Comments and definitions

Vaccine schedules are listed for all indications for child, adolescent, and adult population – Kansas pharmacists are allowed to vaccinate per protocol with a physician ages 6 years and up for flu vaccines (all types) and 12 years and up for all other vaccines. The only exception to this would be yellow fever vaccine, which needs authorization from the Kansas Department of Health and Environment to legally administer.

Infant vaccination schedules are out of the scope of this document – please refer to your local immunization coordinator and ACIP to assist with infant immunization schedules.

A **contraindication** is a condition in a recipient that greatly increases the chance of a serious adverse reaction (or due to the theoretical risk in the case of pregnant women).

A **precaution** is a condition in a recipient that might increase the chance or severity of a serious adverse reaction, or that might compromise the ability of the vaccine to produce immunity (such as administering MMR or MMRV vaccine to a person with passive immunity to measles from a blood transfusion).

Special populations are target or high risk populations that would benefit from vaccination. These should be areas of focus for pharmacists to best protect their patients and their communities. For example, if your pharmacy sees many patients with diabetes, your staff should be alert to the vaccinations these patients are recommended to receive (IIV, Hep B, PPSV23).

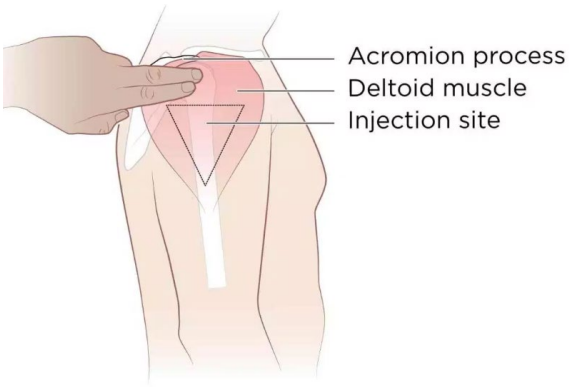
Emergency kits should be present wherever vaccines are being administered. These kits should contain (but are not limited to) the following and should be checked at least quarterly to ensure products are in date and any automated products are fully functional. You should always have phone access to be able to call emergency services during a clinic.

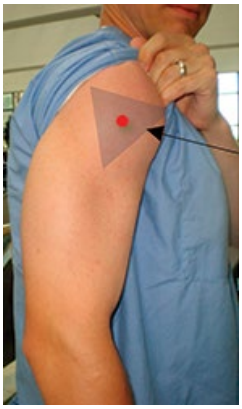
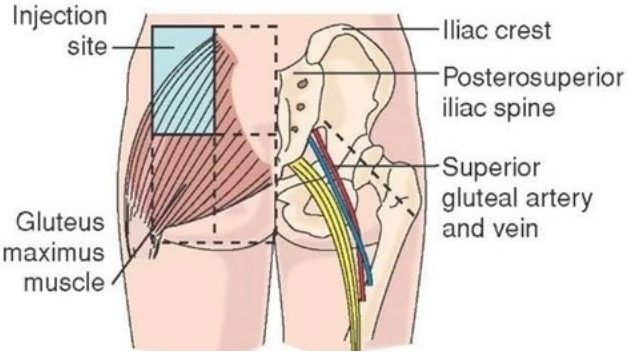
- Epinephrine, 3 doses (at least 1mL) – the first and most important medication to administer in anaphylaxis
- H1 antihistamine such as diphenhydramine (oral and/or injectable) – for itching and hives only
- Syringes or needles for injectable emergency medications
- CPR face mask or one way valve
- Blood pressure cuffs in multiple sizes
- Stethoscope if blood pressure cuffs are not automated
- Light source such as a flashlight for examining throat for swelling
- Recommended apps for smartphone to keep with you at the clinic: CPR metronome/timer; stopwatch for checking pulse, flashlight

Follow manufacturer instructions for **storage and handling** of all vaccines, which is not covered in full in this document. For best practices on storage and handling of vaccine, please refer to the CDC's Storage and Handling Toolkit, which is updated on a regular basis.

Vaccines recommended for international travel are not within the scope of this program. For information and recommendations, please refer to the CDC's Yellow Book and updated travel notices. If you are considering building a business around international travel vaccinations, purchase of a travel vaccine software is recommended to assist in recommendations.

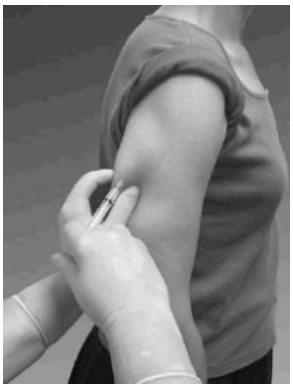
Intramuscular injection location

- Deltoid
  - 


  - Inject at a 90° angle
- Gluteal
  - Kansas pharmacists must have documented training from a health care professional experienced in this technique on file, as this is not covered in most pharmacist immunization training courses
  - Must have private room to administer
  - 

  - Inject at a 90° angle

Subcutaneous injection location

- Fatty tissue over the triceps muscle
-  
- Pinch tissue to prevent injection into the muscle
- Inject at a 45° angle

Recombinant Herpes Zoster Vaccine

Brand names; manufacturer: Shingrix; GlaxoSmithKline (GSK)

CDC approved abbreviation(s): RZV

Indication: Prevention of herpes zoster, commonly known as shingles

Vaccine type: Inactivated, recombinant

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- Age ≥50 years
- Two-dose series (0.5 mL/dose), 0 and 2-6 months
- If second dose is given <4 weeks after the first dose, the second dose should be considered invalid and repeated at an appropriate interval

Catch up schedule: If >6 months have elapsed since the first dose, administer the second dose as soon as possible. No need to restart the vaccine series.

