Vaccine Administration: Minimizing Errors, Reducing Missed Opportunities, Appropriate Storage & Handling

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Disclosures

- Donna Weaver is a federal government employee with no financial interest or conflict with the manufacturer of any product named in this presentation.

- The speaker will not discuss the off-label use of vaccines.

- The speaker will not discuss a vaccine not currently licensed by the FDA.
Vaccine Administration

Appropriate vaccine administration is a critical component of successful immunization program.

Apply the “Rights of Medication Administration”

- The Right Patient
- The Right Vaccine
- The Right Time*
- The Right Dosage
- The Right Route
- The Right Site
- The Right Technique
- The Right Documentation

*includes administering at correct age, appropriate interval, and before vaccine/diluent expiration.
Staff Training and Education

- Develop a competency-based education plan for all staff
- Orient new and temporary staff and validate their knowledge and skills with a skills checklist
- Provide continuing education for all staff on
  - use and administration of new vaccines
  - new schedules
  - new or revised recommendations
The Skills Checklist is a self-assessment tool for health care staff who administer immunizations. To complete it, review the competency areas below and the clinical skills, techniques and procedures outlined for each of them. Score yourself in the Self-Assessment column. If you check **Need to Improve** you indicate further study, practice or change is needed. When you check **Meets or Exceeds** you indicate you believe you are performing at the expected level of competence, or higher.

**Supervisors:** Use the Skills Checklist to clarify responsibilities and expectations for staff who administer vaccines. When you use it for performance reviews, give staff the opportunity to score themselves in advance. Next observe their performance as they provide immunizations to several patients and score in the Supervisor Review columns. If improvement is needed, meet with them to develop a Plan of Action (over) that will help them achieve the level of competence you expect; circle desired actions or write in others. In 30 days, observe their performance again. When all competency areas meet expectations, file the Skills Checklist in their personnel folder. At the end of the probationary period and annually thereafter, observe them again and complete the Skills Checklist.

<table>
<thead>
<tr>
<th>Competency</th>
<th>Clinical Skills, Techniques, and Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Parent Education</strong></td>
<td>1. Welcomes child and family, establishes rapport, and answers parents’ questions.</td>
</tr>
<tr>
<td></td>
<td>2. Explains what vaccines will be given and which type(s) of injection will be done.</td>
</tr>
<tr>
<td></td>
<td>3. Accommodates language or literacy barriers and special needs of parents to help make them feel comfortable and informed about the procedure.</td>
</tr>
<tr>
<td></td>
<td>4. Verifies parents received the Vaccine Information Statements for all vaccines the child is to receive and had time to read them and ask questions.</td>
</tr>
<tr>
<td></td>
<td>5. Screens for contraindications. (MA: score NA – not applicable – if this is MD function.)</td>
</tr>
<tr>
<td></td>
<td>6. Reviews comfort measures and after care instructions with parent, inviting questions.</td>
</tr>
<tr>
<td><strong>B. Medical Protocols</strong></td>
<td>1. Identifies the location of the medical protocols (i.e. immunization protocol, emergency protocol, reference material).</td>
</tr>
<tr>
<td></td>
<td>2. Identifies the location of the epinephrine, its administration technique, and clinical situations where its use would be indicated.</td>
</tr>
<tr>
<td></td>
<td>3. Maintains up-to-date CPR certification.</td>
</tr>
<tr>
<td></td>
<td>4. Understands the need to report any needlestick injury and to maintain a sharps injury log.</td>
</tr>
<tr>
<td><strong>C. Vaccine Handling</strong></td>
<td>1. Checks vial expiration date. Double-checks vial label and contents prior to drawing up.</td>
</tr>
<tr>
<td></td>
<td>2. Maintains aseptic technique throughout.</td>
</tr>
<tr>
<td></td>
<td>3. Selects the correct needle size: 1”- 1 1/2” for IM (DTaP, Hib, HepA, HepB, Pneumo Conj); ½” for SC (MMR, Var); IPV depends on route to be used.</td>
</tr>
<tr>
<td></td>
<td>4. Shakes vaccine vial and/or reconstitutes and mixes using the diluent supplied. Inverts vial and draws up correct dose of vaccine. Rechecks vial label.</td>
</tr>
<tr>
<td></td>
<td>5. Labels each filled syringe or uses labeled tray to keep them identified.</td>
</tr>
<tr>
<td></td>
<td>6. Demonstrates knowledge of proper vaccine handling, e.g. protects MMR from light, logs refrigerator temperature.</td>
</tr>
</tbody>
</table>
Right Patient

- What is the patient’s name? Has the patient received any immunizations under another name?
- What is the patient’s date of birth?
- Has the patient received any vaccines or shots at another clinic or healthcare facility recently?
- Do you have a copy of the patient’s immunization record?
Patient Preparation and Care

- Screen for contraindications and precautions every time a vaccine is administered.

- Be prepared to discuss benefits and risks of vaccines and risks of VPD using VIS and other reliable resources.

- Display confidence and establish environment that promotes a sense of security and trust.

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Screening Questionnaire for Child and Teen Immunization

1. Has the child ever had a seizure?
2. Does the child have a chronic illness?
3. Does the child have a history of allergies?
4. Does the child have a history of eczema?
5. Does the child have a history of anaphylaxis?
6. Does the child have a history of chronic asthma?

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Measles, Mumps, and Rubella Vaccines

**WHAT YOU NEED TO KNOW**

1. Why get vaccinated?
   - Measles, mumps, and rubella are serious diseases that can cause serious illness, disability, and even death.
2. Who should get measles, mumps, and rubella vaccines?
   - Children should be vaccinated at 12-15 months of age and 4-6 years of age.
3. Some people should not get MMR vaccine or should wait:
   - People who have had a severe reaction to MMR vaccine should not get another dose.
   - People who are pregnant or planning to become pregnant within 2 months should not be vaccinated.

