Immunization Administration: A Primer for Pharmacy Technicians

Developed by Idaho State University College of Pharmacy

July 2018

Objectives

• Identify the appropriate type, dosage, and route of administration of various vaccines
• Describe the role of a pharmacy technician in administering immunizations
• Implement appropriate procedures for storage of vaccines, patient documentation, and evaluation of potential contraindications for vaccines
• Demonstrate proper technique for preparing and administering immunizations

What the State of Idaho Allows...

• An Immunizing pharmacist may delegate the technical task of administering an immunization to a certified technician under their supervision who:
  – Holds a current certification in basic life support for healthcare providers offered by the American Heart Association or a comparable Board-recognized certification program that includes cardiopulmonary resuscitation (CPR) and automated electronic defibrillator (AED) training and requires a hands-on skills assessment by an authorized instructor; and
  – Has successfully completed a course on appropriate immunization administration technique by an ACPE-accredited provider or a comparable course; or
  – Has successfully completed the pharmacist qualifications specified under this rule
  – Rule 330.3 was recently cut, but the intent to receive training that is in line with best practice is still required

Technicians...

• Must be a certified technician
• Be delegated by the pharmacist to provide immunizations
  – “To susceptible persons six (6) years of age or older for the protection of communicable disease”
• BLS for Providers that includes:
  – CPR and AED training
  – Hands-on skill assessment
• Completed a course on appropriate immunization administration techniques

Vaccines

• A vaccine is a product that stimulates a person’s immune system to produce immunity to a specific disease, protecting the person from that disease
• Vaccines are made using the disease-causing virus or bacteria, but are weakened or killed to prompt the immune system to develop antibodies against the disease
• Outbreaks of vaccine-preventable diseases can and still do happen across the United States
• Centers for Disease Control (CDC) and Food and Drug Administration (FDA) ensure vaccine safety
• Vaccines are not just for children and can help protect adults with specific health conditions
• Are safe, effective, and work with your body’s immune system to prevent disease

Disclosure Statement

• The planners and presenters of this presentation have disclosed no conflict of interest, including no relevant financial relationships with any commercial interests
Immunity through vaccines

• Live attenuated vaccines
  – Attenuate: “procedures that weaken a pathogen to reduce the severity of disease”
  – Pathogen can still replicate which helps elicit a more pronounced immune response
  – Weakened pathogen usually doesn’t cause disease
  – Contraindicated in immunocompromised patients
    • Cancer, pregnancy, HIV, corticosteroid use

• Inactivated (or killed) vaccines
  – Can be fragments of viruses or bacteria
  – Can be whole viruses or bacteria
  – Antigens are recognized which elicits the immune response
  – Cannot cause disease
  – Do not produce as strong of an immune response
  – Ex. Yearly flu shots

Timing and spacing of Vaccines

<table>
<thead>
<tr>
<th>Antigen Combination</th>
<th>Recommended minimum interval between doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two or more inactivated vaccines</td>
<td>Can be administered simultaneously or at any interval between doses</td>
</tr>
<tr>
<td>Inactivated and live</td>
<td>Can be administered simultaneously or at any interval between doses</td>
</tr>
<tr>
<td>Two or more live intranasal or injectable</td>
<td>4-week minimum, interval if not administered simultaneously</td>
</tr>
</tbody>
</table>

How have immunizations shaped the world?