Contraindications: Severe allergic reaction after a previous dose of RSV.

Precautions: Moderate to severe acute illness with or without fever. Not currently recommended for immunocompromised persons.

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), myalgia, fatigue, headache, shivering, fever, and gastrointestinal illness
- Serious – Anaphylaxis

Other clinical information/notes:

- Preferred herpes zoster vaccine
- If accidently administered subcutaneously, dose is considered valid and does not need to be repeated.
- Store in refrigerator.
- Administer immediately after reconstitution or store in the refrigerator and use within 6 hours.
- Clinical trials show efficacy was 96.6% in adults age 50 to 59 years, 97.4% in adults age 60 to 69 years, and 91.3% in adults age 70 years and older. Efficacy is defined as X% fewer episodes of zoster.

VIS required? No, but strongly encouraged.

Herpes Zoster Vaccine Live

Brand names (if applicable); manufacturer: Zostavax; Merck and Co., Inc

CDC approved abbreviation(s): ZVL

Indication: Prevention of herpes zoster, commonly known as shingles

Vaccine type: Live, attenuated strain of herpes zoster

Route/location of administration: Subcutaneous, upper outer triceps area

Routine vaccine recommendations:

- Approved age ≥50 years, ACIP does not recommend use in age <60 years
- One dose (0.65 mL/dose)

Catch up schedule (if applicable): n/a

Contraindications: Immunocompromised persons, pregnancy, or a life-threatening or severe allergic reaction to gelatin, neomycin, or any other component of herpes zoster vaccine.

Precautions: Delay administration if moderate to severe illness, including fever ≥101.3°F. Minor, acute illnesses (such as common cold) should not delay vaccination. Not recommended for age 50-59 due to short term of efficacy.

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), headache
- Serious – Anaphylaxis, rash, shingles

Other clinical information/notes:

- Available, but not preferred by ACIP – should not be utilized unless patient has contraindication to RZV. Can be utilized in other extenuating circumstances such as vaccine shortage
- Store live, attenuated strain subunit in the freezer and sterile water subunit at room temperature or in the refrigerator. Use Immediately or within 30 minutes of reconstituting.
- Clinical trials show efficacy was 70% in adults age 50 to 59 years, 64% in adults age 60 to 69 years, and 38% in adults age 70 years and older. Efficacy decreases quickly the first year after vaccination, and protection by 6 years after vaccination is less than 35%. Efficacy is defined as X% fewer episodes of zoster.

VIS required? No, but strongly encouraged.

Zoster Case Study:

KQ is a 52 y/o female that presents to the pharmacy with advice from her sister to get her "shingles shot". She has no medical conditions, is not pregnant, and despite "this annoying cold going around," is feeling fine.

What is the most appropriate vaccine to recommend?

A. Zoster Live Vaccine (ZVL, Zostavax)
B. Recombinant Zoster Vaccine (RZV, Shingrix)
C. Both for extra coverage
D. None of the Above

What is the appropriate administration technique for RZV (Shingrix)?

A. Subcutaneous, triceps area, 5/8" needle
B. Subcutaneous, triceps area, 1" needle
C. Intramuscular, deltoid, 1" needle
D. Intramuscular, deltoid, 5/8" needle

What is the appropriate administration technique for ZVL (Zostavax)?

A. Subcutaneous, triceps area, 5/8" needle
B. Subcutaneous, triceps area, 1" needle
C. Intramuscular, deltoid, 1" needle
D. Intramuscular, deltoid, 5/8" needle

What is the appropriate 2nd dose range following RZV (Shingrix) dose 1 administration?

A. 0-1 month
B. 2-6 months
C. 6-12 months
D. 12-15 months

Measles, Mumps, and Rubella Vaccine

Brand names (if applicable); manufacturer: M-M-R II; Merck & Co., Inc. (also available as combo with varicella as ProQuad; Merck & Co.)

CDC approved abbreviation(s): MMR; MMRV in combo

Indication: Prevention of measles (rubeola), mumps, rubella

Vaccine type: Live, attenuated strains of measles, mumps, and rubella viruses

Route/location of administration: Subcutaneous, upper outer triceps area. For small children only, anterolateral aspect of the thigh.

Routine vaccine recommendations:

- Two dose series with at least 28 days in between doses
    - Children and Adolescents
        - First dose age 12 months-15 months, second dose age 4-6 years
- One dose
    - Adults without presumptive evidence of immunity

Special populations:

- Outbreaks – follow guidance from local health department
- Two dose series with at least 28 days in between doses
    - Teens/students at post-high school educational institutions (i.e. college)
    - International Traveler's (≥ 6 months of age)
        - For age 6-11 months, three-dose series with one prior to travel then typical child schedule
    - Healthcare workers
    - Women of childbearing age (not during pregnancy)
    - Household/close contact with immunocompromised persons
    - People with HIV
- One or two doses
    - Adults who received the killed vaccine between 1963 and 1967 or do not know what type of vaccine they received in that time period
- One dose

- Women of childbearing age without presumptive evidence of immunity for rubella

Contraindications: Immunocompromised persons, pregnancy, or a life-threatening or severe allergic reaction to neomycin, gelatin, or any other component of MMR vaccine.