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Positioning and Comforting Restraint

- **Children**
  - encourage parent participation if possible
  - children may be less fearful when sitting rather than lying down
  - use evidence-based strategies to ease the injection process
    - distraction
    - sweet liquids
    - tactile stimulation
    - topical analgesia
Positioning, Comfort, Safety

- **Adolescents and adults**
  - have patient seated or lying down for vaccination to prevent syncope (fainting)
  - consider observing patient (seated or lying down) for 15 minutes after vaccination
  - if syncope develops, patient should receive supportive care and be observed until symptoms resolve
Right Vaccine - check the label at least 3 times

- DT, DTaP, Td, Tdap, TT
- DTaP-HepB-IPV, DTaP-IPV, DTaP-IPV/Hib
- Hib, Hib-HepB
- HepA, HepB, HepA-HepB
- HPV2, HPV4
- IPV
- LAIV, TIV
- MCV4, MPSV4
- MMR, MMRV
- PCV13, PPSV23
- RV1, RV5
- VAR, ZOS
<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Trade Name</th>
<th>Abbreviation</th>
<th>Manufacturer</th>
<th>Type</th>
<th>Route</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>BioThrax</td>
<td>AVA</td>
<td>Emerging BioSolutions</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>Tetanus &amp; diphtheria toxoids and acellular pertussis vaccine.</td>
</tr>
<tr>
<td>DTaP</td>
<td>Daptacel</td>
<td>DTaP</td>
<td>sanofi</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>Tetanus &amp; diphtheria toxoids and acellular pertussis vaccine.</td>
</tr>
<tr>
<td></td>
<td>Infanrix</td>
<td>DTaP</td>
<td>GlaxoSmithKline</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>Tetanus &amp; diphtheria toxoids and acellular pertussis vaccine.</td>
</tr>
<tr>
<td></td>
<td>Tripedia</td>
<td>DTaP</td>
<td>sanofi</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>Tetanus &amp; diphtheria toxoids and acellular pertussis vaccine.</td>
</tr>
<tr>
<td>DT</td>
<td>Generic</td>
<td>DT</td>
<td>sanofi</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>Pediatric formulation (through age 6).</td>
</tr>
<tr>
<td>DTaP/Hib</td>
<td>TriHIBt</td>
<td>DTaP/Hib</td>
<td>sanofi</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>ActHIB reconstituted with Tripedia. Licensed for 4th dose of DTaP &amp; HIB series.</td>
</tr>
<tr>
<td>DTaP-IPV</td>
<td>Kinrix</td>
<td>DTaP-IPV</td>
<td>GlaxoSmithKline</td>
<td>Inactivated Bacterial &amp; Viral</td>
<td>IM</td>
<td>Licensed for 5th (DTaP) and 4th (IPV) booster at 4-6 years.</td>
</tr>
<tr>
<td>DTaP-HepB-IPV</td>
<td>Pediarix</td>
<td>DTaP-HepB-IPV</td>
<td>GlaxoSmithKline</td>
<td>Inactivated Bacterial &amp; Viral</td>
<td>IM</td>
<td>Licensed for doses at 2, 4, &amp; 6 months (through 6 years of age). Not licensed for boosters.</td>
</tr>
<tr>
<td>DTaP-IPV/Hib</td>
<td>Pentacel</td>
<td>DTaP-IPV/Hib</td>
<td>sanofi</td>
<td>Inactivated Bacterial &amp; Viral</td>
<td>IM</td>
<td>Licensed for 4 doses at 2, 4, 6, and 15-18 months.</td>
</tr>
<tr>
<td>Haemophilus influenza type b (Hib)</td>
<td>PedvaxHIB</td>
<td>HIB</td>
<td>Merck</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>PRP-DMP. Polysaccharide conjugate (mening. protein carrier). 2-dose primary schedule.</td>
</tr>
<tr>
<td></td>
<td>ActHIB</td>
<td>HIB</td>
<td>sanofi</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>PRP-T. Polysaccharide conjugate (tetanus toxoid carrier). 3-dose primary schedule.</td>
</tr>
<tr>
<td></td>
<td>Hibertx</td>
<td>HIB</td>
<td>GlaxoSmithKline</td>
<td>Inactivated Bacterial</td>
<td>IM</td>
<td>Polysaccharide conjugate (tetanus toxoid carrier). Booster only.</td>
</tr>
<tr>
<td>Haemophilus influenza type b – hepatitis B</td>
<td>Convax</td>
<td>HIB-HepB</td>
<td>Merck</td>
<td>Inactivated Bacterial &amp; Viral</td>
<td>IM</td>
<td>Should not be used for hepb birth dose.</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Havrix</td>
<td>HepA</td>
<td>GlaxoSmithKline</td>
<td>Inactivated Viral</td>
<td>IM</td>
<td>Pediatric (&lt;18) and adult formulations.  Pediatric = 720 EL.U., 0.5mL. Adult = 1,440 EL.U., 1.0mL. Minimum age = 1 year.</td>
</tr>
<tr>
<td></td>
<td>Vaqta</td>
<td>HepA</td>
<td>Merck</td>
<td>Inactivated Viral</td>
<td>IM</td>
<td>Pediatric (&lt;18) and adult formulations.  Pediatric = 25 U. 0.5mL. Adult = 50 U. 1.0mL. Minimum age = 1 year.</td>
</tr>
</tbody>
</table>
Vaccine Preparation

- **Follow standard precautions to minimize risks of infection**
  - handwashing between patients and anytime hands are soiled
  - gloves not required unless risk of exposure to body fluids, open lesions on hands, or agency requirement
  - use separate syringe and needle for each injection

- **Inspect vaccine and diluent vials for damage or contamination prior to use**
Reconstitution

- Reconstitute vaccines just prior to administration
- Use only the diluent supplied by manufacturer for the corresponding vaccine; dose is not valid if another diluent is used
- Use all diluent supplied for a single dose and draw up all of the vaccine after thorough reconstitution
- Once reconstituted, administer within the time frame specified by manufacturer or discard vaccine
- Changing the needle between reconstitution and administration not necessary unless needle is contaminated or damaged
The following vaccines must be reconstituted correctly before they are administered. Reconstitution means that the lyophilized (freeze-dried) vaccine powder or wafer in one vial must be reconstituted (mixed) with the diluent (liquid) in another. Only use the diluent provided by the manufacturer for that vaccine as indicated on the chart. ALWAYS check the expiration date on the diluent and vaccine. NEVER use expired diluent or vaccine.

