Influenza

There are two main types of influenza vaccine currently available: inactivated influenza vaccine (IIV) and live attenuated influenza vaccine (LAIV).

GENERIC NAMES:
inactivated influenza vaccine, high-dose inactivated influenza vaccine, intradermal influenza vaccine

BRAND NAMES:
Afluria, Fluarix, FluLaval, Fluvirin, Fluzone, Fluzone High Dose, Fluzone Intradermal, Flucelvax, Flublok

DRUG COMPANIES:
CSL Limited, GlaxoSmithKline Biologicals, ID Biomedical Corporation, Novartis Vaccines and Diagnostics Limited, Sanofi Pasteur, Inc., MedImmune Vaccines Inc., Protein Sciences Corp.

Inactivated vaccine comes in multi-dose vials (containing preservative) and in single dose preparations, some of which are thimerisol-free. Inactivated vaccine also comes in an intradermal version and high dose version. Age range recommendations vary for different preparations.

Two new technologies have also been FDA approved and should be available for 2013-2014 influenza season: a cell culture technology based inactivated vaccine and a novel vaccine using insect virus expression and recombinant DNA technology.

In the past, all influenza vaccine has been trivalent, providing coverage for two influenza A strains and one influenza B strain.

Many manufacturers are transitioning from trivalent (covering two Type A strains and one Type B strain) to quadrivalent formulation that doubles Type B coverage.

INACTIVATED INFLUENZA VACCINE (IIV)

INDICATIONS

The ACIP recommends everyone over 6 months old—including all adults—receive influenza vaccine on an annual basis. There are many options.

The standard dose inactivated influenza (IIV) vaccine is recommended for all healthy adults, as well as those with underlying medical conditions. Thimerisol-free IIV is also available, as well as a new intradermal version for adults age 18 through 64, and a high dose version for seniors age 65 and older.

Inactivated influenza vaccine either through injection or intradermally (not LAIV), is the ACIP recommended choice for pregnant women, patients with chronic medical conditions and patients with immune system problems, including HIV. (These clarifications are not clearly indicated on the LAIV product package insert.)

Although influenza vaccine containing thimerisol preservative is safe for pregnant women, thimerisol-free single dose preparations are available from some manufacturers.

Inactivated influenza vaccines are made from vaccine virus that has been "inactivated" or "killed." As part of this inactivation process, only subviron and purified surface antigen are used. That is why IIV is sometimes referred to as "split" (for subviron) or subunit (for purified surface antigen) vaccines. Standard dose trivalent IIV for adults has traditionally contained 15 mcg hemagglutinin antigen (HA) per vaccine strain.

A high-dose inactivated formulation option for seniors age 65 and older was introduced during the 2010-2011 influenza season. Designed to improve immune response, it contains four times more hemagglutinin per dose (60 mcg per strain) as compared to the standard flu vaccine. Side effects include increases in injection site reactions. The cost has been almost double the price of the standard influenza vaccine.

Many manufacturers are transitioning from trivalent (covering two Type A strains and one Type B strain) to quadrivalent formulation that doubles Type B coverage. Expect an added premium to be reflected in price of vaccine with added coverage protection.

Two new influenza formulations were FDA approved late in the 2012-2013 influenza season. These include a cell culture derived inactivated influenza vaccine and a new vaccine using a novel insect (baculovirus) virus expression system and recombinant DNA technology.

The new cell culture derived inactivated influenza vaccine, brand name Flucelvax (made by Novartis), is the first ever seasonal influenza vaccine made using cell culture technology available in the United States. This thimerisol-free and antibiotic-free trivalent inactivated vaccine was FDA approved on November 20, 2012 for adults age 18 and older. This new manufacturing process uses cultured animal mammalian cells (Madin Darby Canine Kidney, known as MDCK cells) to grow vaccine virus rather than chicken eggs.

The new insect virus expression and recombinant DNA technology influenza vaccine, brand name Flublok (made by Protein Sciences Corp), works by producing large quantities of hemagglutinin (HA), the active ingredient in inactivated influenza vaccine. It was FDA approved on January 16, 2013 for adults age 18 through 49.

Many manufacturers are transitioning from trivalent (covering two Type A strains and one Type B strain) to quadrivalent formulation that doubles Type B coverage. This is why the name has changed from TIV (trivalent influenza vaccine) to IIV (inactivated influenza vaccine). However, the cell culture technology based vaccine recently approved is a trivalent formulation.

CONTRAINDICATIONS

- History of life-threatening reaction (severe allergic reaction such as anaphylaxis) to previous flu vaccination.
- History of anaphylactic hypersensitivity to eggs or egg proteins. ACIP now considers mild egg allergy (hives only) as a precaution rather than a contraindication to receiving IIV, as long it given with special precautions, including 30 minute observation period after administration as well as making sure emergency medications are available in case of adverse reaction. There is no need for skin testing and no need to split the dose.
- Anaphylactic hypersensitivity to other vaccine components. During the manufacturing process, additional substances are used to inactivate the influenza virus and to prevent bacterial growth. Trace amount of substances like kanamycin, neomycin, gentamicin, gelatin, and arginine are sometimes added. Other components sometimes added include thimerisol preservative, octoxynol-10,

a-tocopheryl hydrogen succinate, polysorbate, residual amounts of hydrocortisone, formaldehyde, and sodium deoxycholate. Some vaccine preparations contain trace amounts of the preservative thimerisol. Check specific product labels carefully before administering component sensitive individuals.

- Latex allergy. The tip caps and plungers of prefilled syringes and the stoppers of single dose vials may contain natural rubber latex. Be sure to check package inserts and specific product labels carefully.
- History of Guillain-Barre Syndrome within 6 weeks of previous influenza vaccination. Consider using chemoprophylaxis for individuals at high risk for severe influenza complications.
- Moderate or severe acute illness with or without fever. Wait to vaccinate until symptoms improve.

ADMINISTRATION

Standard dose and High Dose IIV

Administer single dose of 0.5 ml intramuscularly in the deltoid muscle. Do not mix with any other vaccine in the same syringe or vial. Shake the syringe or multi-dose vial thoroughly. Administer the dose immediately.

For multi-dose vials, once the stopper has been pierced, the multi-dose vial must be discarded within 28 days. Aspirating before injecting is not necessary. Needle length should be adjusted for body habitus:

- Adults weighing less than 130 pounds: 1/2-inch needle
- Men and women weighing 130 to 152 pounds: 1-inch needle
- Women weighing 153 to 200 pounds: 1-inch or 1-1/2 inch needle
- Women weighing over 200 pounds: 1-1/2 inch needle
- Men weighing 153 to 260 pounds: 1-inch or 1-1/2 inch needle
- Men weighing more than 260 pounds: 1-1/2 inch needle

Intradermal IIV

This intradermal vaccine uses a micro injector with an ultrafine needle that is 0.06 inches in length.

POSSIBLE SIDE EFFECTS

Standard dose IIV

Most common local side effects include pain, redness, and swelling at the injection site. Most common systemic side effects are headache, fatigue, myalgias, low-grade fever, and malaise.

High Dose IIV

Side effects include increases in injection site reactions over other influenza vaccines, which may include pain, redness, and swelling. Most common systemic side effects are headache, fatigue, myalgias, low-grade fever, and malaise.

Intradermal IIV

Injection site reactions, including redness, swelling, induration, and itching were more common with the intradermal as compared to the intramuscular injection but usually resolve within three to seven days.

STORAGE/HANDLING

Keep refrigerated at 35°F to 46°F (2°C–8°C). Do not freeze.

PREGNANCY/NURSING

All pregnant women should be vaccinated against influenza. Pregnant women are at increased risk of influenza complications. Influenza vaccination can be given at any time during pregnancy. ACIP also says that breast feeding is not a contraindication to receiving influenza vaccination.

Pregnant women should be vaccinated each year with inactivated vaccine (IIV)—not live attenuated vaccine (LAIV).

Note that package insert pregnancy categories differ between products. Some products are pregnancy category B (animal studies conducted with those products have not shown any fetal risk) and some are pregnancy category C (animal studies have not been conducted using these products). ACIP says any of the inactivated products are safe for pregnant women and may be administered to pregnant women, including those

containing trace amounts of the preservative thimerisol. A recent study found that a mother's influenza vaccination decreased the odds of a baby acquiring influenza during the first six months of life (when the baby is too young to be vacinnated) by 63%.[1] It also reduced the risk of fever and respiratory infection in both baby and mom by one-third.

CELL CULTURE DERIVED IIV APPROVED BY FDA

GENERIC NAME:
influenza vaccine

BRAND NAME:
Flucelvax

DRUG COMPANY:
Novartis

- FDA approved on November 20, 2012.
- First ever seasonal influenza vaccine using cell culture technology available in U.S
- Uses cultured animal mammalian cells—MDCK cells— to grow vaccine virus rather than chicken eggs.
- Thimerisol-free and antibiotic-free inactivated vaccine

INDICATIONS

FDA licensing: is FDA approved for use in persons 18 years of age and older.

ACIP indications: Annual influenza vaccine is recommended yearly for all adults.

CONTRAINDICATIONS

See Contraindications for other IIV preparations.

ADMINISTRATION

Administer single dose of 0.5 mL intramuscularly in the deltoid muscle. Do not mix with any other vaccine in the same syringe or vial. Shake the syringe thoroughly. Administer the dose immediately. Needle length should be adjusted for body habitus.

POSSIBLE SIDE EFFECTS

Side effects include increases in injection site reactions over other influenza vaccines, which may include pain, redness, and swelling. Most common systemic side effects are headache, fatigue, myalgias, and malaise.

STORAGE/HANDLING

The product should be stored at 2-8°C (36-46°F). Do not freeze.

PREGNANCY/NURSING

Pregnancy category B.

[1] Zaman K et al. NEJM. (2008) 359 (15):1555-1564

NEXT-GENERATION FLU VACCINE USING DNA TECHNOLOGY

GENERIC NAME:
influenza vaccine

BRAND NAME:
Flublok

DRUG COMPANY:
Protein Sciences Corp, of Meriden, Conn

- Uses baculovirus insect virus and recombinant DNA technology to make influenza virus hemagglutinin (HA) protein, the active ingredient in IIV

INDICATIONS

- FDA approved on January 16, 2013 for adults 18-49
- Contains no egg proteins, antibiotics, or preservatives.
- The stoppers used for the single-dose vials do not contain latex.

CONTRAINDICATIONS/ PRECAUTIONS

- History of severe allergic reaction (e.g., anaphylaxis) to any vaccine component
- History of Guillain-Barré syndrome within 6 weeks of receipt of a prior influenza vaccine

POSSIBLE SIDE EFFECTS

Injection site reactions including pain, headache, fatigue and muscle aches

STORAGE/HANDLING

- Store at 2–8°C (36° and 46°F). Do not freeze.
- Shelf life is 16 weeks from the date of manufacture, so be sure to check the expiration date before administering Do not use after expiration date shown on the label.

