Immunization Updates, Vaccine Administration, and Safety
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Immunization Educator
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Immunization Schedules
Use all three schedules: 0-6 years, 7-18 years, and the Catch-Up Schedule and their respective footnotes TOGETHER and NOT SEPARATELY to appropriately vaccinate a child.
**FIGURE 1: Recommended immunization schedule for persons aged 0 through 6 years—United States, 2012** (for those who fall behind or start late, see the catch-up schedule [Figure 3])

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age</th>
<th>Birth</th>
<th>1 month</th>
<th>2 months</th>
<th>4 months</th>
<th>6 months</th>
<th>9 months</th>
<th>12 months</th>
<th>15 months</th>
<th>18 months</th>
<th>19–23 months</th>
<th>2–3 years</th>
<th>4–6 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B¹</td>
<td>Hep B</td>
<td>HepB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotavirus²</td>
<td>RV</td>
<td>RV</td>
<td>RV²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diphtheria, tetanus, pertussis³</td>
<td>DTaP</td>
<td>DTaP</td>
<td>DTaP</td>
<td></td>
<td>see footnote¹</td>
<td>DTaP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenzae type b⁴</td>
<td>Hib</td>
<td>Hib</td>
<td>Hib⁴</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal⁵</td>
<td>PCV</td>
<td>PCV</td>
<td>PCV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Inactivated poliovirus⁶</td>
<td>IPV</td>
<td>IPV</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza⁷</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Influenza (Yearly)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella⁸</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella⁹</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A¹⁰</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal¹¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This schedule includes recommendations in effect as of December 23, 2011. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at [http://www.cdc.gov/vaccines/pubs/acip-list.htm](http://www.cdc.gov/vaccines/pubs/acip-list.htm). Clinically significant adverse events that follow vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS) online ([http://www.vaers.hhs.gov](http://www.vaers.hhs.gov)) or by telephone (800-822-7967).
Changes in 2012 0-6 Schedule

- Meningococcal bars and footnote revised to reflect licensure of one of the meningococcal conjugate vaccines for infants
- Yellow/purple hashed bar added to the hepatitis A row helps clarify the recommendation for completion of the routine schedule and for certain children in high-risk groups ≥ 2 years
Changes in the 2012 0-6 Schedule

• Use of measles, mumps, and rubella (MMR) vaccine in certain infants 6 months through 11 months of age

• Influenza vaccine recommendations for revaccination of certain children < 9 years of age
FIGURE 2: Recommended immunization schedule for persons aged 7 through 18 years—United States, 2012 (for those who fall behind or start late, see the schedule below and the catch-up schedule [Figure 3]).

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>7–10 years</th>
<th>11–12 years</th>
<th>13–18 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus, diphtheria, pertussis¹</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose (if indicated)</td>
</tr>
<tr>
<td>Human papillomavirus²</td>
<td>see footnote²</td>
<td>3 doses</td>
<td>Complete 3-dose series</td>
</tr>
<tr>
<td>Meningococcal³</td>
<td>See footnote³</td>
<td>Dose 1</td>
<td>Booster at 16 years old</td>
</tr>
<tr>
<td>Influenza³</td>
<td></td>
<td>Influenza (yearly)</td>
<td></td>
</tr>
<tr>
<td>Pneumococcal⁶</td>
<td></td>
<td></td>
<td>Complete 2-dose series</td>
</tr>
<tr>
<td>Hepatitis A⁶</td>
<td></td>
<td></td>
<td>Complete 2-dose series</td>
</tr>
<tr>
<td>Hepatitis B¹</td>
<td></td>
<td></td>
<td>Complete 2-dose series</td>
</tr>
<tr>
<td>Inactivated poliovirus³</td>
<td></td>
<td></td>
<td>Complete 2-dose series</td>
</tr>
<tr>
<td>Measles, mumps, rubella³</td>
<td></td>
<td></td>
<td>Complete 2-dose series</td>
</tr>
<tr>
<td>Varicella¹0</td>
<td></td>
<td></td>
<td>Complete 2-dose series</td>
</tr>
</tbody>
</table>

