

Vaccine Update

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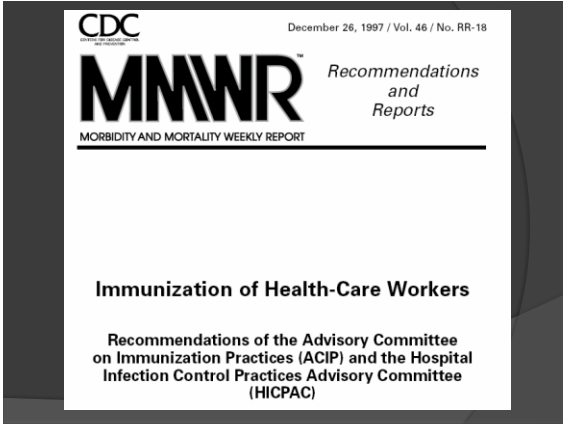
Objectives

- Adult Immunization Schedule Recommendations: What's New?
- Recommendations for Special Hosts: Healthcare Workers (including Laboratory Workers)
- Recommendations for Special Circumstances:
 - Post-exposure prophylaxis
 - Community Outbreaks

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



Morbidity and Mortality Reports (MMWR), Jan 28, 2011, Vol 60, No 2



ACIP Recommendations for HCW

Recommended for all HCW	Immunization May be Indicated
Hepatitis B	Meningococcal
Influenza	Typhoid
Measles	Polio
Mumps	
Rubella	
Varicella	
Pertussis	



What is a Healthcare Worker?

- Healthcare Worker refers to all paid and **unpaid** persons working in health-care settings who have the potential for exposure to patients and/or to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air.
- Healthcare workers might include (but are not limited to) physicians, nurses, nursing assistants, therapists, technicians, emergency medical service personnel, dental personnel, pharmacists, laboratory personnel, autopsy personnel, students and trainees, **contractual staff not employed by the health-care facility**, and persons (e.g., clerical, dietary, house-keeping, laundry, **security, maintenance, billing, and volunteers**) not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from HCP and patients.

Decline in Vaccine-Preventable Disease

Disease	Max incidence/year		2008
Diphtheria	206,939	1921	0
Measles	894,134	1941	140
Mumps	152,209	1968	454
			6,584 (2006)
Pertussis	265,269	1934	13,278
Polio	21,269	1952	0
Rubella	57,686	1969	16
Tetanus	1,560	1923	19

Case 1: Vaccines for Adults

The director of employee health at your hospital seeks your advice on what immunizations your employees should receive. Those who have direct patient contact should receive or be "up-to-date" with the following vaccines:

- HAV, HBV, Td, varicella, influenza
- HBV, influenza, varicella, MMR
- HAV, HBV, Tdap, varicella
- HBV, Tdap, influenza, varicella, MMR

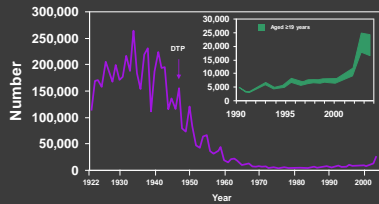
Healthcare Personnel Vaccination: Provisional Recommendations 2011

Vaccine	Recommendations in brief
Hepatitis B	Give 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2). Give IM. Obtain anti-HBs serologic testing 1–2 months after dose #3.
Influenza	Give 1 dose of influenza vaccine annually. Give inactivated injectable influenza vaccine intramuscularly or live attenuated influenza vaccine (LAIV) intranasally.
MMR	For healthcare personnel (HCP) born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart. For HCP born prior to 1957, see below. Give SC.
Varicella (chickenpox)	For HCP who have no serologic proof of immunity, prior vaccination, or history of varicella disease, give 2 doses of varicella vaccine, 4 weeks apart. Give SC.
Tetanus, diphtheria, pertussis	Give a one-time dose of Tdap as soon as feasible to all HCP who have not received Tdap previously. Give Td boosters every 10 years thereafter. Give IM.
Meningococcal	Give 1 dose to microbiologists who are routinely exposed to isolates of <i>N. meningitidis</i> . Give IM or SC.