PREGNANCY/NURSING

Flubok is Pregnancy Category B.

Pregnancy registry is available—contact: Protein Sciences Corporation by calling 1–888–855–7871.

GENERIC NAME:
live attenuated vaccine

BRAND NAME:
FluMist

DRUG COMPANY:
MedImmune Vaccines, Inc.

LIVE ATTENUATED INFLUENZA VACCINE (LAIV)

INDICATIONS

LAIV is an option for healthy non-pregnant adults under age 50.

The vaccine virus used in LAIV is attenuated or weakened but it is still a live virus vaccine. LAIV virus strains replicate locally in nasopharyngeal cells after intranasal administration, stimulating production of serum and nasal and secretory antibodies. ACIP guidance for patients who can receive LAIV is more limiting than that outlined in product package insert. This distinction is clearly pointed out in the table of contraindications and precautions accompanying the 2013 ACIP Adult Immunization Schedule. LAIV is only recommended for healthy people age 2–49. It should not be given to patients with chronic medical conditions (asthma, diabetes, kidney disease) and it should not be given to patients with immune suppression. It should not be given to pregnant women. Although all these subsets of patients are at high risk for influenza related complications, they should receive inactivated vaccine (IIV) instead of LAIV.

ACIP also says health care personnel who care for severely immunocompromised patients requiring a protective environment should not be given LAIV because of the theoretical concerns of transmission risk associated with live (though attenuated) virus vaccine. These health care personnel should instead receive IIV.

CONTRAINDICATIONS

- Persons with immune system problems and family members and household contacts of people so immunosuppressed that they must live in a protected environment (e.g., stem cell transplant recipients).
- History of life-threatening reaction to previous flu vaccination.
- History of anaphylactic hypersensitivity to eggs or egg proteins. Current methodology for making vaccines involves growing vaccine virus in embryonated chicken eggs. This leads to concerns that residual ovalbumin could trigger an allergic reaction. Recent data suggests the amount of residual egg protein in influenza vaccines is very small. New recommendations from ACIP say that patients with mild egg allergy (hives only) may receive influenza vaccine but they should receive IIV (not LAIV) because IIV is the type of flu vaccine product that has been studied in these patients. Extended observation time of 30 minutes is also recommended along with reminder to have emergency medications available in case of adverse reaction, a precaution

that should be observed when giving any vaccinations.

- Moderate or severe acute illness with or without fever. Wait to vaccinate until symptoms improve.
- Hypersensitivity to gentamicin, gelatin, or arginine.
- Concomitant aspirin therapy in children and adolescents. (This is due to concern about Reye's Syndrome since this is a live virus vaccine.)
- Concomitant antiviral therapy. Do not administer LAIV until 48 hours after stopping antiviral medications. Antiviral medications should not be given until two weeks have passed after LAIV (unless medically necessary). Administering antivirals before this two-week window may decrease vaccine effectiveness and repeat vaccination should be considered.

ADMINISTRATION

LAIV is packaged in a nasal sprayer with a dose divider clip. Each sprayer contains a prefilled single dose of 0.2 ml of LAIV vaccine. Position the tip of the nasal sprayer slightly into the nostril and then spray a dose of 0.1 ml into each nostril.

Vaccine dose does NOT need to be repeated if the patient coughs or sneezes after administration.

Persons who are severely immunosuppressed should not administer LAIV. Although they should not receive the vaccine themselves, it is safe for pregnant women, asthmatics, people age 50 and older, and people with other underlying medical conditions to administer LAIV to others.

There is no problem administering inactivated or live vaccines at the same time as LAIV. However, if not given at the same time, after administration of a live vaccine, at least four weeks should pass before another live vaccine is administered.

POSSIBLE SIDE EFFECTS

Runny nose, nasal congestion, headache, fever, and sore throat as a result of local vaccine virus replication in the nasal mucosa.

STORAGE/HANDLING

Keep refrigerated at 35°F to 46°F (2°C–8°C). Do not freeze.

PREGNANCY/NURSING

LAIV is Category B. LAIV is a live attenuated virus vaccine and ACIP says it should NOT be given to pregnant women. However ACIP says it is not necessary for pregnant or postpartum women to avoid contact with someone who has been recently vaccinated with LAIV. Breast feeding is not a contraindication since most live vaccines are not secreted in breast milk.

CPT CODES/ REIMBURSEMENT ISSUES

ALL INFLUENZA VACCINES

Multiple vaccine manufacturers have led to greater availability of vaccine, but unfortunately this has lead to more complicated coding for reimbursement.

For Medicare (as of 1/2/11), codes now vary according to brand of vaccine administered to a particular patient. For patients with commercial insurance, look for guidance on which type of influenza vaccine codes to use.

Medicare has assigned separate influenza vaccine Healthcare Common Procedure Coding System (HCPCS) Q Codes to distinguish between the brand names of inactivated influenza vaccines. The following table shows the most recent brand name and manufacturer codes:

Afluria: *Q2035*

Agriflu: *Q2034*

Fluarix: *90656*

FluLaval: *Q2036*

Fluvirin: *Q2037*

Fluzone: *Q2038*

LAIV: *90660*

Medicare Administration code: *G0008*
Commercial Administration code: *G0008*
Add-on CPT code: *90472*
Each additional vaccine (single or combination vaccine/toxoid). List separately in addition to the code for primary procedure

Diagnosis (ICD-9) code: V04.81
Prophylactic vaccination and inoculation against influenza

CPT codes by Vaccine Type:

90656
Influenza virus vaccine, trivalent, preservative free, when administered to individuals 3 years and older, for intramuscular use - single dose syringe

90658
Influenza virus vaccine, trivalent, when administered to individuals 3 years and older, for intramuscular use -multi-dose vial

90686
Influenza virus vaccine, quadrivalent, preservative free, when administered to individuals 3 years and older, for intramuscular use

90688
Influenza virus vaccine, quadrivalent, when administered to individuals 3 years and older, for intramuscular use

FAQs

Q: How dangerous is LAIV if it inadvertently gets sprayed into the air?

ACIP says the risk of getting vaccine viruses from the environment is unknown; however, it is unlikely to cause problems. LAIV vaccine viruses are attenuated and they are cold adapted. There have not been any reported cases of attenuated vaccine virus infections among patients or providers exposed to attenuated virus inadvertently.

Q: Is it OK to get LAIV if someone in the household is pregnant?

ACIP says having a pregnant household member is not a contraindication to LAIV vaccination. It is also OK for mothers who are nursing to receive LAIV. Pregnant women should receive inactivated vaccine IIV.

Q: Can influenza vaccine be given with other vaccines?

Yes. ACIP says IIV can be given with other inactivated or live vaccines. However, there are a few restrictions: administer at different site and use a different syringe. However, if not given at the same time, let four weeks pass after administration of a live vaccine before administering another live vaccine.

Q: Can influenza vaccine be given to persons who are receiving antiviral medications?

It is fine to give IIV to someone receiving antiviral medications, but not LAIV. Antiviral medications interfere with viral replication and that is how LAIV works: it replicates in the nasal mucosa.

Do not administer LAIV until 48 hours after stopping antiviral medications. Antiviral medications should not be given until after two weeks after LAIV (unless medically necessary). Administering antivirals before this two-week window may decrease vaccine effectiveness and repeat vaccination should be considered.

Q: Can influenza vaccine be given to patients with cellular immunodeficiency?

Yes. IIV inactivated influenza vaccine can and should be given to patients with cellular immunodeficiency. However, patients with immune system problems may not have as a robust immunologic response after vaccination.

Q: Is it safe for a household member of an immunocompromised person to receive LAIV?

It is important to ascertain the type of immunosuppression before deciding to vaccinate. In some cases it may be preferable for the household member to receive IIV instead.

Pneumococcal Polysaccharide (PPSV23) & Pneumococcal 13-valent conjugate (PCV13)

GENERIC NAME:
23-valent Pneumococcal Polysaccharide Vaccine (PPSV23), 13-Valent Pneumococcal Conjugate (PCV13)

BRAND NAME:
Pneumovax 23, Prevnar 13

DRUG COMPANY:
Merck & Co, Inc., Pfizer, Inc.

INDICATIONS

There are now two pneumococcal vaccines for adults: (1) PPSV23, the pneumococcal polysaccharide vaccine, Pneumovax, made by Merck and covering 23 Streptococcus pneumoniae serotypes; and (2) a newer pneumococcal vaccine for adults, pneumococcal conjugate vaccine, PCV 13, Prevnar, made by Pfizer, covering 13 Streptococcus pneumoniae serotypes. The cost of PCV 13 is about twice that of PPSV 23. Incorporation of the newer PCV13 vaccine in to adult immunization strategies is one of the biggest changes in the 2013 ACIP Adult Immunization Schedule. ACIP recommendations differ from FDA licensing parameters.

PPSV23

PPSV23 is FDA approved for all adults age 50 and also for younger adults (and those age 2 and older) at increased risk of pneumococcal disease. PPSV23 is recommended by ACIP for the following groups:

- All adults age 65 and older
- Adults age 19-64 with immunocompromising medical conditions and those with certain chronic medical conditions. This includes patients with chronic obstructive pulmonary disease, emphysema, asthma, chronic cardiovascular diseases, diabetes mellitus, chronic renal failure, nephrotic syndrome, chronic liver disease (including cirrhosis), alcoholism, cochlear implants, cerebrospinal fluid leaks, immunocompromising conditions (including HIV infection), and functional or anatomic asplenia (e.g. sickle cell disease and other hemoglobinopathies, congenital or acquired asplenia, splenic dysfunction, or splenectomy. Vaccination is recommended at least two weeks before elective splenectomy.)
- Adults age 19 to 64 who currently smoke cigarettes.
- Adult residents of nursing homes or long-term care facilities.

It should also be given to patients who anticipate receiving chemotherapy or immunosuppressive therapy at least two weeks before therapy is scheduled to begin. Avoid vaccination during chemotherapy or radiation therapy if possible.

PCV13

PVC13, a pneumococcal conjugate vaccine, is the newer pneumococcal vaccine for

adults. It was previously used only in children, and is now licensed by FDA for adults age 50 and older. ACIP guidance on use of Prevnar differs from FDA licensing parameters. ACIP recommends that PCV13 be given in addition to (not instead of) PPSV23 to immunocompromised adults of all ages. (Note that PCV13 is currently not FDA approved for adults under age 50.) The groups that ACIP says should receive both pneumococcal vaccinations include:

- Immunocompromised patients with sickle cell disease and other hemaglobinopathies, functional or anatomic asplenia, HIV infection and other immunodeficiency syndromes, leukemia, lymphoma and Hodgkin's disease, multiple myeloma, malignancies, advanced kidney disease (chronic renal failure and nephrotic syndrome), solid organ transplants, and other immunocompromising conditions.
- ACIP also recommends dual pneumococcal vaccination for immunocompetent patients with cerebrospinal fluid leak and/or cochlear implants.