• Prior to vaccines, almost everyone got measles and chickenpox
• 1921 diphtheria outbreak killed 15,000 Americans
• Rubella (German measles) was responsible for 2,000 infant deaths and 11,000 miscarriages between 1964 and 1965
• Small pox killed an estimated 300 million people in the 20th century

Current Available Vaccinations

- Adenovirus
- Measles
- Shingles
- Anthrax
- Meningococcal
- Smallpox
- Diphtheria
- Mumps
- Tetanus
- Hepatitis A
- Pertussis
- Tuberculosis
- Hepatitis B
- Pneumococcal
- Typhoid Fever
- Haemophilus influenza type B
- Polio
- Varicella
- Human Papillomavirus
- Rabies
- Yellow Fever
- Seasonal Influenza
- Rotavirus
- Japanese Encephalitis
- Rubella
Commonly administered vaccinations

- Hepatitis A
- Hepatitis B
- Influenza
  - Trivalent
  - Quadrivalent
- Meningitis
- Pneumonia
  - Pneumovax®
  - Prevnar13®
- Shingles
  - Zostavax®
  - Shingrix®
- Tdap (Tetanus, Diphtheria and Pertussis)
- Varicella

Influenza

- Flu season
  - October – May
- Incubation period/Onset of symptoms
  - 1 to 4 days
- Symptoms and complications
  - Fever
  - Non-productive cough
  - Body aches
  - Chills
  - Fatigue and malaise
  - Headache

Influenza 2017-2018

- Trivalent:
  - A/Michigan/45/2015 (H1N1)-like virus
  - A/Hong Kong/4801/2014 (H3N2)-like virus
  - B/Brisbane/60/2008-like virus (Victoria lineage)
- Quadrivalent:
  - Same as above + B/Phuket/3073/2013-like virus (Yamagata lineage)

2016-2017 Updates: Influenza

- Egg allergies 2015-2016
  - Egg allergies are very common in children
  - Reactions leading to death are very rare
  - Update: no longer necessary to screen for egg allergies
  - One less barrier to getting immunized

ACIP Recommendations for Egg Allergies

- Persons with a history of egg allergy who have experienced only hives after exposure to egg should receive influenza vaccine
- Persons who have reactions other than hives may receive any licensed and recommended influenza vaccine
- The selected vaccine should be administered in an inpatient or outpatient medical setting (including but not necessarily limited to hospitals, clinics, health departments, and physician offices). Vaccine administration should be supervised by a health care provider who is able to recognize and manage severe allergic conditions.
- A previous severe allergic reaction to influenza vaccine is a contraindication to future receipt of the vaccine

Vaccines Route Ages

- Fluzone (Sanofi Pasteur) IIV4 IM 6 months +
- Fluvirin (Seqirus) IIV3 IM 4 years +
- Fluarix (GSK) IIV4 IM 3 years +
- Fluzone High-Dose (Sanofi Pasteur) IIV3 IM 65 year +
- Fluzezone Intradermal (Sanofi Pasteur) IIV4 ID 18 - 64 years
- Fluzone (Seqirus) no egg proteins ccIIV4 IM 4 years +
- Fluad (Seqirus) adjuvated HD Fluad Pediatric formulation as well IM 65 year +
- Live attenuated Intranasal Will be used again for 2018-2019
### Tetanus, Diphtheria, and Pertussis

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Type and dose</th>
<th>Ages</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tdap</td>
<td>Boostrix (GSK) 10 year + Adacel (Sanofi Pasteur) 11 - 64 years</td>
<td>0.5 mL IM</td>
<td>Lower dose of diphtheria and pertussis. Given every pregnancy 27–36 weeks.</td>
</tr>
<tr>
<td>DTaP</td>
<td>0.5 mL IM</td>
<td>&lt; 7 years of age (6 weeks – 6 years)</td>
<td>Contains high doses of each toxoid.</td>
</tr>
<tr>
<td>Td</td>
<td>0.5 mL IM</td>
<td>Booster given after 10 years.</td>
<td></td>
</tr>
</tbody>
</table>

### Measles, Mumps, Rubella oh my...

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Type and dose</th>
<th>Ages and comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMR</td>
<td>Live-attenuated viruses 0.5 mL SC</td>
<td>12 – 15 months (first dose) 4 – 6 months (second dose) Adults born before 1957 considered immune Born 1957 or later require documentation of 1 or more MMR dose Contraindicated in patients with neomycin or gelatin allergy, pregnancy, immunosuppression, recent blood products</td>
</tr>
</tbody>
</table>

