2013 Adult Immunization Update

David H. Spach, MD
Professor of Medicine
Division of Infectious Diseases
University of Washington, Seattle
Adult Immunization Update

- Pertussis Vaccine
- Influenza Vaccine
- Zoster Vaccine
- Pneumococcal Vaccine
- Rabies Vaccine
Where do you find out what vaccines are recommended and information about new vaccines?
Advisory Committee on Immunization Practices (ACIP) Recommended Adult Immunization Schedule

http://www.cdc.gov/vaccines/schedules/hcp/adult.html
Advisory Committee on Immunization Practices (ACIP)
2013 Recommended Adult Immunization Schedule

<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>1 dose annually</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)</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>
</tr>
<tr>
<td>Varicella</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)</td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV23)</td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Pneumococcal 13-valent conjugate (PCV13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Meningococcal</td>
<td>1 or more doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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; zoster vaccine recommended regardless of prior episode of zoster

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indication)

No recommendation

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967. Information on how to file a Vaccine Injury Compensation Program claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400. Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at www.cdc.gov/vaccines or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays. 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.

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).

# ACIP 2013 Recommended Adult Immunization Schedule

Vaccinations Indicated Based on Medical or Other Indications

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>INDICATION</th>
<th>Pregnancy</th>
<th>Immune-compromising conditions (excluding human immunodeficiency virus [HIV])&lt;sup&gt;4,9,18,35&lt;/sup&gt;</th>
<th>HIV infection CD4+ T lymphocyte count&lt;sup&gt;4,9,18,35&lt;/sup&gt;</th>
<th>Men who have sex with men (MSM)</th>
<th>Heart disease, chronic lung disease, chronic alcoholism</th>
<th>Asplenia (including elective splenectomy and persistent complement component deficiencies)&lt;sup&gt;3,14&lt;/sup&gt;</th>
<th>Chronic liver disease</th>
<th>Kidney failure, end-stage renal disease, receipt of hemodialysis</th>
<th>Diabetes</th>
<th>Healthcare personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza&lt;sup&gt;2,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>1 dose IIV annually</td>
<td>1 dose IIV annually</td>
<td></td>
<td>1 dose IIV annually</td>
<td>1 dose IIV annually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>1 dose Tdap each pregnancy</td>
<td>1 dose Tdap each pregnancy</td>
<td></td>
<td>Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>Contraindicated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td>3 doses through age 21 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>Contraindicated</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;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>Contraindicated</td>
<td></td>
<td></td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV23)&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>1 or 2 doses</td>
<td></td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal 13-valent conjugate (PCV13)&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>1 or more doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>3 doses</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

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)

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, 2013. 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.

Pertussis Vaccine
Reported Pertussis Case in U.S. 1922-2012


*2012 data are provisional.
Pertussis Epidemiology in United States

- 2010: 27,550 pertussis cases
- 2011: 18,719 pertussis cases
- 2012: 41,880 pertussis cases (18 deaths)
- Children age <1 with pertussis: > 50% require hospitalization

Source: CDC and Prevention
# Pertussis

Progression of Disease

<table>
<thead>
<tr>
<th>Incubation</th>
<th>Catarrhal</th>
<th>Paroxysmal</th>
<th>Convalescent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-10 Days</td>
<td>5-7 Days</td>
<td>2 Weeks - 2 Months</td>
<td>2 Weeks - 4 Months</td>
</tr>
</tbody>
</table>
A 67-year-old man comes into the ER with a laceration on his hand that he suffered while working on his house. He has not had a tetanus shot for about 20 years.

What would you recommend regarding a “tetanus shot”?

A. No need for vaccine since he is older than 65 and has immunity
B. Give Td vaccine now and repeat in about 10 years
C. Give Tdap now and give Td in about 10 years
D. Give Tdap now and give Tdap in about 10 years
2013 ACIP Recommendations for Adolescents and Adults

- A 27-year-old woman is seen at her OB-GYN office after recently discovering she was pregnant. Her last menstrual period was 10 weeks prior. She received a Tdap vaccine about 2 years ago when she cut her foot on a piece of glass at a beach.

- What would you recommend regarding Tdap?

  A. Give her tetanus vaccine in about 8 years
  B. Give her Tdap in about 8 years
  C. Give her Tdap at week 12-16 during pregnancy
  D. Give her Tdap at week 27-36 during pregnancy
Timing or Tdap following Td
2013 ACIP Recommendations for Adults

• “For tetanus, diphtheria, and acellular pertussis (Tdap) vaccine, recommendations have been expanded to include routine vaccination of adults aged 65 years and older and for pregnant women to receive Tdap vaccine with each pregnancy. The ideal timing of Tdap vaccination during pregnancy is during 27–36 weeks’ gestation.”