This schedule includes recommendations in effect as of December 23, 2011. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at [http://www.cdc.gov/vaccines/pubs/acip-list.htm](http://www.cdc.gov/vaccines/pubs/acip-list.htm). Clinically significant adverse events that follow vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS) online ([http://www.vaers.hhs.gov](http://www.vaers.hhs.gov)) or by telephone (800-822-7967).
Changes in the 2012 7-18 Schedule

- Recommendation for routine use of quadrivalent human papillomavirus vaccine in males at 11 to 12 year of age
- Routine booster dose of meningococcal conjugate vaccine at 16 years of age
### Recommended Adult Immunization Schedule—United States - 2012

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

**Figure 1. Recommended adult immunization schedule, by vaccine and age group**

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>AGE GROUP</th>
<th>19-21 years</th>
<th>22-26 years</th>
<th>27-49 years</th>
<th>50-59 years</th>
<th>60-64 years</th>
<th>≥ 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose annually</td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs</td>
</tr>
<tr>
<td>Varicella</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Doses</td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 doses</td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 doses</td>
</tr>
<tr>
<td>Zoster</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 or 2 doses</td>
</tr>
<tr>
<td>Pneumococcal (polysaccharide)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 or 2 doses</td>
</tr>
<tr>
<td>Meningococcal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 doses</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 doses</td>
</tr>
</tbody>
</table>

*Covered by the Vaccine Injury Compensation Program*

- For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection
- Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)
- Tdap recommended for ≥55 if contact with <12 month old child. Either Td or Tdap can be used if no infant contact
- No recommendation
### Figure 2. Vaccines that might be indicated for adults based on medical and other indications

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>INDICATION</th>
<th>Pregnancy</th>
<th>Immunocompromising conditions (excluding human immunodeficiency virus [HIV])</th>
<th>HIV infection&lt;sup&gt;6,7,13,14&lt;/sup&gt; CD4+ T lymphocyte count</th>
<th>Men who have sex with men (MSM)</th>
<th>Men with other risk factors</th>
<th>Heart disease, chronic lung disease, chronic alcoholism</th>
<th>Asplenia&lt;sup&gt;13&lt;/sup&gt; (including elective splenectomy and persistent complement component deficiencies)</th>
<th>Chronic liver disease</th>
<th>Diabetes, kidney failure, end-stage renal disease, receipt of hemodialysis</th>
<th>Health-care personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)&lt;sup&gt;3,4&lt;/sup&gt;</td>
<td>Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella&lt;sup&gt;4,5&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female&lt;sup&gt;5,6&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male&lt;sup&gt;5,6&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster&lt;sup&gt;6&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)&lt;sup&gt;7,8&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal (polysaccharide)&lt;sup&gt;8,9&lt;/sup&gt;</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal&lt;sup&gt;10,11&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A&lt;sup&gt;11,12&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B&lt;sup&gt;12,13&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Covered by the Vaccine Injury Compensation Program

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention’s (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), American College of Obstetricians and Gynecologists (ACOG) and American College of Nurse-Midwives (ACNM).

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection. Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications). Contraindicated. No recommendation.

These schedules indicate the recommended age groups and medical indications for which administration of currently licensed vaccines is commonly indicated for adults ages 19 years and older, as of January 1, 2012. For all vaccines being recommended on the Adult Immunization Schedule: a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated and when the vaccine’s other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturers’ package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/pubs/acip-list.htm). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.
Changes to the 2012 Adult Schedule

- Yellow and purple hashed bar added for Td and Tdap vaccines to highlight recommendations for adults ≥ 65 years of age
- Table listing contraindications and precautions for vaccines recommended for adults included
- Column for MSM
- Use of Tdap vaccine in pregnancy
- Recommendations for use of HPV4 vaccine for males
- Recommendation for hepatitis B vaccination of certain adults with diabetes
# 2012-2013 Texas Minimum State Vaccine Requirements for Child-Care Facilities

This chart summarizes the vaccine requirements incorporated in Title 25 Health Services, §§97.61-97.72 of the Texas Administrative Code (TAC). This chart is not intended as a substitute for consulting the TAC, which has other provisions and details. The Department of State Health Services is granted authority to set immunization requirements by the Human Resources Code, Chapter 42.