Timing and order of vaccination for patients receiving both PCV 13 and PPSV 23

For those in groups recommended to receive both vaccinations, timing and order of vaccination makes a difference. When possible, PCV13 should be given before PPSV23; then wait at least 2 months before giving dose of PPSV23. For patients with the above mentioned conditions who have already received PPSV23, wait at least a year after last PPSV23 before giving PCV13.

CONTRAINDICATIONS

History of severe allergic reaction to vaccine components, including phenol (preservative) used in PPSV23 and any diphtheria – containing vaccine for PCV13.

ADMINISTRATION

PPSV 23:

A single dose of 0.5 mL should be administered intramuscularly in the deltoid of the upper arm or subcutaneously to the skin overlying the triceps muscle.

PCV 13:

A single dose of 0.5 mL should be administered intramuscularly in the deltoid of the upper arm.

The package insert for PCV 13 Prevnar states that antibody responses to Prevnar 13 were diminished when given with inactivated Influenza Virus Vaccine. ACIP says both can be given together.

Although the shingles vaccine (Zostavax) says that Zostavax should not be given simultaneously with PPSV23, ACIP says there is no problem and that both vaccines may be given at the same time (at different sites.)

PCV13 and PPSV23 should NOT be given at the same time. Also, for patients receiving both PCV13 and meningococcal conjugate vaccine (MCV4), timing depends on the meningococcal vaccine product used. If using MCV4-D (Menactra by Sanofi), give PCV13 first, then wait four weeks before giving MCV4. If using MCV4-CRM (Menveo by Novartis), you can give both products simultaneously.

POSSIBLE SIDE EFFECTS

The most common adverse reactions following both PPSV23 and PCV13 are injection site reactions (tenderness, redness, limitation of motion), which are typically mild and resolve within a few days of vaccination. Other side effects include headache, fatigue and muscle aches. For PPSV23, local reactions are more frequent following second vaccination, but are typically not severe and are self limited.

STORAGE/HANDLING

PPSV23 is a clear, colorless solution available in single dose or multi-dose vial. PCV13 is a suspension supplied in a single dose prefilled syringe.

The vaccines are used directly as supplied. No dilution or reconstitution is necessary.

PREGNANCY/NURSING

PPSV23 is Category C. Although there is no evidence that PPSV23 is harmful to a pregnant women or her fetus, it is not recommended during pregnancy unless there is an indication for its use. PCV13 is Pregnancy Category B. Animal reproductive studies on female rabbits at 20 times the human dose revealed no evidence of impaired fertility or harm to the fetus, however no adequate or well controlled studies have been performed in pregnant women.

Women who have underlying conditions known to put them at risk for invasive pneumococcal disease should be vaccinated before becoming pregnant, if possible.

REIMMUNIZATION

ACIP recommendations for those who need a second dose of PPSV23 and for PPSV23 dose at 65 (or older) remain unchanged.

For patents under age 65, a one-time revaccination after five years for those with the following conditions is indicated:

- chronic renal failure, nephrotic syndrome;
- sickle cell disease;
- functional or anatomic splenectomy;
- immunocompromised patients.

When previously vaccinated patients before age 65 reach age 65 (no matter whether they have already received 1 or 2 doses of PPSV23), an additional one time revaccination PPSV23 dose is recommended. This should be given at age 65 or later–when at least five years have passed since their last PPSV23 dose.

At this time, repeat vaccination with PCV13 for adults is not recommended.

CPT CODES/ REIMBURSEMENT ISSUES

Vaccine CPT codes:

90670 (PCV13), 90732 (PPSV23)

Commercial Plans Administration code: *90471 (PPSV23 & PCV13)*
Immunization administration (includes percutaneous, intradermal, subcutaneous, or intramuscular injections); one vaccine (single or combination vaccine/toxoid)

Medicare Administration Code: *G00092*

Add-on CPT code: *90472 (PPSV23 & PCV13)*
Each additional vaccine (single or combination vaccine/toxoid). List separately in addition to the code for primary procedure

ICD-9 code: *V03.82 Pneumococcal vaccination when administered alone*

V06.6
Pneumococcal and influenza vaccinations (Effective October 1, 2006), providers must report diagnosis code V06.6 on claims when the purpose of the visit was to receive both vaccines during the same visit

FAQs

Q: Is hypertension an indication for PPSV23?

No. Persons with hypertension in the absence of chronic heart disease or other chronic disease indication should not receive PPSV23.

Q: Can PPSV23 be given at the same time as influenza vaccine?

Yes. PPSV23 can be given on the same visit as influenza vaccine by separate injection and preferably in the other arm.

Q: Should Alaska natives or American Indians without underlying disease indications receive PPSV23?

No. ACIP no longer recommends routine vaccination of these groups. However, in certain situations, public health authorities may recommend PPSV23 for Alaska Natives and American Indians ages 50 through 64 years who are living in areas where the risk for invasive pneumococcal disease is increased.

Q: What is the difference between pneumococcal conjugate (PCV 13) and pneumococcal polysaccharide vaccine (PPSV 23)?

The pneumococcal conjuage vaccine invokes T dependent immune mechanisn, with the potential for more robust immunogenicity, including better functional antibody and lessened risk of hyporesponsiveness with subsequent dosing.

PCV13 covers 13 pneumococcal serotypes and PPSV23 covers 23 pneumococcal serotypes. PCV13 is given to children. It is unclear how the indirect herd effect of giving PCV13 children will affect disease in adults.

Tetanus Toxoid/Td/Tdap

Tetanus Toxoid

GENERIC NAMES:
tetanus toxoid, tetanus toxoid adsorbed

BRAND NAME:
none

DRUG COMPANY:
Sanofi-Pasteur

Td

GENERIC NAMES:
tetanus, diphtheria toxoids, absorbed

BRAND NAME:
none

DRUG COMPANIES:
Massachusetts Public Health Biologics, Aventis-Pasteur

Tdap

GENERIC NAMES:
tetanus toxoid, diphtheria toxoid, acellular pertussis vaccine

BRAND NAMES:
Adacel, Boostrix

DRUG COMPANIES:
Sanofi-Pasteur, GlaxoSmithKline Biologicals

INDICATIONS

All persons who are not allergic to the vaccine or a vaccine component should receive a primary vaccine series, ideally during childhood, of tetanus/diphtheria/pertussis vaccine. Following completion of a primary series, a booster dose of tetanus-containing vaccine should be given every 10 years to maintain immunity against tetanus.

All adults should have at least one dose of tetanus vaccine replaced with a dose of Tdap vaccine, which provides additional protection against pertussis (whooping cough). Td booster administration every 10 years should be continued.

Pregnant women should receive Tdap vaccination during each pregnancy, regardless of their prior vaccination history. The ideal time for this vaccination is at 27-36 weeks gestation. Unvaccinated new mothers should receive Tdap booster before leaving the hospital after delivering the baby.

In the 2013 adult immunization schedule, ACIP recommends that all adults age 65 years and older who previously have not received Tdap should receive a single dose of Tdap to protect against pertussis and reduce the likelihood of transmission.

Persons who work in health care, child care, and who will have contact with infants and immunocompromised patients should be vaccinated as soon as feasible with Tdap vaccine.

Td or Tdap may also be given as tetanus wound prophylaxis. ACIP recommends that pertussis vaccination, when indicated, should not be delayed and that Tdap should be administered regardless of interval since the last tetanus or diphtheria toxoid-containing vaccine. ACIP concluded that while longer intervals between Td and Tdap vaccination could decrease the occurrence of local reactions, the benefits of protection against pertussis outweigh the small potential risk for adverse events. Either vaccine can be given as tetanus wound prophylaxis in patients without known adequate immunity.

CONTRAINDICATIONS

Absolute

- A severe allergy to any component of tetanus, diphtheria, and/or pertussis vaccines.
- A life-threatening allergic reaction following a dose of tetanus-containing vaccine (DTP, DTaP, DT, Tdap, or Td). These patients should not receive another dose of tetanus-containing vaccine (Td or Tdap).
- Anyone who had a coma, prolonged seizure, or multiple seizures within seven days following a dose of DTP or

DTaP vaccine should not be given Tdap unless a cause other than the vaccine was found.

Relative

- Persons with epilepsy or another nervous system problem. Defer the vaccine if these conditions are ill-defined or not yet stabilized. Carefully weigh the risk/benefit of repeated vaccination with these vaccines in the affected patient.
- Persons with severe swelling or severe pain after a previous dose of DTP, DTaP, DT, Td, or Tdap vaccine, since this type of reaction may recur with further doses. Carefully weigh the risk/benefit of repeated vaccination with these vaccines in the affected patient.
- Persons who have/have had GBS less than six weeks following a previous dose of tetanus-containing vaccine. These patients may be at risk of recurrence or worsening with repeated doses of tetanus-containing vaccine. Carefully weigh the risk/benefit of repeated vaccination with these vaccines in the affected patient.
- A moderate or severe acute illness on the day the immunization is planned. These patients should usually wait until they recover before getting Tdap or Td vaccine. A person with a mild illness or low-grade fever can usually be vaccinated.

ADMINISTRATION

Td and Tdap vaccines are adjuvant-containing vaccines; a 0.5 ml dose should be administered intramuscularly in the deltoid muscle of the arm. The anterolateral thigh is an alternate site. For men and women weighing less than 60 kg (130 lb), a 5/8- to 1-inch needle is sufficient to ensure intramuscular injection. For women weighing 60-90 kg (130-200 lb) and men 60-118 kg (130-260 lb), a 1 1/2-inch needle is needed. For women weighing more than more than 90 kg (200 lb) or men weighing more than 118 kg (260 lb), a 1 1/2-inch needle is required.

Tdap and Td vaccines may be administered simultaneously with other adult vaccines. When two or more vaccines are to be administered, they can be given on the same day at different anatomic sites.

Primary series: Three doses of tetanus-containing vaccine over a six-month time period—a first dose followed by a booster dose at one month and a third dose at least six months after the first dose. If the primary series is administered in a previously unimmunized adult, Tdap may replace Td for any of the doses in the series.

POSSIBLE SIDE EFFECTS

Pain at the injection site is the most common local reaction, reported in about 65% patients within 14 days of the injection in vaccination trials.[1,2,3,4,5] Large injection site reactions may occur, but are uncommon.

The most frequently reported systemic adverse events during the 15 days following vaccination were headache, generalized body aches, and fatigue (25-33% of patients in vaccine trials). Fever is less common, but also has been reported.

STORAGE/HANDLING

Td and Tdap vaccine should be refrigerated and stored at 2°C to 8°C (35°F to 46°F). Do not freeze. The vaccines should not be used beyond their marked expiration date.

