

2008: Immunizations Update

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Disclosures

- No financial conflict or interest with the manufacturer of any product named during this course.



Disclosures

- I will not present the use of any vaccine in a manner inconsistent with the label with the exception of rotavirus vaccine
- I will not present investigational new drugs



Overview

- 2008 Childhood/adolescent schedule
- 2007-08 Adult schedule
- Rotavirus vaccine
- Vaccine shortages
- Influenza season
- Measles outbreaks
- Zoster vaccine
- Combination vaccines
- General Recommendations



Recommended Immunization Schedule for Persons Aged 0-6 Years—UNITED STATES • 2008

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	24 months	2-3 years	4-6 years
Hepatitis A ^a	HepA		HepA				HepA					
Rotavirus ^b	Rota		Rota	Rota								
Diphtheria, Tetanus, Pertussis ^c	DTaP		DTaP	DTaP	DTaP	DTaP			DTaP			DTaP
Measles, Mumps, Rubella ^d	M/M/R		M/M	M/M	M/M	M/M			M/M			M/M
Poliovirus ^e	IPV		IPV	IPV	IPV	IPV			IPV			IPV
Inactivated Poliovirus ^e	IPV		IPV	IPV	IPV	IPV			IPV			IPV
Influenza ^f	Influenza (Yearly)											
Measles, Mumps, Rubella ^d	M/M/R								M/M/R			M/M/R
Varicella ^g	Varicella								Varicella			Varicella
Hepatitis A ^a	HepA (2 doses)								HepA Series			HepA Series
Meningococcal ^h	MCV4								MCV4			MCV4

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 31, 2007, for children aged 0 through 6 years. Additional information is available at www.cdc.gov/vaccines/imz/downloads.htm. Any dose not administered at the recommended age should be administered at any subsequent age, when indicated and feasible. Additional vaccine series may be licensed and recommended during the year. Current contraindications should be used whenever any component of the combination are indicated and other components of the vaccine are not contraindicated and approved by the Food and Drug Administration for that dose of the vaccine. Providers should consult the respective Advisory Committee on Immunization Practices statement for detailed recommendations, including for <http://www.cdc.gov/vaccines/imz/downloads.htm>. Directly reportable adverse events that follow immunization should be reported to the National Vaccine Injury Reporting System (NVIRS). Guidance about how to obtain and complete NVIRS form is available at www.cdc.gov/nvirs or by telephone, 800-833-2395.



Recommended Immunization Schedule for Persons Aged 7-18 Years—UNITED STATES • 2008

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

Vaccine	Age	7-10 years	11-12 years	13-18 years
Diphtheria, Tetanus, Pertussis ^c	DTaP	DTaP	Tdap	Tdap
Hansen Papillomavirus ^d	HPV (3 doses)	HPV Series	HPV Series	HPV Series
Meningococcal ^e	MCV4	MCV4	MCV4	MCV4
Pneumococcal ^f	PPV	PPV	PPV	PPV
Influenza ^g	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)
Hepatitis A ^a	HepA Series	HepA Series	HepA Series	HepA Series
Hepatitis B ^b	HBV Series	HBV Series	HBV Series	HBV Series
Inactivated Poliovirus ^e	IPV Series	IPV Series	IPV Series	IPV Series
Measles, Mumps, Rubella ^d	MMR Series	MMR Series	MMR Series	MMR Series
Varicella ^g	Varicella Series	Varicella Series	Varicella Series	Varicella Series

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 31, 2007, for children aged 7-18 years. Additional information is available at www.cdc.gov/vaccines/imz/downloads.htm. Any dose not administered at the recommended age should be administered at any subsequent age, when indicated and feasible. Additional vaccine series may be licensed and recommended during the year. Current contraindications should be used whenever any component of the combination are indicated and other components of the vaccine are not contraindicated and approved by the Food and Drug Administration for that dose of the vaccine. Providers should consult the respective Advisory Committee on Immunization Practices statement for detailed recommendations, including for <http://www.cdc.gov/vaccines/imz/downloads.htm>. Directly reportable adverse events that follow immunization should be reported to the National Vaccine Injury Reporting System (NVIRS). Guidance about how to obtain and complete NVIRS form is available at www.cdc.gov/nvirs or by telephone, 800-833-2395.