Precautions: Moderate or severe acute illness with or without fever, receipt of antibody-containing blood product within last 11 months, history of thrombocytopenia or thrombocytopenic purpura, upcoming need for TB skin testing, personal or family history of seizures. Persons with egg allergy are at increased risk for ADE.

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), fever, swollen glands in cheek and neck
- Moderate – Seizure associated with fever, temporary pain and stiffness in the joints, temporary low platelet count, body rash
- Serious – Anaphylaxis, deafness, long-term seizures, coma, or lowered consciousness, brain damage

Other clinical information/notes:

- Store live, attenuated strain subunit in the refrigerator, protected from light, and diluent subunit at room temperature or in the refrigerator. Use immediately or store in refrigerator for up to 8 hours.
- Separate from other live vaccines by at least 4 weeks before or after.
- Efficacy of one dose
    - 93% effective for measles
    - 78% effective for mumps
    - 97% effective for rubella
- Efficacy of two-dose series
    - 97% effective for measles
    - 88% effective for mumps

VIS required? Yes

MMR Case Study

OL is an 18 YO male who presents to the pharmacy the summer before moving away to start college. He is not sick today, has no medical conditions preventing him from receiving vaccines, and got his TB test last week.

Which vaccine series is most appropriate for OT?

A. One-dose
B. Two-dose
C. Three-dose

What is the appropriate administration technique for the MMR (M-M-R-II) vaccine?

A. Subcutaneous, triceps area, 5/8" needle
B. Subcutaneous, triceps area, 1" needle
C. Intramuscular, deltoid, 1" needle
D. Intramuscular, deltoid, 5/8" needle

Upon completion of vaccine consent form, OT points out he has a mild allergy to eggs. Can he still get the vaccine?

A. Yes
B. No
C. Maybe

When should OT return for the 2nd dose?

A. 3 days
B. 7 days
C. 21 days
D. 28 days

Vaccine Name: Varicella Zoster Vaccine

Brand names (if applicable); manufacturer: Varivax; Merck & Co. (also available as combo with MMR as ProQuad; Merck & Co.)

CDC approved abbreviation(s): VAR; MMRV in combo

Indication: Prevention of chicken pox

Vaccine type: Live, attenuated

Route/location of administration: Subcutaneous, upper outer triceps area

Routine vaccine recommendations:

- Children 12 months-12 years
    - Two dose series (0.5 mL/dose)
        - First dose age 12 months-15 months, second dose age 4-6 years
- Adolescents >13 years and adults
    - Two dose series (0.5 mL/dose)

Contraindications: Immunocompromised persons, TB infection, recently received blood transfusion or other blood product, pregnancy, or a life-threatening or severe allergic reaction to gelatin, neomycin, or any other component of herpes zoster vaccine.

Precautions: Avoid using salicylates (aspirin) for 6 weeks after getting varicella vaccine.

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling)
- Serious – Anaphylaxis, pneumonia, meningitis, inflammation of blood vessels, rash with possibility to spread varicella vaccine virus to susceptible persons

Other clinical information/notes:

- Store live, attenuated vaccine in the freezer.
- Efficacy of one dose 85% at preventing any form of varicella (almost 100% effective against severe) varicella. Two doses 88% to 98% effective at preventing all varicella.

VIS required? Yes

Varicella Case Study

AL is a 12 YO male who presents to the pharmacy with his mom to receive the "chickenpox shot". He is up to date on his MMR vaccine, has a slight runny nose but no fever, and no allergies that his mom is aware of.

Which vaccine is most appropriate for AL?

A. Varicella (Varivax)
B. MMRV (ProQuad)
C. One of each
D. None of the above

How long must AL wait between doses of varicella?

A. 1 week
B. 1 month
C. 3 months
D. 6 months

What is the proper administration technique for varicella?

A. Subcutaneous, triceps area, 5/8" needle
B. Subcutaneous, triceps area, 1" needle
C. Intramuscular, deltoid, 1" needle
D. Intramuscular, deltoid, 5/8" needle

What if AL was 10 YO?

A. Administer 1 dose of varicella
B. Administer 2 doses of varicella
C. Contraindicated in <12 YO
D. Pharmacist administration not allowed per statute

Vaccine Name: Hepatitis B Vaccine

Brand names (if applicable); manufacturer: Recombivax HB; Merck & Co., Inc., Engerix-B; GlaxoSmithKline (GSK) or in combo products: Pediatrix (IPV, DTaP, and HepB); GlaxoSmithKline (GSK), Twinrix (HepB and HepA); GlaxoSmithKline (GSK)

CDC approved abbreviation(s): HepB

Indication: Prevention of hepatitis B

Vaccine type: Inactivated, recombinant

Route/location of administration: Adults- Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- Dosing for patients ≤20 years old: 0.5 mL (5 mcg) of pediatric or adult formulation Recombivax HB, 0.5 mL (10 mcg) of pediatric formulation Engerix-B or 1 ml (20mcg) of the adult formulation of Engerix-B may be used in adolescents.
- Dosing for patients ≥20 years old: 1 mL (10mcg) of pediatric or adult formulation Recombivax HB or 1 mL (20 mcg) of adult formulation Engerix-B.
- Children, Adolescents, and Adults
    - Dose 1
    - Dose 2: 1 month after Dose 1
    - Dose 3: 5 months after Dose 2
    - Age 11-15 alternate schedule
        - Two 1 ml doses of Recombivax HB vaccine separated by 4-6 months

