

# **Immunization Update 2011**

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# Disclosures

- **William Atkinson is a federal government employee with no financial interest or conflict with the manufacturer of any product named in this presentation**
- **The speaker will discuss the off-label use of pneumococcal and meningococcal conjugate, Tdap and zoster vaccines**
- **The speaker will not discuss a vaccine not currently licensed by the FDA**

# Disclosures

- The recommendations to be discussed are primarily those of the Advisory Committee on Immunization Practices (ACIP)
  - composed of 15 experts in clinical medicine and public health who are not government employees
  - provides guidance on the use of vaccines and other biologic products to the Department of Health and Human Resources, CDC, and the U.S. Public Health Service

[www.cdc.gov/vaccines/recs/acip/](http://www.cdc.gov/vaccines/recs/acip/)

# Childhood and Adolescent Immunization Schedules

- **Published at least annually since 1995**
- **Child and adolescent schedules published by AAP, AAFP, and CDC in January or February of each year**
- **Schedules for children 0 through 6 years and 7-18 years separated in 2007**
- **2011 schedule published as a QuickGuide in Morbidity and Mortality Weekly Report on February 11, 2011**

## Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States • 2011

For those who fall behind or start late, see the catch-up schedule

Vaccine	Age	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19-23 months	2-3 years	4-6 years
Hepatitis B <sup>1</sup>		HepB	HepB									
Rotavirus <sup>2</sup>			RV	RV	RV <sup>2</sup>							
Diphtheria, Tetanus, Pertussis <sup>3</sup>			DTaP	DTaP	DTaP	see footnote <sup>4</sup>			DTaP			DTaP
Haemophilus influenzae type b <sup>5</sup>			Hb	Hb	Hb <sup>6</sup>	Hb						
Pneumococcal <sup>7</sup>			PCV	PCV	PCV	PCV					PCV13	
Inactivated Poliovirus <sup>8</sup>			IPV	IPV								IPV
Influenza <sup>9</sup>									Influenza (Yearly)			
Measles, Mumps, Rubella <sup>10</sup>							MMR		see footnote <sup>4</sup>			MMR
Varicella <sup>11</sup>							Varicella		see footnote <sup>4</sup>			Varicella
Hepatitis A <sup>12</sup>												HepA Series
Meningococcal <sup>13</sup>												MCV4

This schedule includes recommendations in effect as of December 31, 2010. 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. Considerations should include provider assessment, patient preference, and the potential for adverse events. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations: <http://www.cdc.gov/acip/> or <http://www.hhs.gov/ohrt/>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS) at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

### 1. Hepatitis B vaccine (HepB). (Minimum age: birth)

- Administer monovalent HepB to all newborns before hospital discharge.
- If mother is hepatitis B surface antigen (HBsAg)-positive, administer HepB and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth.
- If mother's HBsAg status is unknown, administer HepB within 12 hours of birth. Determine mother's HBsAg status as soon as possible and, if HBsAg-positive, administer HBIG (no later than age 1 week).

#### Doses following the birth dose:

- The second dose should be administered at age 1 or 2 months. Monovalent HepB should be used for doses administered before age 6 weeks.
- Infants born to HBsAg-positive mothers should be tested for HBsAg and antibody to HBsAg 1 to 2 months after completion of at least 2 doses of the HepB series, at age 9 through 18 months (generally at the next well-child visit).
- Administration of 4 doses of HepB to infants is permissible when a combination vaccine containing HepB is administered after the birth dose.
- Infants who did not receive a birth dose should receive 3 doses of HepB on a schedule of 0, 1, and 6 months.
- The final (3rd or 4th) dose in the HepB series should be administered no later than age 24 weeks.

### 2. Rotavirus vaccine (RV). (Minimum age: 6 weeks)

- Administer the first dose at age 6 through 14 weeks (maximum age: 14 weeks 6 days). Vaccination should not be initiated for infants aged 15 weeks 0 days or older.
- The maximum age for the final dose in the series is 8 months 0 days.
- If Rotarix is administered at ages 2 and 4 months, a dose at 6 months is not indicated.

### 3. Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP). (Minimum age: 6 weeks)

- The fourth dose may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.

### 4. Haemophilus influenzae type b conjugate vaccine (Hib). (Minimum age: 6 weeks)

- If PRP-COMP (PedvaxHIB or Comvax [HepB-Hib]) is administered at ages 2 and 4 months, a dose at age 6 months is not indicated.
- Hibrix should not be used for doses at ages 2, 4, or 6 months for the primary series but can be used as the final dose in children aged 12 months through 4 years.

### 5. Pneumococcal vaccine. (Minimum age: 6 weeks for pneumococcal conjugate vaccine [PCV]; 2 years for pneumococcal polysaccharide vaccine [PPSV])

- PCV is recommended for all children aged younger than 5 years. Administer 1 dose of PCV to all healthy children aged 24 through 59 months who are not previously vaccinated for their age.
- A PCV series begun with 7-valent PCV (PCV7) should be completed with 13-valent PCV (PCV13).
- A single supplemental dose of PCV13 is age-appropriate for all children aged 14 through 59 months who have received an age-appropriate series of PCV7.
- A single supplemental dose of PCV13 is recommended for all children aged 60 through 71 months with underlying medical conditions who have received an age-appropriate series of PCV7.

### 6. Inactivated poliovirus vaccine (IPV). (Minimum age: 6 weeks)

- If 4 or more doses are administered prior to age 4 years an additional dose should be administered at age 4 through 6 years.
- The final dose in the series should be administered on or after the fourth birthday and at least 6 months following the previous dose.

### 7. Influenza vaccine (seasonal). (Minimum age: 6 months for inactivated influenza vaccine [IIV]; 2 years for live, attenuated influenza vaccine [LAIV])

- For healthy children aged 2 years and older (i.e., those who do not have underlying medical conditions that predispose them to influenza complications), either LAIV or IIV may be used, except LAIV should not be given to children aged 2 through 4 years who have had wheezing in the past 12 months.
- Administer 2 doses (separated by at least 4 weeks) to children aged 6 months through 8 years who are receiving seasonal influenza vaccine for the first time or who were vaccinated for the first time during the previous influenza season but only received 1 dose.
- Children aged 9 months through 8 years who received 2 doses of monovalent 2009 H1N1 vaccine should receive 2 doses of 2010-2011 seasonal influenza vaccine. See MMWR 2010;59(No. RR-8):33-34.

### 8. Measles, mumps, and rubella vaccine (MMR). (Minimum age: 12 months)

- The second dose may be administered before age 4 years, provided at least 4 weeks have elapsed since the first dose.

### 9. Varicella vaccine. (Minimum age: 12 months)

- The second dose may be administered before age 4 years, provided at least 3 months have elapsed since the first dose.
- For children aged 12 months through 12 years the recommended minimum interval between doses is 3 months. However, if the second dose was administered at least 4 weeks after the first dose, it can be accepted as valid.

### 10. Hepatitis A vaccine (HepA). (Minimum age: 12 months)

- Administer 2 doses at least 6 months apart.
- HepA is recommended for children aged older than 23 months who live in areas where vaccination programs target older children, who are at increased risk for infection, or for whom immunity against hepatitis A is desired.

### 11. Meningococcal conjugate vaccine, quadrivalent (MCV4). (Minimum age: 2 years for Menactra and 11 years for Menveo)

- Administer 2 doses of MCV4 at least 8 weeks apart to children aged 2 through 10 years with persistent complement component deficiency and anatomic or functional asplenia, and 1 dose every 5 years thereafter.
- Persons with human immunodeficiency virus (HIV) infection who are vaccinated with MCV4 should receive 2 doses at least 8 weeks apart.
- Administer 1 dose of MCV4 to children aged 2 through 10 years who travel to countries with highly endemic or epidemic disease and during outbreaks caused by a vaccine serogroup.
- Administer MCV4 to children at continued risk for meningococcal disease who were previously vaccinated with MCV4 or meningococcal polysaccharide vaccine after 3 years if the first dose was administered at age 2 through 6 years.

The Recommended Immunization Schedules for Persons Aged 0 Through 18 Years are approved by the Advisory Committee on Immunization Practices (<http://www.cdc.gov/vaccines/imz/sectors/>), the American Academy of Pediatrics (<http://www.aap.org>), and the American Academy of Family Physicians (<http://www.aafp.org>).  
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through 9 years who are receiving seasonal influenza vaccine for the first

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## Persons Aged 7 Through 18 Years—United States • 2011

See the schedule below and the catch-up schedule

	11-12 years	13-18 years
	Tdap	Tdap
	HPV (3 doses) (females)	HPV series
	MCV4	MCV4
	Influenza (Yearly)	
	Pneumococcal	
	HepA Series	
	Hep B Series	
	IPV Series	
	MMR Series	
	Varicella Series	

2010. 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. Considerations should include provider assessment, patient preference, and the potential for adverse events. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations: <http://www.cdc.gov/vaccines/imz/sectors/> or <http://www.hhs.gov/ohrt/>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS) at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

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- If mother is hepatitis B surface antigen (HBsAg)-positive, administer HepB and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth.
- If mother's HBsAg status is unknown, administer HepB within 12 hours of birth. Determine mother's HBsAg status as soon as possible and, if HBsAg-positive, administer HBIG (no later than age 1 week).

### 2. Rotavirus vaccine (RV). (Minimum age: 6 weeks)

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- The maximum age for the final dose in the series is 8 months 0 days.
- If Rotarix is administered at ages 2 and 4 months, a dose at 6 months is not indicated.

### 3. Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP). (Minimum age: 6 weeks)

- The fourth dose may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.

### 4. Haemophilus influenzae type b conjugate vaccine (Hib). (Minimum age: 6 weeks)

- If PRP-COMP (PedvaxHIB or Comvax [HepB-Hib]) is administered at ages 2 and 4 months, a dose at age 6 months is not indicated.
- Hibrix should not be used for doses at ages 2, 4, or 6 months for the primary series but can be used as the final dose in children aged 12 months through 4 years.

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- For healthy children aged 2 years and older (i.e., those who do not have underlying medical conditions that predispose them to influenza complications), either LAIV or IIV may be used, except LAIV should not be given to children aged 2 through 4 years who have had wheezing in the past 12 months.
- Administer 2 doses (separated by at least 4 weeks) to children aged 6 months through 8 years who are receiving seasonal influenza vaccine for the first time or who were vaccinated for the first time during the previous influenza season but only received 1 dose.
- Children aged 9 months through 8 years who received 2 doses of monovalent 2009 H1N1 vaccine should receive 2 doses of 2010-2011 seasonal influenza vaccine. See MMWR 2010;59(No. RR-8):33-34.

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- HepA is recommended for children aged older than 23 months who live in areas where vaccination programs target older children, who are at increased risk for infection, or for whom immunity against hepatitis A is desired.

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- Persons with human immunodeficiency virus (HIV) infection who are vaccinated with MCV4 should receive 2 doses at least 8 weeks apart.
- Administer 1 dose of MCV4 to children aged 2 through 10 years who travel to countries with highly endemic or epidemic disease and during outbreaks caused by a vaccine serogroup.
- Administer MCV4 to children at continued risk for meningococcal disease who were previously vaccinated with MCV4 or meningococcal polysaccharide vaccine after 3 years if the first dose was administered at age 2 through 6 years.

be administered after 5 years to children with functional or anatomic asplenia or an immunocompromising condition. See MMWR 2010;59(No. RR-11).