Catch-up Immunization Schedule
UNITED STATES • 2008

The table below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine's recommended age is indicated by the number in the column for the vaccine. Use the section appropriate for the child's age.

Vaccine	Minimum Interval Between Doses	Minimum Interval Between Doses			
		Age 1 to Age 2	Age 2 to Age 3	Age 3 to Age 4	Age 4 to Age 5
Hepatitis B ^a	8 wks	4 weeks	4 weeks	4 weeks	4 weeks
Diphtheria, Tetanus, Pertussis ^b	6 wks	4 weeks	4 weeks	4 weeks	4 weeks
Measles, mumps, rubella (MMR) ^b	6 wks	4 weeks	4 weeks	4 weeks	4 weeks
Poliovirus ^c	4 wks	4 weeks	4 weeks	4 weeks	4 weeks
Varicella ^d	12 mos	4 weeks	4 weeks	4 weeks	4 weeks
Rotavirus ^e	12 mos	4 weeks	4 weeks	4 weeks	4 weeks

CATCH-UP SCHEDULE FOR PERSONS AGED 7-18 YEARS

Vaccine	Minimum Interval Between Doses
Tetanus, diphtheria, pertussis (Tdap) ^b	10 years
Measles, mumps, rubella (MMR) ^b	4 weeks
Poliovirus ^c	4 weeks
Varicella ^d	12 mos

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FIGURE 1. Recommended adult immunization schedule, by vaccine and age group — United States, October 2007–September 2008

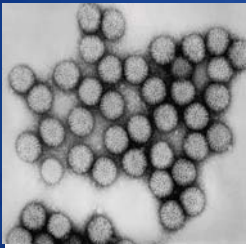
Vaccine	Age group (yrs)		
	19–49	50–64	≥65
Tetanus, diphtheria, pertussis (Tdap) ^a	1 dose (1st booster every 10 yrs)	1 dose (1st booster every 10 yrs)	1 dose (1st booster every 10 yrs)
Human papillomavirus (HPV) ^b	3 doses (0, 2, 6 mos)	2 doses (0, 2 mos)	1 dose (1st booster every 10 yrs)
Measles, mumps, rubella (MMR) ^b	1 or 2 doses	2 doses (0, 4–6 wks)	1 dose
Varicella ^b	1 dose annually	2 doses (0, 4–6 wks)	1 dose annually
Influenza ^b	1 dose annually	1 dose annually	1 dose annually
Pneumococcal polysaccharide ^b	1–2 doses	1 dose	1 dose
Hepatitis A ^b	2 doses (0, 6–12 mos, or 0, 6–18 mos)	2 doses (0, 6–12 mos, or 0, 6–18 mos)	2 doses (0, 6–12 mos, or 0, 6–18 mos)
Hepatitis B ^b	3 doses (0, 1–2, 4–6 mos)	3 doses (0, 1–2, 4–6 mos)	3 doses (0, 1–2, 4–6 mos)
Meningococcal ^b	1 or more doses	1 or more doses	1 or more doses
Zoster ^c	1 dose	1 dose	1 dose

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FIGURE 2. Vaccines that might be indicated for adults based on medical and other indications — United States, October 2007–September 2008

Vaccine	Indications
Tetanus, diphtheria, pertussis (Tdap) ^a	1 dose (1st booster every 10 yrs)
Human papillomavirus (HPV) ^b	3 doses for persons through age 26 yrs (0, 2, 6 mos)
Measles, mumps, rubella (MMR) ^b	1 or 2 doses
Varicella ^b	2 doses (0, 4–6 wks)
Influenza ^b	1 dose (1st booster every 10 yrs)
Pneumococcal polysaccharide ^b	1–2 doses
Hepatitis A ^b	2 doses (0, 6–12 mos, or 0, 6–18 mos)
Hepatitis B ^b	3 doses (0, 1–2, 4–6 mos)
Meningococcal ^b	1 or more doses
Zoster ^c	1 dose

Rotavirus



- Most common cause of severe diarrhea in children
- All children worldwide infected by age 5
- Improvements in sanitation won't substantially reduce disease incidence
- Limited strains in circulation


Rotavirus Disease in the United States

- Annually responsible for:
 - >400,000 physician visits
 - 160,000 emergency dept visits
 - 55,000-70,000 hospitalizations
 - 20-60 deaths