[1] http://www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM142764.pdf [Adacel FDA monograph]

[2] http://www.fda.gov/downloads/BiologicsBloodVaccines/UCM152842.pdf [Boostrix Package insert]

[3] Halperin SA, Smith B, Russell M, Hasselback P, Guasparini R, Skowronski D, Meekison W, Parker R, Lavigne P, Barreto L. An adult formulation of a five-component acellular pertussis vaccine combined with diphtheria and tetanus toxoids is safe and immunogenic in adolescents and adults. Vaccine. 2000 Jan 31;18(14):1312-9.

[4] Pichichero ME, Rennels MB, Edwards KM, Blatter MM, Marshall GS, Bologa M, Wang E, Mills E. Combined tetanus, diphtheria, and 5-component pertussis vaccine for use in adolescents and adults. JAMA. 2005 Jun 22;293(24):3003-11. Epub 2005 Jun 2.

[5] Southern J, Andrews N, Burrage M, Miller E. Immunogenicity and reactogenicity of combined acellular pertussis/tetanus/low dose diphtheria vaccines given as a booster to UK teenagers. Vaccine. 2005 May 31;23(29):3829-35. Epub 2005 Mar 30.

PREGNANCY/NURSING

Boostrix Tdap vaccine is pregnancy Category B and Adacel Tdap vaccine is Category C.

Tdap should be administered to pregnant women with each pregnancy. Ideally, Tdap vaccination should be administered between 27 and 36 weeks gestation. In women who have not previously received a Tdap vaccine, Tdap vaccination in the immediate postpartum period is recommended to help reduce the potential for pertussis in the infant.

A registry of women who have been given Tdap in pregnancy is being maintained. Pregnancy vaccine registries: Adacel: 800-822-2463; Boostrix: 888-825-5249.

REIMMUNIZATION/BOOSTER

Tetanus (Td or Tdap) booster vaccine should be administered every 10 years in adults.

After receipt of Tdap, persons should continue to receive Td for routine booster immunization against tetanus and diphtheria, according to previously published guidelines.

CPT CODES/ REIMBURSEMENT ISSUES

CPT code: 90703
Tetanus toxoid adsorbed, for intramuscular

CPT code: 90715
Tetanus, diphtheria toxoids and acellular pertussis vaccine (Tdap), for use in individuals seven years or older, for intramuscular

CPT code: 90718
Tetanus and diphtheria toxoids (Td) adsorbed for use in individuals seven years or older, for intramuscular

Note: Administration of Td post injury requires an ICD-9 code that identifies the injury.

FAQs

Q: Can a child or an adult who has had pertussis get the disease again? Should you vaccinate someone with a history of pertussis infection?

The frequency at which reinfection may occur is not well defined but it does occur. Reinfection may present clinically as a persistent cough rather than as typical pertussis.

Adolescents or adults who have a history of pertussis disease generally should receive Tdap according to the routine recommendation. Vaccination, regardless of history of prior pertussis infection, is recommended because the duration of protection induced by pertussis disease is unknown (waning might begin as early as seven years after infection) and because the diagnosis of pertussis can be difficult to confirm. Administering pertussis vaccine to persons with a history of pertussis presents no theoretical risk.

Q: If an adolescent or adult who has never received their one-time dose of Tdap is either infected with or exposed to pertussis, is vaccination with Tdap still necessary? If so, when?

Yes. If the illness was recent (less than five years) and the diagnosis was certain (i.e., confirmed by laboratory testing), it is reasonable to wait three to five years before administration of Tdap, unless tetanus and diphtheria toxoids are needed.

Q: When a patient seen in the ER needs tetanus protection, which vaccine should be given, Td or Tdap?

Adolescents and adults ages of any age who require a tetanus toxoid-containing vaccine as part of wound management should receive a single dose of Tdap instead of Td if they have not previously received Tdap. If Tdap is not available or was previously administered, then Td should be used.

Q: At what age might most patients never have received a primary series?

Although young adults born in the United States who received standard pediatric health care should have been vaccinated appropriately, one should not assume the tetanus vaccination status for any person based on age alone. Only a written record is acceptable proof of immunization. Persons without documentation of immunization should be assumed to be unimmunized.

Q: If a dose of DTaP or Tdap is inadvertently given to a patient for whom the product is not indicated (e.g., wrong age group), how do we rectify the situation?

The first step is to inform the patient that you have administered the incorrect vaccine. Next, DTaP given to patients age seven or older can be counted as valid for the one-time Tdap dose.

Q: I have a patient who received single-antigen tetanus (TT) in the ER rather than Td or Tdap. Should he be revaccinated?

ACIP recommends that patients always be given Td or, if appropriate, Tdap rather than TT, as long as there is no contraindication to the other vaccine components. However, since it's already been given, you can wait until the next scheduled booster dose is due and administer Td (or Tdap) at that time. There are exceptions (e.g., the patient plans to travel internationally, has potential contact with an infant younger than age 12 months) in which case you should administer Tdap (or Td) in order to reduce the potential for diphtheria and pertussis transmission.

Q: When should a person receive tetanus toxoid alone?

Single antigen tetanus toxoid should only be used in the rare instance of a person with a documented prior severe allergic response to diphtheria toxoid.

[1] Centers for Disease Control and Prevention. Prevention of pertussis, tetanus, and diphtheria among pregnant and postpartum women and their infants: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2008;57:1–51.

Herpes Zoster

GENERIC NAME:
herpes zoster virus vaccine

BRAND NAME:
Zostavax

DRUG COMPANY:
Merck & Co., Inc.

INDICATIONS

The Advisory Committee on Immunization Practices (ACIP) recommends herpes zoster vaccination for adults aged 60 or older, unless there is a contraindication. The Shingles Prevention Study showed that the vaccine reduced the overall risk of acquiring shingles by 51% and reduced the incidence of post herpetic neuralgia (PHN) by 66% in patients 60 and older.

In March 2011, the FDA extended its approval of the use of herpes zoster vaccine for people ages 50 to 59. In this age group, the vaccine reduced the risk of developing shingles by approximately 70%. However, as of this writing, the ACIP maintains its 60 or older recommendation.

The vaccine is not indicated as treatment for zoster (shingles) or as a treatment for PHN.

The vaccine is not indicated for primary prevention of primary varicella infection (chickenpox).

CONTRAINDICATIONS

- History of anaphylactic/anaphylactoid reaction to vaccine components including gelatin and neomycin. However, history of contact dermatitis due to neomycin is not considered to be a contraindication.
- History of immune system diseases including leukemia, lymphomas, and other malignant bone marrow or lymphatic system cancers and individuals with AIDS whose CD4+ T lymphocyte count is less than 200 cells per microliter.
- Patients on immunosuppressive therapy.
- Patients with active untreated tuberculosis.
- Pregnancy

ADMINISTRATION

Herpes zoster vaccine when reconstituted is a semi-hazy to translucent, off-white to pale yellow liquid.

Administer a single dose of 0.65 mL subcutaneously in the deltoid region of the upper arm. Do not inject intravascularly or intramuscularly.

The vaccination can be given to patients with mild acute illnesses with or without fever. However, for patients with severe acute illness, it is best to postpone vaccination until they are feeling better.

The package insert recommends that administration of herpes zoster vaccine and pneumococcal vaccine should be separated by a 4-week period.[1] The ACIP continues to recommend that these vaccines may be given

simultaneously, or in either order without regard to timing.

POSSIBLE SIDE EFFECTS

The most frequent vaccine-related adverse events include headache and injection site reactions (redness, pain, tenderness, swelling, and bruising).

There is *potential risk* of transmitting the vaccine virus to varicella-susceptible individuals, including pregnant women who have not had chickenpox. The risk for transmitting the attenuated vaccine virus to susceptible persons should be weighed against the risk for developing active variella zoster virus infection that could be transmitted to a susceptible person.

Living with a pregnant household member is not a contraindication to zoster vaccination.

STORAGE/HANDLING

The vaccine must be stored frozen between -58°F and +5°F (-50°C and -15°C) in a freezer with a separate sealed freezer door. Note that the use of dry ice may subject the vaccine to temperatures colder than -58°F (-50°C).

In February 2010, the manufacturer released new handling and storage guidelines allowing storage and or transportation at refrigerator temperature (2° to 8°C, 35°-46°F) for up to 72 hours prior to constitution. Vaccine stored at refrigerator temperature that is not used within 72 hours should be discarded.

Diluent should be stored separately at room temperature (20° to 25°C, 68° to 77°F), or in the refrigerator (2° to 8°C, 35° to 46°F).

Time is of the essence after removing the vaccine from freezer. Reconstitute it immediately upon removal from freezer. The vaccine must be administered within 30 minutes after reconstitution. Discard reconstituted vaccine if not used within 30 minutes. Do not freeze reconstituted vaccine.

Take particular patient safety measures to make sure you don't store zoster vaccine with other vaccines that have to be kept in freezer like varicella (chickenpox) vaccine. Both zoster and varicella vaccines must be kept frozen. Make sure that you have them clearly marked and delineated in your freezer to avert administration errors.

PREGNANCY/NURSING

Herpes zoster vaccine is Category C. The vaccine should not be given to women who are pregnant or to women of childbearing age.

Although naturally occurring varicella zoster virus (VZV) infection is known to sometimes cause fetal harm, the risk is small. The virus strain used in the vaccine is live but attenuated; its affect on the fetus is expected to be even less than naturally occurring infection. Still, vaccine strain virus effects have not been studied so the effect of the vaccine strain on the fetus is unknown. ACIP also states that women should avoid becoming pregnant for four weeks following zoster vaccination. Report any exposure to zoster vaccine during pregnancy to the pregnancy registry at 800-986-8999.

Living with a pregnant household member is not a contraindication to zoster vaccination, according to ACIP.

The vaccine should not be given to women who are nursing. On the other hand, ACIP says that since most live vaccines, including varicella vaccine, are not secreted in breast milk, breast-feeding is not a contraindication for zoster vaccination

REIMMUNIZATION/BOOSTER

Currently, no additional booster shot is recommended.

CPT CODES/ REIMBURSEMENT ISSUES

Herpes zoster Vaccine CPT code: *90736*

Administration code: *90471*
Immunization administration

The vaccine and administration fee is covered under Medicare Part D. Coverage can vary depending on the Medicare Part D carrier. For reimbursement questions, contact the Merck Vaccine Reimbursement Support Center at 1-800-734-6282.

Patients with private insurance should refer to their insurance policy benefits.

The website eDispense can help reduce your reimbursement time by 45 days and show how much the specific Part D plan will pay per patient: *https://enroll.edispense.com/ws_enroll/login/jsp?profile=VM*.

ICD-9 code: *V05.9*
Needed for other prophylactic vaccination and inoculation against single disease, unspecified single disease

FAQs

Q: Does one need to make sure the patient has had chickenpox before administering the vaccine?

It is not necessary to ask patients about their history of varicella (chickenpox) or to conduct serologic testing for varicella immunity.