Special populations:

- Adults aged 18-59 with diabetes
- Adults >60 w/ diabetes at discretion of clinician
- Health care and public safety workers at risk for exposure to blood or bodily fluids
- People whose sex partners have hep B
- Household contacts of persons with hep B
- Sexually active persons no in a long-term monogamous relationship
- Persons seeking treatment or testing for a sexually transmitted disease
- Men who have sex with men
- People who share needles, syringes, or other injection equipment
- Residents and staff of facilities for developmentally disabled persons
- Persons in correctional facilities
- Victims of sexual assault or abuse
- Travelers to regions with increased rates of hepatitis B
- People with chronic liver disease, kidney disease, HIV infection, or diabetes
- Anyone who wants to be protected from hepatitis B

Catch up schedule (if applicable): Minimum interval between the first two doses is 4 weeks, and the minimum interval between the second and third doses is 8 weeks

Contraindications: Severe allergic reaction after a previous dose or to a vaccine component, hypersensitivity to yeast

Precautions: Moderate or severe acute illness with or without fever

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), fever, nausea, vomiting, dizziness
- Serious – Anaphylaxis

Other clinical information/notes:

- If vaccine accidently given subcutaneously, dose is considered invalid and should be repeated unless serologic testing indicates adequate response.
- Vaccine-induced antibody levels decline with time; however, immune memory remains intact for more than 20 years following immunization. Both adults and children with declining antibody levels are still protected against significant HBV infection.
- Age ≥40 years old, male sex, obesity, smoking, and chronic illness have been independently associated with nonresponse to HepB vaccine.

VIS required? Yes

HepB Case Study

KF is a 22 YO male about to start clinical rotations with nursing school. He presents to the pharmacy today needing to get the Hepatitis B vaccine. He has no prior medical conditions, he has a slight runny nose with no fever, and is up to date on HepA vaccinations.

What is the most appropriate dosing schedule for KF to complete the HepB vaccination series?

A. Dose 1, Dose 2: 1 month following Dose 1
B. Dose 1, Dose 2: 1 year following Dose 2
C. Dose 1, Dose 2: 1 month following Dose 1, Dose 3: 5 months following Dose 2
D. Dose 1, Dose 2: 1 month following Dose 1, Dose 3: 1 year following Dose 2

What is the most appropriate administration technique for vaccinating an adult with the HepB vaccine?

A. Intramuscular; deltoid; 1" needle
B. Intramuscular; deltoid; 5/8" needle
C. Subcutaneous; deltoid; 1" needle
D. Subcutaneous; triceps; 5/8" needle

The administering pharmacy intern accidently gave the vaccine subcutaneously. Is that dose valid?

A. Yes
B. No
C. Maybe, if serologic testing indicates an adequate immune response

Vaccine Name: Meningococcal ACWY Vaccine

Brand names (if applicable); manufacturer: Menactra; Sanofi Pasteur, Menveo; GlaxoSmithKline (GSK)

CDC approved abbreviation(s): MenACWY

Indication: Prevention of meningococcal disease caused by *Neisseria meningitidis* serogroups A, C, Y and W-135

Vaccine type: Inactivated

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- 0.5 mL/dose
- Adolescents and teens
    - Dose 1: 11-12 years old
    - Dose 2: 16 years old
- Refer to ACIP for dosing schedule for high risk individuals, age ≥2 months.

- **Catch up schedule (if applicable):**
    - Adolescents and teens
        - Age 13-15 years: 1 dose now and booster at age 16-18 years.
            - Minimum interval 8 weeks.
        - Age 16-18 years: 1 dose, no booster unless at increased risk
        - Age 19-21 years: Not routinely recommended, although 1 dose may be administered to catch up
    - Adults ≥22 years old
        - Routine vaccination not recommended

Special populations: Refer to ACIP for dose and series

- Persons with persistent complement component deficiencies
- Persons taking Soliris® (eculizumab)
- Anatomic or functional asplenia
- Microbiologists who are routinely exposed to *N. Meningitidis*
- Persons traveling to or residing in countries in which meningitis is hyperendemic or epidemic, particularly if contact with local population will be prolonged
- Persons with HIV
- College students living in residence halls
- Are part of a population identified to be at increased risk because of a serogroup B meningococcal disease outbreak (follow guidance from public health officials)

Contraindications: Severe allergic reactions after a previous dose of MenACWY, MPSV4, or combination vaccine Hib-MenCY-TT, including diphtheria or tetanus toxoid

Precautions: Moderate or severe acute illness with or without fever

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), muscle or joint pains, fever, headache
- Serious – Anaphylaxis

Other clinical information/notes:

- Efficacy 1 month following Menactra series completion was 82-97% for adolescents and 74-89% for adults.
- Efficacy 1 month following Menveo series completion was 75-96% for adolescents and 69-94% for adults.
- For Menveo, the MenA component should only be reconstituted with the MenCWY liquid component. If MenCWY accidently given alone, revaccination might not be necessary unless international travel is expected.
- MPSV4 is only licensed meningococcal vaccine for adults aged ≥56 years

VIS required? Yes

Meningococcal Case Study

RG is a 13 YO female who presents today with her mother to receive the meningococcal vaccine. She is healthy, has no prior conditions, and has no allergies.

What is the most appropriate administration technique for MenACWY?

A. Intramuscular; deltoid; 1” needle
B. Intramuscular; deltoid; 5/8” needle
C. Subcutaneous; deltoid; 1” needle
D. Subcutaneous; triceps; 5/8” needle

When should RG return to the pharmacy to receive a booster dose?