<table>
<thead>
<tr>
<th>Age at which child must have vaccines to be in compliance:</th>
<th>Minimum Number of Doses Required of Each Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DTaP</td>
</tr>
<tr>
<td>0 through 2 months</td>
<td>None</td>
</tr>
<tr>
<td>By 3 months</td>
<td>1 Dose</td>
</tr>
<tr>
<td>By 5 months</td>
<td>2 Doses</td>
</tr>
<tr>
<td>By 7 months</td>
<td>3 Doses</td>
</tr>
<tr>
<td>By 16 months</td>
<td>3 Doses</td>
</tr>
<tr>
<td>By 19 months</td>
<td>4 Doses</td>
</tr>
<tr>
<td>By 25 months</td>
<td>4 Doses</td>
</tr>
<tr>
<td>By 43 months</td>
<td>4 Doses</td>
</tr>
</tbody>
</table>

* For MMR, Varicella, and Hepatitis A vaccines, the first dose must be given on or after the first birthday.

** A complete Hib series is two doses plus a booster dose on or after 12 months of age (three doses total). If a child receives the first dose of Hib vaccine at 12-14 months of age, only one additional dose is required (two doses total). Any child who has received a single dose of Hib vaccine on or after 15 months of age is in compliance with these specified vaccine requirements.
# 2012-2013 Texas Minimum State Vaccine Requirements for Students Grades K-12

This chart summarizes the vaccine requirements incorporated in the Texas Administrative Code (TAC), Title 25 Health Services, Sections 97.61 to 97.72. This chart is not intended as a substitute for consulting the TAC, which has other provisions and details. [Click here for complete TAC language](#).

The Department of State Health Services (DSHS) is granted authority to set immunization requirements by the Texas Education Code, Chapter 38, Health & Safety, Subchapter A, General Provisions.

## IMMUNIZATION REQUIREMENTS

A student shall show acceptable evidence of vaccination prior to entry, attendance, or transfer to a child-care facility or public or private elementary or secondary school in Texas.

<table>
<thead>
<tr>
<th>Vaccine Required (Attention to notes and footnotes)</th>
<th>Minimum Number of Doses Required by Grade Level</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K - 3rd</td>
<td>4th- 6th</td>
</tr>
<tr>
<td>Diphtheria/Tetanus/Pertussis (DTaP/DTP/DT/Td/Tdap)¹</td>
<td>5 doses or 4 doses</td>
<td>5 doses or 4 doses</td>
</tr>
<tr>
<td>Polio¹</td>
<td>4 doses or 3 doses</td>
<td>4 doses or 3 doses</td>
</tr>
<tr>
<td>Measles, Mumps, and Rubella¹,² (MMR)</td>
<td>2 doses</td>
<td>2 doses</td>
</tr>
<tr>
<td>Hepatitis B²</td>
<td>3 doses</td>
<td>3 doses</td>
</tr>
<tr>
<td>Varicella¹,²,³</td>
<td>2 doses</td>
<td>1 dose</td>
</tr>
<tr>
<td>Meningococcal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A¹,²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Receipt of the dose up to (and including) 4 days before the birthday will satisfy the school entry immunization requirement.

² Serologic confirmation of immunity to measles, mumps, rubella, hepatitis B, hepatitis A, or varicella or serologic evidence of infection is acceptable in place of vaccine.

³ Previous illness may be documented with a written statement from a physician, school nurse, or the child's parent or guardian containing wording such as: "This is to verify that (name of student) had chickenpox on or about (date) and does not need varicella vaccine." This written statement will be accepted in place of any and all varicella vaccine doses required.
Vaccines
Live Attenuated Vaccines

• Attenuated (weakened) form of “wild” virus or bacterium
• Must replicate to be effective
• Fragile
• Interference from circulating antibody (especially with measles vaccine)
• Immune response similar to natural illness
Live Attenuated Vaccines

- Produce immunity in most recipients with 1 dose
- Small percentage of recipients do not respond to the 1\textsuperscript{st} dose of an injected live vaccine
- 2\textsuperscript{nd} dose is recommended to provide a very high level of immunity in population
- Severe reactions possible (rare, usually only when erroneously administered to immunosuppressed persons)
Live Attenuated Vaccines