Q: Is it OK to get the zoster vaccine if someone in the household is pregnant?

ACIP guidelines state that living with a pregnant household member is not a contraindication to receiving zoster vaccination.

Q: Can zoster vaccine be administered in patients taking steroids?

Patients taking 20 mg a day of prednisone (or the equivalent) for two weeks or more should not receive the zoster vaccination until after steroid therapy has been discontinued for at least one month. Short-term use of low- to moderate-dose steroid therapy (less than 20 mg a day for less than 14 days) is not considered to be immunosuppressive.

Q: Can patients on low-dose immunosuppressive therapy for treating rheumatological and certain chronic inflammatory diseases receive the zoster vaccination?

Low doses of methotrexate (<0.4 mg/kg/week), azathioprine (<3.0 mg/kg/day), or 6-mercaptopurine (<1.5 mg/kg/day) are also not considered sufficiently immunosuppressive to create vaccine safety concerns and are not contraindications for administration of the zoster vaccine.

FAQs continue on next page

Q: Can zoster vaccine be given to patients taking immune mediators and immune modulators?

The safety and efficacy of zoster vaccine administered concurrently with these agents is unknown. If it is not possible to administer zoster vaccine to patients before initiation of therapy, physicians should assess the immune status of the recipient on a case-by-case basis to determine the relevant risks and benefits. Otherwise, vaccination with zoster vaccine should be deferred for at least one month after discontinuation of such therapy.

Q: Can zoster vaccine be given to patients with cellular immunodeficiency?

ACIP says the vaccine should not be given to patients with clinical or laboratory evidence of other unspecified cellular immunodeficiency. However, persons with impaired humoral immunity including hypogammaglobulinemia or dysgammaglobulinemia can receive zoster vaccine.

Q: Can the zoster vaccine be given to patients taking intranasal, inhaled or topical steroids, or steroids administered in or around joints??

Use of intranasal steroids, inhaled steroids, or topical steroids is not a contraindication for zoster vaccination. The vaccine is also not contraindicated for those undergoing treatment with steroid joint, bursa, or tendon injections.

Q: Should the zoster vaccine be given to patients with a previous history of shingles?

ACIP guidelines state that people with previous history of shingles can be vaccinated unless they possess other contraindications. Shingles has a 3% recurrence rate, There is no documented safety concern if a dose of shingles vaccine is given to anyone who has already had the illness.

Q: What about vaccination after a zoster episode?

The proper time for vaccination after a zoster episode remains controversial. Expert recommendations vary from six months to two years. Vaccination should not be given during an acute episode. Zoster vaccination is not indicated to treat acute zoster or to treat PHN.

Q: Is there anything you should do if a patient receiving the vaccine develops a rash and then is exposed to someone at risk for varicella?

Although transmission of Oka/Merck strain VZV has been documented following varicella vaccination, this is rare. Also, rates of varicella-like rash appear to be less common following zoster vaccination than following varicella vaccination.

If a susceptible, immunocompromised person is inadvertently exposed to a person with a vaccine-related rash, varicella immuneglobulin need not be administered because disease associated with this type of transmission is expected to be mild. Acyclovir, valacyclovir, and famciclovir are active against live-attenuated Oka/Merck strain VZV and can be used in the unlikely situations in which a severe illness develops in the susceptible contact.

FAQs continue on next page

[1] Tseng HF, Smith N, Sy LS, Jacobsen SJ. Evaluation of the incidence of herpes zoster after concomitant administration of zoster vaccine and polysaccharide pneumococcal vaccine. Vaccine. 2011 May 9;29(20):3628-32.

Q: Can the vaccine be given to patients anticipating immunosuppression?

This is a valid concern because the risk and morbidity for zoster is much greater in people who are immunosuppressed. ACIP recommends giving one dose of the zoster vaccine at the first possible encounter while immunity is intact. Administer the vaccine at least 14 days, preferably four weeks, before the initiation of immunosuppressive therapy.

Q: Should the zoster vaccine be given to persons receiving antiviral medications?

Antivirals including acyclovir, famciclovir, and valacyclovir are effective against herpes family viruses including the strain found in VZV-based zoster vaccine. Administration of antiviral medications should be discontinued at least 24 hours prior to the administration of zoster vaccine, if possible, and should not be given for at least 14 days after vaccination. The June 6, 2008, *MMWR* on "Prevention of Herpes Zoster" (*http://www.cdc.gov/mmwr/pdf/rr/rr5705.pdf*) includes a section discussing vaccine administration to patients in certain groups, including those patients anticipating immunosuppression therapy (e.g., before stem cell transplant) and for HIV-positive individuals.

Q: Is it safe to give the vaccine to patients with past history of leukemia or lymphoma, but who are now in remission?

ACIP recommends that patients in remission can receive the vaccine as long as at least three months have elapsed since they have received chemotherapy or radiation therapy.

HPV

GENERIC NAMES:
quadrivalent HPV vaccine (HPV4), bivalent HPV vaccine (HPV2)

BRAND NAMES:
Gardasil (HPV4), Cevarix (HPV2)

DRUG COMPANIES:
Merck & Co., Inc., GlaxoSmithKline

Note: *HPV vaccines are not meant to be a treatment for HPV infection or HPV-related disease. Women must still get regular cervical cancer screening.*

QUADRIVALENT HPV VACCINE

Only one quadrivalent HPV vaccine is currently available. It is sold as brand name Gardasil and is made by Merck & Co., Inc. HPV4 covers HPV types 6, 11, 16, 18.

INDICATIONS

HPV4 vaccine is indicated for girls and young women ages 9 through 26 years for prevention of genital cancers—cervical, vaginal, and vulvar cancers—and precancers, as well as prevention of genital warts.

The vaccine is also indicated for boys and young men age 9 through 21 for prevention of genital warts and anal cancer. Males ages 21 through 26 may also receive the vaccine. Men who have sex with men should receive HPV up to age 26.

The vaccine does not contain viral DNA so there is no risk of being infected with HPV virus from the vaccine.

CONTRAINDICATIONS

- History of severe allergic reaction to vaccine components including baker's yeast *(Saccharomyces cerevisiae),* amorphous aluminum hydroxyphosphate sulfate (the adjuvant used in quadrivalent vaccine), and polysorbate 80. Patients with a history of immediate hypersensitivity to yeast should not be given the HPV4 vaccine.
- History of allergic reaction to a previous dose of HPV vaccine.
- Pregnant or planning to get pregnant soon. (Pregnant women exposed to quadrivalent HPV vaccine should enroll in the pregnancy registry by calling 1-800-986-8999.) Pregnancy testing is not needed before vaccine administration.

ADMINISTRATION

The vaccine is 0.5 mL per dose in three doses administered intramuscularly in the deltoid of the upper arm or the anterolateral thigh. The second and third doses should be given at one to two months and at six months after the first dose, respectively. The minimal interval between the first and second dose is four weeks. The minimum interval between the second and third dose is 12 weeks. The minimum interval between the first and third dose is 24 weeks.

If the vaccine schedule is interrupted, the series does *not* have to be restarted.

Try to use the same vaccine product for all doses if possible. The series can be continued with the other vaccine product if the vaccine initially used is not available.The HPV4 vaccine may be given at the same time as other vaccines but do not mix in the same syringe with other vaccines.

POSSIBLE SIDE EFFECTS

Fainting or syncope after vaccine administration has been reported. Make sure the patient is observed for 15 minutes after vaccine administration.

The most common adverse effect is pain, swelling, redness, itching, and bruising at the injection site. Other common adverse side effects include headache, fever, nausea, and dizziness.

STORAGE/HANDLING

Quadrivalent vaccine is a white, cloudy liquid. Shake well before using.

Keep refrigerated at 2°C to 8°C (35°F to 46°F). Do not freeze. Protect from light. Administer as soon as possible after taking the vaccine out of the refrigerator. It can be out of the refrigerator as long as the temperature is below 25°C but for no more than 72 hours.

PREGNANCY/NURSING

HPV4 vaccine is Category B. Lactating women can receive the HPV vaccine, but it is contraindicated for women who are pregnant or planning to become pregnant.

REIMMUNIZATION/BOOSTER

Currently, no booster dose of HPV vaccine is recommended.

BIVALENT HPV VACCINE

Only one bivalent HPV vaccine is currently available. It is sold as brand name Cervarix and is made by GlaxoSmithKline. HPV2 covers HPV types 16, 18.

INDICATIONS

HPV2 vaccine is indicated for girls and young women ages 10 through 25 years for prevention of cervical cancers and precancers.

Currently there is no FDA indication for boys and men.

ADMINISTRATION

The vaccine is 0.5 mL per dose in three doses administered intramuscularly, preferably in the deltoid of upper arm. The second and third doses should be given one to two months and six months after the first dose, respectively. The minimal interval between the first and second dose is four weeks. The minimum interval between the second and third dose is 12 weeks. The minimum interval between first and third dose is 24 weeks.

If the vaccine schedule is interrupted, the series does not have to be restarted.

Try to use the same vaccine product for all doses if possible. The HPV vaccine may be given at the same time as other vaccines but do not mix in the same syringe with other vaccines.

POSSIBLE SIDE EFFECTS

Fainting or syncope after vaccine administration has been reported. Make sure the patient is observed for 15 minutes after vaccine administration.

The most common adverse effect is pain, redness, and swelling at the injection site. Other adverse side effects include fatigue, headache, muscle aches, gastrointestinal symptoms, and joint aches.

STORAGE/HANDLING

Bivalent vaccine is a homogenous, turbid, white suspension. Shake well before using.

Keep refrigerated at 2°C to 8°C (35°F to 46°F). Do not freeze.

Bivalent vaccine is available in a single dose vial or prefilled syringe. Note that the tip and plunger of the pre-filled syringe contains latex.

PREGNANCY/NURSING

HPV2 vaccine is Category B. Llactating women can receive the HPV vaccine, but is contraindicated for women who are pregnant or planning to become pregnant.

REIMMUNIZATION/BOOSTER

Booster doses are not recommended at this time.

CPT CODES/ REIMBURSEMENT ISSUES

HPV vaccine CPT code: *90649*

Administration code: *90472*
Immunization administration (includes percutaneous, intradermal, subcutaneous, or intramuscular injections); one vaccine (single or combination vaccine/toxoid)

Add-on CPT code: *90472*
Each additional vaccine (single or combination vaccine/toxoid). List separately in addition to the code for primary procedure

ICD-9 code: *V05.9*
Needed for other prophylactic vaccination and inoculation against single disease, unspecified single disease

FAQs

Q: Do you have to do a pregnancy test before giving either vaccine?

No, but neither HPV2 nor HPV4 should be given to women who are known to be pregnant or are planning to get pregnant soon.

Q: What should you do if you find out that patient is pregnant?

Pregnant women exposed to HPV vaccine should enroll in pregnancy registry. Both vaccines are in Pregnancy category B.

Q: Can a patient get the HPV vaccine while nursing?