A. 6 months (age 13.5)
B. 1 year (age 14)
C. 3 years (age 16)
D. Never

Is a Vaccine Information Statement required for MenACWY?

A. Yes
B. No
C. No, but encouraged

Vaccine Name: Meningococcal B Vaccine

Brand names (if applicable); manufacturer: Bexsero (MenB-4C); GlaxoSmithKline (GSK), Trumenba (MenB-FHbp); Pfizer

CDC approved abbreviation(s): MenB or specific agents as above

Indication: Prevention of meningococcal disease caused by *Neisseria meningitidis* serogroup B

Vaccine type: Inactivated, recombinant

Route/location of administration: Intramuscular, deltoid region of upper arm

Vaccine schedule:

- Teens and young adults 16–23 years (preferred age 16–18 years)
- 0.5 mL/dose
- Bexsero:
    - Healthy or high risk
        - Dose 1
        - Dose 2: ≥1 month following
- Trumenba:
    - Healthy/low risk
        - Dose 1
        - Dose 2: 6 months following
    - High risk
        - Dose 1
        - Dose 2: 1-2 months following
        - Dose 3: 6 months following Dose 1

Special populations:

- Children and adolescents who
    - Have complement component deficiency
    - Are taking Soliris® (eculizumab)
    - Have anatomic or functional asplenia
    - Are part of a population identified to be at increased risk because of a serogroup B meningococcal disease outbreak (follow guidance from public health officials)

Contraindications: Severe allergic reactions after a previous dose of MenB or latex

Precautions: Should only be used in pregnancy if clear risk to serotype B meningococcal disease is evident. Pregnancy registry available. Moderate to severe acute illness with or without fever.

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), myalgia, fatigue, headache, nausea

- Serious – Anaphylaxis

Other clinical information/notes:

- Protective antibodies decline quickly after the first year following primary series but stabilize for next 4 years. A booster dose for high risk groups may be required every 5 years for added protection.
- Shake Trumenba syringe vigorously to obtain a homogenous white suspension. Do not use the pre-filled syringe if it cannot be re-suspended.

VIS required? Yes

Meningococcal B Case Study

FR is 18 YO male who presents to the pharmacy today while preparing to move away to college at the end of the summer. He is up to date on all other vaccines, feeling fine, and has no prior medical conditions.

What is the most appropriate administration technique for MenB?

A. Intramuscular; deltoid; 1” needle
B. Intramuscular; deltoid; 5/8” needle
C. Subcutaneous; deltoid; 1” needle
D. Subcutaneous; triceps; 5/8” needle

Upon completing the vaccine consent form, FR indicates that he is severely allergic to latex. Is MenB still appropriate for him to receive?

A. Yes
B. No
C. Maybe

Is a Vaccine Information Statement required for MenB?

A. Yes
B. No
C. No, but encouraged

Vaccine Name: Human Papillomavirus Vaccine

Brand names (if applicable); manufacturer: Gardasil-9; Merck & Co., Inc.

CDC approved abbreviation(s): 9vHPV

Indication: Prevention of HPV-associated cancers, precancers, and anogenital warts

Vaccine type: Inactivated, recombinant

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- Target population: Females and males ages 11 or 12 (can start at age 9 years)
- 0.5 mL/dose
- Adolescents < 15 years old
    - Dose 1
    - Dose 2: 6-12 months following
        - 3rd dose will be required if Dose 2 is ≤5 months following Dose 1
- Teens and Adults ≥ 15 years old
    - Dose 1
    - Dose 2: 1-2 months following
    - Dose 3: 6 months following Dose 1

Catch up schedule (if applicable):

- Recommended until age 26, unless part of certain high risk groups which increases age range to 26.
- Shared clinical decision making with the patient for ages 27-45 years.
- If the vaccination schedule is interrupted, the series does not need to be restarted. Completion dosing schedule is based on age of patient at dose 1.

Contraindications: Severe allergic reactions after a previous dose of HPV vaccine, latex, yeast, pregnancy

Precautions: Moderate to severe acute illness with or without fever

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling), fever ≥100°F
- Serious – Anaphylaxis

Other clinical information/notes:

- To prevent fainting and injuries related to fainting, adolescents should be seated or lying down during vaccination and remain in that position for 15 minutes after the vaccine is given.

- Following 1 month after 9vHPV series, ≥97.9% of tested patients showed an immune response to the 9 strains included.
- Store in refrigerator. Discard if vaccine is accidently frozen.
- As of 2016, only 9vHPV is being distributed in the United States. For patients who were adequately vaccinated with 2vHPV or 4vHPV, prior to 9vHPV release, there is no ACIP recommendation stating additional vaccination with 9vHPV is needed.

VIS required? Yes

HPV Case Study

RK is a 14 YO male who presents to the pharmacy to receive the HPV vaccine. He has no allergies, no prior medical conditions, and is not feeling sick today.

What is the most appropriate administration technique for the HPV vaccine?

A. Intramuscular; deltoid; 1" needle
B. Intramuscular; deltoid; 5/8" needle
C. Subcutaneous; deltoid; 1" needle
D. Subcutaneous; triceps; 5/8" needle

Would the recommended dosing schedule change if RK was female?

A. Yes
B. No
C. Maybe

What is the most appropriate dosing schedule if RK was 16 YO?