Information about reporting vaccine adverse events is available on the <http://www.vaers.hhs.gov> or by telephone, 800-822-7967. Suspected cases of vaccine-preventable diseases should be reported to the state or local health departments. Additional information, including precautions and contraindications to immunization, is available from the National Center for Immunization and Respiratory Diseases at <http://www.cdc.gov/vaccines/imz/sectors/> or by telephone, 800-822-6929.

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## Who Start Late or Who Are More Than 1 Month Behind—United States • 2011

See the schedule below and the catch-up schedule

### THROUGH 6 YEARS

(Minimum interval between doses)

0 weeks (and at least 1 week after first dose)

2 weeks<sup>1</sup>

6 months<sup>2</sup>

6 months<sup>3</sup>

6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

6 months<sup>4</sup>

6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

6 months<sup>4</sup>

6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

6 months<sup>4</sup>

6 weeks (as final dose)

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6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

6 months<sup>4</sup>

6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

6 months<sup>4</sup>

6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

6 months<sup>4</sup>

6 weeks (as final dose)

The dose only necessary for children aged 12 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at age 12 months

4 weeks

# Changes in the 2011 Schedule for Persons 0 Through 18 Years

- Recommendations for PCV-13 added
- Guidance for administration of 1 or 2 doses of seasonal influenza vaccine based upon the child's history of monovalent 2009 H1N1 vaccination
- Use of Tdap among children aged 7 through 10 years who are incompletely vaccinated against pertussis is addressed
- Reference to a specified interval between Td and Tdap vaccination removed
- Addition of a routine 2-dose schedule of MCV4 for certain persons at high risk for meningococcal disease
- Recommendation for a routine adolescent booster dose of MCV4

# Adult Immunization Schedules

- **Published annually since 2002**
- **Collaborative effort of the ACIP, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, and the American College of Physicians**
  - **officially endorsed by each organization**

# Adult Immunization Schedule Indications by Age Group - 2011

## Recommended Adult Immunization Schedule UNITED STATES - 2011

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

VACCINE ▼	AGE GROUP ▶	19–26 years	27–49 years	50–59 years	60–64 years	≥65 years
Influenza <sup>1,*</sup>		1 dose annually				
Tetanus, diphtheria, pertussis (Td/Tdap) <sup>2,*</sup>		Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs				Td booster every 10 yrs
Varicella <sup>3,*</sup>		2 doses				
Human papillomavirus (HPV) <sup>4,*</sup>		3 doses (females)				
Zoster <sup>5</sup>					1 dose	
Measles, mumps, rubella (MMR) <sup>6,*</sup>		1 or 2 doses		1 dose		
Pneumococcal (polysaccharide) <sup>7,8</sup>		1 or 2 doses				1 dose
Meningococcal <sup>9,*</sup>		1 or more doses				
Hepatitis A <sup>10,*</sup>		2 doses				
Hepatitis B <sup>11,*</sup>		3 doses				

\*Covered by the Vaccine Injury Compensation Program.

For all persons in this category who meet the age requirements and who lack evidence of immunity (e.g., lack documentation of vaccination or have no evidence of previous infection)

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

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 <http://www.vaers.hhs.gov> or by telephone, 800-522-7967.

Information on how to file a Vaccine Injury Compensation Program claim is available at <http://www.hrsa.gov/vaccinecompensation> or by telephone, 800-338-2382. Information about filing a claim for vaccine injury is available through 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 also is available at <http://www.cdc.gov/vaccines> or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 24 hours a day, 7 days a week.

# Adult Immunization Schedule Indications by Condition - 2011

**Figure 2. Vaccines that might be indicated for adults based on medical and other indications**

VACCINE ▼	INDICATION ▶	Pregnancy	Immuno-compromising conditions (excluding human immunodeficiency virus [HIV]) <sup>2,5,6,13</sup>	HIV Infection <sup>2,5,12,13</sup>		Diabetes, heart disease, chronic lung disease, chronic alcoholism	Asplenia <sup>12</sup> (including elective splenectomy) and persistent complement component deficiencies	Chronic liver disease	Kidney failure, end-stage renal disease, receipt of hemodialysis	Healthcare personnel
				CD4+ T lymphocyte count						
				<200 cells/pL	≥200 cells/pL					
Influenza <sup>1,*</sup>										1 dose TIV or LAIV annually
Tetanus, diphtheria, pertussis (Td/Tdap) <sup>2,*</sup>	Td									Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs
Varicella <sup>3,*</sup>			Contraindicated							2 doses
Human papillomavirus (HPV) <sup>4,*</sup>										3 doses for females through age 26 yrs
Zoster <sup>5</sup>			Contraindicated							1 dose
Measles, mumps, rubella (MMR) <sup>6,*</sup>			Contraindicated							1 or 2 doses
Pneumococcal (polysaccharide) <sup>7,8</sup>										1 or 2 doses
Meningococcal <sup>9,*</sup>										1 or more doses
Hepatitis A <sup>10,*</sup>										2 doses
Hepatitis B <sup>11,*</sup>										3 doses

\*Covered by the Vaccine Injury Compensation Program.

 For all persons in this category who meet the age requirements and who lack evidence of immunity (e.g., 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)

 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 February 4, 2011. 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 (<http://www.cdc.gov/vaccines/pubs/acip-11st.htm>).

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 Obstetricians and Gynecologists (ACOG), and the American College of Physicians (ACP).



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
CENTERS FOR DISEASE CONTROL AND PREVENTION



# Adult Immunization Schedule Footnotes - 2011

## Footnotes

### Recommended Adult Immunization Schedule—UNITED STATES • 2011

For complete statements by the Advisory Committee on Immunization Practices (ACIP), visit [www.cdc.gov/vaccines/pubs/ACIP-list.htm](http://www.cdc.gov/vaccines/pubs/ACIP-list.htm).

#### 1. Seasonal influenza vaccination

Annual vaccination against influenza is recommended for all persons aged 6 months and older, including all adults. Healthy, nonpregnant adults aged less than 50 years without high-risk medical conditions can receive either intranasally administered live, attenuated influenza vaccine (FluMist), or inactivated vaccine. Other persons should receive the inactivated vaccine. Adults aged 65 years and older can receive the standard seasonal influenza vaccine or the high-dose (Fluzone) seasonal influenza vaccine. Additional information about influenza vaccination is available at <http://www.cdc.gov/vaccines/vpd-vac/fla/default.htm>.

#### 2. Tetanus, diphtheria, and acellular pertussis (Td/Tdap) vaccination

Administer a one-time dose of Tdap to adults aged less than 65 years who have not received Tdap previously or for whom vaccine status is unknown to replace one of the 10-year Td boosters, and as soon as feasible to all 1) postpartum women, 2) close contacts of infants younger than age 12 months (e.g., grandparents and child-care providers), and 3) healthcare personnel with direct patient contact. Adults aged 65 years and older who have not previously received Tdap and who have close contact with an infant aged less than 12 months also should be vaccinated. Other adults aged 65 years and older may receive Tdap. Tdap can be administered regardless of interval since the most recent tetanus or diphtheria-containing vaccine.

Adults with uncertain or incomplete history of completing a 3-dose primary vaccination series with Td-containing vaccines should begin or complete a primary vaccination series. For unvaccinated adults, administer the first 2 doses at least 4 weeks apart and the third dose 6–12 months after the second. If incompletely vaccinated (i.e., less than 3 doses), administer remaining doses. Substitute a one-time dose of Tdap for one of the doses of Td, either in the primary series or for the routine booster, whichever comes first.

If a woman is pregnant and received the most recent Td vaccination 10 or more years previously, administer Td during the second or third trimester. If the woman received the most recent Td vaccination less than 10 years previously, administer Tdap during the immediate postpartum period. At the clinician's discretion, Td may be deferred during pregnancy and Tdap substituted in the immediate postpartum period, or Tdap may be administered instead of Td to a pregnant woman after an informed discussion with the woman.

The ACIP statement for recommendations for administering Td as prophylaxis in wound management is available at <http://www.cdc.gov/vaccines/pubs/acip-list.htm>.

#### 3. Varicella vaccination

All adults without evidence of immunity to varicella should receive 2 doses of single-antigen varicella vaccine if not previously vaccinated or a second dose if they have received only 1 dose, unless they have a medical contraindication. Special consideration should be given to those who 1) have close contact with persons at high risk for severe disease (e.g., healthcare personnel and family contacts of persons with immunocompromising conditions) or 2) are at high risk for exposure or transmission (e.g., teachers; child-care employees; residents and staff members of institutional settings, including correctional institutions; college students; military personnel; adolescents and adults living in households with children; nonpregnant women of childbearing age; and international travelers).

Evidence of immunity to varicella in adults includes any of the following: 1) documentation of 2 doses of varicella vaccine at least 4 weeks apart; 2) U.S.-born before 1980 (although for healthcare personnel and pregnant women, birth before 1980 should not be considered evidence of immunity); 3) history of varicella based on diagnosis or verification of varicella by a healthcare provider (for a patient reporting a history of or having an atypical case, a mild case, or both, healthcare providers should seek either an epidemiologic link with a typical varicella case or to a laboratory-confirmed case or evidence of laboratory confirmation, if it was performed at the time of acute disease); 4) history of herpes zoster based on diagnosis or verification of herpes zoster by a healthcare provider; or 5) laboratory evidence of immunity or laboratory confirmation of disease.

Pregnant women should be assessed for evidence of varicella immunity. Women who do not have evidence of immunity should receive the first dose of varicella vaccine upon completion or termination of pregnancy and before discharge from the healthcare facility. The second dose should be administered 4–8 weeks after the first dose.

#### 4. Human papillomavirus (HPV) vaccination

HPV vaccination with either quadrivalent (HPV4) vaccine or bivalent vaccine (HPV2) is recommended for females at age 11 or 12 years and catch-up vaccination for females aged 13 through 26 years.

Ideally, vaccine should be administered before potential exposure to HPV through sexual activity; however, females who are sexually active should still be vaccinated consistent with age-based recommendations. Sexually active females who have not been infected with any of the four HPV vaccine types (types 6, 11, 16, and 18, all of which HPV4 prevents) or any of the two HPV vaccine types (types 16 and 18, both of which HPV2 prevents) receive the full benefit of the vaccination. Vaccination is less beneficial for females who have already been infected with one or more of the HPV vaccine types. HPV4 or HPV2 can be administered to persons with a history of genital warts, abnormal Papanicolaou test, or positive HPV DNA test, because these conditions are not evidence of previous infection with all vaccine HPV types.

HPV4 may be administered to males aged 9 through 26 years to reduce their likelihood of genital warts. HPV4 would be most effective when administered before exposure to HPV through sexual contact.

A complete series for either HPV4 or HPV2 consists of 3 doses. The second dose should be administered 1–2 months after the first dose; the third dose should be administered 6 months after the first dose.

Although HPV vaccination is not specifically recommended for persons with the medical indications described in Figure 2, "Vaccines that might be indicated for adults based on medical and other indications," it may be administered to these persons because the HPV vaccine is not a live-virus vaccine. However, the immune response and vaccine efficacy might be less for persons with the medical indications described in Figure 2 than in persons who do not have the medical indications described or who are immunocompetent.