Yes. ACIP says lactating women can receive the HPV vaccine.

Q: Does it matter which vaccine is given to boys?

Yes. Currently, only the quadrivalent vaccine, which provides protection against genital warts and anal cancer, is licensed for males.

Q: Can the HPV vaccines be used to treat an abnormal pap smear?

No. They are not meant to be a treatment for HPV infection or HPV-related disease.

Q: Do you still have to get cervical cancer screening if you get the HPV vaccine?

Yes. HPV vaccines are not meant to be a treatment for HPV infection or HPV-related disease. Women must still get regular cervical cancer screening.

Meningococcal

GENERIC NAMES:
meningococcal conjugate vaccine (MCV4), meningococcal polysaccharide vaccine (MPSV4)

BRAND NAMES:
Menomune, Menactra, Menveo

DRUG COMPANIES:
Sanofi Pasteur, Novartis

Three quadrivalent vaccines are licensed in the United States to prevent invasive meningococcal disease (IMD) caused by *N. meningitidis* serogroups A, C, Y, and W-135 serogroup. (B is not currently preventable by United States licensed vaccines.) Available vaccines are:

- **MCV4:** Meningococcal conjugate quadrivalent vaccine (Menactra, Sanofi Pasteur, licensed in 2005, conjugated to diphtheria toxoid)
- **MCV4:** Meningococcal conjugate quadrivalent vaccine (Menveo, Novartis vaccines, licensed in 2010, conjugated to cross reactive mutant protein)
- **MPSV4:** Polysaccharide meningococcal quadrivalent vaccine (Menomune, Sanofi Pasteur, licensed in 1981)

The MCV4 vaccines are the vaccines of choice where indicated because they elicit strong primary immune responses, as well as anamnestic (long-term memory) immune responses upon exposure to the antigen(s). They also reduce asymptomatic carriage of *N. meningitidis*, providing herd immunity and protecting unvaccinated persons.

INDICATIONS

ACIP recommends routine immunization with MCV4 of adolescents 11 through 18 years of age and immunization of persons 2 through 54 years of age who are at elevated risk for IMD including:

- College freshman living in dormitories
- Microbiologists routinely exposed to *N. meningitidis*
- Military recruits
- Persons who travel to or reside in countries where *N. meningitidis* is hyper-endemic or epidemic, particularly if contact with the local population will be prolonged
- Persons with persistent complement component deficiency
- Persons with anatomic or functional asplenia
- Persons with HIV infection

MPSV4 is indicated for people ages 56 and older.

CONTRAINDICATIONS

- Previous known severe allergic reaction to any component of the vaccine. Safety data are not available for use of MCV4 in pregnant women.

PRECAUTIONS

Vaccination should be deferred in persons with moderate or severe acute illness until the illness resolves.

ADMINISTRATION

MCV4: For persons 11 through 54 years of age, MCV4 vaccines are given as a single 0.5 mL dose intramuscularly.

MPSV4: For persons age two years and above, the MPSV4 vaccine is given as a 0.5 mL dose subcutaneously every three to five years to persons who remain at risk for meningococcal disease.

POSSIBLE SIDE EFFECTS

Meningococcal conjugate vaccines tend to be mildly more likely to cause an inflammatory response than polysaccharide vaccines. In one study, 13% of adults receiving the MCV4 vaccine reported pain limiting arm motion in the injected arm, compared to 3% of those who received MPSV4. Low-grade fever, swelling, and redness occur in 10%–14% of MCV4 and MPSV4 recipients. Systemic and local adverse events tend to be low grade, transient, and self-resolving.

STORAGE/HANDLING

All meningococcal vaccines licensed in the United States should be refrigerated. Freezing may destroy vaccine potency, and such vaccines should not be used. For single-dose reconstituted MPSV4 vaccine, the vaccine should be used within 30 minutes. For multidose vials, where vaccine has been reconstituted, the vaccine may be used for up to 35 days if kept refrigerated.

PREGNANCY/NURSING

MPSV4 vaccine is Category C. MPSV4 vaccine is safe in pregnant women at risk for meningococcal disease. Safety data are not available for the use of MCV4 vaccines in pregnant women. Vaccine recipients may breastfeed.

REIMMUNIZATION

ACIP recommends routine vaccination of persons with quadrivalent meningococcal conjugate vaccine at age 11 or 12 years, with a booster dose at age 16 years. After a booster dose of meningococcal conjugate vaccine, antibody titers are higher than after the first dose and are expected to protect adolescents through the period of increased risk through age 21 years. For adolescents who receive the first dose at age 13 through 15 years, a one-time booster dose should be administered, preferably at age 16 through 18 years, before the peak in increased risk. Persons who receive their first dose of meningococcal conjugate vaccine at or after age 16 years do not need a booster dose. Routine vaccination of healthy persons who are not at increased risk for exposure to *N. meningitidis* is not recommended after age 21 years.

Data indicate that the immune response to a single dose of meningococcal conjugate vaccine is not sufficient in

persons with certain medical conditions such as asplenia. Persons with persistent complement component deficiencies (e.g., C5–C9, properidin, factor H, or factor D) or asplenia should receive a 2-dose primary series administered 2 months apart and then receive a booster dose every 5 years. Adolescents aged 11 through 18 years with HIV infection should be routinely vaccinated with a 2-dose primary series. Other persons with HIV who are vaccinated should receive a 2-dose primary series administered 2 months apart. All other persons at increased risk for meningococcal disease (e.g., microbiologists or travelers to an epidemic or highly endemic country) should receive a single dose.

CPT CODES/ REIMBURSEMENT ISSUES

Meningococcal vaccine CPT codes: 90733 (Menomune) and 90734 (Menactra)

ICD-9 code: V03.89

FAQs

Q: Should all college freshmen receive meningococcal vaccine?

Vaccine administration remains a recommendation from the ACIP and is not a mandate. However, individual states may mandate vaccination prior to school or college entry. Studies have estimated the risk of meningococcal disease in entering college freshmen to be two- to five-fold higher than the general public. While this is an elevated rate, the absolute number of cases is small, and the cost of the vaccine is relatively high. Cost per case prevented by vaccinating all freshmen is estimated at $1.4-$2.9 million, while cost per death prevented is estimated to be $22-$48 million.

Q: How long does immunity last after vaccination?

Immunity to the polysaccharide vaccine wanes after three to five years, particularly in younger children. While immunity after MCV4 vaccines is expected to last somewhat longer, recent data suggest that bactericidal antibody-based immunity wanes by five years.

Hepatitis A

GENERIC NAME:
hepatitis A vaccine, hepatitis A/hepatitis B combination

BRAND NAMES:
Havrix, Vaqta, Twinrix

DRUG COMPANIES:
GlaxoSmithKline, Merck & Co., Inc.

INDICATIONS

The vaccine is indicated for all persons older than 18 years of age who provide a home or day care for a child who is an international adoptee.

It is indicated for male adolescents and adults who have sex with men, as well as for all persons who are users of injection or non-injection illicit drugs.

The vaccine is indicated for all patients with chronic liver disease or who are awaiting or have received a liver transplant as well as for individuals whose occupation requires exposure to hepatitis A–infected primates or with the virus in a research laboratory.

The vaccine is recommended for travelers to countries that have an elevated prevalence of hepatitis A infection.

CONTRADICTIONS

- History of severe allergic reaction to a previous dose of hepatitis A vaccine or a vaccine component.

ADMINISTRATION

The vaccine is 1 mL per dose in two doses, given six months apart, administered intramuscularly into the deltoid muscle of the upper arm. Use the same vaccine product for both doses if possible.

The combination hepatitis A/hepatitis B vaccine is licensed for use in persons older than 17 years of age. The 1 mL dose is given in a three-dose schedule at 0, 1, and 6 months. After three doses of the combination vaccine, antibody responses to both components are comparable to responses after the single-antigen vaccines given separately.

Hepatitis A vaccines may be given at the same time as other vaccines, but do not mix in the same syringe with other vaccines. The vaccines should be given at different anatomic sites.

POSSIBLE SIDE EFFECTS

Soreness at the injection site and headache are the most common adverse effects; low-grade fever occurs in less than 10 percent of recipients.

STORAGE/HANDLING

Keep refrigerated at 1°C to 8°C (36°F to 46°F). Do not freeze.

PREGNANCY/NURSING

Hepatitis A vaccine is Category C. (Studies in animals and humans have not been done.) The vaccines are produced from inactivated hepatitis A virus, thus there is no absolute contraindication to their use in pregnancy. Pregnant women at risk for hepatitis A, such as those traveling to developing countries, might be considered for immune globulin prophylaxis.

REIMMUNIZATION/BOOSTER

There are no indications for reimmunization.

CPT CODES/ REIMBURSEMENT ISSUES

Unspecified code: *90730*

Hepatitis A/Hepatitis B combination codes:
90632, 90636

FAQs

Q: Should you test for antibody before vaccination?

It is not generally cost effective to screen individuals for antibody in order to determine whether they are susceptible to hepatitis A before immunization. Pre-vaccination testing might be considered in specific circumstances where the expected prevalence of immunity is high. These might include persons who were born in areas of the world with high endemicity of hepatitis A infection and adults in certain population groups such as American Indians, Alaska Natives, and Hispanics. One must determine whether the testing process will be a barrier to the initiation of vaccination.

Q: Should the person who has been vaccinated with hepatitis A vaccine be tested for antibody to ensure immunity?

There is no need for post-immunization serologic testing because the vaccine is highly immunogenic.

Q: What should be done if the second (last) dose of hepatitis A vaccine is delayed beyond 18 months?

Administer the second dose as soon as possible. The first dose does not need to be repeated.

Q: Can hepatitis A vaccine be given to immunocompromised persons (e.g., persons on hemodialysis or persons with AIDS)?

Because hepatitis A vaccine is inactive, no special precautions need to be taken when vaccinating immunocompromised persons.

Q: Is it harmful to administer an extra dose(s) of hepatitis A or hepatitis B vaccine or to repeat the entire vaccine series if documentation of vaccination history is unavailable?

If necessary, administering extra doses of hepatitis A or hepatitis B vaccine is not harmful.

FAQs continue on next page

Q: Which groups do NOT need routine vaccination against hepatitis A?

Food service workers. Food-borne hepatitis A outbreaks are relatively uncommon in the United States. Although food handlers have a critical role in common-source food borne outbreaks, they are not at increased risk of hepatitis A because of their occupation. Consideration may be given to vaccination of employees who work in areas where community-wide outbreaks are occurring and where state and local health authorities or private employers determine that such vaccination is appropriate.

Sewage workers. In the United States, no work-related outbreaks of hepatitis A have been reported among workers exposed to sewage.

Health care workers. Health care workers are not at increased risk for hepatitis A. If a patient with hepatitis A is admitted to the hospital, routine infection-control precautions should be sufficient to prevent transmission to hospital staff.