A. Dose 1; Dose 2: 6-12 months following Dose 1
B. Dose 1; Dose 2: 6-12 months following Dose 1; Dose 3: 18 months following Dose 1
C. Dose 1; Dose 2: 1-2 months following Dose 1; Dose 3: 6 months following Dose 1
D. Dose 1; Dose 2: 1-2 months following Dose 1; Dose 3: 4-6 months following Dose 1; Dose 4: 12-18 months following Dose 1

Vaccine Name: Hepatitis A Vaccine

Brand names (if applicable); manufacturer: Havrix; GlaxoSmithKline (GSK), Vaqta; Merck & Co., Inc., Twinrix; GlaxoSmithKline (GSK) (combo vaccine HAV and HBV)

CDC approved abbreviation(s): HAV

Indication: Prevention of Hepatitis A

Vaccine type: Inactivated

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- 2 dose series
- Children, adolescents, and teens 12 months-18 years
    - First dose 12-23 months, second dose 6-18 months later
    - Havrix- 720 enzyme-linked (EL) units/dose
    - Vaqta- 25 units/dose
    - Twinrix- not approved
- Adults ≥ 18 years
    - Havrix- 1,440 EL units/dose
    - Vaqta- 50 units/dose
    - Twinrix- 720 EL units/dose (follow schedule for Hepatitis B prevention)

Catch up schedule (if applicable): Minimum interval 6 months between doses of HAV single antigen vaccine.

Special populations:

- Travel to countries where Hep A is common
- Men who have sex with men
- Illicit drug use
- Persons who have Hep B or Hep C
- Persons being treated with clotting-factor concentrates
- Persons working with Hep A infected animals or in a lab that researches using Hep A
- Close contacts with an international adoptee from a country where Hep A is common

Contraindications: Severe allergic reactions after a previous dose of HAV

Precautions: Moderate to severe acute illness with or without fever, pregnancy

Vaccine reactions (ADE):

- Common: Injection site reactions (pain, redness, and swelling), low-grade fever, headache, tiredness
- Serious – Anaphylaxis

Other clinical information/notes:

- Efficacy for adults 1 month after first dose was 94-100% and all persons vaccinated had protective levels of antibody following second dose.
- Efficacy for children-teens 1 month after first dose was 97-100% and 100% following second dose.
- HAV (or combo) can be given with other vaccines with no decrease in efficacy.

VIS required? Yes

HAV Case Study

FR is a 20 YO female getting ready to assist in laboratory research on hepatitis A virus. She was informed by the lab that Hepatitis A vaccination is required for her to begin. She is up to date on her Hepatitis B vaccination.

Which vaccine is most appropriate for FR?

A. HAV (single antigen, Havrix or Vaqta)
B. HAV/HBV (combo antigen, Twinrix)
C. HPV (Gardasil 4 or 9)
D. HIB (ActHIB)

What is the appropriate administration technique for adults receiving HAV?

A. Intramuscular; deltoid; 1” needle
B. Intramuscular; deltoid; 5/8” needle
C. Subcutaneous; deltoid; 1” needle
D. Subcutaneous; triceps area; 5/8” needle

Upon completing the vaccine consent form, FR indicates that she is pregnant. Is HAV still appropriate to administer?

A. No
B. Yes
C. Depends on the trimester

Vaccine Name: Tetanus, Diphtheria, and Pertussis Vaccine

Brand names (if applicable); manufacturer: Adacel; Sanofi Pasteur, Ltd, Boostrix, GlaxoSmithKline (GSK)

CDC approved abbreviation(s): Tdap

Indication: Prevention of tetanus, diphtheria, and whooping cough (pertussis)

Vaccine type: Inactivated (pertussis antigen) and absorbed toxoid (tetanus and diphtheria)

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- 0.5 mL/dose
- Adolescents and Teens (Tdap only, DTaP contraindicated for patients ≥7 years old)
    - Booster 3: 11-12 years
- Adults
    - Once if never received (follow Td schedule)
- Pregnant women
    - Once every pregnancy in 3rd trimester

Catch up schedule (if applicable):

Contraindications: Life-threatening allergic reaction to a dose of this vaccine or to any diphtheria toxoid-, tetanus toxoid-, or whooping cough-containing vaccine, encephalopathy within 7 days after a childhood dose of DTP, DTaP, or Tdap (can still get Td), Guillain-Barre syndrome, seizures or another nervous system problem, severe pain or swelling after any vaccine containing tetanus, diphtheria, or pertussis.

Precautions: Moderate to severe acute illness with or without fever

Vaccine reactions (ADE):

- Common – Injection site reactions (pain, redness, and swelling)
- Serious – Anaphylaxis

Other clinical information/notes:

- Efficacy following first year is 70% and 75% following 4 years after vaccination. Vaccination during pregnancy protects 75% of infants from pertussis for 2 months.

VIS required? Yes

Tdap Case Study

KP is a 32 YO female who presents to the pharmacy with instructions from her OB-GYN to get a Tdap vaccine. She is 33 weeks pregnant and otherwise healthy. This is her 2nd pregnancy and she received a Tdap vaccine during the 1st pregnancy.

Is Tdap indicated for in pregnancy?

A. Yes, in 1st trimester
B. Yes, in 2nd trimester
C. Yes, in 3rd trimester
D. No

What is the appropriate administration technique for adults receiving Tdap?