### Herpes Zoster Vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Type and dose</th>
<th>Ages</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zostavax</td>
<td>Live-attenuated vaccine 0.65 mL SC</td>
<td>FDA: ≥ 50  ACIP: ≥ 60</td>
<td>Limited duration of immunity (8–10 years) with no booster information. 17 x more potent than varicella vaccine. Needs to be stored frozen. Only good for 30 minutes after reconstitution.</td>
</tr>
<tr>
<td>Shingrix</td>
<td>Recombinant, Adjuvanted vaccine (Not live) 0.5 mL IM at 0 and 2 to 6 months (2 dose)</td>
<td>≥ 50</td>
<td>Longer lasting immunity. More effective than Zostavax (92%) in ages 50 and older. Refrigerated. Good for 6 hours after reconstitution.</td>
</tr>
</tbody>
</table>

### Varicella (chicken Pox)

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Type and Dose</th>
<th>Ages and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varivax</td>
<td>Live attenuated 2 doses of 0.5 mL SC</td>
<td>Children 12 months 4 – 6 years Adults 2 doses 4 weeks apart with no history/evidence</td>
</tr>
</tbody>
</table>

### Pneumococcal Vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Type and Dose</th>
<th>Ages and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevnar13 (PCV13)</td>
<td>Inactivated bacterial 0.5 mL IM Once</td>
<td>Infants 6 weeks to 15 months (4 doses) Adults ≥ 65 years of age Patients aged 19 to 64 Immunocompromising conditions, functional or anatomic asplenia, CSF leak, and cochlear implants</td>
</tr>
<tr>
<td>Pneumovax (PPSV23)</td>
<td>0.5 mL IM Adults ≥ 65 years of age Ages 2 to 64 with the following: Cigarette smokers ≥ 18 years of age Chronic CVD (CHF) Chronic pulmonary disease (COPD, asthma) Diabetes melitus Alcoholism Chronic liver disease Candidates for or recipient of cochlear implant CSF leak Functional or anatomic asplenia (sickle cell disease, splenectomy) Immunocompromised patients Chronic renal failure or nephrotic syndrome Solid organ transplantation</td>
<td></td>
</tr>
</tbody>
</table>
Immunization Schedules

- Available from the CDC
- Recommendations based on age of the patient
- Recommendations based on the disease states of the patient
- Immunization schedule should be read with footnotes

Case #1

- JB is a 44 y/o female with a past medical history of Heart Disease and Type 2 Diabetes. Her mother just got shingles, and she is afraid of getting them herself. She shows up at your pharmacy asking for the immunization. What do you do?

Case #4

- GF is a 40-year-old male that comes in to your clinic asking about the flu shot. He states that he has never had one before. He has a mild cold today with no fever. He mentions that he has an egg allergy. What should you recommend today?
Bloodborne Pathogens
• Infectious microorganisms in human blood that cause disease
  – Examples include Hepatitis A, Hepatitis B & HIV
• Needle sticks and other sharps-related injuries can expose a person to a blood borne pathogen
• If exposed
  – Wash needle sticks and cuts with soap and water
  – Flush splashes to the nose, mouth, or skin with water
  – Irrigate eyes with clean water, saline, or sterile irrigants
  – Report the incident to your supervisor
  – Immediately seek medical treatment

Practice Setting
• What items should be on your table before administering vaccines?
  – Needle disposal “sharps” container
  – Medical gloves
  – Alcohol wipes
  – Band-Aids
  – One inch gauze pads or cotton balls
• Privacy
• Safety protocol

Side Effects of Immunizations
• Any vaccine can cause side effects
• Minor side effects:
  – Arm soreness, redness or swelling
  – Abdominal pain, cough, nausea
  – Headaches, upper respiratory tract infection
  – Low grade fever
• Serious side effects:
  – Guillain-Barre Syndrome
  – Severe allergic reaction