Saudi Arabia for all travelers to Mecca during the annual Hajj.

Meningococcal conjugate vaccine, quadrivalent (MCV4) is preferred for adults with any of the preceding indications who are aged 55 years and younger; meningococcal polysaccharide vaccine (MPSV4) is preferred for adults aged 56 years and older. Revaccination with MCV4 every 5 years is recommended for adults previously vaccinated with MCV4 or MPSV4 who remain at increased risk for infection (e.g., adults with anatomic or functional asplenia, or persistent complement component deficiencies).

whether they report a previous episode of herpes zoster. Persons with chronic

in 1957 or later should have documentation of 1 or more doses of MMR vaccine the three diseases, or documentation of provider-diagnosed measles or mumps

ce of immunity. The first dose, is recommended for adults who 1) have been recently exposed to

k in a healthcare facility; or 4) plan to travel internationally. Persons who received

revaccinated with 2 doses of MMR vaccine. The first dose, is recommended for adults who 1) live in a community experiencing

tions; 3) work in a healthcare facility; or 4) plan to travel internationally. Persons at high risk for mumps infection (e.g. persons who are working in a healthcare

ould be determined. If there is no evidence of immunity, women who are not e MMR vaccine upon completion or termination of pregnancy and before discharge

who lack laboratory evidence of measles, mumps, and/or rubella immunity or nel with 2 doses of MMR vaccine at the appropriate interval (for measles and appropriate interval during an outbreak of measles or mumps, and 1 dose during an

ntly; chronic liver diseases; cirrhosis; chronic alcoholism; functional or anatomic 2 weeks before surgery); immunocompromising conditions (including chronic renal

to HIV diagnosis as possible. Routine use of PPSV is not recommended for American Indians/Alaska Natives

ditions. However, public health authorities may consider recommending PPSV for the risk for invasive pneumococcal disease is increased

chronic renal failure or nephrotic syndrome; functional or anatomic asplenia (e.g., ns aged 65 years and older, one-time revaccination is recommended if they were

don. functional asplenia, or persistent complement component deficiencies. Adults with

ministered at 0 and 2 months. e students living in dormitories; microbiologists routinely exposed to isolates

ngococcal disease is hyperendemic or epidemic (e.g., the "meningitis belt" of local populations will be prolonged. Vaccination is required by the government of

itis A virus (HAV) infection:

g.

itis A (a list of countries is available at <http://www.cdc.gov/travel/>

with an international adoptee during the first 60 days after arrival in the United use hepatitis A vaccine series should be administered as soon as adoption is

months (Havrix), or 0 and 6–18 months (Vaqta). If the combined hepatitis A schedule may be used, administered on days 0, 7, and 21–30, followed by a

itis B virus (HBV) infection:

g., persons with more than one sex partner during the previous 6 months); n-drug users; and men who have sex with men.

ntially infectious body fluids. HIV infection; and persons with chronic liver disease.

embers of institutions for persons with developmental disabilities; and members is available at <http://www.cdc.gov/travel/content/diseases.aspx>.

; HIV testing and treatment facilities; facilities providing drug-abuse treatment k with men; correctional facilities; end-stage renal disease programs and s with developmental disabilities.

inated or not completely vaccinated. The second dose should be administered least 4 months after the first dose). If the combined hepatitis A and hepatitis B e, administered on days 0, 7, and 21 to 30, followed by a booster dose at month

ose of 40 µg/mL (Recombivax HB) administered on a 3-dose schedule or 2

y be used infection, or who have had a splenectomy, if they have not previously received

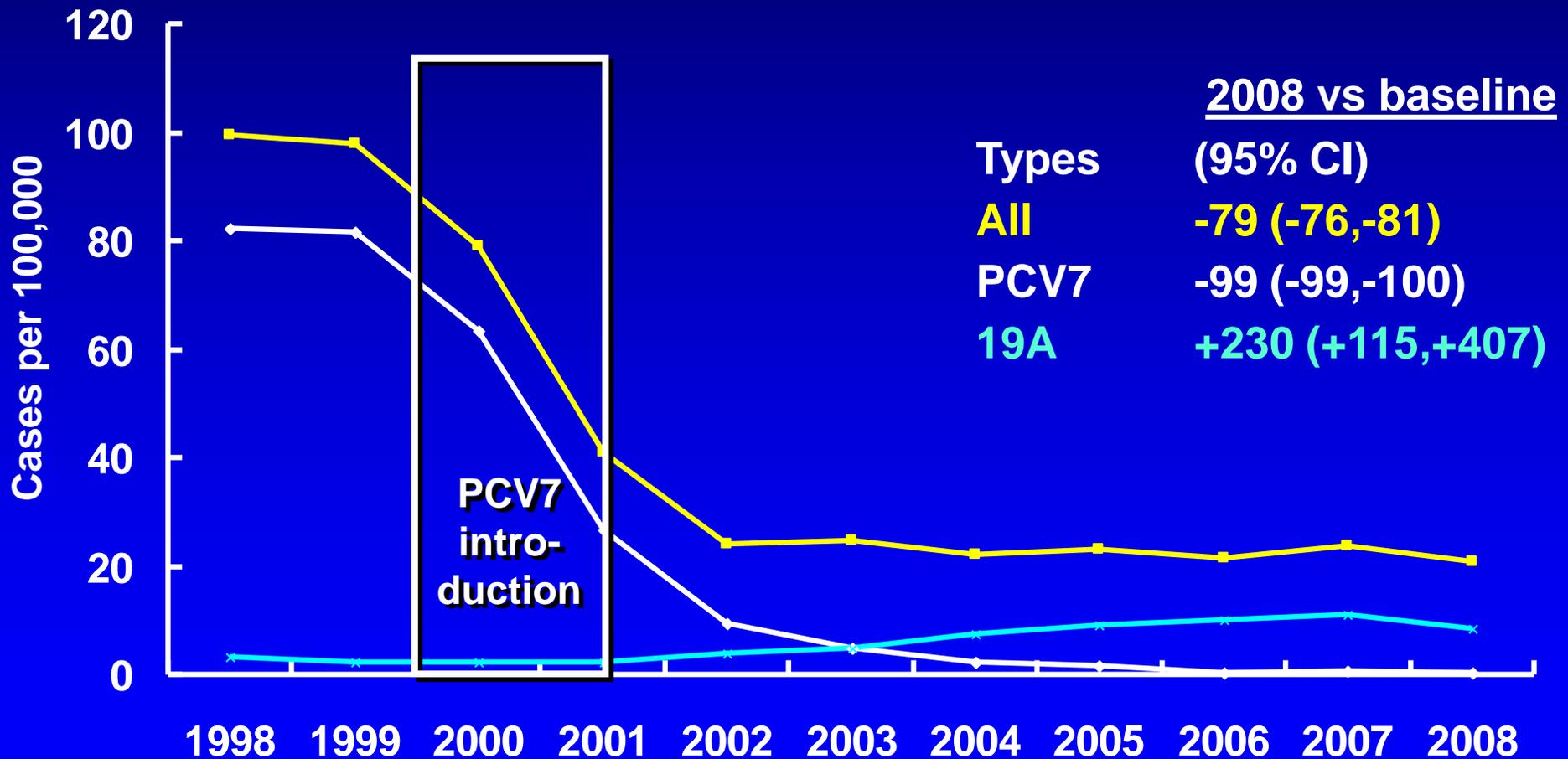
ed influenza vaccine]) and live vaccines generally are avoided in persons with t <http://www.cdc.gov/vaccines/pubs/acip-list.htm>.

# Changes in the 2011 Adult Immunization Schedule

- **Universal influenza vaccination**
- **Re-ordered list of vaccines to keep all universally-recommended vaccines together**
- **Restarting vaccination series**
- **Revaccination with PPSV**
- **Meningococcal conjugate 2-dose series**
- **Permissive use of Tdap vaccine in adults 65 years of age and older and removal of minimal interval**

# Rates of Invasive Pneumococcal Disease Among Children <5 years old, 1998-2008

— Overall — PCV7 type — 19A



CDC Active Bacterial Core Surveillance, 2009

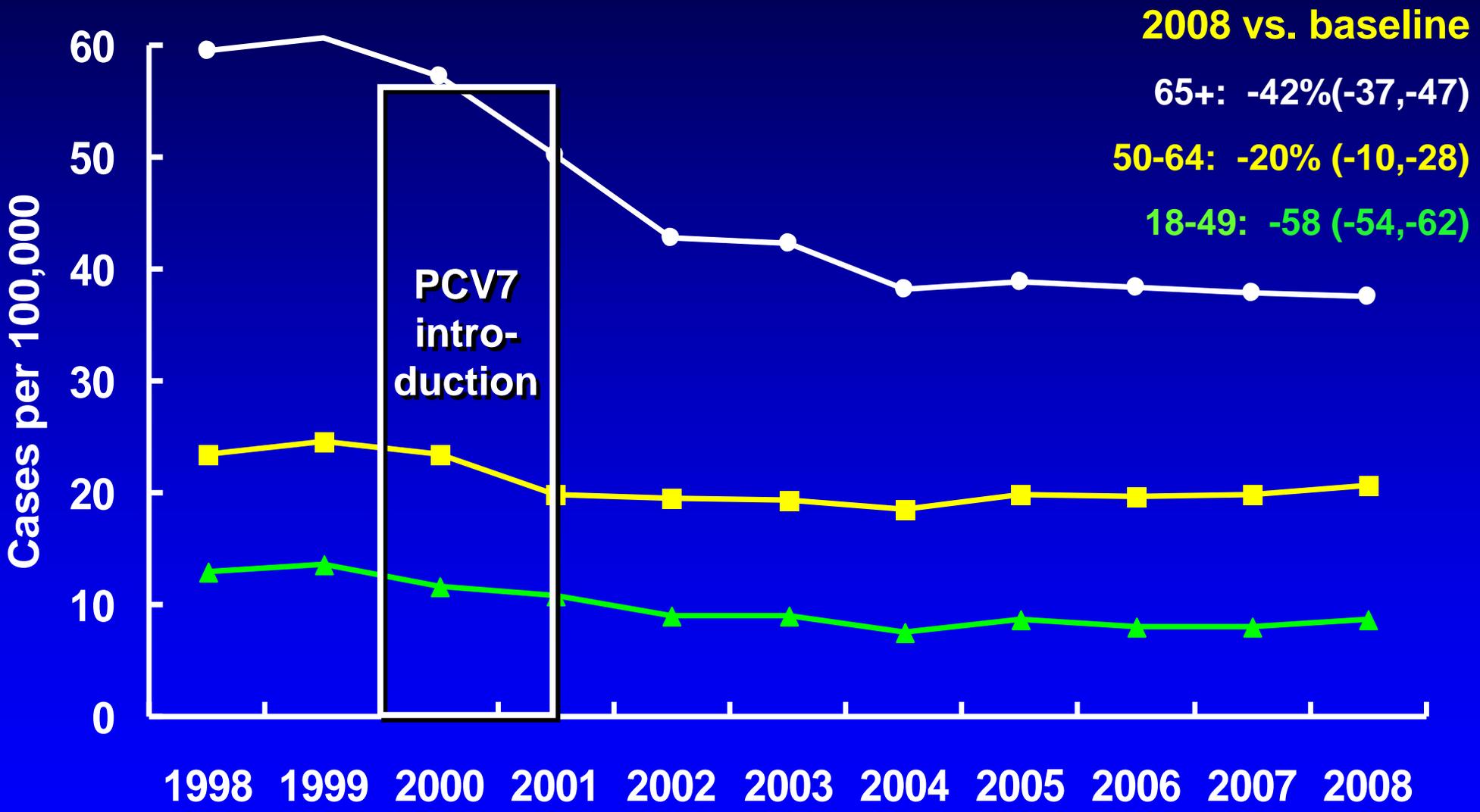
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# Pneumococcal Conjugate Vaccine, 13-valent (PCV13)