<table>
<thead>
<tr>
<th>Vaccine product name</th>
<th>Manufacturer</th>
<th>Lyophilized vaccine (powder)</th>
<th>Liquid diluent (may contain vaccine)</th>
<th>Time allowed between reconstitution and use*</th>
<th>Diluent storage environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ActHIB (Hib)</td>
<td>sanofi pasteur</td>
<td>ActHIB</td>
<td>0.4% sodium chloride</td>
<td>24 hrs</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>Hiberix (Hib)</td>
<td>GlaxoSmithKline</td>
<td>Hib</td>
<td>0.9% sodium chloride</td>
<td>24 hrs</td>
<td>Refrigerator or room temp</td>
</tr>
<tr>
<td>Imovax (RAB&lt;sub&gt;HDCV&lt;/sub&gt;)</td>
<td>sanofi pasteur</td>
<td>Imovax</td>
<td>Sterile water</td>
<td>Immediately</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>JE-VAX</td>
<td>sanofi pasteur</td>
<td>JE-VAX</td>
<td>Sterile water</td>
<td>8 hrs</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>M-M-R II (MMR)</td>
<td>Merck</td>
<td>MMR</td>
<td>Sterile water</td>
<td>8 hrs</td>
<td>Refrigerator or room temp</td>
</tr>
<tr>
<td>Menomune (MPSV4)</td>
<td>sanofi pasteur</td>
<td>MPSV4</td>
<td>Distilled water</td>
<td>30 min (single-dose vial) 35 days (multi-dose vial)</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>Menveo (MCV4)</td>
<td>Novartis</td>
<td>MenA</td>
<td>MenCWY</td>
<td>8 hrs</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>Pentacel (DTaP-IPV/Hib)</td>
<td>sanofi pasteur</td>
<td>ActHIB</td>
<td>DTaP-IPV</td>
<td>Immediately†</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>ProQuad (MMRV)</td>
<td>Merck</td>
<td>MMRV</td>
<td>Sterile water</td>
<td>30 min</td>
<td>Refrigerator or room temp</td>
</tr>
<tr>
<td>RabAvert (RAB&lt;sub&gt;PCECV&lt;/sub&gt;)</td>
<td>Novartis</td>
<td>RabAvert</td>
<td>Sterile water</td>
<td>Immediately</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>Rotarix (RV1)&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>GlaxoSmithKline</td>
<td>RV1</td>
<td>Sterile water, calcium carbonate, and xanthan*</td>
<td>24 hrs</td>
<td>Room temp</td>
</tr>
<tr>
<td>Varivax (VAR)</td>
<td>Merck</td>
<td>VAR</td>
<td>Sterile water</td>
<td>30 min</td>
<td>Room temp or refrigerator</td>
</tr>
<tr>
<td>YF-VAX (YF)</td>
<td>sanofi pasteur</td>
<td>YF-VAX</td>
<td>0.9% sodium chloride</td>
<td>60 min</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>Zostavax (ZOS)</td>
<td>Merck</td>
<td>ZOS</td>
<td>Sterile water</td>
<td>30 min</td>
<td>Room temp or refrigerator</td>
</tr>
</tbody>
</table>
Filling Syringes

- Follow standard medication preparation guidelines for drawing vaccine from vial into syringe
- Inspect vaccine visually for particulate matter and/or discoloration
- If problems noted (e.g., vaccine cannot be resuspended), do not administer vaccine
- Administer vaccine as soon as possible after filling syringe
- CDC strongly discourages providers from prefilling large numbers of syringes
Single-dose Vials and Manufacturer Filled Syringes

- **Use or discard that clinic day when**
  - rubber stopper is exposed or vaccine is withdrawn from vial
  - manufacturer-filled syringe is activated (i.e., syringe cap removed or needle attached)
Don’ts of Vaccine Preparation

- Never combine vaccines into same syringe unless FDA-approved for combination
- Never transfer vaccine from one syringe to another
- Never combine partial doses from different vials to obtain a complete dose
- Displacing volume to be withdrawn with air likely unnecessary and can lead to wasted doses
## Right Time – Age and Intervals

<table>
<thead>
<tr>
<th>Vaccine and dose number</th>
<th>Recommended age for this dose</th>
<th>Minimum age for this dose</th>
<th>Recommended interval to next dose</th>
<th>Minimum interval to next dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B (HepB)-1(^3)</td>
<td>Birth</td>
<td>Birth</td>
<td>1-4 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>HepB-2</td>
<td>1-2 months</td>
<td>4 weeks</td>
<td>2-17 months</td>
<td>8 weeks</td>
</tr>
<tr>
<td>HepB-3(^4)</td>
<td>6-18 months</td>
<td>24 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Diphtheria-tetanus-acellular pertussis (DTaP)-1(^3)</td>
<td>2 months</td>
<td>6 weeks</td>
<td>2 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>DTaP-2</td>
<td>4 months</td>
<td>10 weeks</td>
<td>2 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>DTaP-3</td>
<td>6 months</td>
<td>14 weeks</td>
<td>6-12 months</td>
<td>6 months(^5,6)</td>
</tr>
<tr>
<td>DTaP-4</td>
<td>15-18 months</td>
<td>12 months</td>
<td>3 years</td>
<td>6 months(^5)</td>
</tr>
<tr>
<td>DTaP-5</td>
<td>4-6 years</td>
<td>4 years</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Haemophilus influenzae type b (Hib)-1(^3,7)</td>
<td>2 months</td>
<td>6 weeks</td>
<td>2 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Hib-2</td>
<td>4 months</td>
<td>10 weeks</td>
<td>2 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Hib-3(^8)</td>
<td>6 months</td>
<td>14 weeks</td>
<td>6-9 months</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Hib-4</td>
<td>12-15 months</td>
<td>12 months</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Inactivated poliovirus (IPV)-1(^3)</td>
<td>2 months</td>
<td>6 weeks</td>
<td>2 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>IPV-2</td>
<td>4 months</td>
<td>10 weeks</td>
<td>2-14 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>IPV-3</td>
<td>6-18 months</td>
<td>14 weeks</td>
<td>3-5 years</td>
<td>6 months</td>
</tr>
<tr>
<td>IPV-4(^6)</td>
<td>4-6 years</td>
<td>4 years</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Pneumococcal conjugate (PCV)-1(^7)</td>
<td>2 months</td>
<td>6 weeks</td>
<td>8 weeks</td>
<td>4 weeks</td>
</tr>
</tbody>
</table>
Check the Expiration Date of Vaccine and Diluent