Q: Who should receive protection against hepatitis A before travel?

All susceptible persons traveling to or working in countries that have elevated rates of hepatitis A should be vaccinated. The risk for hepatitis A exists even for travelers to urban areas, those who stay in luxury hotels, and those who report that they have good hygiene and that they are careful about what they drink and eat.

Q: How soon before travel should the first dose of hepatitis A vaccine be given?

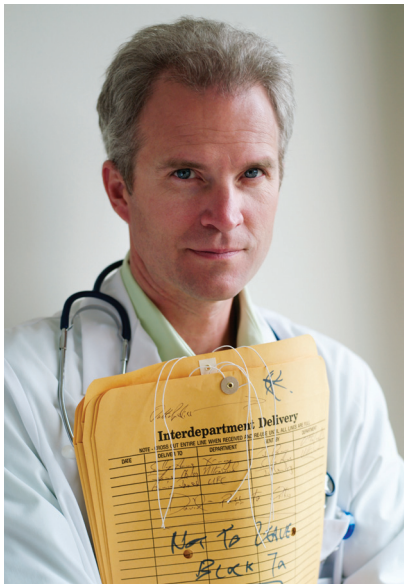
The first dose of hepatitis A vaccine should be administered as soon as travel is considered. Immune globulin and vaccine have equivalent post-exposure efficacy and one dose of hepatitis A vaccine administered at any time before departure may provide adequate protection for most healthy persons.

Hepatitis B

GENERIC NAMES:
hepatitis B vaccine, hepatitis A/hepatitis B combination

BRAND NAMES:
Engerix-B, Recombivax HB, Twinrix

DRUG COMPANIES:
GlaxoSmithKline, Merck & Co., Inc.



INDICATIONS

The vaccine is indicated for all adolescents up to age 19.

The vaccine is indicated for the following populations, in all persons 19 years of age and older:

- *Behavioral:* Sexually active persons who are not in a long-term mutually monogamous relationship, persons seeking evaluation or treatment for a sexually transmitted disease, current or recent illicit injection-drug users, and men who have sex with men.
- *Occupational:* Health care personnel and public safety workers who may be exposed to blood or other potentially infectious body fluids.
- *Medical:* Persons who are younger than age 60 as soon as feasible after diagnosis and those with diabetes who are 60 years or older at the discretion of the treating physician based on the need for assisted blood glucose monitoring in a congregate facility; persons with end-stage renal disease (including those receiving hemodialysis); persons with HIV infection, and persons with chronic liver disease.
- *Other:* Household contacts and sex partners of persons with chronic hepatitis B virus infection; clients and staff of institutions for persons with developmental disabilities.
- *Travelers:* International travelers to countries with elevated prevalence of hepatitis B infection.

CONTRAINDICATIONS

- History of serious adverse event after receipt of a previous dose of hepatitis B vaccine or those with a history of hypersensitivity to yeast or any vaccine component.

ADMINISTRATION

A three-dose schedule (1mL per dose) is recommended for both monovalent vaccines. The second dose should be given one month after the first dose; the third dose should be administered at least two months after the second dose (and at least four months after the first dose). The vaccine should be administered intramuscularly into the deltoid muscle of the upper arm.

Alternative vaccination schedules (e.g., 0, 1, and 4 months or 0, 2, and 4 months) have been shown to be as effective as the standard schedule of 0, 1, and 6 months.

In 2007 the FDA approved accelerated dosing for

hepatitis A and B vaccines, as well as the combination hepatitis A and hepatitis B vaccine. Following the initial dose, subsequent doses are given at seven and 21-30 days, followed by a booster dose at 12 months. This accelerated dosing schedule can provide protection in three weeks' time and can be used when there is not enough time for the standard six-month dosing schedule. If the vaccine schedule is interrupted, the series does not need to be restarted.

Special formulation and administration schedules: Adults receiving hemodialysis or with other immunocompromising conditions should receive the dialysis formulation of Recombivax HB administered on a three-dose schedule or two doses of Engerix-B administered concurrently on a four-dose schedule at 0, 1, 2, and 6 months.

The combination hepatitis A/hepatitis B vaccine is licensed for use in persons older than 17 years of age. The 1 mL dose is given in a three-dose schedule at 0, 1, and 6 months. After three doses of the combination vaccine, antibody responses to both components have been shown to be comparable to responses after the single-antigen vaccines given separately.

The hepatitis B vaccines may be given at the same time as other vaccines but do not mix in the same syringe with other vaccines. The vaccines should be given at different anatomic sites.

POSSIBLE SIDE EFFECTS

Soreness at the injection site is the most commonly reported adverse event; low-grade fever may occur but is uncommon.

STORAGE/HANDLING

Keep refrigerated at 2°C to 8°C (36-46°F). Do not freeze.

PREGNANCY/NURSING

Hepatitis B vaccine is Category C. Pregnancy is not a contraindication to vaccination. The vaccines contain noninfectious hepatitis B virus surface antigen and cause no risk of infection to the fetus.

REIMMUNIZATION/BOOSTER

For persons with normal immune status who have been vaccinated, booster doses are not recommended.

For hemodialysis patients, the need for booster doses should be assessed by annual testing for antibody to hepatitis B surface antigen (anti-HBsAg). A booster dose should be administered when anti-HBs levels decline to <10 mIU/mL. For other immunocompromised persons, the need for booster doses has not been determined.

CPT CODES/ REIMBURSEMENT ISSUES

Hepatitis A-Hepatitis B combination codes:
90731, 90636

FAQs

Q: Can a patient receive the first dose of hepatitis B vaccine from one manufacturer and subsequent doses from another manufacturer?

Yes. No differences in immune response are observed when vaccines from different manufacturers are used to complete the series.

Q: Is it harmful to administer an extra dose(s) of hepatitis A or hepatitis B vaccine or to repeat the entire vaccine series if documentation of the vaccination history is unavailable?

If necessary, administering extra doses of hepatitis A or hepatitis B vaccine is not harmful.

Q: Who should receive post-vaccination testing?

Testing for immunity is advised for persons whose subsequent clinical management depends on knowledge of their immune status, including the following:

- Health care workers and public safety workers at high risk for continued percutaneous or mucosal exposure to blood or body fluids
- Chronic hemodialysis patients, HIV-infected persons, and other immuno-compromised persons (e.g., hematopoietic stem-cell transplant recipients or persons receiving chemotherapy)
- Sex partners of persons with chronic HBV infection

Q: When should post-vaccination testing be performed?

When necessary, post-vaccination testing for antibody to hepatitis B surface antigen (anti-HBsAg) should generally be performed one to two months after completion of the vaccine series.

Q: Is there any benefit or risk in vaccinating a person who has been infected with HBV?

Persons who have already been infected with HBV will receive no benefit from vaccination. However, there is no risk to a previously infected person who receives vaccination.

Q: Should persons be tested for immunity to hepatitis B before being vaccinated?

It is currently recommended that certain populations undergo testing for HBV infection prior to vaccination, including the following:

- Hemodialysis patients
- Pregnant women
- Persons with known or suspected exposure to HBV including the following:
  - Household contacts of HBV-infected persons
  - Persons with known occupational or other exposures to infectious blood or body fluids
- Foreign-born persons from countries of high HBV endemicity
- HIV-positive persons

For these populations, serologic assays for HBsAg and anti-HBsAg should be used to determine infection or immunity prior to vaccination.

FAQs continue on next page

Q: After receiving the hepatitis B vaccine series, what level of anti HBs is considered protective?

An anti-HBs level of >10mIU/mL is considered protective.

Q: What should be done if hepatitis series is given but laboratory testing does not show seroconversion?

Hepatitis B series should be repeated and then re-test for anti- HBs in one to two months. If the test is still negative, the person can be classified as a non-responder and is most likely susceptible to Hepatitis B infection.

Q: Do people at occupational risk (like health care workers) need to get additional Hepatitis B boosters if they demonstrated laboratory evidence of seroconversion after receiving the initial vaccine series even if current anti HBs titer is less than 10 mIU/mL?

People who have shown seroconversoin after initial 3 dose series do not need a booster. These patients are still protected because immune memory maintains anamnestic anti-HBs response.

Measles-Mumps-Rubella

GENERIC NAME:
Live-attenuated measles, mumps, and rubella vaccine

BRAND NAME:
MMR-II (MMR)

DRUG COMPANY:
Merck & Co., Inc.

INDICATIONS

Routine for all infants, children, and adolescents (two doses separated by at least one month).

All adults born in 1957 or later should receive at least one dose (unless contraindicated). Persons born prior to 1957 generally can be assumed to be protected.

Persons at increased risk for contraction of measles, mumps, or rubella:

- International travelers
- Persons attending post-secondary schooling
- Health care workers (HCWs)
- Women of childbearing age
- HIV-infected persons who do not have evidence of severe immunosupression (defined as persons with total CD4+ T-lymphocyte counts greater than 200 or CD4+ T-lymphocytes greater than 14% of total lymphocytes)
- Unimmunized exposed persons (if used within 72 hours of exposure)

All HCWs should receive two doses of MMR vaccine at least 28 days apart unless they have laboratory evidence of immunity or laboratory confirmation of measles, mumps, and rubella infection, or were born before 1957. Unvaccinated HCWs who lack laboratory evidence of immunity to any of these viruses should receive two doses of MMR (at least 28 days apart) during an outbreak of measles or mumps, and one dose of MMR during a rubella outbreak.

CONTRAINDICATIONS

Absolute

- Pregnancy, severe immunosuppression (due to disease, such as HIV infection, chemotherapy, radiation, corticosteroid treatment, etc.), severe allergic reactions to any vaccine component (particularly porcine gelatin), and recent administration of blood products (due to inhibition of immune responses to the vaccine).

Relative

- Acute moderate to severe illness (defer until recovered), and thrombocytopenia within six weeks after a previous dose of MMR vaccine.

ADMINISTRATION

MMR vaccine is given as a 0.5 mL dose subcutaneously.

POSSIBLE SIDE EFFECTS

Transient rashes, fevers, and lymphadenopathy. Due to the nature of MMR vaccine recommendations, most reported side

effect rates have been reported from studies in children and thus may not accurately reflect adverse event rates in adults. Therefore, only the more important systemic adverse events are discussed here.

According to the CDC, thrombocytopenia occurs in one case per 30,000 doses—with increased risk among persons with a history of immune thrombocytopenic purpura (ITP).

Arthralgias and arthritis have been associated with live rubella virus immunization in adolescent females. Among postpubertal, susceptible females, the incidence of this adverse event has been as high as 25%, although these side effects are transient in nature. Whether more chronic, persistent arthritis can result remains debatable.

Aseptic meningitis has been reported in other countries using alternative strains of mumps; however, the use of the Jeryl Lynn strain—the only strain used in the United States—has not been associated with such side effects. There is no evidence of increased risk of subacute sclerosing panencephalitis among persons receiving MMR or measles-containing vaccines in the United States. The CDC estimates that the risk of anaphylaxis after MMR vaccine is less than one per million doses.