- In 2008, 61% of invasive pneumococcal disease cases among children younger than 5 years were attributable to the serotypes included in PCV13
- Serotype 19A accounted for 43% of cases

# Rates of Invasive Pneumococcal Disease (all serotypes) Among Adults $\geq 18$ Years-Old



Moore, IDSA, 2009. ABCs 1998-2008



# Pneumococcal Conjugate Vaccine, 13-valent (PCV13)

- Contains the same serotypes of *S. pneumoniae* as PCV7 plus 6 additional serotypes (including 19A)
- Approved by FDA for use among children 6 weeks through 71 months of age
- Same 4-dose schedule as PCV7
- Series started the PCV7 should be completed with PCV13 if possible

MMWR 2010;59(No. 6):258-61

# ACIP Recommendations for PCV13 Supplemental Dose

- **A single supplemental dose of PCV13 is recommended for children who have received a complete age-appropriate series of PCV7**
  - **all children 14 through 59 months**
  - **children with an underlying medical condition 60 through 71 months (including those who have already received a dose of PPSV)**

TABLE 2. Underlying medical conditions that are indications for pneumococcal vaccination among children, by risk group

Risk group	Condition
Immunocompetent children	Chronic heart disease*
	Chronic lung disease†
	Diabetes mellitus
	Cerebrospinal fluid leaks
	Cochlear implant
Children with functional or anatomic asplenia	Sickle cell disease and other hemoglobinopathies
	Congenital or acquired asplenia, or splenic dysfunction
Children with immunocompromising conditions	HIV infection
	Chronic renal failure and nephrotic syndrome
	Diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas and Hodgkin disease; or solid organ transplantation
	Congenital immunodeficiency <sup>§</sup>

Source: Advisory Committee on Immunization Practices, 2010.

\* Particularly cyanotic congenital heart disease and cardiac failure.

† Including asthma if treated with high-dose oral corticosteroid therapy.

§ Includes B- (humoral) or T-lymphocyte deficiency; complement deficiencies, particularly C1, C2, C3, and C4 deficiency; and phagocytic disorders (excluding chronic granulomatous disease).

# ACIP Recommendations for PCV13 Supplemental Dose

- A single dose of PCV13 may be administered to children 6 through 18 years of age\* who are at increased risk for invasive pneumococcal disease
  - functional or anatomic asplenia, including sickle cell disease
  - HIV infection and other immunocompromising conditions
  - cochlear implant
  - CSF leak

\*off-label recommendation. *MMWR* 2010;59(No. RR-11):1-19



# MMWR<sup>TM</sup>

**Morbidity and Mortality Weekly Report**

[www.cdc.gov/mmwr](http://www.cdc.gov/mmwr)

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Recommendations and Reports

December 10, 2010 / Vol. 59 / No. RR-11

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## **Prevention of Pneumococcal Disease Among Infants and Children – Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine**

**Recommendations of the Advisory Committee on Immunization Practices (ACIP)**

**TABLE 9. Recommended schedule for administering doses of 13-valent pneumococcal conjugate vaccine (PCV13) to children aged <24 months by PCV vaccination history and age — Advisory Committee on Immunization Practices, United States, 2010**

Age at this visit (mos)	Vaccination history: total number of PCV7 and/or PCV13 doses received previously	Recommended PCV13 regimen*
2–6 mos	0 doses	3 doses, 8 weeks apart; fourth dose at age 12–15 mos
	1 dose	2 doses, 8 weeks apart; fourth dose at age 12–15 mos
	2 doses	1 dose, 8 weeks after the most recent dose; fourth dose at age 12–15 mos
7–11 mos	0 doses	2 doses, 8 weeks apart; third dose at 12–15 mos
	1 or 2 doses before age 7 mos	1 dose at age 7–11 mos, with a second dose at 12–15 mos, ≥8 weeks later
12–23 mos	0 doses	2 doses, ≥8 weeks apart
	1 dose before age 12 mos	2 doses, ≥8 weeks apart
	1 dose at ≥12 mos	1 dose, ≥8 weeks after the most recent dose <sup>†</sup>
	2 or 3 doses before age 12 mos	1 dose, ≥8 weeks after the most recent dose <sup>†</sup>
	4 doses of PCV7 or other age-appropriate, complete PCV7 schedule	1 supplemental dose ≥8 weeks after the most recent dose

**Abbreviation:** PCV7 = 7-valent pneumococcal polysaccharide-protein conjugate vaccine.

\* Minimum interval between doses is 8 weeks except for children vaccinated at age <1 year, for whom minimum interval between doses is 4 weeks.

<sup>†</sup> No additional PCV13 doses are indicated for children aged 12–23 months who have received 2 or 3 doses of PCV7 before age 12 months and at least 1 dose of PCV13 at age ≥12 months.

# New Pneumococcal Polysaccharide Vaccine Recommendations

- Routine pneumococcal polysaccharide vaccination is recommended for adults 19 through 64 years of age:
  - with asthma
  - who smoke cigarette
- Data are insufficient to recommend vaccination for persons younger than 19 years with asthma or who smoke

*MMWR* 2010;59(No. 34):1102-6

# Changes in the 2011 Adult Schedule for Persons 19 Years and Older

- **Universal influenza vaccination**
- **Re-ordered list of vaccines to keep all universally-recommended vaccines together**
- **Restarting vaccination series**

# Changes in the 2011 Schedule for Persons 0 Through 18 Years

- **Recommendations for PCV-13 added**
- **Guidance for administration of 1 or 2 doses of seasonal influenza vaccine based upon the child's history of monovalent 2009 H1N1 vaccination**

# Influenza Vaccination Recommendation

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- Annual influenza vaccination is recommended for every person in the United States 6 months of age and older

*MMWR* 2010;59(RR-8)

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# Rationale: Recommendation to Vaccinate All Persons 6 Months of Age or Older

- **Morbidity and mortality occurs in all age groups, including among adults 19-49 years of age**
- **Some persons who have influenza complications**
  - **have no previously identified risk factors**
  - **have risk factors but are unaware that they should be vaccinated, or**
  - **might be at risk due to newly identified risk factors**
- **Simplicity**

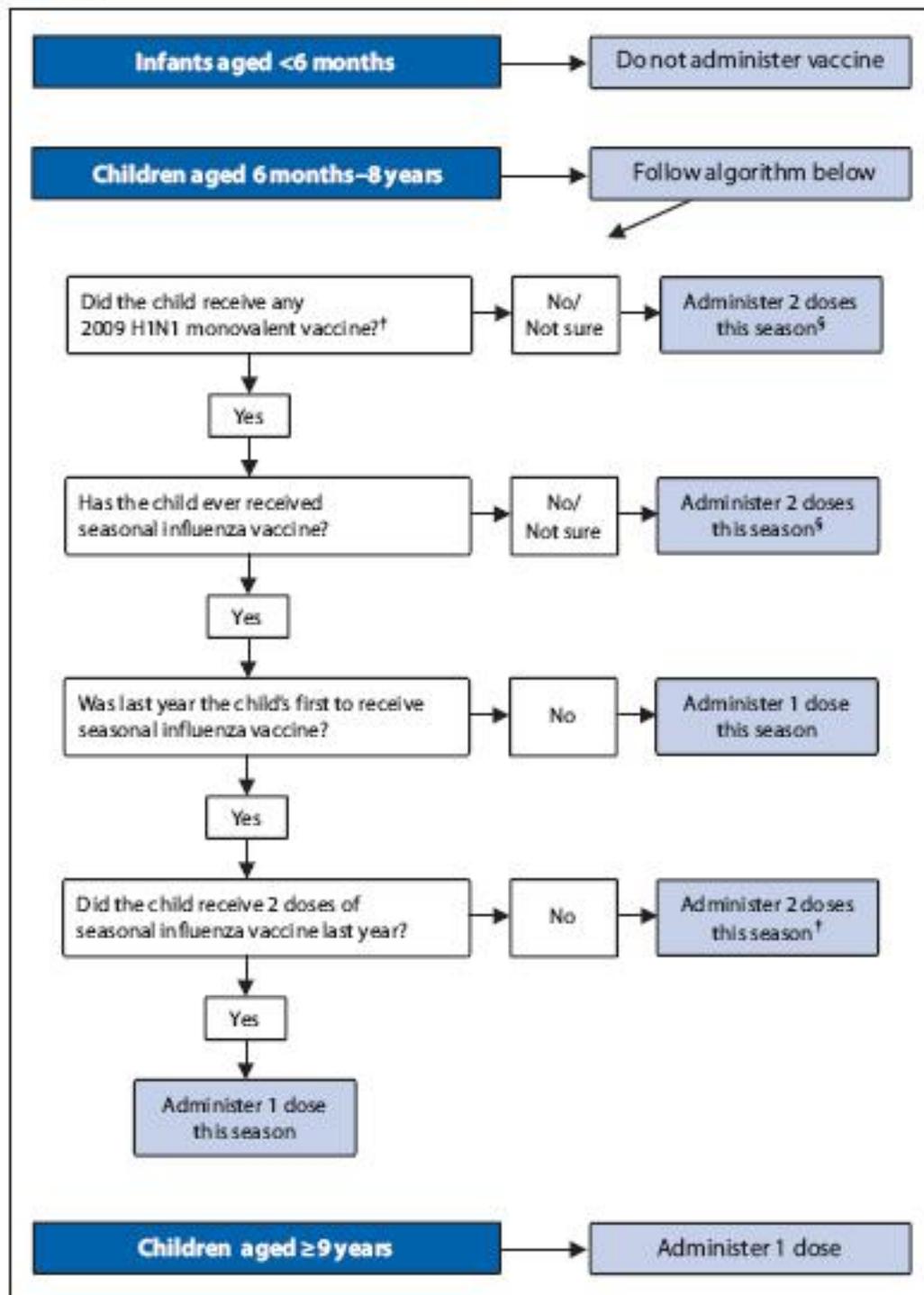
*MMWR* 2010;59(RR-8)

# Obesity as New Risk Factor for Severe Illness due to 2009 H1N1

- Disproportionate number of obese, particularly morbidly obese, among severely ill during 2009 H1N1 pandemic
- Morbid obesity ( $BMI \geq 40$ ) was associated with hospitalization, and possibly death, due to 2009 H1N1 infection among adults without chronic medical conditions
- Additional studies with larger samples of patients and appropriate comparison groups are needed

Morgan OW, et al. PLOS ONE, 2010

FIGURE 3. Number of 2010–2011 seasonal influenza vaccine doses recommended for children



# Influenza Vaccination Schedule

- One dose is recommended for most people
- 2 doses recommended for
  - children younger than 9 years who are receiving seasonal influenza vaccine for the first time
  - children younger than 9 years who vaccinated for the first time in the previous season but received only 1 dose

# Pop Quiz #1

## To Vaccinate or Not To Vaccinate?

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- An 8 year old child is being vaccinated for the first time
- When the child returns for the second dose he/she is now 9 years old
- Should the second dose be given?