- If an expired dose of a live virus vaccine is administered, wait at least 4 weeks to repeat the dose.
- If an expired dose is not a live vaccine, the dose should be repeated as soon as possible.
### Administering Vaccines: Dose, Route, Site, and Needle Size

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>Dose</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diptheria, Tetanus, Pertussis (DTP), Oral polio (OPV), Haemophilus influenzae type b (Hib)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Hepatitis A (HepA)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Hepatitis B (HepB)</td>
<td>10 μg</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>0.3 mL</td>
<td>Intrat</td>
</tr>
<tr>
<td>Influenza, trivalent inactivated (TIV)</td>
<td>6.5 mL</td>
<td>0.25 mL</td>
</tr>
<tr>
<td>Mumps, mumps, rubella (MMR)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Meningococcal conjugate (MCV)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Meningococcal – polysaccharide (MPSV)</td>
<td>0.5 mL</td>
<td>SC</td>
</tr>
<tr>
<td>Pneumococcal conjugate (PCV)</td>
<td>0.5 mL</td>
<td>IM</td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV)</td>
<td>0.5 mL</td>
<td>IM or SC</td>
</tr>
<tr>
<td>Polio, inactivated (IPV)</td>
<td>0.5 mL</td>
<td>IM or SC</td>
</tr>
<tr>
<td>Rotavirus (RV)</td>
<td>2 mL</td>
<td>Oral</td>
</tr>
<tr>
<td>Varicella (Var)</td>
<td>0.5 mL</td>
<td>SC</td>
</tr>
<tr>
<td>Zoster (Zax)</td>
<td>0.05 mL</td>
<td>SC</td>
</tr>
</tbody>
</table>

**Injection Site and Needle Size**

#### Subcutaneous (SC) injection
Use a 25-26 gauge needle. Choose the injection site that is appropriate to the person's age and body mass.

<table>
<thead>
<tr>
<th>Age</th>
<th>Needle Length</th>
<th>Injection Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants &lt; 12 mos</td>
<td>1”</td>
<td>SC</td>
</tr>
<tr>
<td>Children 12-15 yrs</td>
<td>1”-1 1/2”</td>
<td>SC</td>
</tr>
</tbody>
</table>

#### Intramuscular (IM) injection
Use a 25-26 gauge needle. Choose the injection site and needle length appropriate to the person’s age and body mass.

<table>
<thead>
<tr>
<th>Age</th>
<th>Needle Length</th>
<th>Injection Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborns</td>
<td>8”</td>
<td>SC</td>
</tr>
<tr>
<td>Infants 1-12 mos</td>
<td>1”-1 1/2”</td>
<td>SC</td>
</tr>
<tr>
<td>Toddlers 1-2 yrs</td>
<td>1 1/2”-2”</td>
<td>SC</td>
</tr>
</tbody>
</table>

**How to Administer Intramuscular (IM) Vaccine Injections**

Administer these vaccines by the intramuscular (IM) route. Diptheria, tetanus, pertussis (DTaP), oral polio (OPV), Haemophilus influenzae type b (Hib), hepatitis A (HepA), hepatitis B (HepB), human papillomavirus (HPV), attenuated influenza (TIV), quadrivalent meningococcal conjugate (MCV), and pneumococcal conjugate (PCV). Administer inactivated polio (IPV) and pneumococcal polysaccharide (PPSV) either IM or SC.

**Patient Age**

- Newborn (≤ 12 mos): Administer high dose sites to avoid injecting into joint. Sites include: deltoid muscle or lateral thigh muscle, or gluteal muscle (upper arm or lower arm respectively).
- Children 1-15 yrs: Administer shoulder or upper arm deltoid muscle (1”-1 1/2” gauge). Additional sites include: lateral thigh muscle, gluteal muscle (upper arm), anterolateral thigh muscle (upper arm), or deltoid muscle (lower arm). Additional sites are used to ensure adequate vaccine is injected into the muscle.
- Adults 16 yrs and older: Administer shoulder muscle (1”-1 1/2” gauge). Additional sites include: lateral thigh muscle, gluteal muscle (upper arm), or deltoid muscle (lower arm). Additional sites are used to ensure adequate vaccine is injected into the muscle.

**Needle Insertion**

- Use a needle long enough to reach deep into the muscle.
- Insert needle at 90° angle into the thickest portion of deltoid muscle — above the level of the skin and beneath the acromion.

**IM site for infants and toddlers**

- Insert needle at a 90° angle into the thickest portion of deltoid muscle.

**IM site for children and adults**

- Insert needle at a 90° angle into the thickest portion of deltoid muscle — above the level of the skin and beneath the acromion.
# Injectable Vaccine Administration for Children Birth-6 years