MMWR 2006:55 (RR-12)

Pentavalent Rotavirus Vaccine (RotaTeq®)

- Approved by FDA in February 2006
- Contains 5 strains of live human-bovine reassortant rotavirus



RotaTeq®

- Oral vaccine suspended in a liquid buffer/stabilizer
 - Does not require feeding or antacid before dosing to neutralize stomach acid
 - Stored refrigerated (36° to 45°F) with 24-month shelf life



Rotarix® Rotavirus Vaccine



- Approved by FDA in April 2008
- Contains one strain of live attenuated human rotavirus (G1P[8])



Rotarix® Rotavirus Vaccine

- Lyophilized vaccine requiring reconstitution with diluent
- Uses a transfer adaptor (no needle)
- Stored refrigerated (36° to 45°F)



Current Rotavirus Vaccine Recommendations

- Routine immunization of all infants without contraindications
- Series may be started as early as 6 weeks of age
- RotaTeq – 3 doses (2,4,6 months)
- Rotarix – 2 doses (2,4 months)



Rotavirus Vaccine Recommendations

- Vaccination should not be initiated for infants older than 14 weeks 6 days of age because of possible increased risk of Intussusception
- Minimum interval between subsequent doses is 4 weeks
- Vaccine should NOT be administered after 8 months of age (off label ACIP recommendation)



Rotavirus Vaccine Interchangeability

- ACIP recommends use of the same product if feasible
- If the same brand is not available, or the previously used product unknown, can use either product
- If any dose in the series is unknown or RotaTeq® a total of three doses must be given



Rotavirus vaccine

- **Contraindications**
 - Serious allergy to vaccine component
 - Rotarix® contains latex
- **Precautions**
 - Altered immunocompetence
 - Moderate to severe acute gastroenteritis
 - Pre-existing chronic GI disease
 - Infants with hx of intussusception

MMWR 2006; 55 (RR-12)



Regurgitation

- Readministration not recommended if dose is regurgitated or spit out
- Repeat remaining doses on schedule
- Administer before injectable vaccines (while child is calmer)

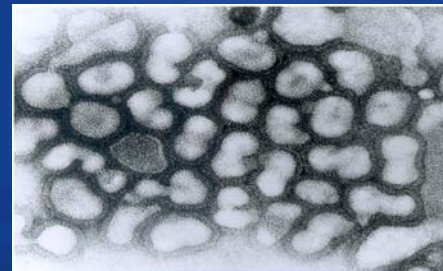


Vaccine Shortages

- **PedvaxHib – expected to continue until 4th quarter of 2008 or 1st quarter of 2009**
- **ProQuad – expected to continue until 1st quarter of 2009**
- **Rabies vaccine – supply expected to improve during mid-2008**
- **Japanese Encephalitis vaccine – restricted purchase**



2008-2009 Influenza Season



Influenza Season 2008-2009

- Recommended Groups for Vaccination
- Anyone who wants influenza vaccine
- Children 6 months – 18 years of age (5 years – 18 years if feasible)
- Healthy adults 50 years old and older
- Persons 5 – 49 years old at high risk for complications
- Pregnant women
- Residents of chronic care facilities
- Household contacts of persons at high risk for complications
- Health care workers



Influenza: High Risk for Complications

- Birth through 59 months of age
- Adults 50 years old and older
- Chronic lung disease, asthma
- Chronic heart disease
- Metabolic diseases, e.g. diabetes
- Sickle-cell disease and thalassemias
- Chronic renal disease
- High risk of aspiration
- Immunosuppression
- Pregnancy
- Chronic aspirin therapy: 18 years old and younger



2008-2009 Influenza Vaccine

- A/Brisbane/10/2007 (H3N2)
- A/Brisbane/59/2007 (H1N1)
- B/Florida/4/2006 (Yamagata lineage)



Inactivated Influenza Vaccines Available in 2008-2009

Vaccine	Package	Dose	Age	Thimerosal
Fluzone (sanofi pasteur)	Multidose vial*	Age-dependent	≥6 mos	Yes
	Single dose syringe*	0.25 mL	6-35 mos	No
	Single dose syringe and vial*	0.5 mL	≥36 mos	No
Fluvirin (Novartis)	Multidose vial	0.5 mL	≥4 yrs	Yes
Fluarix (GSK)	Single dose syringe	0.5 mL	≥18 yrs	Trace
Flulaval (GSK)	Multidose vial	0.5 mL	≥18 yrs	Yes
Afluria (CSL)	Single dose syringe	0.5 mL	≥18 yrs	Trace
	Multidose vial	0.5 mL	≥18 yrs	Yes