Advisory Committee on Immunization Practices <http://www.cdc.gov/vaccines/recs/acip/>

In the News: Pertussis Makes a Resurgence

Number of Reported Pertussis Cases, by Year—United States, 1922–2005



Centers for Disease Control and Prevention. *MMWR*. 2006;55(RR-17):1–33.

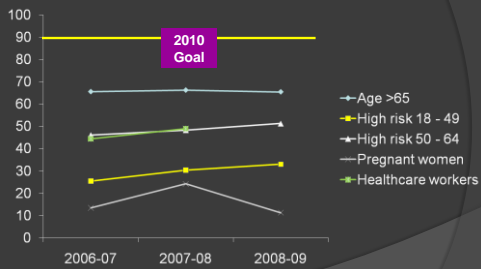
2011 Recommendations from ACIP

- All HCW, regardless of age, should receive a single dose of Tdap as soon as feasible if they have not previously received Tdap and regardless of the time since last Td dose. Vaccinating HCP with Tdap will protect them against pertussis and is expected to reduce transmission to patients, other HCW, household members, and persons in the community.
- Hospitals and ambulatory-care facilities should provide Tdap for HCW and use approaches that maximize vaccination rates (e.g., education about the benefits of vaccination, convenient access, and the provision of Tdap at no charge).

Influenza Vaccination

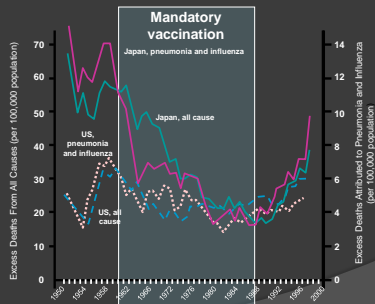


Self-Reported Seasonal Influenza Vaccination Coverage Levels



CDC. MMWR Recomm Rep. 2010 Aug 6;59(RR-8):1-62.

Impact of Vaccination of Japanese Schoolchildren on Mortality in the Elderly



Reichert TA. N Engl J Med. 2001;344:889-896.

Influenza Vaccines for 2010-11 Seasons

- Types of influenza vaccines available:
 - Inactivated (TIV)
 - High-dose inactivated
 - Live attenuated (LAIV)
- Trivalent (covers 3 circulating strains)
 - 2009 A (H1N1) no longer a separate monovalent vaccine
- Trivalent vaccine currently available throughout US

CDC, MMWR Recomm Rep. 2010 Aug 6;59(RR-8):1-62.

2011 Recommendations from ACIP

- All HCW should receive an annual influenza vaccination.
- Comprehensive programs to increase vaccine coverage among HCW are needed and might include variety of strategies (e.g., declinations, mandatory vaccination).
- Note re:LAIV
 - Should only be given to healthy non-pregnant HCW age 49 years and younger
 - TIV is preferred over LAIV for HCW who are in close contact with severely immunosuppressed patients

- "Barriers to HCW... Factors shown to increase vaccine acceptance include a desire for self-protection, previous receipt of influenza vaccine, a desire to protect patients, and perceived effectiveness of vaccine. Strategies that have shown improvement in HCW vaccination rates have included campaigns to emphasize the benefits of HCW vaccination for staff and patients, vaccination of senior medical staff or opinion leaders, removing administrative barriers (e.g., costs), providing vaccine in locations and at times easily accessible by HCW, and monitoring and reporting HCP influenza vaccination rates. **Intranasally administered live attenuated influenza vaccine (LAIV) may also be an option for healthy, non-pregnant adult age 49 years or less who dislike needles"**

- “Influenza vaccination rates among HCW within facilities should be regularly measured and reported, and ward-, unit-, and specialty-specific coverage rates should be provided to staff and administration. Such information may also be useful in helping to identify persons who remain unvaccinated, permitting discussion of potential barriers to vaccination, and increasing compliance with vaccination policies.”