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age/Reminders</th>
<th>Route</th>
<th>Site □</th>
<th>Needle*</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria, Tetanus, Pertussis (DTaP)</td>
<td>Ages 6 weeks-6 years</td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoida</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to prior dose or component; encephalopathy without other cause within 7 days of a pertussis-containing vaccine</td>
</tr>
<tr>
<td><em>Haemophilus influenzae B (Hib)</em></td>
<td>No routine doses after age 59 months</td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoid</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to prior dose or component</td>
</tr>
<tr>
<td>Pneumococcal conjugate (PCV13)</td>
<td>No routine doses after age 59 months</td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoid</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to prior dose or component</td>
</tr>
<tr>
<td>Hepatitis B (hep B)</td>
<td>1st dose at birth; last dose at/after 6 months</td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoid</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to a prior dose or component (baker’s yeast)</td>
</tr>
<tr>
<td>Inactivated Polio (IPV)</td>
<td>Give last dose at/after age 4 yrs · Minimum interval at least 6 months between doses 3-4 and, if needed, doses 4-5 · If only 3 doses needed, 6 months between next to last and last dose</td>
<td>SC</td>
<td>Anterolateral Thigh or Lateral Upper Arm</td>
<td>5/8&quot; 23-25 g</td>
<td>Anaphylactic reaction to a prior dose or component (neomycin, streptomycin, polymyxin B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoid</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to a prior dose or component (neomycin or gelatin); pregnancy</td>
</tr>
<tr>
<td>Measles, Mumps, Rubella (MMR)</td>
<td>1st dose at/after age 12 mo; 4 week interval between two doses (all ages)</td>
<td>SC</td>
<td>Anterolateral Thigh or Lateral Upper Arm</td>
<td>5/8&quot; 23-25 g</td>
<td>Anaphylactic reaction to a prior dose or component (neomycin or gelatin); pregnancy</td>
</tr>
<tr>
<td>Varicella (Var)</td>
<td>1st dose at/after age 12 mo; 3 month interval between doses (ages 12 mo-12 yrs)</td>
<td>SC</td>
<td>Anterolateral Thigh or Lateral Upper Arm</td>
<td>5/8&quot; 23-25 g</td>
<td>Anaphylactic reaction to a prior dose or component (neomycin or gelatin); pregnancy</td>
</tr>
<tr>
<td>Inactivated Influenza (TIV)</td>
<td>Ages 6 months and older; brand to use based on age</td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoid</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to a prior dose or component (eggs)</td>
</tr>
<tr>
<td>Hepatitis A (hep A)</td>
<td>1st dose at/after age 12 mo 2nd dose 6 months later</td>
<td>IM</td>
<td>Anterolateral Thigh or Deltoid</td>
<td>1&quot;-1.5&quot; 22-25 g</td>
<td>Anaphylactic reaction to prior dose or component; hypersensitivity to alum (Havrix®; 2-phenoxyethanol)</td>
</tr>
</tbody>
</table>

□ Vaccines should never be administered in the buttocks.

◊ See package insert for complete contraindication/component listing; may vary by brand

* Professional judgment is appropriate when selecting needle length for use in all children, especially small infants or larger children.

± Use of the deltoid muscle in children 18 months and older (if adequate muscle mass is present) is an option for IM injections.

February 13, 2011
Oral (PO) Route

- **Rotavirus vaccines**
  - RV1/Rotarix
  - RV5/RotaTeq
  - see detailed administration instructions in manufacturer product information
  - do not readminister a dose that is regurgitated, spit out, or vomited, but do continue series

- **Oral typhoid (TY21a, Vivotif)**
  - do not open capsules or mix with anything
Intranasal (NAS) Route

- Live attenuated influenza vaccine
  - LAIV/FluMist
  - deliver ½ dose in each naris
  - do not repeat dose if patient coughs, sneezes, blows nose, etc.
Subcutaneous (subcut) Injections

- Needle size: 23 - 25 gauge, 5/8”
Intramuscular (IM) Injections

Needle length & Site depend on:
- Muscle size
- Fatty tissue thickness
- Vaccine volume
- Injection technique

Aspiration is NOT required
Correct!

NO!!!

Correct!

Incorrect!

NO!!!
NEW YORK (Reuters Health) - Our ever-expanding waistlines may have outgrown the doctor's needle, researchers say, in what could be another casualty of the obesity epidemic.

HEALTH

In a new study, the researchers report that using a standard 1-inch needle to immunize obese
Multiple Vaccinations

- Use the thigh for multiple IM injections in infants and young children
- The deltoid muscle can be used for older children and adults
- Separate each injection by at least 1”
- Administer most reactive vaccines in separate limbs, (e.g., tetanus-containing & PCV)
- Administer vaccine and immune globulin at separate sites
- Combination vaccines can reduce the number of

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Volume Injected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deltoid</td>
<td>0.5 mL</td>
</tr>
<tr>
<td>Vastus lateralis (anterolateral thigh)</td>
<td>1 - 4 mL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deltoid</td>
<td>0.5 - 2 mL</td>
</tr>
<tr>
<td>Vastus lateralis</td>
<td>1 - 5 mL</td>
</tr>
</tbody>
</table>
Giving All the Doses 12 Months and Older

- Needle Lengths
  - IM = 1 to 1.5 inches
  - SC = 5/8 inch

- Separate injection sites by 1-2 inches

- Anterolateral thigh is the preferred site for multiple IM injections

- Deltoid (upper arm) is an option for IM in children ≥18 mo with adequate muscle mass

- Using combination vaccines will decrease the number of injections needed to keep a child up-to-date
Managing Acute Vaccine Reactions

- Anaphylaxis following vaccination is rare
- Thorough screening for contraindications and precautions can often prevent reactions
- Have procedures in place for emergencies
- Staff should be familiar with signs and symptoms of anaphylaxis
  - flushing, facial edema, urticaria, itching, swelling of the mouth or throat, wheezing, and difficulty breathing
- All staff should know their role in an emergency
- Vaccinators should be trained in CPR
- At a minimum, have epinephrine and equipment to maintain airway on hand
- Stabilize patient and transfer to emergency facility for further evaluation and treatment
Medical Management of Vaccine Reactions in Children and Teens

All vaccines have the potential to cause an adverse reaction. To minimize adverse reactions, patients should be carefully screened for precautions and contraindications before vaccine is administered. Even with careful screening, reactions can occur. These reactions can vary from trivial and inconvenient (e.g., soreness, itching) to severe and life-threatening (e.g., anaphylaxis). If reactions occur, staff should be prepared with procedures for their management. The table below describes procedures to follow if various reactions occur.