STORAGE/HANDLING ISSUES

MMR vaccine is a lyophilized vaccine, which must be reconstituted prior to administration. Lyophilized vaccine should be stored at ≤2°C to 8°C (35°F to 46°F), and protected from light (which can inactivate the viruses). Reconstituted vaccine is stored under the same conditions, must not be frozen, and must be used within eight hours after reconstitution.

PREGNANCY/NURSING

MMR vaccine is Category C. As these are live, attenuated vaccine viruses, administration while pregnant is contraindicated. Registries of pregnant women who have been inadvertently immunized while pregnant have not demonstrated increased risks of fetal defects or harm. Pregnancy should be deferred for 30 days after vaccination with MMR. Such women should be asked whether they believe they may be pregnant. If the answer is "no", simply educate regarding the need to avoid MMR immunization while pregnant and record in the medical record. Pregnancy testing is encouraged if the woman is unsure.

REIMMUNIZATION/BOOSTER

Routine reimmunization of otherwise fully and age-appropriately immunized persons is not necessary. Reimmunization of those initially immunized with inactivated vaccines (commonly done from 1963-1967 with measles and from 1950-1978 for mumps) or vaccine of unknown origin is recommended. Additionally, reimmunization of those persons previously immunized with a live measles vaccine concomitantly administered with immune globulin preparations (commonly done from 1963-1975) should be considered.

CPT CODES/ REIMBURSEMENT ISSUES

Measles vaccine CPT code: *90705*

MMR vaccine CPT code: *90707*

Measles ICD-9 code: *V04.2*

MMR ICD-9 code: *V06.4*

UPDATED FEBRUARY 2013

FAQs

Q: Can MMR vaccine be administered on the same days as a tuberculin skin test (TST)?

Yes. However, live MMR vaccine can interfere with the immune response to tuberculin skin testing, if the TST test is administered more than one day following MMR administration. This effect is thought to last for only four to six weeks.

Q: If a patient is only susceptible to one of the three viruses in the MMR vaccine, can the vaccine be given?

There are no increased risks to giving the MMR vaccine even when the recipient is immune to one or more of its components.

Q: What about antibody testing?

Antibody testing is generally more expensive than the cost of the vaccine.

Q: Can the live viruses in the MMR vaccine be transmitted to others?

There are no reports or evidence for transmission of MMR vaccine viruses. Therefore nursing mothers can safely receive MMR vaccine as can close contacts/family members of immunocompromised individuals.

Q: Why is recent blood product administration a contraindication for receipt of MMR vaccine?

While not a safety issue, it is an immunogenicity issue as the immune globulins in such products neutralize MMR vaccine viruses, preventing development of full immunity. Depending upon the blood product used, MMR vaccination should be delayed between three and 11 months.

Q: Since measles vaccine virus is grown in chicken eggs, why is egg allergy not a contraindication to MMR vaccination?

The quantities of any residual egg protein are so small that there has been no evidence of anaphylactic reaction in egg-allergic individuals directly challenged with MMR vaccine.

Q: Should rubella-containing vaccines be avoided in adults with arthritis?

Arthritis is not a contraindication for MMR vaccine. There are no published studies demonstrating any increased risk or exacerbation of pre-existing arthritis in persons receiving rubella-containing vaccines.

Q: Can MMR vaccines be given to HIV-positive individuals?

MMR vaccine is indicated for all asymptomatic and symptomatic HIV-infected persons who do not have evidence of severe immunosuppression. For adolescents and adults, the total CD4+ T lymphocytes should be greater than 200/QL, or the CD4+ T lymphocytes should be greater than 14% of total lymphocytes.

Varicella

GENERIC NAME:
Varicella vaccine

BRAND NAME:
Varivax (live, attenuated, single antigen varicella vaccine)

DRUG COMPANY:
Merck & Co., Inc.

INDICATIONS

Varivax is approved for all persons over the age of 12 months.

The vaccine is indicated for all healthy nonpregnant adults who do not have immunity, as evidenced by documentation of age-appropriate vaccination, laboratory evidence of immunity, or confirmation of disease by a laboratory or health care professional.

Birth before 1980 may be considered as evidence of immunity for some adults, but should not be considered as such for health care providers and pregnant women.

Special consideration for vaccination should be given to adults who do not have immunity and present an increased risk of exposure or transmission of varicella, including health care workers, persons working in environments with increased likelihood of varicella-zoster virus transmission. These include teachers, day care workers, residents and staff of institutional settings, college students, military personnel, nonpregnant women of childbearing age, adolescents and adults living in households with children or immunocompromised persons, and international travelers.

Varicella vaccination is recommended for post-exposure prophylaxis of healthy persons without evidence of immunity following exposure to varicella either individually or in an outbreak setting.

CONTRAINDICATIONS

Absolute

- Previous hypersensitivity to the vaccine or to a vaccine component, including gelatin and neomycin. A history of contact dermatitis to neomycin is not a contraindication.
- Immunocompromised patients including those with any hematologic malignancy such as leukemia, lymphoma, or other blood dyscrasias that affect the bone marrow or lymphatic system are contraindicated because the vaccine contains live attenuated varicella virus.
- Persons with primary or acquired immune deficiency such as AIDS, other cellular immunodeficiency, hypogammaglobulinemia, or dysgammaglobulinemia. Persons with HIV/AIDS over the age of eight years who have an absolute CD4 count above 200 cells/mm^3 may receive the varicella vaccine.

- Patients on immunosuppressive medications including systemic corticosteroids ≥20 mg of prednisone equivalent daily for more than two weeks who are also at risk for more extensive vaccine–associated rash or disseminated varicella disease. Vaccine should not be given until after corticosteroid therapy has been discontinued for at least one month.
- There are no published data regarding varicella vaccination in patients taking immunomodulators such as Tacrolimus (FK506), Sirolimus, Etanercept, Infliximab, or Mycophenolate.
- Pregnant women, as the affect on the fetus is unknown, although the potential risk is considered to be low. Nonpregnant women who receive the vaccine should not become pregnant for at least one month after each injection.

Relative:

- Persons with a severe acute illness including active, untreated tuberculosis, until they have recovered from their illness. Mild illnesses, with or without fever, are not a contraindication.
- Persons who have received blood (not including washed red blood cells), plasma, or immunoglobulin should not undergo varicella vaccination for three to 11 months, depending on the dose of antibody containing blood product administered due to interference with response to the vaccine. Receipt of antibody-containing blood products may interfere with vaccine efficacy if administered within two weeks following vaccination.

ADMINISTRATION

In adolescents and adults over the age of 13 years, the dose of varicella vaccine is 0.5 mL administered subcutaneously. The outer aspect of the deltoid region of the upper arm is preferred with the anterolateral thigh being an alternate site of administration. A second dose of 0.5 mL of varicella vaccine should be administered four to eight weeks after the first dose.

Varicella vaccine may be simultaneously administered with other vaccines. While data are limited for concomitant administration of some adult vaccines, in general, studies have shown seroconversion and side effect rates similar to those following administration of vaccines separately. Vaccines administered concomitantly should be given on the same day at different anatomic sites.

POSSIBLE SIDE EFFECTS

Injection site reactions (soreness, erythema, swelling, rash, pruritus, pyrexia, hematoma, induration, or numbness) were reported by 24.4% of vaccine recipients after the first dose in a prelicensure study of adolescents and adults compared to 32.5% after the second dose.[1] Fever was reported in about 10% after either dose. About 3% developed a varicella-like rash locally at the injection site after the first dose compared to 1% after the second dose, while 5.5% developed a generalized rash after the first dose compared to 0.9% after the second dose.

Severe complications including pneumonia, hepatitis, and severe disseminated varicella are rare and have occurred when vaccine was given to immunocompromised patients or those with other severe underlying illness.

Rarely, transmission of vaccine strain varicella virus from healthy vaccine recipients to susceptible contacts has occurred; this risk increases if the vaccine recipient has a vaccine-related rash.

STORAGE/HANDLING

Varicella vaccine is provided by the manufacturer as separate vials of lyophilized vaccine and diluent. The lyophilized vaccine must be stored frozen at a temperature between -58°F and +5°F (-50°C and -15°C) and must be used before the expiration date. Storage in any freezer (e.g., chest, frost-free) that reliably maintains a temperature between -58°F and +5°F (-50°C and -15°C) and has a separate sealed freezer door is acceptable. Store the diluent separately in a refrigerator or at room temperature. Prior to reconstitution, the vaccine may be stored in a refrigerator at

2°C to 8°C (35° to 46°F) for 72 hours. If not used within 72 hours, discard the vaccine—do not refreeze. Once reconstituted, administer the vaccine within 30 minutes. Reconstitute the vaccine by withdrawing 0.7mL of diluent into a syringe. Then inject the withdrawn diluent into the vial of lyophilized vaccine and agitate gently. The reconstituted vaccine is a clear, colorless to pale yellow liquid that should not have any visible particles or discoloration. Withdraw the reconstituted vaccine (the total contents of the vaccine vial after reconstitution) which should be a minimum of 0.5 ml for subcutaneous administration.

PREGNANCY/NURSING

Varicella vaccine is contraindicated in pregnancy as it is a live virus vaccine. The potential affect on the fetus is unknown. Women who receive the vaccine should not become pregnant for at least one month following vaccination. The manufacturer, in collaboration with the CDC, maintains a pregnancy registry to evaluate maternal-fetal outcomes in patients who received varicella vaccination within the three months preceding or during pregnancy. Reports can be made to the Varivax Pregnancy Registry at 1-800-986-8999

REIMMUNIZATION/BOOSTER

A second dose of vaccine is recommended four to eight weeks after the initial dose. If more than eight weeks have elapsed since the first dose was given, the second dose can be given without restarting the vaccination series.

CPT CODES/ REIMBURSEMENT ISSUES

Varicella vaccine CPT code:
90716
for live, subcutaneous use

Measles, mumps, rubella, and varicella vaccine (MMRV) CPT code: 90710
for live, subcutaneous use

FAQs

Q: Can a household contact of a pregnant woman receive the varicella vaccine?

Yes, a household contact should receive the varicella vaccine if susceptible. By vaccinating the household contact this will prevent active varicella zoster virus infection in the contact and thereby prevent transmission to the pregnant woman.

Q: Can a nursing mother receive the varicella vaccine?

Yes, varicella virus has not been observed to transmit through breast milk and passive transmission of antibodies through breast milk is not thought to occur.

Q: Can a patient with HIV/AIDS be given the varicella vaccine?

It depends on the CD4 counts. Adult patients with absolute CD4 counts below 200 cells/mm^3 should not be given the vaccine. Patients whose CD4 cell count is above 200 cells/mm^3 may receive the vaccine.

[1] http://www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM142813.pdf [FDA, package insert Varivax frozen]