Viral
measles, mumps, rubella, varicella, zoster, yellow fever, live attenuated influenza, rotavirus, vaccinia (smallpox)

Bacterial
BCG, oral typhoid
Inactivated Vaccines

- Cannot replicate; noninfectious
- Can give to immunosuppressed persons
- Generally not as effective as live vaccines
- Less interference from circulating antibody
- Generally require 3 to 5 doses
- Immune response mostly humoral
- Antibody titer may diminish with time
Inactivated Vaccines

Whole-cell vaccines

Viral
- polio (IPV), rabies, hepatitis A

Bacterial
- none available in the U.S.
Inactivated Vaccines

Fractional vaccines

Subunit  hepatitis B, influenza, acellular pertussis, human papillomavirus, anthrax

Toxoid  diphtheria, tetanus
Pure Polysaccharide Vaccines

• Not consistently immunogenic in children < 2 years of age
• No booster response
• Antibody with less functional activity
• Immunogenicity improved by conjugation (joining polysaccharide with protein)
Inactivated Vaccines

Fractional vaccines

Polysaccharide
pneumococcal, meningococcal, typhoid Vi

Conjugate
Haemophilus influenzae type b, pneumococcal, meningococcal
# Antibody and Measles- and Varicella-Containing Vaccines

<table>
<thead>
<tr>
<th>Product Given 1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine</td>
<td>Wait 2 weeks before giving antibody</td>
</tr>
<tr>
<td>Antibody</td>
<td>Wait ≥ 3 months before giving vaccine (see Table 5 in the General Recommendations)</td>
</tr>
</tbody>
</table>
Storage & Handling
Cold Chain

• Maintain cold chain throughout process: Manufacturer→Provider’s Office→Patient
• Develop and maintain a detailed written routine storage and handling plan
  – Assign primary and secondary vaccine coordinators
  – Orient all staff who handle, have access to, or administer vaccines
  – Ordering and accepting vaccine deliveries
  – Storing and handling vaccine
  – Managing inventory
  – Managing potentially compromised vaccines
Written Emergency Vaccine Retrieval and Storage Plan

• Back-up location with appropriate storage units, temperature monitoring capability, and a back-up generator

• Back-up facility, such as a local hospital, the Red Cross, or a long-term care facility
Freezers and Refrigerators

• Recommend stand-alone freezers and refrigerators without freezers
• Dorm-style refrigerators are NOT recommended under ANY circumstance
  – For temporary storage, a compact refrigerator without a freezer compartment can be used
• Must be able to maintain required temperature range throughout the year
• Certified calibrated thermometers (still recommended to read temps at least twice daily)
• Must be dedicated to the storage of biologics
• Do not store food in vaccine refrigerator or freezer
Refrigerated Vaccines

- Required temperature
  - 35 F and 46 F (2 C and 8 C)
  - Average temperature 40 F (5 C)
- Both types influenza vaccine and both brands of rotavirus vaccine
- If unintentionally exposed to freezing temperature, DO NOT USE. Segregate vaccine from other vaccine and label appropriately. Contact the manufacturer.
Frozen Vaccines

• Required temperature: -58 F and +5 F (-50 C and -15 C)

• Varicella, MMRV, zoster: keep frozen until administered

• MMR may be stored in either the freezer or the refrigerator
Principles of Vaccination
General Recommendations on Immunization

- Timing and spacing of vaccines
- Contraindications and precautions
- Preventing and reporting adverse reactions
- Vaccine administration
- Vaccine storage and handling
- Altered immunocompetence
Principle of Vaccination

- Inactivated vaccines generally not affected by circulating antibody to the antigen
- Live attenuated vaccines may be affected by circulating antibody to the antigen
  - Especially important with measles, probably varicella
  - Mumps, rubella, and rotavirus vaccines seem to be less sensitive to circulating antibody
- Yellow fever and typhoid vaccines not affected since most U.S. blood products do not contain much yellow fever or typhoid antibody
- LAIV and zoster vaccine do not appear to be affected by circulating antibody
## Spacing of Vaccine Combinations Not Given on the Same Day

<table>
<thead>
<tr>
<th>Combination</th>
<th>Minimum Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two live injected or intranasal</td>
<td>4 weeks</td>
</tr>
<tr>
<td>All other combinations including live oral vaccines</td>
<td>None</td>
</tr>
</tbody>
</table>
Principles of Vaccination