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Symptoms</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localized</td>
<td>Soreness, redness, itching, or swelling at the injection site</td>
<td>Apply a cold compress to the injection site. Consider giving an analgesic (pain reliever) or antipruritic (anti-itch) medication.</td>
</tr>
<tr>
<td>Slight bleeding</td>
<td></td>
<td>Apply an adhesive compress over the injection site.</td>
</tr>
<tr>
<td>Continuous bleeding</td>
<td></td>
<td>Place thick layer of gauze pads over site and maintain direct and firm pressure; raise the bleeding injection site (e.g., arm) above the level of the patient's heart.</td>
</tr>
<tr>
<td>Psychological frightening</td>
<td>Fright before injection is given</td>
<td>Have patient sit or lie down for the vaccination.</td>
</tr>
<tr>
<td></td>
<td>Extreme paleness, sweating, coldness of the hands and feet, nausea, light-headedness, dizziness, weakness, or visual disturbances</td>
<td>Have patient lie flat or sit with head between knees for several minutes. Loosen any tight clothing and maintain an open airway. Apply cool, damp cloths to the patient's face and neck.</td>
</tr>
<tr>
<td>Loss of consciousness</td>
<td></td>
<td>Examine the patient to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated.</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>Sudden or gradual onset of generalized itching, erythema (redness), or urticaria (hives); angioedema (swelling of the lips, face, or throat); severe bronchospasm (wheezing); shortness of breath; shock; abdominal cramping; or cardiovascular collapse</td>
<td>See “Emergency Medical Protocol for Management of Anaphylactic Reactions in Children and Teens” on the next page for detailed steps to follow in treating anaphylaxis.</td>
</tr>
</tbody>
</table>

Supplies you may need at a community immunization clinic

- **First-line treatment:** Aqueous epinephrine 1:1000 dilution, in ampules, vials of solution, or prefilled syringes, including epinephrine auto-injectors (e.g., EpiPen). If EpiPens are to be stocked, both EpiPen Jr. (0.15 mg) and adult EpiPen (0.30 mg) should be available.
- **Secondary treatment option:** Diphenhydramine (Benadryl) injectable (50 mg/mL solution) or oral (12.5 mg/5 mL liquid; 25 or 50 mg capsules/tablets)
- **Other medications:** Syringes: 1 and 3 cc; 22-25 gauge; 1/2", 1/4", and 2" needles for epinephrine and diphenhydramine (Benadryl)
- Alcohol wipes
- Tourniquet
- Pediatric & adult airways (small, medium, large)
- Pediatric & adult nose/pocket masks with one-way valve
- Oxygen (if available)
- Stethoscope
- Sphygmomanometer (blood pressure measuring device) child, adult and extra-large cuffs
- Tongue depressors
- Flashlight with extra batteries (for examination of mouth and throat)
- Wrist watch with ability to count seconds
- Cell phone or access to an ornate phone

Emergency medical protocol for management of anaphylactic reactions in children and teens

1. If itching and swelling are confined to the injection site where the vaccination was given, observe patient closely for the development of generalized symptoms.
2. If symptoms are generalized, activate the emergency medical system (EMS; e.g., call 911) and notify the on-call physician. This should be done by a second person, while the primary nurse assesses the airway, breathing, circulation, and level of consciousness of the patient.
3. Drug Dosing Information:
   a. **First-line treatment:** Administer aqueous epinephrine 1:1000 dilution (i.e., 1 mg/mL) intramuscularly; the standard dose is 0.01 mg/kg body weight, up to 0.3 mg maximum single dose in children and 0.5 mg maximum in adolescents (see chart on next page).
   b. **Secondary treatment option:** For hives or itching, you may also administer diphenhydramine either orally or by intramuscular injection; the standard dose is 1-2 mg/kg body weight, up to 30 mg maximum dose in children and 50 mg maximum dose in adolescents (see chart on next page).
4. Monitor the patient closely until EMS arrives. Perform cardiopulmonary resuscitation (CPR), if necessary, and maintain airway. Keep patient in supine position (flat on back) unless he or she is having breathing difficulty. If breathing is difficult, patient’s head may be elevated, provided blood pressure is adequate to prevent loss of consciousness. If blood pressure is low, elevate legs. Monitor blood pressure and pulse every 5 minutes.
5. If EMS has not arrived and symptoms are still present, repeat dose of epinephrine every 5–15 minutes for up to 3 doses, depending on patient’s response.
6. Record all vital signs, medications administered to the patient, including the time, dosage, response, and the name of the medical personnel who administered the medication, and other relevant clinical information.
7. Notify the patient’s primary care physician.
Right Documentation

- Required documentation in permanent medical record for vaccines covered by National Childhood Vaccine Injury Act
  1) date of administration
  2) vaccine manufacturer
  3) vaccine lot number
  4) name and title of person who administered vaccine and address of clinic or facility where permanent record will reside
  5) vaccine information statement (VIS)
     - date printed on the VIS
     - date VIS given to patient or parent/guardian
Right Documentation

- Best practice guidelines for documentation also include:
  - vaccine type
  - vaccine route
  - vaccine site
  - adverse events
  - serologic test results

- Participation in immunization information system is encouraged

- Documentation of vaccine refusal is recommended
Documentation Records

Provider Record

Patient Record
Prevent Vaccine Administration Errors

- All vaccine administration errors are human errors and all are preventable.
Vaccine Administration Errors

- Administration of the wrong vaccine formulation
  - DTaP and Tdap
  - Varicella and zoster
  - MCV4 and MPSV4
  - PCV and PPSV

- Generally need to repeat with correct vaccine except DTaP given to an adult and zoster given to a child

*MMWR* 2011;60(No. RR-2)
Vaccine Administration Errors

- **Wrong diluent or reconstitution error**
  - ActHIB and Hiberix
  - Pentacel
  - Menveo MCV

- **CDC always recommends repeating the dose if the wrong diluent is used** (except Merck sterile water diluent can be used for MMR, MMRV, Var and Zos)
Pentacel Reconstitution Error

- Do NOT use the Hib (ActHib) and liquid DTaP-IPV solution separately

- If the DTaP-IPV solution is administered separately there will be no diluent for the Hib component

- You will be unable to use the Hib dose because Hib must only be reconstituted with DTaP-IPV or specific ActHib diluent (NOT with MMR/varicella diluent, normal saline or any other vaccine)

- If Hib reconstituted with an inappropriate diluent* is administered, it should NOT be counted as a valid dose and should be repeated as soon as possible

*ANY diluent except DTaP-IPV or sanofi ActHib diluent
Menveo MCV Vaccine

- Lyophilized serogroup A vaccine reconstituted with liquid containing serogroups C, Y, & W135
- Lyophilized serogroup A antigen can ONLY be reconstituted with liquid C-Y-W135 diluent
- May be used for any person 2 through 55 years of age for whom MCV4 is indicated including revaccination