General Contraindications
• Inactivated vaccines:
  – Severe allergic reaction (e.g. anaphylaxis) after a previous dose of any influenza vaccine or to a vaccine component
• Live vaccines:
  – Severe allergic reaction (e.g. anaphylaxis) after a previous dose of any influenza vaccine or to a vaccine component
  – Pregnant women
  – Immunocompromised adults

Slide on Myths of Vaccinations
• Myth #1: Vaccines cause autism
  – False – Several major studies have shown that there is no link between any vaccination and the likelihood of developing autism
• Myth #2: Vaccines contain large amounts of unsafe toxins
  – False – Only trace amounts of preservative chemicals are used in vaccine formulations. There is no scientific evidence that suggests that receiving low levels of mercury, aluminum or formaldehyde is harmful.
• Myth #3: You can get the disease from receiving a vaccine
  – Almost never – Inactivated vaccines do not transmit disease. Live vaccines may cause a mild case of the disease (such as a small chickenpox rash). This isn’t harmful and can actually show that the vaccine is working.

Single vs. Multi Use Vials
• Single use medications should be dedicated to a single patient for a single procedure
  – Examples include zoster and pneumonia
  – Do not contain a preservative
  – Removing the needle cap or attaching a syringe breaks the sterile seal
• Multi use vials should be assessed with a clean syringe EVERY TIME
  – Examples include influenza and tuberculin PPD
  – Contain preservative agent
  – May be used through the expiration date
Vaccine “Cold Chain”

- Exposure of vaccines to temperatures outside the recommended ranges can decrease their potency and reduce their effectiveness.
- Vaccines must be stored properly from the time they are manufactured until the time they are administered.
- Every facility has a written protocol for routine and emergency vaccine storage and handling.
- Temperature logs as well as thermometers are needed to ensure that the vaccines stay within a required temperature range.

Required Temperatures

- Must use stand alone freezers and refrigerators (no dorm-style units).
  - Frozen Vaccines (Varicella, MMRV, and Zoster)
    - Between -58°F and +5°F
  - Refrigerated Vaccines
    - Between 33°F and 46°F
- CDC recommends reviewing and recording temperatures in both freezer and refrigerator units at least twice daily.
- If stored vaccines have been exposed to temperatures outside of ranges:
  - Separate from other vaccine supplies.
  - Mark with “DO NOT USE.”
  - Contact immunization program, vaccine manufacturer(s), or both for guidance.

Expiration Dates

- Vaccine and diluent expiration dates indicate when the product must be discarded.
- Dates are printed on vials, manufacturer filled syringes, and packages.
- When the expiration date only has the month and year, the product may be used up to and including the last day of that month.
- When the expiration date includes the day, month and year, the product may be used through the end of that day.
- The beyond use date (BUD) can sometimes be used in place and replaces the expiration date and is noted on the label along with initials of the person making the change.
A Pharmacy Technician Can...

1. Walk the patient through the questionnaire
2. Provide the appropriate VIS based on the immunization(s)
3. Input the prescription either from the pharmacist or provider
4. Fill the prescription
5. Prep the area of immunization
6. Verify the patient, the correct immunization, and expiration dates prior to administration
7. Administer the immunization
8. Assess the patient for adverse drug reactions immediately following the immunization

Immunization Assessment

- Filled out by the patient
- Reviewed by the pharmacist
- Assess current immunization schedule for immunizations based on patient’s age and disease state
- Screen for contraindications
  - Pregnancy
  - Allergies (latex or to the vaccine itself)
  - Immunosuppressed