• All vaccines can be administered at the same visit as all other vaccines.
  – Exception: In children with functional or anatomic asplenia, PCV 13 and Menactra brand meningococcal conjugate vaccine should not be administered at the same visit. Separate by at least 4 weeks.
Principles of Vaccination

- Increasing the interval between doses of a multidose vaccine does not diminish the effectiveness of the vaccine.
- Decreasing the interval between doses of a multidose vaccine may interfere with antibody response and protection.
- If the interval between doses is longer than the recommended interval, you do not have to repeat or add doses.

See Table 1 of the General Recommendations.
Violation of Minimum Interval or Minimum Age

• Vaccine doses administered up to 4 days before the minimum interval or age can be counted as valid

• Intended to be used in immunization record assessment, not for scheduling purposes

• May help to avoid missed vaccination opportunities for patients who come in a few days early for an appointment
Contraindications & Precautions
Contraindications & Precautions

- **Contraindication**: a condition in a vaccine recipient that increases the likelihood of a serious adverse reaction
- **Precaution**: a condition in a recipient that might increase the chance or severity of an adverse reaction OR compromise the ability of the vaccine to produce immunity
Contraindications

- Permanent
  - Severe (anaphylactic) allergic reaction to a vaccine component or following a prior dose
  - Encephalopathy within 7 days of pertussis vaccine (applies only to pertussis-containing vaccines)
  - History of intussusception (applies only to rotavirus vaccines)
  - Diagnosis of severe combined immunodeficiency (SCID) (applies only to rotavirus vaccines)

- Temporary
  - Live vaccines in pregnant or immunocompromised individuals
## Contraindications & Precautions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Live</th>
<th>Inactivated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe allergic reaction</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Encephalopathy</td>
<td>--</td>
<td>C</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>C</td>
<td>V (P with HPV)</td>
</tr>
<tr>
<td>Immunosuppression</td>
<td>C</td>
<td>V</td>
</tr>
<tr>
<td>Moderate or severe illness</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Recent blood product</td>
<td>P (MMR &amp; Var only)</td>
<td>V</td>
</tr>
</tbody>
</table>
Immunosuppression

• Diseases
  • Congenital immunodeficiency
  • Leukemia or lymphoma
  • Generalized malignancy

• Drugs and Therapy
  • Alkylating agents
  • Antimetabolites
  • Radiation

• Special recommendations for Hematopoietic Cell Transplant (HCT) recipients apply. (See CDC’s Web site for details)
Immunosuppression

- Corticosteroids
  - ≥ 20 mg per day
  - ≥ 2 mg per kg of body weight/day
  - Not aerosols, topical, alternate-day, short (<14 days) high-dose courses
  - If high-dose steroids are received > 14 days, wait ≥ one month after discontinuation of therapy before administering a live virus vaccine
  - Treat immune system mediators/modulators (e.g., interferons, etanercept) as high-dose steroids until more is known
Screening
Screening

• Is the patient sick today?
• Does the patient have an allergy to any medication, food, vaccine, or latex?
• Has the patient had a serious reaction to a vaccine in the past?
• Has the patient had a seizure, brain, or nerve problem?
• Has the patient had a problem with wheezing or asthma; lung, heart, kidney, or metabolic disease (e.g., diabetes); or a blood disorder?
Screening

• Does the patient have cancer, leukemia, AIDS, or any other immune system problem?

• Has the patient taken prednisone, cortisone, other steroids, or anticancer drugs, or had x-ray treatments in the past 3 months?

• Has the patient received a transfusion of blood or blood products, or been given a medicine called immune or gamma globulin in the past year?
Screening

• Is the patient pregnant, or is there a chance she can become pregnant during the next month? Ask of all females of child-bearing age, including young adolescents.

• Has the patient received any vaccinations in the past 4 weeks?