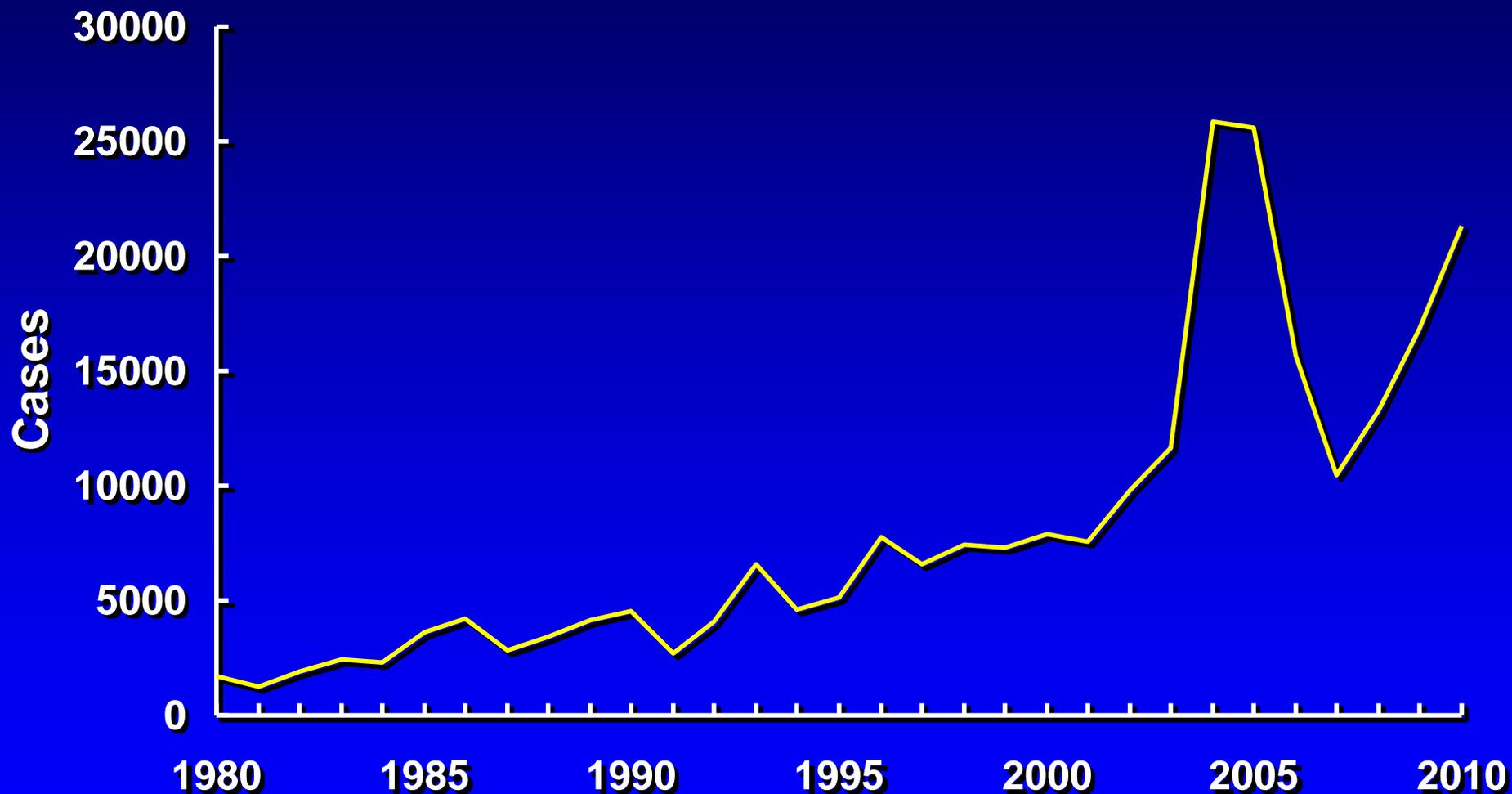
# Pop Quiz #1

## To Vaccinate or Not To Vaccinate?

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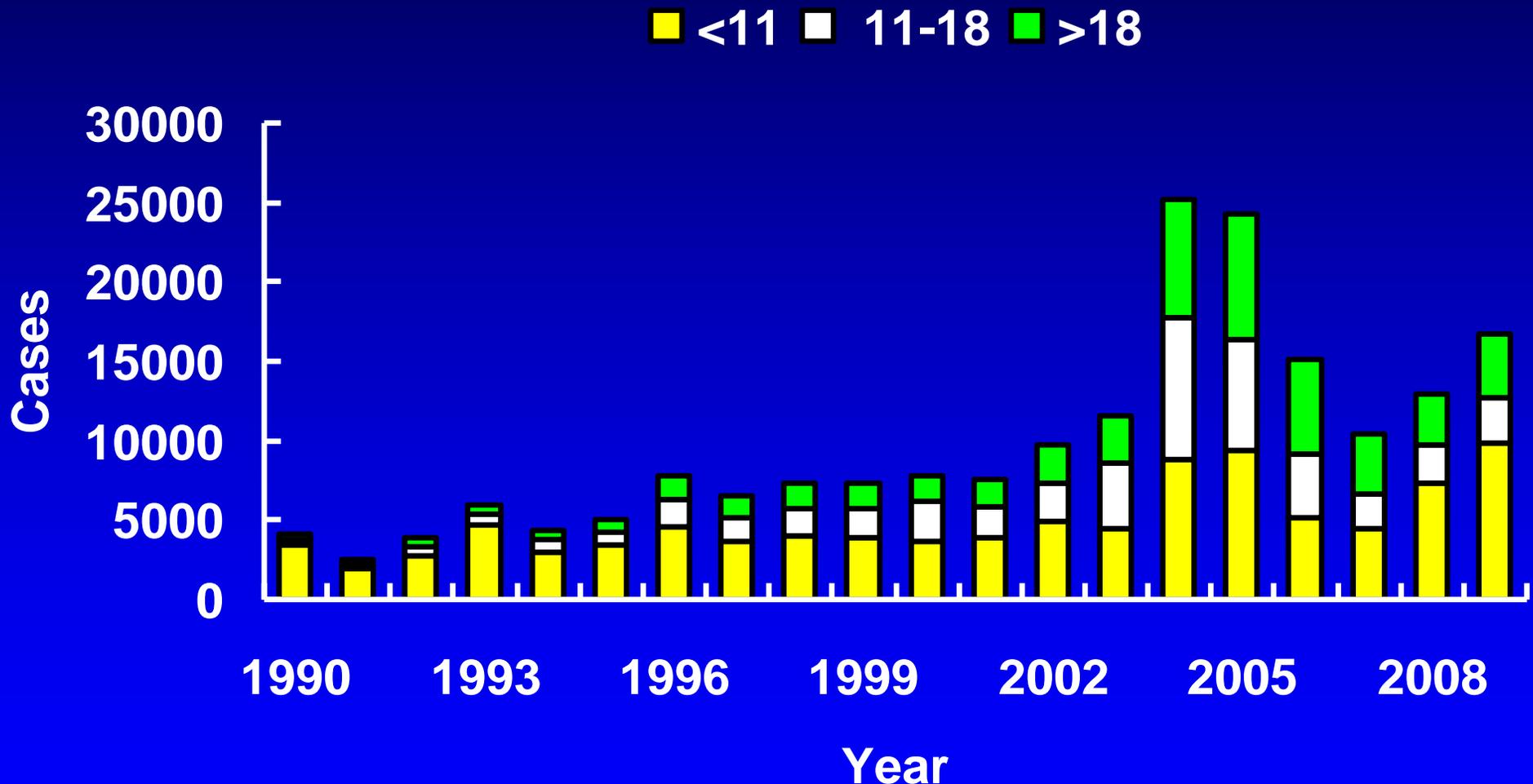
- An 8 year old child is being vaccinated for the first time
- When the child returns for the second dose he/she is now 9 years old
- Should the second dose be given?
  
- No. The second dose is not needed in this situation.

# Pertussis—United States, 1980-2010\*



\*2010 provisional data

# Reported Pertussis by Age Group, 1990-2009



CDC, unpublished data, 2010

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# Pertussis Deaths in the United States, 2000-2009

Age at onset		Total
<3 mos	≥3 mos	
175	19	194
(90%)	(10%)	

CDC, unpublished data, 2010

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# Tdap

- Tdap reduces the risk of pertussis by 60% - 80%
- Tdap approved ages
  - 10 through 64 years for Boostrix
  - 11 through 64 years for Adacel
  - Schedule: One time only dose (IM)
- Tdap is not approved by the FDA for children 7 through 9 years or adults 65 years or older

Wei SC et al. *Clin Infect Dis* 2010;51:315-21

# Immunization Schedule for Persons Aged 7 Through 18 Years - 2011

## Recommended Immunization Schedule for Persons Aged 7 Through 18 Years—United States • 2011

For those who fall behind or start late, see the schedule below and the catch-up schedule

Vaccine ▼	Age ►	7–10 years	11–12 years	13–18 years	
Tetanus, Diphtheria, Pertussis <sup>1</sup>			Tdap	Tdap	Range of recommended ages for all children
Human Papillomavirus <sup>2</sup>	see footnote <sup>2</sup>		HPV (3 doses) (females)	HPV Series	
Meningococcal <sup>3</sup>		MCV4	MCV4	MCV4	Range of recommended ages for catch-up immunization
Influenza <sup>4</sup>		Influenza (Yearly)			
Pneumococcal <sup>5</sup>		Pneumococcal			Range of recommended ages for certain high-risk groups
Hepatitis A <sup>6</sup>		HepA Series			
Hepatitis B <sup>7</sup>		Hep B Series			
Inactivated Poliovirus <sup>8</sup>		IPV Series			
Measles, Mumps, Rubella <sup>9</sup>		MMR Series			
Varicella <sup>10</sup>		Varicella Series			

This schedule includes recommendations in effect as of December 21, 2010. 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. Considerations should include provider assessment, patient preference, and the potential for adverse events. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations: <http://www.cdc.gov/vaccines/pubs/acip-list.htm>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS) at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

# Tdap Recommendations for Adolescents

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- All adolescents should preferably receive Tdap at the 11 to 12 year-old preventive healthcare visit
- Persons 11 through 18 years of age who have not received Tdap should receive a dose followed by Td booster doses every 10 years

*MMWR* 2011; 60 (No. 1):13-5

# New Tdap Recommendations for Adolescents

- Persons 7 through 10 years of age who are *not fully immunized* against pertussis (including those never vaccinated or with unknown pertussis vaccination status) should receive a **single dose** of Tdap\*
- Either brand may be used
- If Tdap is given at this age a second dose at 11-12 years is not needed

\*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-5

# New Tdap Recommendations for Adolescents

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- **“Not fully immunized”**
  - fewer than 4 doses of DTaP, or
  - 4 doses of DTaP and last dose was prior to age 4 years