*MMWR 2010;59(No. 9):273*
Menveo Vaccine Administration Errors

- Liquid C-Y-W135 component (diluent) administered without using it to reconstitute the lyophilized A component

- Revaccination may not be needed
  - serogroup A disease is rare in the U.S. so revaccination not needed if the person does not plan to travel outside the U.S.
  - revaccinate (no minimum interval) if international travel anticipated especially to Africa
Vaccine Administration Errors

- **Wrong route of administration**
  - IM vaccines given SC
    - Repeat if rabies or hepatitis B
  - SC vaccines given IM
    - Do not repeat
  - Oral or intranasal vaccines (RV, LAIV) vaccines given IM or SC (!)
    - Always repeat

*MMWR 2011;60(No. RR-2)*
Reporting Vaccine Administration Errors

- CDC currently has no mechanism for reporting vaccine administration errors.
- If an adverse event occurs it should be reported to VAERS.
- Discussions are underway to develop a reporting mechanism.
Strategies to Prevent Administration Errors

- Strict adherence to “Rights of Medication Administration”
- Ongoing training and education of staff
- Involve staff in selection of vaccine products
- Keep current reference materials available on each vaccine
- Rotate vaccines with the shortest expiration dates in the front and remove and discard any expired vaccine
Strategies to Prevent Administration Errors

- Label vaccines clearly and do not store look-alike and sound-alike vaccines next to each other
- Administer only vaccines you have prepared
- Triple check your work BEFORE administering vaccine
- Counsel parents and patients on vaccines to be administered and importance of maintaining immunization records for family members
Don’t Miss Opportunities to Vaccinate

- Reasons for Missed Opportunities
  - Physician or patient unaware of need
  - Visits for mild illness, injury & follow-up
  - Need for multiple vaccines
  - Invalid contraindications

- Standing orders can decrease missed opportunities and increase immunization rates

---

Standing Orders for Administering Varicella Vaccine to Children & Teens

**Purpose:** To reduce morbidity and mortality from varicella (chickenpox) by vaccinating all children and teens who meet the criteria established by the Centers for Disease Control and Prevention’s Advisory Committee on Immunization Practices.

**Policy:** Under these standing orders, eligible nurses and other healthcare professionals (e.g., pharmacists), where allowed by state law, may vaccinate children and teens who meet any of the criteria below.

**Procedure**
1. Identify children and teens ages 12 months and older in need of vaccination against varicella. (Note: Because HIV-infected children are at increased risk for morbidity from varicella and herpes zoster (shingles), single-dose varicella vaccine should be considered for HIV-infected children with CD4+ T lymphocyte percentages ≥25% or for adolescents with CD4+ lymphocytes count ≥200 cell/μL.)
2. Screen all patients for contraindications and precautions to varicella vaccine:
   - Contraindications:
     - a history of severe reaction (e.g., amphotericin) after a previous dose of varicella vaccine or to a varicella vaccine component. For a list of vaccine components, go to www.cdc.gov/vaccines/pubs/pocketbook/downloads/appendices/look.htm.
     - pregnant now or may become pregnant within 1 month
     - having any malignant condition, including blood dyscrasia, leukemia, lymphoma of any type, or other malignant neoplasms affecting the bone marrow or lymphatic systems
     - receiving high dose systemic immunosuppressive therapy (e.g., two weeks or more of daily receipt of 20 mg or more [or 2 mg/kg body weight or more] of prednisone or equivalent)
     - a child with CD4+ T lymphocyte percentages ≤15% or an adolescent with CD4+ lymphocyte count <200 cell/μL
     - for combination MMRV only, primary or acquired immunodeficiency, including immunosuppression associated with AIDS or other clinical manifestations of HIV infections, cellular immunodeficiencies, hypogammaglobulinemia, and dysgammaglobulinemia.
3. **Procedures:**
   - recent receipt (within the previous 11 months) of antibody containing blood product (specific interval depends on product)
   - moderate or severe acute illness with or without fever
4. Provide all patients (parental/legal representative) with a copy of the most current federal Vaccine Information Statement (VIS). You must document, in the patient’s medical record or office log, the publication date of the VIS and the date it was given to the patient ( parental/legal representative). Provide non-English speaking patients with a copy of the VIS in their native language, if available; these can be found at www.immunize.org.
5. Provide routine vaccination with varicella vaccine at ages 12-15 months and at 4-6 years. Administer 0.5 ml varicella vaccine subcutaneously (52-56, ≥60 model) in the periorbital fat or subcutaneous fat for children and teens.
6. For children and teens who have not received two doses of varicella vaccine (generally given at the ages specified in #4), give a dose at the earliest opportunity and then schedule a second dose, if needed. Observe minimum intervals of 12 weeks between doses for children ages 12 years or younger and 6 weeks between doses for teens 13 years and older.
7. Document each patient’s vaccination administration information and follow-up in the following places:
   - Medical chart: Record the date the vaccine was administered, the manufacturer and lot number, the vaccination site and route, and the name and title of the person vaccinating the patient. If vaccination was not given, record the reason(s) for non-compliance of the vaccine (e.g., medical contraindication, patient refusal).
   - **Personal Immunization record card:** Record the date of vaccination and the administration of the clinic.
8. Be prepared for management of a medical emergency related to the administration of vaccine by having a written emergency medical protocol available, as well as equipment and medications.
9. Report all adverse reactions to varicella vaccine to the Vaccine Adverse Event Reporting System (VAERS) at www.vaers.hhs.gov or by calling 800-822-7963 VAERS report forms are available at www.vaers.hhs.gov. This policy and procedure shall remain in effect for all patients of the until rescinded or until ______________________.

Medical Director’s signature: ______________________
Effective date: ______________________
Vaccine Storage and Handling

- Vaccines are fragile and prevent serious, sometimes fatal diseases.