• See the Immunization Action Coalition’s Web site for screening tools
Vaccine Administration
Infection Control

• Hand hygiene (between each patient)
  – Handwashing recommended
  – Alcohol-based waterless antiseptic can be used if handwashing station not available

• Gloves
  – Not required by OSHA unless
    • Potential for exposure to blood or body fluids
    • Vaccinator has open lesions on the hands
    • Agency policy
Infection Control

• Equipment disposal
  – NEVER detach, recap, or cut a used needle
  – Place immediately in puncture-proof container
  – Dispose as infectious medical waste

• Do not need to change needles between drawing or reconstituting vaccine and administration unless needle is contaminated or bent
Infection Control

• Use a new syringe and needle for each vaccine
• Never mix vaccines in same syringe unless approved for mixing by the FDA
• NEVER transfer vaccine from one syringe to another
Reducing Anxiety

• Display a positive attitude through facial expressions, body language, comments
• Use a soft, calm tone of voice
• Maintain eye contact, even with small children
• Explain why vaccines are needed
  – It’s a shield to protect you from infection.
• Be honest
• Explain what to expect
Positioning and Restraint

• Encourage parent to hold child during administration (increases child’s comfort)
• Research supports children are less fearful and receive less pain if sitting up rather than lying down.
• Adolescents and adults should be seated during vaccination to minimize chances of syncope.
• Providers should consider observing patients for at least 15 minutes after they are vaccinated. (Patient should be seated at this time.)
Pain Reduction

- Comfort measures (e.g., distraction, ingestion of sweet liquids, breastfeeding, cooling of injection site, topical analgesia)
- Pretreatment with 5% topical lidocaine-prilocaine emulsion
- Topical refrigerant spray
- Antipyretics before or at vaccination not recommended. Can get used to treat fever or pain following vaccination.
Other General Guidelines

• Separate injection sites in same limb by at least one inch
  – Td-containing vaccines & PCV may cause more localized reactions. Best to give in separate limbs

• Aspiration
  – Not required
  – No reports of injury because of failure to aspirate
  – 2007 Canadian study: administration without rapid injection without aspiration decreased pain in infants.
Routes

• See Table 10 in General Recommendations
• Oral
  – Rotavirus vaccines
  – Oral typhoid (Ty21a)
• Intranasal
  – Live attenuated influenza vaccine (LAIV)
• If these are given incorrectly via injection, the dose is consider invalid and should be repeated
• Intradermal
  – One type of influenza vaccine only
  – Follow manufacturer’s instructions for proper administration
Subcutaneous

- 45° angle, 23 to 25G, ⅜ inch
- Sites:
  - Infants <12 months: thigh (but ↑ outer triceps can be used)
  - Everyone >12 months: upper outer triceps of arm
- Vaccines
  - Measles, mumps, and rubella-containing vaccines
  - Meningococcal polysaccharide
  - Varicella
  - Zoster
  - Yellow fever
Intramuscular

• 90° angle
• Size: 22 to 25G
• Length
  – Newborn: ⅝ inch
  – Infant: 1 inch
  – Older children: ⅝ to 1 ¼ inch (depends on technique, etc.)
  – Adolescent/adult: 1 to 1 ½ inch
• Sites (depends on age and muscle mass)
  – Vastus lateralis muscle of anterolateral thigh
  – Deltoid muscle in upper arm
  – Give in center of muscle
  – NEVER use the gluteus muscle for routinely recommended vaccines
Intramuscular Vaccines

- Anthrax
- Diphtheria, tetanus, and pertussis
- *Haemophilus influenzae* type b
- Hepatitis A and B
- Influenza (inactivated)
- Pneumococcal conjugate
- Meningococcal conjugate
- Rabies
- Japanese encephalitis
- Typhoid Vi
Either Subcutaneous or Intramuscular

- Inactivated polio
- Pneumococcal polysaccharide
Vaccine Safety
Competency-Based Training

• All staff should receive competency-based training and education on immunization
• Orient staff to vaccines used in your facility
• Validate knowledge and skills through a skills checklist (see CDC Web site for samples)
• Provide continuing education when new schedules, vaccines, or recommendations
Rights of Medication Administration

- **Right** patient
- **Right** vaccine or diluent
- **Right** time (including the correct age, appropriate interval, and before the vaccine or diluent expires)
- **Right** dosage
- **Right** route, needle length, and technique
- **Right** site
- **Right** documentation (including spelling of name and correct date of birth)
Right Documentation

- Date of administration
- Vaccine manufacturer and lot number
- Name and title of the person who administered the vaccine
- Address of the facility where the permanent record will reside
- Date the VIS was provided
- VIS date
- Vaccine type, route, dosage, site
Right Documentation

• Episodes of adverse events after vaccination
• Serologic test results
• Participation in an immunization registry
• Provide the patient or patient’s parent with an updated record after vaccination.
Avoid These Errors...