*MMWR* 2011; 60 (No. 1):13-5

# New Tdap Recommendations for Adults

- **Adults 65 years of age and older who have or who anticipate having close contact with an infant younger than 12 months of age and who have not previously received Tdap should receive a single dose of Tdap\***
- **Other adults 65 years of age and older may receive a dose of Tdap\***

**\*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-5**

# Tdap and Healthcare Personnel (HCP)

- **Unvaccinated HCP, regardless of age\*, should receive a single dose of Tdap as soon as feasible**



**\*off-label recommendation. Approved by ACIP on Feb 23, 2011**

# Tdap and Healthcare Personnel (HCP)

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- **Tdap is not currently licensed or recommended for more than one dose**
  - **after receipt of Tdap, HCP should receive routine booster immunization against tetanus and diphtheria according to previously published guidelines**

# Tdap and Healthcare Personnel (HCP)

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- **Hospitals and ambulatory-care facilities should provide Tdap for HCP and use approaches that maximize vaccination rates (e.g., education about benefits of vaccination, convenient access, and at no charge)**

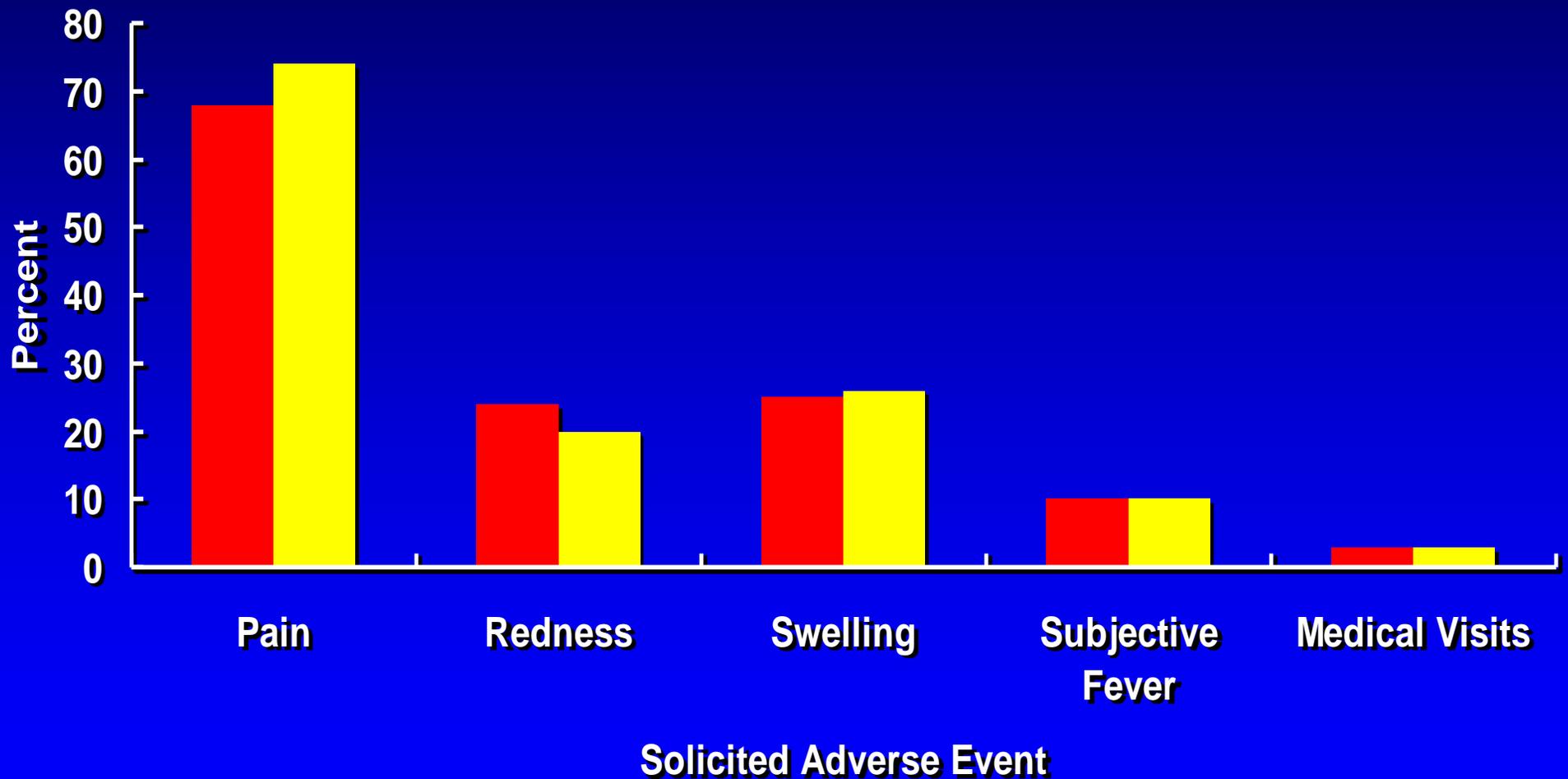
# Td-Tdap Interval Recommendation

- Tdap can be administered regardless of the interval since the last tetanus and diphtheria containing vaccine\*
- ACIP concluded that while longer intervals between Td and Tdap vaccination could decrease the occurrence of local reactions, the benefits of protection against pertussis outweigh the potential risk for adverse events

\*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-5

# Tdap Adverse Event Rates by Interval Since Previous Td/TT

■ < 2 yrs since Td/TT ■ ≥ 2 yrs since Td/TT



Talbot et al. *Vaccine* 2010;28:8001-7

## Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis (Tdap) Vaccine from the Advisory Committee on Immunization Practices, 2010

Despite sustained high coverage for childhood pertussis vaccination, pertussis remains poorly controlled in the United States. A total of 16,858 pertussis cases and 12 infant deaths were reported in 2009 (1; CDC, unpublished data, 2009). Although 2005 recommendations by the Advisory Committee on Immunization Practices (ACIP) called for vaccination with tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) for adolescents and adults to improve immunity against pertussis, Tdap coverage is 56% among adolescents and <6% among adults (2,3). In October 2010, ACIP recommended expanded use of Tdap. This report provides the updated recommendations, summarizes the safety and effectiveness data considered by ACIP, and provides guidance for implementing the recommendations.

ACIP recommends a single Tdap dose for persons aged 11

the United States, the additional recommendations are made to facilitate use of Tdap to reduce the burden of disease and risk for transmission to infants (Box).

### Timing of Tdap Following Td

**Safety.** When Tdap was licensed in 2005, the safety of administering a booster dose of Tdap at intervals <5 years after Td or pediatric DTP/DTaP had not been studied in adults. However, evaluations in children and adolescents suggested that the safety of intervals as short as 18 months was acceptable (6). Rates of local and systemic reactions after Tdap vaccination in adults were lower than or comparable to rates in adolescents during U.S. prelicensure trials; therefore, the safety of using intervals as short as 2 years between Td and Tdap in adults was inferred (4).

# Meningococcal Vaccines

- **Meningococcal polysaccharide vaccine**
  - first licensed in 1974
  - limited indications
- **Meningococcal conjugate vaccines**
  - First licensed in 2005
  - only vaccine recommended for routine use among civilians

# Menactra MCV4 Vaccine

- Quadrivalent polysaccharide vaccine (A, C, Y, W-135) conjugated to diphtheria toxoid
- Approved for a single dose among persons **9 months\*** through 55 years of age
- FDA approval based on serologic non-inferiority compared to meningococcal polysaccharide vaccine

**\*as of April 22, 2011**

# Menveo MCV4 Vaccine

- **Approved by FDA in February 2010 for a single dose among persons 2 through 55 years of age**
- **Lyophilized serogroup A vaccine reconstituted with liquid containing serogroups C, Y, and W135**
- **FDA approval based upon serologic non-inferiority to Menactra**

# Meningococcal Conjugate Vaccine (MCV4) Issues

## Issue

- Inadequate response to a single dose of MCV4
- Waning immunity following 1 dose of MCV4
- Routine vaccination of infants

## Solution

- Routine 2-dose primary series
- Revaccination of some MCV4 recipients
- New vaccine or change in FDA licensure

# Persons at Highest Risk of Meningococcal Disease or Suboptimal Vaccine Response

- **Complement deficiency**
  - very high antibody titer required to compensate for complement deficiency
- **Asplenia**
  - evidence of suboptimal response
- **Single dose primary series may not be sufficient to confer protection for persons with these high-risk conditions**

# New MCV4 Recommendations

- Administer 2 doses\* of MCV4 at least 8 weeks apart to persons with persistent complement component deficiency and anatomic or functional asplenia, and 1 dose every 5 years\* thereafter

\* off-label recommendations. *MMWR* 2011;60(No. 3):72-6.

# MCV4 Recommendations and HIV

- HIV infection alone is **not** an indication for MCV4 vaccination
- Persons with HIV infection show evidence of suboptimal response to vaccination
- Some persons with HIV infection should receive MCV4 (adolescents, some international travelers, microbiologists, etc)
- Persons with HIV infection who are vaccinated with MCV4 should receive 2 doses at least 8 weeks apart\*

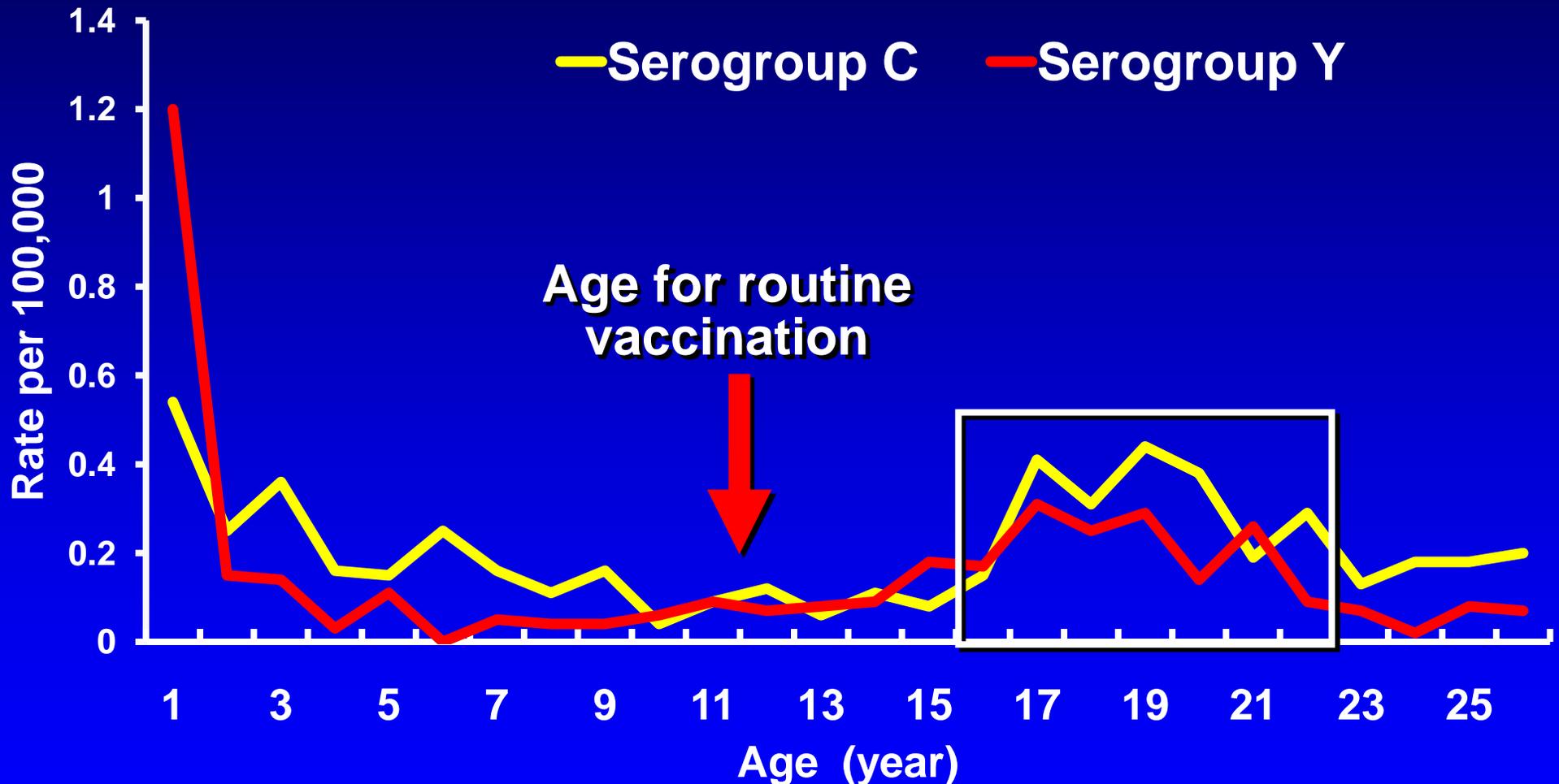
\*off-label recommendation. *MMWR* 2011;60(No. 3):72-6.