Screening Checklist for Potential Contraindications to Vaccines for Adults

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you sick today?</td>
<td></td>
</tr>
<tr>
<td>Do you have allergies to medications, food, a vaccine component, or latex?</td>
<td></td>
</tr>
<tr>
<td>Have you ever had a serious reaction after receiving a vaccination?</td>
<td></td>
</tr>
<tr>
<td>Do you have a long-term health problem with heart disease, lung disease, asthma, kidney disease, metabolic disease (e.g., diabetes), anemia, or other blood disorders?</td>
<td></td>
</tr>
<tr>
<td>Do you have cancer, leukemia, HIV/AIDS, or any other immune system problem?</td>
<td></td>
</tr>
<tr>
<td>In the past 3 months, have you taken medications that affect your immune system, such as prednisone, other steroids, or anticoagulant drugs; drugs for the treatment of rheumatoid arthritis, Crohn’s disease, or psoriasis; or have you had radiation treatments?</td>
<td></td>
</tr>
<tr>
<td>Have you had a seizure or a brain or other nervous system problem?</td>
<td></td>
</tr>
<tr>
<td>During the past year, have you received a transfusion of blood or blood products, or been given immune gamma globulin or an antibiotic drug?</td>
<td></td>
</tr>
<tr>
<td>For women: Are you pregnant or is there a chance you could become pregnant during the next month?</td>
<td></td>
</tr>
<tr>
<td>Have you received any vaccinations in the past 4 weeks?</td>
<td></td>
</tr>
</tbody>
</table>

Vaccine Information Sheet, “VIS”

- Information sheets produced by the CDC that explain both the benefits and the risks of a vaccine to the vaccine recipient
- Federal law requires that a VIS is provided to the patient, parent, or legal representative before each dose of certain vaccines
- The CDC maintains a current English language for each vaccine
  - Translated VIS can be found at the Immunization Action Coalition via immunization.org website
- VIS are not consent forms and are updated on an as needed basis

Things to Keep in Mind...

- Any vaccine can cause a side effect
  - Sore arm or low grade fever most common
- Vaccines are only contraindicated if
  - Severe allergic reaction to previous vaccination
- Caution in patients with
  - Severe allergies
  - Pregnancy
  - Immunocompromised
Documentation

- IRIS: Idaho’s Immunization Reminder Information System
  - Allows clinics and pharmacies to document and keep records of patient’s previous immunizations
  - Technicians should play a role in updating patient records on IRIS along with contacting the patient’s primary care provider
- https://iris.dhw.idaho.gov/IRIS/portalInfoManager.do

Record Keeping

- Patient’s name, date of birth, address, and known allergies
- Product name, manufacturer, dose, lot number, expiration, and date of administration
- Documentation that VIS was provided
- Site and route of administration; if part of series, which dose
- Patient’s healthcare provider, if applicable
- Name of immunizing pharmacist, student pharmacist, or certified technician
- Adverse events reported, and dates of any subsequent reporting if applicable
- Completed consent forms

Adverse Reactions to Immunizations

- Local
  - Most common, occurring in up to 80% of vaccine doses
  - Typical reactions include pain, swelling, and redness at the site of injection
  - Typically mild and self-limiting
- Systemic
  - More generalized events that include fever, malaise, myalgias
  - May be caused by the vaccine or something unrelated to the vaccine
  - May occur following a live vaccine, due to replication being necessary for replication in order to produce immunity

Adverse Reactions Continued...

- Allergic
  - Rare
  - Caused by the vaccine itself or some other component of the vaccine
  - Anaphylaxis may be life-threatening
  - Emergency protocol and supplies for the treatment of anaphylaxis required

Anaphylaxis Signs and symptoms

- Sudden or gradual onset of:
  - Generalized itching
  - Erythema (redness)
  - Urticaria (hives)
  - Angioedema (swelling of the lips, face, or throat)
  - Severe bronchospasm (wheezing)
  - Shortness of breath
  - Shock
  - Abdominal cramping
  - Cardiovascular collapse