Live Attenuated Influenza Vaccine (FluMist®)

- Approved only for healthy persons 2 years through 49 years of age who are not pregnant
 - healthcare personnel (except those working with hospitalized HSCT patients)
 - persons in close contact with high-risk groups
 - persons who want to reduce their risk of influenza



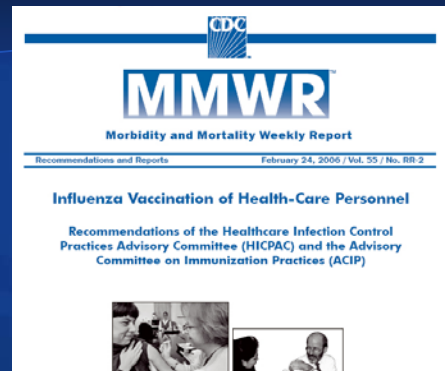
Live Attenuated Influenza Vaccine (FluMist®)

- Now refrigerator stable
- (35-46 degrees Fahrenheit)
- Smaller volume (0.1 cc per naris)



In the 2006 National Health Interview Survey, only 42% of healthcare workers reported receiving influenza vaccine in the previous 12 months.

MMWR 2007;56(RR-6):1-54



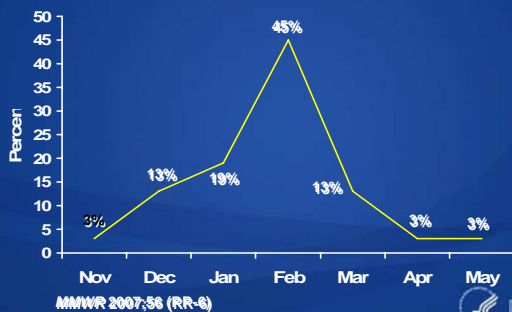
Influenza Vaccination of HCPs

- Educate HCPs about the benefits of vaccination for themselves, their families, and their patients
- Educate staff about vaccine adverse reactions
- Provide free vaccine at the work site to all employees, including night and weekend staff

MMWR 2006;55(RR-2)



Month of Peak Influenza Activity United States, 1976-2006



MMWR 2007;56 (RR-6)



Timing of Influenza Vaccine Programs

- Influenza activity can occur as early as October
- In more than 80% of seasons since 1976, peak influenza activity has not occurred until January or later
- In more than 60% of seasons the peak was in February or later



Timing of Influenza Vaccine Programs

- Providers should begin offering vaccine soon after it becomes available, if possible by October
- To avoid missed opportunities for vaccination, providers should offer vaccine during routine healthcare visits or during hospitalizations whenever vaccine is available



Timing of Influenza Vaccine Programs

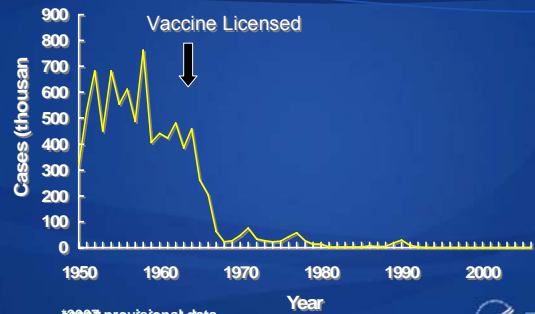
- Persons planning organized vaccination campaigns should consider scheduling these events after at least mid-October
- Scheduling campaigns after mid-October will minimize the need for cancellations because vaccine is unavailable
- Continue to offer influenza vaccine in December
- Providers should continue to vaccinate throughout influenza season