# New MCV4 Recommendations

- **Persons with complement component deficiency, asplenia who previously received 1 dose should receive a second dose\* at the earliest opportunity**
- **Persons with HIV who previously received 1 dose *and for whom vaccination is still indicated* should be given a second dose\***

\*off-label recommendations. *MMWR* 2011;60(No. 3):72-6.

# Rates of Meningococcal Disease (C and Y) by Age, 1999-2008



Active Bacterial Core surveillance (ABCs), 1998-2008

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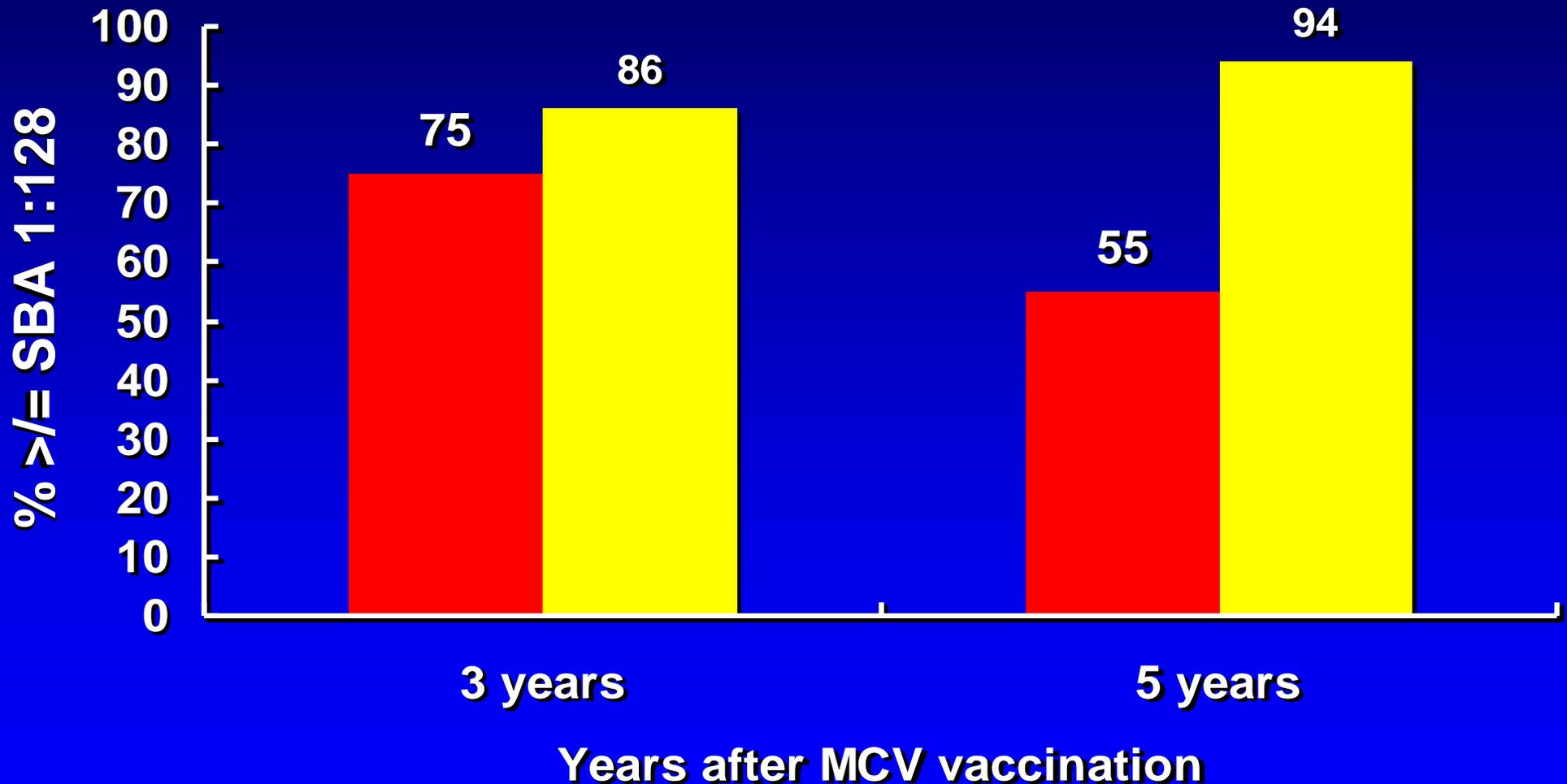
# Meningococcal Conjugate (MCV4) Revaccination

- In its 2005 recommendations for MCV, ACIP made no recommendation about revaccination pending the availability of additional data
- Serologic data are now available from the manufacturer that show significant decline in antibody 3-5 years after vaccination although few “breakthrough” cases have been reported

*MMWR* 2009;58(No. 37):1042-3

# Seroprotection Rates Following MCV Vaccination

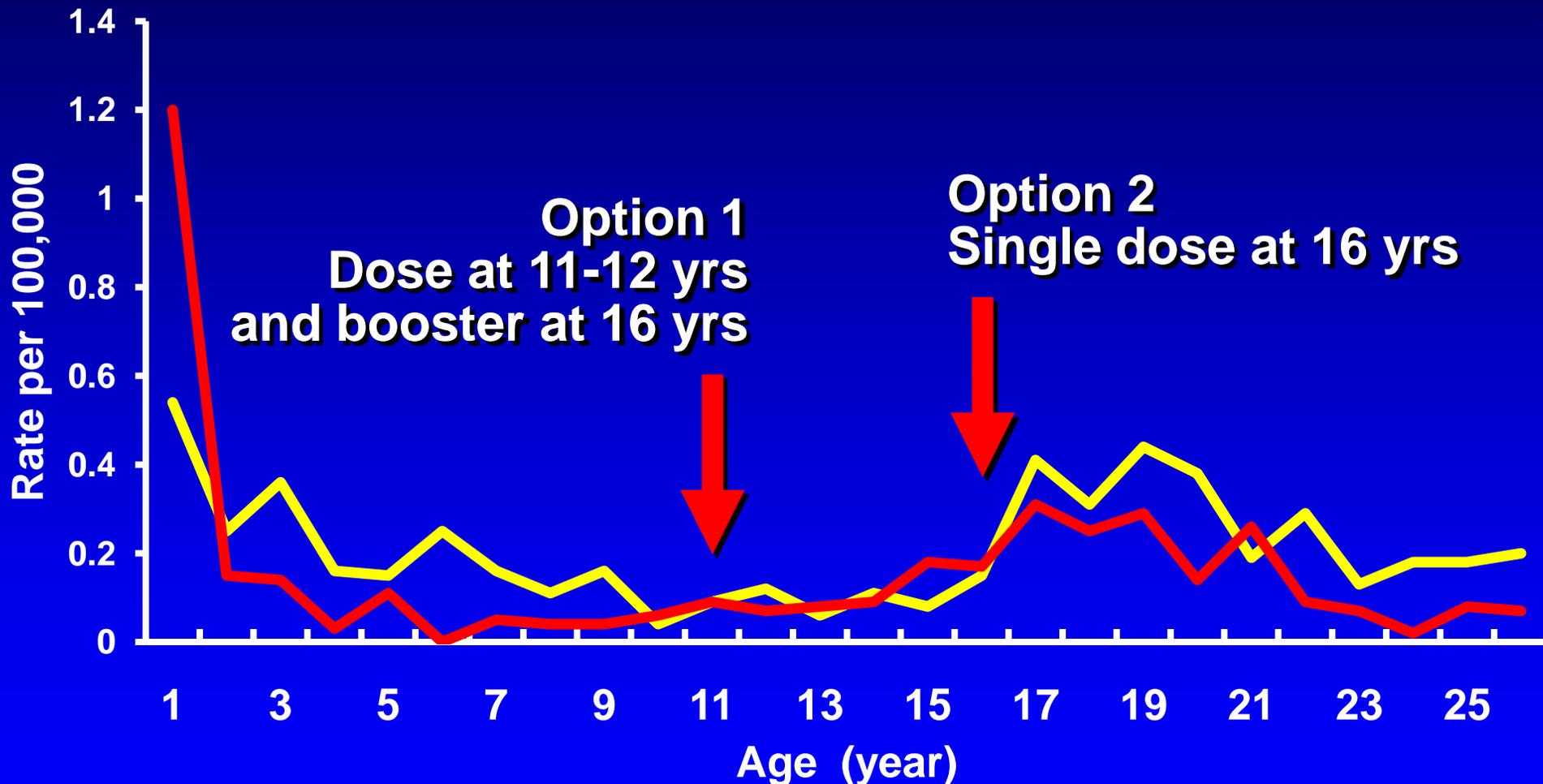
■ C ■ Y



MMWR 2009;58(No. 37):1042-3

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# Rates of Meningococcal Disease (C and Y) by Age, 1999-2008



Active Bacterial Core surveillance (ABCs), 1998-2008

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# New MCV4 Recommendations\*

- **New recommendations**
  - administer MCV4 at age 11 or 12 years with a **booster dose** at 16 years of age
  - administer 1 dose at age 13 through 15 years if not previously vaccinated
  - for persons vaccinated at age 13 through 15 years administer a 1-time booster dose is recommended, preferably at or after 16 through 18 years of age

\*off-label recommendation. *MMWR* 2011;60(No. 3):72-6.