A. Intramuscular; deltoid; 1" needle
B. Intramuscular; deltoid; 5/8" needle
C. Subcutaneous; deltoid; 1" needle
D. Subcutaneous; triceps area; 5/8" needle

Is a vaccine information statement required following Tdap administration?

A. No
B. Yes
C. No, but encouraged

Vaccine Name: 13-valent pneumococcal conjugate vaccine

Brand names (if applicable); manufacturer: Prevnar 13; Wyeth Pharmaceuticals, Inc., a subsidiary of Pfizer Inc.

CDC approved abbreviation(s): PCV13

Indication: Prevention of pneumococcal disease

Vaccine type: Inactivated

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- People 2 through 64 years old with certain medical conditions (see special populations)
- Shared clinical decision making for persons aged ≥65 years

Catch up schedule (if applicable): 1 dose for healthy children aged 24–59 months with any incomplete PCV13 schedule.

- ***2 doses if:*** Dose 1 was given at 12 months of age or older, if it has been at > 8 weeks since last dose
- ***3 doses if:*** 2 doses were given before 12 months of age and it has been 8 weeks since dose 2

  At least one of the 2 prior doses dose was given at 12 months or older and it has been 8 weeks since dose 2

- ***4 doses if:*** 3 doses were given before 12 months of age and it has been 8 weeks since dose 3

Special populations:

- Children or adults with:
  - CSF leak
  - Cochlear implant
  - Sickle cell disease or other hemoglobinopathies
  - Congenital or acquired asplenia, or splenic dysfunction
  - HIV infection
  - Chronic renal failure or nephrotic syndrome
  - Iatrogenic immunosuppression - diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy such as malignant neoplasm, leukemia, lymphomas, and Hodgkin's disease, or solid organ transplantation
  - Congenital immunodeficiency
  - Multiple myeloma

- Some of the listed conditions require 1 dose of PCV13 and 2 doses of PPSV23 at least 8 weeks later – verify recommend dosing schedule with ACIP

Contraindications: Severe allergic reaction after a previous dose of PCV13, or allergy to any component of the vaccine or any diphtheria toxoid containing vaccine

Precautions: Moderate to severe acute illness with or without fever, impaired immune responsiveness; reduced antibody response

Vaccine reactions (ADE):

- Common - Local injection site reactions (such as pain, swelling or redness), fever (higher than 100.4°F [38°C]), decreased appetite, irritability, headache, fatigue, chills
- Serious – Gastroenteritis, bronchiolitis, pneumonia, Sudden Infant Death Syndrome, angioedema, anaphylaxis

VIS required? Yes

Vaccine Name: 23-valent pneumococcal polysaccharide vaccine

Brand names (if applicable); manufacturer: Pnuemovax23, Merck & Co.

CDC approved abbreviation(s): PPSV23

Indication: Prevention of pneumococcal disease

Vaccine type: Inactivated

Route/location of administration: Intramuscular, deltoid region of upper arm or subcutaneous, upper outer triceps area

Routine vaccine recommendations:

- One dose for people 2 through 64 years old with certain high risk medical conditions (see special populations)
- Two doses, at least 5 years apart, for those aged 2-64 with certain high risk medical conditions (see special populations)
- Adults 19 through 64 years old who smoke cigarettes
- One dose for all adults aged ≥65 years
    - If a PPSV23 vaccination was administered due to a special indication prior to the age of 65 years, ensure at least 5 years have passed since the prior dose

Special populations:

- One dose for persons aged 2-64 with one or more of the following conditions:
    - Alcoholism
    - Chronic heart disease
    - Chronic liver disease
    - Chronic lung disease (including COPD and asthma)
    - Diabetes
- Two doses, at least 5 years apart, for children or adults with the following conditions – verify recommend dosing schedule with ACIP as PCV13 is also recommended prior to PPSV23 for these groups:
    - Sickle cell disease or other hemoglobinopathies
    - Congenital or acquired asplenia, or splenic dysfunction
    - HIV infection
    - Chronic renal failure or nephrotic syndrome
    - Iatrogenic immunosuppression - diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy such as malignant neoplasm, leukemia, lymphomas, and Hodgkin's disease, or solid organ transplantation
    - Congenital immunodeficiency
    - Multiple myeloma

Contraindications: History of life-threatening allergic reaction or have a severe allergy, patient with severe acute illness, pregnancy

Precautions: Moderate or severe acute illness, severely compromised cardiovascular and/or pulmonary function

Vaccine reactions (ADE):

- Common: Local injection site reactions (pain, swelling, or erythema), fever, myalgias
- Serious: Anaphylaxis

Other clinical information/notes:

- Local reactions are reported more frequently following a second dose of PPSV23 vaccine than following the first dose.

VIS required? No

Pneumococcal Case Study

MC is a 59 YO female who is filling her prescriptions with your pharmacy for the first time. Her complete medication list is as follows:

Lisinopril 10mg 1 qday
Simvastatin 20mg 1 qhs
ProairHFA 2 puffs every 4-6 hours as needed for SOB
HOLD: Chantix Starter Pack

What pneumococcal vaccine(s) are recommended for MC?

A. PPSV23, one dose
B. PPSV23, one dose now, one dose in 5 years
C. PCV13 now, PPSV23 in 8 weeks
D. PCV13, one dose

MC's spouse, RC, a 66 YO male also brings in their prescriptions after hearing good reviews of your pharmacy and your vaccine technique. His complete medication list is as follows:

Rosuvastatin 20mg 1 qday
Metformin ER 1000mg 2 qday
Januvia 50mg 1 qday
Losartan 100mg 1 qday

What pneumococcal vaccine(s) are recommended for RC?