**2013 ACIP Recommendations for Adults**  
**Tetanus, Diphtheria, & Acellular Pertussis Vaccination (Td/Tdap)**

<table>
<thead>
<tr>
<th>Age Groups (Years)</th>
<th>Substitute 1-Dose of Tdap then 1-Dose Td Booster Every 10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-49</td>
<td></td>
</tr>
<tr>
<td>50-64</td>
<td></td>
</tr>
<tr>
<td>65 and Older</td>
<td></td>
</tr>
</tbody>
</table>

Pregnant women should receive Tdap with each pregnancy  
(at 27-36 weeks of gestation)

Seasonal Influenza Vaccine
Influenza Viruses

Hemagglutinin “H”
Neuraminidase “N”
RNA
M$_2$ protein (only on type A)
Influenza Viruses

- **H3N2** Seasonal
- **H1N1** Seasonal
- **H1N1** Pandemic “Swine Flu”
- **H5N1** “Bird Flu”
- **H7N9** “Bird Flu”
Influenza Vaccine: Questions

- What influenza strains are in the 2013-2014 vaccine.
- Will the 2013-2014 influenza vaccines protect against pandemic H1N1 influenza (“swine flu”)?
Influenza Strains in US 2013-2014 Influenza Vaccine*

- A/California/7/2009 H1N1-like virus (pandemic)
- A/Victoria/361/2011 H3N2-like virus
- B/Massachusetts 2012-like virus
- *B/ Brisbane/60 2008-like virus

*Available in quadrivalent vaccines

Source: CDC and Prevention.
Recently Licensed Influenza Vaccines for 2013-2014

- Quadrivalent Live Attenuated Influenza Vaccine (LAIV4)
- Quadrivalent Inactivated Influenza Vaccines (IIV4): 2 types
- Trivalent Cell Culture-Based Inactivated Influenza Vaccine (ccIIV3)
- Recombinant Hemagglutinin Influenza Vaccine (RIV3)
Live Attenuated Quadrivalent

- **Type**
  - Live, attenuated, quadrivalent vaccine
  - Intranasal delivery

- **Approval Age**: Healthy Persons 2-49

- **Contraindications**
  - **Asthma**
  - Children aged < 5 with history or recurrent wheezing
  - Women who are pregnant
  - Persons with medical risk factors* for influenza-related complications
  - Family member/close contact of severe immunocompromised (e.g. BMT)

*persons with chronic heart or lung disease, such as asthma or reactive airways disease; people with medical conditions such as diabetes or kidney failure; or people with illnesses that weaken the immune system, or who take medications that can weaken the immune system.

*From: CDC and Prevention.*
A 46-year-old woman with severe asthma has a history of egg allergy. She has not received influenza vaccine in the past because of her egg allergy.

What would you recommend?
Can the person eat lightly cooked egg without reaction?

Yes: Administer vaccine per usual protocol

No: After eating eggs or egg-containing foods, does person experience ONLY hives?

Yes: Administer RIV3 (if patient 18-49 yrs)
No: OR Administer IIV

Observe for reaction for ≥ 30 minutes following vaccination

No: After eating eggs or egg-containing foods, does person experience other symptoms, such as:
- Cardiovascular
- Respiratory
- Gastrointestinal
- Reaction requiring epinephrine
- Reaction requiring emergency medical attention

Yes: Administer RIV3 (if patient 18-49 yrs)
No: OR Refer to a physician with expertise in management of allergic conditions for further evaluation

Yes: After eating eggs or egg-containing foods, does person experience only hives?
No: Administer RIV3 (if patient 18-49 yrs)

OR Administer IIV

Observe for reaction for ≥ 30 minutes following vaccination

No: After eating eggs or egg-containing foods, does person experience other symptoms, such as:
- Cardiovascular
- Respiratory
- Gastrointestinal
- Reaction requiring epinephrine
- Reaction requiring emergency medical attention

Yes: Administer RIV3 (if patient 18-49 yrs)
No: OR Refer to a physician with expertise in management of allergic conditions for further evaluation
Influenza A H7N9

- Transmission: bird to human
- Epidemiology: China only
- Mortality: 20%
Zoster Vaccine
• “Approximately 1 million new cases of zoster occur in the United States annually.”

• “Approximately one in three persons in the general population will develop zoster during their lifetime.”