# **New MCV4 Adolescent Vaccination Recommendations**

- **The minimum interval between doses is 8 weeks**
- **A booster dose is not recommended for healthy persons if the first dose is administered at 16-21 years of age**
- **A booster dose is not recommended for healthy persons 22 years or older even if the first dose is administered at 11-15 years of age**
- **The booster dose should always be MCV4 (not MPSV4)**

## Updated Recommendations for Use of Meningococcal Conjugate Vaccines — Advisory Committee on Immunization Practices (ACIP), 2010

On October 27, 2010, the Advisory Committee on Immunization Practices (ACIP) approved updated recommendations for the use of quadrivalent (serogroups A, C, Y, and W-135) meningococcal conjugate vaccines (Menveo, Novartis; and Menactra, Sanofi Pasteur) in adolescents and persons at high risk for meningococcal disease. These recommendations supplement the previous ACIP recommendations for meningococcal vaccination (1,2). The Meningococcal Vaccines Work Group of ACIP reviewed available data on immunogenicity in high-risk groups, bactericidal antibody persistence after immunization, current epidemiology, vaccine effectiveness (VE), and cost-effectiveness of different strategies for vaccination of adolescents. The Work Group then presented policy options for consideration by the full ACIP. This report summarizes two new recommendations approved by ACIP: 1) routine vaccination of adolescents, preferably at age 11 or

Meningococcal disease incidence has decreased since 2000, and incidence for serogroups C and Y, which represent the majority of cases of vaccine-preventable meningococcal disease, are at historic lows. However, the peak in disease among persons aged 18 years (Figure) has persisted, even after routine vaccination was recommended in 2005. In the 2009 National Immunization Survey-Teen, 53.6% of adolescents aged 13 through 17 years had received a dose of meningococcal vaccine (3). From 2000–2004 to 2005–2009, the estimated annual number of cases of serogroups C and Y meningococcal disease decreased 74% among persons aged 11 through 14 years but only 27% among persons aged 15 through 18 years. Cases of meningococcal disease caused by serogroups C and Y among persons who were vaccinated with meningococcal conjugate vaccine have been reported. An early VE analysis that modeled expected cases of disease in vaccinated persons estimated a VE

TABLE 2. Summary of meningococcal conjugate vaccine recommendations, by risk group — Advisory Committee on Immunization Practices (ACIP), 2010

Risk group	Primary series	Booster dose
Persons aged 11 through 18 years	1 dose, preferably at age 11 or 12 years	At age 16 years if primary dose at age 11 or 12 years At age 16 through 18 years if primary dose at age 13 through 15 years No booster needed if primary dose on or after age 16 years
HIV-infected persons in this age group	2 doses, 2 months apart	At age 16 years if primary dose at age 11 or 12 years At age 16 through 18 years if primary dose at age 13 through 15 years No booster needed if primary dose on or after age 16 years
Persons aged 2 through 55 years with persistent complement component deficiency* or functional or anatomical asplenia	2 doses, 2 months apart	Every 5 years At the earliest opportunity if a 1-dose primary series administered, then every 5 years
Persons aged 2 through 55 years with prolonged increased risk for exposure†	1 dose	Persons aged 2 through 6 years: after 3 years Persons aged 7 years or older: after 5 years <sup>§</sup>

Abbreviation: HIV = human immunodeficiency virus.

\* Such as C5–C9, properidin, or factor D.

† Microbiologists routinely working with *Neisseria meningitidis* and travelers to or residents of countries where meningococcal disease is hyperendemic or epidemic.

§ If the person remains at increased risk.

# MCV Revaccination Recommendations

- Other high-risk persons recommended for revaccination
  - microbiologists with prolonged exposure to *Neisseria meningitidis*
  - frequent travelers to or persons living in areas with high rates of meningococcal disease
- Revaccinate **every 5 years\*** as long as the person remains at increased risk
  - MCV for persons 2 through 55 years of age
  - MPSV for persons 56 years and older

\*off-label recommendation. *MMWR* 2009;58(No. 37):1042-3

# Interchangeability of MCV4 Brands

- No data are available on the interchangeability of MCV4 brands
- Whenever feasible, the same brand of vaccine should be used for all doses of the vaccination series
- If vaccination providers do not know or have available the type of vaccine product previously administered, any product should be used to continue or complete the series

*MMWR* 2011;60(No. 2):72-6.

## Sanofi Pasteur Announces FDA Approval of Menactra Meningococcal Conjugate Vaccine Indication for Infants



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### - Indication Provides New Option to Help Protect Earlier Against Meningococcal Disease -

SWIFTWATER, Pa., April 22, 2011 /PRNewswire/ -- Sanofi Pasteur, the vaccines division of the sanofi-aventis Group (EURONEXT: SAN and NYSE: [SNY](#)), announced today that the U.S. Food and Drug Administration (FDA) has granted licensure to expand the indication for its meningococcal conjugate vaccine, Menactra® (Meningococcal [Groups A, C, Y and W-135] Polysaccharide Diphtheria Toxoid Conjugate Vaccine), to include a two-dose schedule for infants and children 9 months through 23 months of age. This is the first U.S. approval of a meningococcal vaccine for this age group.



(Photo: <http://photos.prnewswire.com/prnh/20110422/NY88254> )

"Licensure of Menactra vaccine for infants as young as 9 months of age gives the opportunity to help protect infants against this potentially deadly disease when the likelihood of exposure supports a need for early protection," said Stephen I. Pelton, MD, Professor of Pediatrics and Epidemiology, Boston University Schools of Medicine and Public Health and Chief, section of Pediatric Infectious Diseases, Boston Medical Center.

Meningococcal disease is a rare but deadly disease caused by the bacterium *Neisseria meningitidis*. The disease can

# Herpes Zoster Vaccine (Zostavax)

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- Administered to persons who had chickenpox to reduce the risk of subsequent development of zoster and postherpetic neuralgia
- Contains live varicella vaccine virus in much larger amount (14x) than standard varicella vaccine (Varivax)
- Reduces the risk of zoster ~50% in persons 60 years and older

*NEJM* 2005;352(22):2271-84

# Zoster Vaccine

- On March 24, 2011 the Food and Drug Administration approved a label change for zoster vaccine to include persons 50 through 59 years of age
- ACIP has not yet recommended vaccination of persons younger than 60 years
- An ACIP recommendation is not necessary for clinicians to use a vaccine according to license

# ACIP Recommendations for Zoster Vaccine

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- **Adults 60 years and older should receive a single dose of zoster vaccine**
- **Need for booster dose or doses not known at this time**
- **A history of herpes zoster should not influence the decision to vaccinate**

*MMWR* 2008;57(RR-5)

DEPARTMENT OF HEALTH AND HUMAN SERVICES

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# Zoster Vaccination After Shingles

- ACIP did not define an interval between recovery from shingles and administration of zoster vaccine
- People recover from shingles because of an immune response to varicella zoster virus
- It seems prudent to defer zoster vaccination for a few months to allow the shingles-induced immune response to wane

# Zoster Vaccine

- It is not necessary to inquire about chickenpox or test for varicella immunity before administering zoster vaccine
- Persons 60 years of age and older can be assumed to be immune\* regardless of their recollection of chickenpox

*MMWR* 2008;57(RR-5)

\*for the purpose of establishing eligibility for zoster vaccine

# Serologic Testing for Varicella Immunity

- If a person 60 years or older is tested for varicella antibody and found to be negative
  - administer 2 doses of regular varicella vaccine (not zoster vaccine)
  - zoster vaccine is not indicated for persons whose immunity is based upon varicella vaccination

**HIGHLIGHTS OF PRESCRIBING INFORMATION**

These highlights do not include all the information needed to use ZOSTAVAX<sup>1</sup> safely and effectively. See full prescribing information for ZOSTAVAX.

**ZOSTAVAX<sup>®</sup>****Zoster Vaccine Live**

Suspension for subcutaneous injection

Initial U.S. Approval: 2006

-----**INDICATIONS AND USAGE**-----  
ZOSTAVAX is a live attenuated virus vaccine indicated for prevention of herpes zoster (shingles) in individuals 60 years of age and older (1). ZOSTAVAX is not indicated for the treatment of zoster or postherpetic neuralgia (PHN) (1).

-----**DOSAGE AND ADMINISTRATION**-----  
Single 0.65 mL subcutaneous injection (2.1)

-----**DOSAGE FORMS AND STRENGTHS**-----  
Single dose vials with not less than 19,400 plaque-forming units [PFU] per 0.65 mL dose when reconstituted to a suspension (2.1, 3, 16).

-----**CONTRAINDICATIONS**-----

- History of anaphylactic/anaphylactoid reaction to gelatin, neomycin, or any other component of the vaccine (4.1).
- History of primary or acquired immunodeficiency states (4.2).
- On immunosuppressive therapy (4.2).
- ZOSTAVAX is not indicated in women of child-bearing age and should not be administered to pregnant females (4.3, 8.1, 17.1).

- ZOSTAVAX is not indicated for prevention of primary varicella infection (Chickenpox) (5.2, 8.4).
- Transmission of vaccine virus may occur rarely between vaccinees and susceptible contacts (5.1).
- Defer vaccination in patients with active untreated tuberculosis (5.5).

-----**ADVERSE REACTIONS**-----  
The rate of serious adverse events (SAEs) from Days 0 to 42 postvaccination may be increased in recipients of ZOSTAVAX compared to recipients of placebo (Table 1, 6.1.1).

The most frequent vaccine-related adverse events, reported in  $\geq 1\%$  of subjects vaccinated with ZOSTAVAX, were headache and injection site reactions (6.1.1).

-----**DRUG INTERACTIONS**-----  
ZOSTAVAX and PNEUMOVAX<sup>®2</sup> 23 should not be given concurrently because concomitant use resulted in reduced immunogenicity of ZOSTAVAX (7.1, 14).

To report vaccine exposure during pregnancy call 1-800-986-8999.

To report **SUSPECTED ADVERSE REACTIONS**, contact Merck & Co., Inc. at 1-877-888-4231 or VAERS at 1-800-822-7967 and [www.fda.gov/vaers](http://www.fda.gov/vaers).

See 17 for **PATIENT COUNSELING INFORMATION** and FDA-Approved Patient Labeling.

Revised: 12/2009

# Zoster and Pneumococcal Polysaccharide (PPSV) Vaccines

- Zoster package insert advises that zoster and PPSV should not be administered concurrently
- Based on a study that showed the titer against VZV was lower in persons who received zoster and PPSV at the same visit compared to persons who received these vaccines 4 weeks apart
- The amount of antibody needed to prevent zoster is not known so the clinical significance of the Merck study is uncertain

# Zoster and PPSV Vaccines

- Study examined the incidence of zoster (per 1000 person-years) among persons in a large HMO 60 years and older who received zoster and PPSV vaccines on the same day or PPSV 30 to 365 days before zoster vaccine
  - same day 4.55
  - different visits 4.51

Tseng et al, Vaccine 2011 (in press)

# Zoster and PPSV Vaccines

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- CDC has **not** changed its recommendation for either vaccine
- Zoster and PPSV should be administered at the same visit if the person is eligible for both vaccines

# What's Next?

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- **Additional combination vaccines**
- **Meningococcal vaccination of infants**
- **More than 1 dose of Tdap?**
- **ACIP recommendation for HPV vaccination of males (currently a “permissive” recommendation)**
- **PCV13 vaccination of adults?**

# CDC Vaccines and Immunization Contact Information

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- **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/**