• Wrong formulation
  – e.g., Tdap instead of DTaP, zoster instead of varicella (Check labels at least ≥ 3 times)

• Wrong diluent
  – e.g., using 0.9% NaCl instead of 0.4% to reconstitute ActHIB (Check labels ≥ 3 times)

• Wrong route or site of administration
  – e.g., giving MPSV IM, giving HPV in buttocks

• Lack of documentation
Vaccine Testing

• Prelicensure
  – Safety, immunogenicity, and efficacy
  – Include unvaccinated control groups
  – Relatively small number of participants

• Postlicensure
  – Identify rare reactions not detected during prelicensure
  – Monitor increases in known reactions
  – Identify risk factors or pre-existing conditions that may promote reactions
  – Identify vaccine lots with unusually high rates or types of events
  – Identify signals of possible adverse reactions
Vaccine Information Statements

HPV (Human Papillomavirus) Vaccine
Gardasil®

What You Need to Know

1. What is HPV?
   Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives. About 20 million Americans are currently infected, and about 6 million more get infected each year. HPV is usually spread through sexual contact. Most HPV infections don’t cause any symptoms, and go away on their own. But HPV can cause cervical cancer in women. Cervical cancer is the 2nd leading cause of cancer deaths among women around the world. In the United States, about 12,000 women get cervical cancer every year and about 4,000 are expected to die from it. HPV is also associated with several less common cancers, such as vaginal and vulvar cancers in women, and anal and oropharyngeal (back of the throat, including base of tongue and tonsils) cancers in both men and women. HPV can also cause genital warts and warts in the throat.

There is no cure for HPV infection, but some of the problems it causes can be treated.

2. HPV vaccine: Why get vaccinated?
   The HPV vaccine you are getting is one of two vaccines that can be given to prevent HPV. It may be given to both males and females. This vaccine can prevent most cases of cervical cancer in females, if it is given before exposure to the virus. In addition, it can prevent vaginal and vulvar cancer in females, and genital warts and anal cancer in both males and females.

Protection from HPV vaccine is expected to be long-lasting. But vaccination is not a substitute for cervical cancer screening. Women should still get regular Pap tests.

3. Who should get this HPV vaccine and when?
   HPV vaccine is given as a 3-dose series
   • 1st Dose: Now
   • 2nd Dose: 1 to 2 months after Dose 1
   • 3rd Dose: 6 months after Dose 1

   Additional (booster) doses are not recommended.

   Routine Vaccination
   • This HPV vaccine is recommended for girls and boys 11 or 12 years of age. It may be given starting at age 9.

   Why is HPV vaccine recommended at 11 or 12 years of age?
   HPV infection is easily acquired, even with only one sex partner. That is why it is important to get HPV vaccine before any sexual contact takes place. Also, response to the vaccine is better at this age than at older ages.

   Catch-Up Vaccination
   This vaccine is recommended for the following people who have not completed the 3-dose series:
   • Females 13 through 26 years of age.
   • Males 13 through 21 years of age.

   This vaccine may be given to men 22 through 26 years of age who have not completed the 3-dose series.

   It is recommended for men through age 26 who have sex with men or whose immune system is weakened because of HIV infection, other illness, or medications.

   HPV vaccine may be given at the same time as other vaccines.

4. Some people should not get HPV vaccine or should wait.
   • Anyone who has ever had a life-threatening allergic reaction to any component of HPV vaccine, or to a previous dose of HPV vaccine, should not get the vaccine. Tell your doctor if the person getting vaccinated has any severe allergies, including an allergy to yeast.

   HPV vaccine is not recommended for pregnant women. However, receiving HPV vaccine when pregnant is not a reason to consider terminating the pregnancy. Women who are breast feeding may get the vaccine.

