm?s_cid=rr6207a1_w#LiveAttenuatedInfluenzaVaccines


**Live Attenuated Influenza Vaccines**

_Shedding, transmission, and stability of vaccine viruses: Data indicate that both children and adults vaccinated with LAIV can shed vaccine viruses after vaccination, although in lower amounts than occur typically with shedding of wild-type influenza viruses. Rarely, shed vaccine viruses can be transmitted from vaccine recipients to unvaccinated persons. However, serious illnesses have not been reported among unvaccinated persons who have been infected inadvertently with vaccine viruses. One study of 197 children aged 8 through 36 months in a child care center assessed transmissibility of vaccine viruses from 98 vaccinated children to the 99 unvaccinated children; 80% of vaccine recipients shed one or more virus strains (mean duration: 7.6 days). One influenza B vaccine virus strain isolate was recovered from a placebo recipient and was confirmed to be vaccine-type virus. The influenza B virus isolate retained the cold-adapted, temperature-sensitive, attenuated phenotype. The placebo recipient from whom the influenza B vaccine virus strain was isolated had symptoms of a mild upper respiratory illness. The estimated probability of acquiring vaccine virus after close contact with a single LAIV recipient in this population was 1%–2% (6)._
References