A. PPSV23, one dose
B. PCV13, one dose
C. PCV13 now, PPSV23 in 1 year
D. Further conversation with RC is recommended before a vaccine recommendation can be made

Vaccine Name: Inactivated Influenza Vaccine

Brand names (if applicable); manufacturer: Afluria Quadrivalent (Seqirus), Fluarix Quadrivalent (GlaxoSmithKline), Flublok Quadrivalent (Protein Sciences Corp.), Flucelvax Quadrivalent (Seqirus), Flulaval Quadrivalent (GlaxoSmithKline), Fluzone Quadrivalent (Sanofi), Fluzone High Dose Trivalent (Sanofi)

CDC approved abbreviation(s):

- IIV (sometimes seen as IIV3 or IIV4 for trivalent or quadrivalent products respectively)
- RIV for Flublok

Indication: Prevention of influenza

Vaccine type: Inactivated; adjuvanted (Fluad), Recombinant (Flublok)

Route/location of administration: Intramuscular, deltoid region of upper arm

Routine vaccine recommendations:

- One dose annually for all persons ≥ 6months old without contraindications
- 2 doses ≥4 weeks apart for child who has received <2 total doses of trivalent or quadrivalent flu vaccine prior to July 1, 2018

Contraindications: History of severe allergic reaction to any component of the vaccine or after previous dose of any influenza vaccine.

Precautions: Moderate to severe illness with or without fever; History of Guillain-Barre syndrome syndrome within 6 weeks of receipt of influenza vaccine.

Vaccine reactions (ADE):

- **Common:** Soreness, redness, swelling at site of injections, hoarseness, sore, red or itchy eyes, cough, fever, aches, headache, itching, fatigue
- **Serious:** Guillain-Barre syndrome. If flu vaccine given at the same time as PCV13 and/or DTaP a child is more likely to have a seizure caused by fever.

Other clinical information/notes:

- There are no official recommendations on when to start vaccinating your patient with influenza vaccinations, but recent ACIP meetings have postulated that July/August is too early due to the short duration of protection.
- ACIP recommends that persons with egg allergy of any severity receive influenza vaccine
    - People able to eat lightly cooked eggs such as scrambled eggs without reaction are unlikely to be allergic
    - Egg allergy reactions that are only hives – can receive any flu vaccine
    - Egg allergy reactions such as angioedema, respiratory distress, or recurrent emesis – can receive any flu vaccine, but administration should be supervised by

a health care professional who is able to recognize and manage severe allergic reactions

- FluBlok, is a recombinant influenza vaccine (RIV). Flublok is the only vaccine currently available that is completely egg free.
- Fluzone HD: Each dose of this vaccine contains 4 times as much hemagglutinin as the regular formulation of Fluzone.
- Flucelvax Quadrivalent is cell-based flu vaccine, which likely has a much smaller amount of egg protein since the original vaccine virus is grown in eggs, but mass production of that vaccine does not occur in eggs.

VIS required? Yes

Vaccine Name: live attenuated influenza vaccine

Brand names (if applicable); manufacturer: FluMist

CDC approved abbreviation(s): LAIV

Indication: Prevention of influenza

Vaccine type: Live

Route/location of administration: Intranasal – Nasal

Routine vaccine recommendations:

- One dose annually, approved for use in ages 2-49

Contraindications:

- Children and adolescents receiving long term aspirin or aspirin containing therapy
- Immunosuppression
- Pregnancy
- History of egg allergy
- History of severe allergy to vaccine or components
- Children <5years old with recurrent wheezing
- Patients with recent wheezing or asthma
- Persons who have taken influenza antiviral medications within previous 48 hours

Precautions:

- History of Guillain-Barre syndrome within 6 weeks following a previous dose of influenza
- Moderate to severe acute illness without fever
- Persons who care for severely immunosuppressed persons requiring protective environment for 7 days after receipt

- Persons with chronic medical conditions

Vaccine reactions (ADE):

- **Common:** headache, nasal congestion, rhinitis, fever, sore throat, fatigue, myopathy, cough, chills
- **Serious:** Guillain-Barre syndrome, Bell's Palsy, anaphylaxis, pericarditis, rash

Other clinical information/notes:

- LAIV is approved for use only in healthy, nonpregnant persons 2 through 49 years of age
- Vaccinated children can shed vaccine viruses in nasopharyngeal
- secretions for up to 3 weeks

VIS required? Yes

Influenza Vaccine Case Studies

GH is a 38 YO male who fills his thyroid medication with your pharmacy on September 23rd.

What is NOT an option for his flu vaccine this year?

A. Flumist, IN, one dose
B. Fluzone Quad, IM, one dose
C. Fluad, IM, one dose
D. Flucelvax, IM, one dose

BT is a 72 YO male who is picking up his med sync package at your counter on October 3rd. You offer a flu vaccine, but he declines vaccination today when you do not have the high dose flu vaccine in stock.

What is an appropriate counseling point for BT?

A. We should have the high dose vaccine in by the end of October and we will call you when we get it in.
B. You can get the regular dose flu shot today and we will give you the high dose when we get it in.
C. We do have Fluad in stock, which is the same as the high dose flu shot – you can receive that vaccine today with no waiting.
D. It is not recommended to delay flu vaccination for a specific product – there is no CDC recommendation for high dose and we recommend that you are vaccinated with what we have in stock today