Who should zoster vaccine?
Zoster Vaccine

- **Vaccine**
  - Live, high-titer, attenuated vaccine (Oka)
  - Does not contain thimerosal

- **FDA-Approval Status**
  - Approved for person **age 50** and older regardless of whether they report a prior history of herpes zoster

- **Contraindications**
  - History of primary or acquired immunodeficiency states
  - On immunosuppressive therapy
  - Pregnant women

*From: ACIP & Centers for Disease Control.*
Zoster Vaccine in Adults 60 and Older
Shingles Prevention Study

Study Design

- Background
  - N = 38,546
  - Adults aged > 60
  - Randomized, double-blinded
  - Excluded those with prior h/o zoster
  - Followed median of 3.1 years

- Vaccines (single dose)
  - Zoster Vaccine (n = 19,270)
  - Placebo (n = 19,276)

*Zoster Vaccine = Live attenuated Oka


Zoster and Post Herpetic Neuralgia*

*Effectiveness of Zoster Vaccine
- Decreased Herpes Zoster by 51.3%
- Decreased PHN by 66.5%
Zoster Vaccine in Adults 50-59
Zoster Efficacy and Safety (ZEST) Trial: protocol 022

Study Design

- Background
  - N = 22,396
  - Adults aged 50-59
  - Randomized, double-blinded
  - Excluded those with prior h/o zoster
  - Followed median of 1.3 years

- Vaccines (single dose)
  - Zoster Vaccine (n = 11,211)
  - Placebo (n = 11,228)

*Zoster Vaccine = Live attenuated Oka

Efficacy Summary*

- Decreased Herpes Zoster by 69.8%
- Decreased zoster pain severity-by-duration score by 73%

From: Zostax Product Information. Merck
Zoster Vaccine: Questions

- Which of the following immunocompromising conditions are considered contraindications for zoster vaccine?

A. Prednisone: 30 mg daily (on day 24 of 28 day course)
B. Low dose methotrexate: 0.1 mg/kg once weekly
C. A person undergoing stem cell transplantation
D. Immune modulators, eg. adalimumab, infliximab, and etanercept

Use of Zoster Vaccine in Immunocompromised Persons

- High dose corticosteroids ($\geq 20$ mg/d) for $\geq 14$ days
  - Contraindicated and defer vaccine for $\geq 1$ month after corticosteroids stopped

- Low dose immunosuppressants: methotrexate ($<0.4$ mg/Kg/week), azathioprine ($<3.0$ mg/Kg/day), or 6 mercaptopurine ($<1.5$ mg/Kg/day)
  - NOT contraindicated

- Stem Cell Transplantation
  - Limited experience and take on case-by-case basis

- Immune modulators (eg. adalimumab, infliximab, and etanercept)
  - Case-by-case basis (consider deferring for 1 month after stopping modulator)

Pneumococcal Vaccines
Invasive Pneumococcal Disease in 2009

- 43,500 estimated cases
- 5,000 estimated deaths
- 84% of cases and deaths occurred in adults

Pneumococcal Polysaccharide Vaccine (PPSV)

Pneumococcal Polysaccharide Vaccine-23 (PPSV23)

- Polysaccharide Capsule
- Cell Wall
- Cell Membrane

*Streptococcus pneumoniae*

- T-Cell Independent
- Shorter-Term Immunity
- Lack of Anamnestic Response
Pneumococcal Conjugate Vaccine (PCV) - 13 (PCV13)

- Polysaccharide Capsule
- Cell Wall
- Cell Membrane

Streptococcus pneumoniae

Polysaccharide

Protein Conjugate

T-Cell Dependent
Longer-Term Immunity
Good Anamnestic Response
A 37-year-old woman with chronic renal failure on dialysis is seen for a routine visit. She has never received pneumococcal vaccine.

What would you recommend regarding vaccinations with pneumococcal vaccine?

A. No pneumococcal vaccine is indicated
B. Vaccinate now; no further pneumococcal vaccinations required
C. Vaccinate now with PPSV-23 and and repeat again after 5 years
D. Vaccinate now with PCV-13, then give PPSV-23 in 8 weeks and again in 5 years
<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Underlying Medical Condition or Other Indication</th>
</tr>
</thead>
</table>
| Immunocompetent persons                | Cerebrospinal fluid leaks  
Cochlear implant                                                                                             |
| Persons with functional or anatomic asplenia | Sickle cell disease and other hemoglobinopathies  
Congenital or acquired asplenia, splenic dysfunction, or splenectomy                                      |
| Immunocompromised persons              | Congenital or acquired immunodeficiencies  
HIV infection  
Chronic renal failure  
Nephrotic syndrome  
Leukemias  
Lymphomas  
Hodgkin disease  
Generalized malignancy  
Iatrogenic immunosuppression (including long-term systemic corticosteroids and radiation therapy  
Solid organ transplantation  
Multiple myeloma                                                                                           |
Pneumococcal Polysaccharide Vaccine (PCV13)
Adult Indications and Schedule