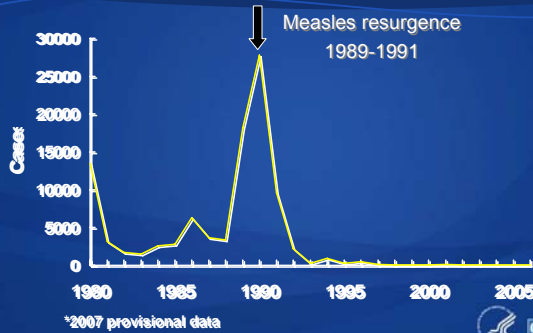
Measles



Measles – United States, 1950-2007*



Measles – United States, 1980-2007*



Measles–United States, 2008

- 127 cases reported from 15 states, DC and NYC*
- 87% imported or linked to imported case
- 19% younger than 12 months of age (10 others 12 to 15 months)
- Only 6 cases had documentation of vaccination
 - many (40%) unvaccinated because of religious or personal beliefs
- 17% exposed in a healthcare setting

MMWR 2008;57(No.18):494-8 and CDC unpublished data
*as of July 3, 2008



Measles 2008

- Measles has been imported from Switzerland, Israel, Belgium, Italy, Germany, India, China, Pakistan, the Philippines, and Russia
 - All international travelers should have evidence of measles immunity
 - CDC recommends measles/MMR vaccination of 6-11 month old children traveling outside the United States
- www.cdc.gov/travel/



Zoster



Zoster

- Risk factors

Aging
Cellular immunosuppression
Intrauterine exposure to VZV
Varicella at <18 month of age



Zoster: Complications

- Post-herpetic neuralgia
- Pain that lasts after rash clears, sometime up to a year
- Occurs in 20 percent of shingles cases



Zoster Vaccine

- Zostavax by Merck
- Licensed May 2006
- Live attenuated vaccine
- Indicated for prevention of zoster



Zoster Vaccine

- Indicated for persons 60 years old and older
- Indicated for persons with current varicella immunity based on disease
- Indicated regardless of a history of zoster
- One dose, 0.6 cc subcutaneous injection



Zoster Vaccine

- Contraindications
- Severe allergic reaction to vaccine component or following a prior dose
- Immunosuppression
- Pregnancy
- Active, untreated tuberculosis

- Precautions
- Moderate or severe acute illness



Combination Vaccines

- DTaP, DT
- MMR
- MMRV
- Tdap, Td

- DTaP/Hep B/IPV (Pediarix®)
- Hep B/Hib (Comvax®)
- DTaP/Hib (TriHIBit®)
- Hep A/Hep B (Twinrix®)
- DTaP/IPV/Hib (Pentacel®)
- DTaP/IPV (Kinrix™)



General Guidelines

“Licensed combination vaccines may be used whenever any components of the combination are indicated and other components are not contraindicated and if approved by the Food and Drug Administration for that dose of the series.”

Spacing and timing rules same as for individual antigens



General Guidelines

- Use of licensed combination vaccines is preferred to separate injection of their equivalent component vaccines to reduce the number of injections and missed opportunities to protect through vaccination
- Exception: no preference between MMR and MMRV



Use of Combination Vaccines

Pros	Cons
↓ number of injections	Higher costs
↑ timely coverage	Unnecessary doses
↓ costs of stocking & administering separate vaccines	
↓ costs of extra healthcare visits	
Facilitate introduction of new vaccines & recommendations	



Combination Vaccines

- Immunogenicity and safety studies performed alongside separate components given simultaneously
- Considered to effective when immunogenicity found to be “non-inferior” to separate components
- Similar comparison for safety



Pentacel®

- ActHib reconstituted with DTaP/IPV
- May be used for first four doses of DTaP and Hib
- Can count as four doses of IPV if given at approved ages
- Additional dose of IPV (NOT Pentacel®) may be required for school at 4-6 years of age



Pentacel®

- Fourth dose of Pentacel® licensed for 15 – 18 months old
- A dose does NOT need to be repeated if fourth dose given as young as 12 months of age, as long as the appropriate minimum interval maintained from previous dose



Kinrix™

- Combination DTaP/IPV
- Recommended for the fifth dose of DTaP, and the fourth dose of IPV
- Recommended age: 4-6 years



Kinrix™

- If fourth dose of IPV given at a four week minimum interval from dose three, and with a minimum age of 18 weeks, it does not have to be repeated
- WARNING: DTaP MAY need to be repeated – minimum age for fourth dose 12 months
- DO NOT use Kinrix™ in infancy



Kinrix™

- Kinrix™ is for

KINDERGARTEN!!



Questions?