Anaphylaxis treatment

- Notify pharmacist and call 911
- Epinephrine
  - Adult dose range from 0.3mL to 0.5mL per dose of aqueous epinephrine 1mg/mL dilution
  - There are NO contraindications to epinephrine administration in the setting of anaphylaxis
- If EMS has not arrived and symptoms are still present, repeat dose of epinephrine every 5-15 minutes for up to 3 total doses, depending on patient’s response
- Keep patient in supine position (flat on back) unless he or she is having breathing difficulty
- Monitor blood pressure and pulse every 5 minutes
- Report incident to the Vaccine Adverse Event Reporting System (VAERS)
Reporting Adverse Events

- Vaccine Adverse Event Reporting System (VAERS)
  - Passive reporting system that collects potentially new, rare and severe side effects associated with vaccines
  - Helps health professionals know how to better educate patients in the future
  - Helps assess safety of new vaccines

Types of Vaccines

- Injectable
  - Need to mix
  - Multiuse vials
  - Ready to use, vial
  - Ready to use, manufacturer filled syringe
- Nasal
- Oral

Routes of Administration

- Intramuscular
  - Injection into the deltoid muscle
- Subcutaneous
  - Injection into the fatty tissue under the skin
- Nasal
  - Liquid sprayed into the nose
- Oral

Safety Precautions

- OSHA requires all immunizers start Hepatitis B vaccination series
- Safety needles and devices should be implemented
  - Self-retracting needles or Hinged-arm snapping needle covers
- Always keep your eye on the needle after it has been in a patient
- Sharps container should be close by and within arms reach
- Every pharmacy should have a post-exposure plan for needle-sticks
- Never recap a needle after it has been in a patient

Immunization Dose and Route

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Dose</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diptheria, tetanus, pertussis</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Hemophilus influenza type b (Hib)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Hepatitis A (HepA)</td>
<td>0.19 proc. 0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Hepatitis B (HepB)</td>
<td>0.19 proc. 0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Human papillomavirus (HPV)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Influenza, live attenuated (LAIV)</td>
<td>0.2 mL (0.1 mL in each nostril)</td>
<td>Intranasal spray</td>
</tr>
</tbody>
</table>
Immunization Dose and Route

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Dose</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococcal polysaccharide (PPV)</td>
<td>0.5 mL</td>
<td>IM or SCat</td>
</tr>
<tr>
<td>Polyvalent (IPV)</td>
<td>0.5 mL</td>
<td>IM or SCat</td>
</tr>
<tr>
<td>Haemophilus (HiT)</td>
<td>0.5 mL</td>
<td>IM or SCat</td>
</tr>
<tr>
<td>Tetanus (Tet)</td>
<td>0.5 mL</td>
<td>IM or SCat</td>
</tr>
<tr>
<td>Varicella (VZ)</td>
<td>0.5 mL</td>
<td>Subcut</td>
</tr>
<tr>
<td>Dose (Dpt)</td>
<td>0.8 mL</td>
<td>Subcut</td>
</tr>
</tbody>
</table>

Combination Vaccines

- Hib-Tech (TT or PCV7) 0.5 mL IM
- Pediatrix (Hib-Tech, PCV7, IPV, MMR, HepB) 1 mL IM
- Recombivac (Hib-Tech, PCV7, IPV, MMR, HepB) 1 mL IM

Immunization Sites

- Intramuscular (IM) injection
- Subcutaneous (Subcut) injection

Prepping the Immunization

- Preparing the immunization area
  - Obtaining required supplies and disinfecting the area
- Selecting the correct vaccine
  - Match the order with the vaccine label
- Identify expiration date
- Washing hands
- Preparing the vaccine
- Verifying the right
  - Patient, vaccine, time, dose, route, site, and documentation
Aseptic Technique

- Wash hands before and after administration (hand sanitizer)
- Syringes and needles are single use and should NEVER be reused
- Cleaning the surrounding area
- Sharps container is easily accessible

Administering the Vaccination

References