- Pneumococcal Vaccine Naïve
  - Administer PCV13 first
  - Give PPSV23 vaccine (at least 8 weeks after PCV13)
  - Give 2\textsuperscript{nd} dose of PPSV23 vaccine 5 years later

- Previously Received PPSV23
  - Give PCV13 (at least 1 year after last dose of PPSV23)
  - Given 2\textsuperscript{nd} dose of PPSV23 vaccine 5 years after 1\textsuperscript{st} dose

Pneumococcal Polysaccharide Vaccine (PCV13)  
Adult Indications and Schedule  

<table>
<thead>
<tr>
<th>Pneumococcal Vaccine-Naïve Adults</th>
<th>≥ Age 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV13 ≥ 8 wks</td>
<td>PPSV23  ≥ 5 yrs</td>
</tr>
</tbody>
</table>

Pneumococcal Polysaccharide Vaccine (PCV13)  
Adult Indications and Schedule

Pneumococcal Vaccine-Naïve Adults

<table>
<thead>
<tr>
<th>PCV13</th>
<th>≥ 8 wks</th>
<th>PPSV23</th>
<th>≥ 5 yrs</th>
<th>PPSV23</th>
<th>≥ 5 yrs</th>
<th>PPSV23</th>
</tr>
</thead>
</table>

PPSV23-Immunized Adults

<table>
<thead>
<tr>
<th>PPSV23</th>
<th>≥ 1 yr</th>
<th>PCV13</th>
<th>≥ 8 wks</th>
<th>PPSV23</th>
<th>≥ 5 yrs</th>
<th>PPSV23</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PPSV23</th>
<th>≥ 5 yrs</th>
<th>PPSV23</th>
<th>≥ 1 yr</th>
<th>PCV13</th>
<th>≥ 8 wks</th>
<th>PPSV23</th>
</tr>
</thead>
</table>

Why did **PCV13** Replace **PCV7**
Impact of Conjugate Pneumococcal Vaccine on Invasive Pneumococcal Disease & Deaths

Rates of Invasive Pneumococcal Disease and Deaths In United States, 1999 and 2004

### Invasive Pneumococcal Disease

#### Northern California Kaiser Permanente

**Change in Rates of Invasive Pneumococcal Disease**

1995-2000 Rate Compared with 2002-3 Rates

**Change in Invasive Disease (%)**

- 5 to 19: -39
- 20 to 39: -52
- 40 to 59: -16
- 60+: -27
- All > 5: -25

Pneumococcal Conjugate Vaccine: PCV7
Serotypes

4 6B 9V
14 18 19F 23
Impact of Conjugate 7-Valent Pneumococcal Vaccine Among Alaska Native Children

- Alaska Native children are experiencing replacement invasive pneumococcal disease with serotypes not covered by heptavalent pneumococcal conjugate vaccine.”

Impact of Conjugate 7-Valent Pneumococcal Vaccine Among Alaska Native Children

Vaccine Serotypes

- 4
- 6B
- 9V
- 14
- 18C
- 19F
- 23F

Non-Vaccine Serotypes

- 6A
- 7F
- 19A

Emergence of Multidrug-Resistant Pneumococcus Serotype 19A in Children in Massachusetts and New York

Vaccine Serotypes

- 4
- 6B
- 9V
- 14
- 18C
- 19F
- 23F

Non-Vaccine Serotypes

- 6A
- 7F
- 19A

Pneumococcal Conjugate Vaccine (PCV13)

Serotypes in PCV7
- 4
- 6B
- 9V
- 14
- 18C
- 19F
- 23F

New Serotypes
- 1
- 3
- 5
- 6A
- 7F
- 19A
Rabies Vaccine
A 29-year-old male is bitten on the shoulder by a bat and the bat escaped.

What percent of Rabies Immune Globulin should be given at the wound site?

A. 25%
B. 50%
C. 75%
D. 100%
Case History: Question

• In addition to giving Rabies Immune Globulin, how many doses of rabies vaccine should be given? He has never received rabies vaccine before.

A. One  
B. Two  
C. Four  
D. Five
Rabies: Post-Exposure Prophylaxis

Not Previously Vaccinated

• Wound cleansing
• *Rabies Immune Globulin
• +Rabies Vaccine: day 0, 3, 7, 14

*Administer vaccine as IM in deltoid
+Administer full dose of RIG around wound if possible; remaining volume give at site distant from vaccine site

*Note: Number of recommended doses of rabies vaccine changed from 5 to 4 (ACIP June 24, 2009)

Questions?