- Improper S&H:
  - reduced vaccine effectiveness
  - inadequate protection against disease

It is better to **NOT VACCINATE** than to administer a dose of vaccine that has been mishandled.
Consequences of Vaccine Mismanagement

- Clinic patient care, risk and liability
  - No data on the safety or efficacy of compromised vaccine

- Loss of trust/confidence in health care decisions/care can effect future patient encounters

- Misperceptions of vaccine failure

- Financial consequences
  - Replace vaccine stock in the storage unit
  - Revaccinate clients who received compromised vaccine - Vaccine cost and staff time
Vaccine Management Plans

- Assign S&H responsibilities to one person
- Designate a back-up person
- Provide training on vaccine storage and handling for other staff regarding their responsibilities
- Develop and maintain detailed written S&H protocols
  - Routine
  - Emergency
Store All Vaccines Appropriately

- **Live attenuated vaccines**
  - Tolerate freezing (except LAIV and rotavirus)
  - Live viruses deteriorate rapidly after removal from proper storage conditions

- **Inactivated vaccines**
  - Inactivated by freezing
  - Tolerate short times out of the refrigerator
Vaccine Storage Unit

- Vaccine storage units should
  - Be in good working order
  - Be able to maintain required temperatures year round
  - Have enough room to store the year’s largest inventory with crowding
  - Be dedicated to storage of vaccines
Vaccine Storage Equipment

- Stand-alone freezer and refrigerator units are recommended

- Combination freezer and refrigerator units can be used
  - Must have separate, sealed exterior compartment doors
  - There should be separate temperature controls for the refrigerator and freezer
  - Frost free or automatic defrost units are preferred
Vaccine Storage Equipment

- Do NOT use a “dormitory” unit for permanent storage of vaccines
  - Small combination freezer/refrigerator unit with one exterior door
  - an icemaker compartment (freezer) within the refrigerator
Keep the Storage Unit Working
Take Preventive Measures

- Use a plug guard or safety-lock plug
- Post a warning sign at the plug and on the refrigerator
- Label fuses and circuit breakers
- Install a temperature alarm
- Notify building management not to interrupt power
Storage Unit Best Practices

- Remove all the bins and drawers
- Put water bottles along the wall and floor of the refrigerator
- Place the unit in front of the electrical outlet if possible
- Keep frozen pack or ice cubes in the freezer
Vaccine Storage DON’Ts

- Don’t store vaccine in the doors
  - Temperature is not stable

- Don’t store vaccine in the bins or drawers
  - Inadequate air circulation

- Don’t let doors stand open
  - Can affect temperature
  - Can expose vaccine to light
Store ONLY Vaccines in the Unit

- NEVER store food in the same unit

- If you must store other biologics in the same unit, store them BELOW the vaccines to avoid contamination
Temperature Monitoring Equipment

- Your thermometers (and any other monitoring equipment) should be:
  - Designed for refrigerators or freezers
  - Calibrated with a certificate of Traceability and Calibration
  - In good working order
Thermometer Types

- Bio-safe Liquid
- Min/Max
- Digital Continuous
- Digital Wireless Continuous
- Graphing Continuous
Thermometer Basics

- Your thermometers (and any other monitoring equipment) should be:
  - Designed for refrigerators or freezers
  - Calibrated with a certificate of Traceability and Calibration
  - In good working order

- Place a calibrated thermometer in the refrigerator & freezer units/compartments

- Keep the thermometer away from coils, vents, walls, and floor of unit

- Place thermometer next to or with the vaccine
Temperature Monitoring

1. Post a refrigerator and freezer temperature log

2. Record the temperature twice daily

3. Store temperature logs for at least 3 years unless state statutes or rules require a longer period
Take IMMEDIATE Action for Out-of-range Temperature

Temperature Log for Vaccines (Fahrenheit)

Instructions: Place an “X” in the box that corresponds with the temperature. The hatched rows represent unacceptable temperature ranges. If the temperature recorded is in the hatched zone:
1. Store the vaccine under proper conditions as quickly as possible.
2. Call the vaccine manufacturer to determine whether the potency of the vaccine(s) has been affected.
3. Call the immunization program at your local health department for further assistance.

Content in the image includes a table with columns for Day of Month, Exact Time, Refrigerator Temperature, and Room Temperature. The shaded section highlights where immediate action is required.

Adapted for the Immunization Action Coalition courtesy of the Michigan Department of Community Health.

Immunization Action Coalition • 1571 Selby Ave., Ste. 254 • St. Paul, MN 55104 • (651) 647-9029 • www.immunize.org • admin@immunize.org
Managing Your Vaccine Inventory

- Order vaccine responsibly
- Store vaccine in the original box until it is time to use it
  - Exposure to light can affect the potency of some vaccines
  - Decreases the potential for medication errors
- Store diluent as directed in the product information
- Never store diluent in the freezer
Isolate Questionable Vaccines

- Isolate questionable vaccine
- Then follow your state health department immunization program policy and contact either the manufacturer’s quality control office or the immunization program for guidance
## Vaccine Handling after Opening

<table>
<thead>
<tr>
<th>Multi-dose Vials</th>
<th>Single-dose Vials</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Contain a bacteriostatic</td>
<td>- Do NOT contain a bacteriostatic</td>
</tr>
<tr>
<td>- Good until expiration date unless</td>
<td>- Once opened vial should be used or discarded at the end of the clinic day</td>
</tr>
<tr>
<td>contaminated or manufacturer’s</td>
<td></td>
</tr>
<tr>
<td>package insert states otherwise</td>
<td></td>
</tr>
</tbody>
</table>
Handle Vaccines with Care

- Do NOT refreeze vaccines after thawing
  - Unreconstituted varicella-containing vaccines may be stored for up to 72 hours between 35°F and 46°F (2°C -8°C)
It’s a Team Effort!

High Immunization rates begin with a team designed plan!
Immunization S&H and Administration Resources

- **CDC**
  - 12th edition of Pink Book,
    http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

- **Immunization Action Coalition**
  - http://www.immunize.org/handouts/

- **CA EZIZ interactive online training**
  - http://www.eziz.org/

- **Michigan AIM Toolkit**
  - http://www.aimtoolkit.org/
CDC Vaccines and Immunization
Contact Information

• Telephone  800.CDC.INFO
  (for patients and parents)

• Email  nipinfo@cdc.gov
  (for providers)

• Website  www.cdc.gov/vaccines/

• Vaccine Safety  www.cdc.gov/vaccinesafety/