   Any woman who learns she was pregnant when she got this HPV vaccine is encouraged to contact the manufacturer’s HPV-in-pregnancy registry at 800-986-8999. This will help us learn more about how pregnant women respond to the vaccine.

   People who are mildly ill when a dose of HPV vaccine is planned can still be vaccinated. People with a moderate or severe illness should wait until they are better.

5. What are the risks from this vaccine?
   This HPV vaccine has been used in the U.S. and around the world for about six years and has been very safe. However, any medicine could possibly cause a serious problem, such as a severe allergic reaction. The risk of any vaccine causing a serious injury, or death, is extremely small. Life-threatening allergic reactions from vaccines are very rare. If they do occur, it would be within a few minutes to a few hours after the vaccination.

   Several mild to moderate problems are known to occur with this HPV vaccine. These do not last long and go away on their own.

   • Reactions in the arm where the shot was given:
     - Pain (about 8 people in 10)
     - Redness or swelling (about 1 person in 4)

   • Fever:
     - Mild (100°F) (about 1 person in 10)
     - Moderate (102°F) (about 1 person in 65)

   • Other problems:
     - Headache (about 1 person in 3)
     - Fainting: Brief fainting spells and related symptoms (such as jerking movements) can happen after any medical procedure, including vaccination. Sitting or lying down for about 15 minutes after a vaccination can help prevent fainting and injuries caused by falls. Tell your doctor if the patient feels dizzy or light-headed, or has vision changes or ringing in the ears. Like all vaccines, HPV vaccines will continue to be monitored for unusual or severe problems.

6. What if there is a moderate or severe reaction?
   What should I look for?
   • Any unusual condition, such as a high fever or unusual behavior. Signs of a serious allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

   What should I do?
   • Call a doctor, or get the person to a doctor right away.
   • Tell your doctor what happened, the date and time it happened, and when the vaccination was given.
   • Ask your doctor, nurse, or health department to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form. Or you can file this report through the VAERS web site at www.vaers.hhs.gov, or by calling 1-800-822-7967. VAERS does not provide medical advice.

7. The National Vaccine Injury Compensation Program
   The National Vaccine Injury Compensation Program (VICP) was created in 1986. Persons who believe they may have been injured by a vaccine can learn about the program and about filing a claim by calling 1-800-338-2382 or visiting the VICP website at www.hrsa.gov/vaccinecompensation.

8. How can I learn more?
   • Ask your doctor. They can give you the vaccine package insert or suggest other sources of information.
   • Call your local or state health department.
   • Contact the Centers for Disease Control and Prevention (CDC):
     • Call 1-800-232-4636 (1-800-CDC-INFO) or
     • Visit CDC’s website at www.cdc.gov/vaccines

Vaccine Information Statement (interim)
HPV Vaccine (Gardasil)

2/22/2012
42 U.S.C. § 300aa-26
Office Use Only
Adverse Reactions & Events

- Adverse reaction (side effect) – extraneous effect caused by vaccine
  - Local: pain, swelling, redness @ injection site
  - Systemic: fever, malaise, headache, etc.
  - Allergic: may be caused by vaccine antigen or component. Severe reactions rare.

- Adverse event – any event following a vaccine
  - May be a true adverse reaction
  - May be only coincidental
VAERS

• Vaccine Adverse Event Reporting System
• Nat’l surveillance system co-managed by CDC & FDA
• Can detect rare adverse events after vaccines are licensed
• Can report to VAERS using secure Web site (recommended), print forms from Web site (vaers.hhs.gov), or call 1-800-822-7967
What to Report to VAERS

• Any post-vaccination medical occurrence that is of concern to you, the patient, or family member, even if you are not certain that the vaccine caused the event

• Healthcare providers MUST report:
  – any reaction listed on the table of reportable events (see VAERS Web site)
  – any reaction to a vaccine which is specified in the manufacturer’s package insert as a contraindication to additional doses of the vaccine
References & Resources

• www.cdc.gov/vaccines
• www.immunize.org
• www.immunizetexas.org
• http://www.sanantonio.gov/health/Immunizations.html
• http://www.cdc.gov/vaccines/ed/epivac/default.htm
• http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.htm
• http://www.cdc.gov/vaccines/pubs/pinkbook/index.html
• National Institute of Standards and Technology. Dec 2009