Case 2: Mumps Outbreak

A mumps outbreak is affecting your community. As head of infection control you implement appropriate vaccination for HCWs at your hospital. Each of the following is an acceptable measure of immunity except for:

- a. 2 doses of MMR after 1 year of age, separated by >28d
- b. Positive serology
- c. History of physician documented disease

Mumps Outbreak

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- c. History of physician documented disease

2011 Recommendations from ACIP

- ⦿ MMR:
- ⦿ History of disease no longer considered adequate evidence of immunity
- ⦿ HCW born before 1957 can be considered immune only if:
 - Laboratory evidence of immunity/past infection OR
 - Appropriate vaccination against MMR

Case 3: Varicella Outbreak

Several HCWs have been exposed to a patient with Varicella. One female nurse is found to lack protective antibodies and has no documented history of varicella. Six days post-exposure she is healthy with a negative pregnancy test. You recommend:

- a. Valacyclovir for 14 days and keep working
- b. VZIG and keep working
- c. No prophylaxis, work furlough from day 10-21 post-exposure
- d. No prophylaxis, remove nurse from work if rash develops
- e. Immunize the nurse and no work furlough

2011 Recommendations from ACIP

- Evidence of Varicella immunity includes:
 - Documentation of 2 doses of Vaccine
 - Physician confirmed Varicella or *H. Zoster*
 - Laboratory evidence of immunity

Varicella Vaccine

Indications:

- Age \geq 1 year with no h/o immunity (2 dose schedule for all)
- Post-exposure prophylaxis or outbreak control
 - Give within 3-5 days of exposure
- vaccine recipients with lower rate of shingles

-Cautions:

- Avoid in immunocompromised hosts
- Rash 7-21 days post vaccine
 - 3% rash at site of injection (median 2 lesions)
 - 3-5% generalized rash (median 5 lesions)
- Avoid ASA/salicylates
- Avoid antiviral drugs eg. acyclovir 24 hr before and 2 weeks post immunization

Outbreaks

- Measles
 - MMR within 72 hours of exposure
 - Immunoglobulin within 6 days of exposure
- Varicella
 - Vaccine within 3 (to 5) days of exposure
- Meningococcus
 - Vaccine \pm antibiotic prophylaxis (within 14d exposure)
- Influenza
 - Vaccine + antiviral prophylaxis
- Hepatitis A
 - Vaccine within 14 days if age < 40 yrs (Immunoglobulin otherwise)

Unvaccinated, Non-immune HCW: Post-Exposure Furlow (PEF)

- ⊙ Measles
 - 5th day post 1st exp to 21st day post-last exposure
 - 7 days post-rash
- ⊙ Mumps
 - 12th day post 1st exp to 26th day post last exp
 - 5 days post onset of symptoms (↓ from 9 days 10/08)
- ⊙ Varicella
 - 10th day post 1st exp to 21st day post last exposure
 - 28th day post last exposure if VZIG given
 - Until all lesions are dry and crusted
- ⊙ Rubella
 - 7th day post 1st exp to 21st day post last exp
 - 5 days after rash appears

Case 4: Travel

A 21 yo RN has decided to volunteer in Haiti and will leave in 2 months to Port-au-Prince for a 2-week medical mission. She is in good health and received her childhood immunizations and a Td booster, Hepatitis B and measles vaccination 3 years ago. She had chickenpox as a child. You recommend?

- a. Typhoid, Polio, weekly chloroquine for malaria
- b. HAV, Typhoid, Influenza, weekly chloroquine, consider Tdap
- c. HAV, Typhoid, Japanese B encephalitis, weekly chloroquine, Tdap
- d. HAV, Cholera, Typhoid, Yellow fever, weekly chloroquine

Travel: Routine Vaccines

Vaccine	Adult Dose	Indication
Hepatitis A	1 ml IM booster 6-12 mo	endemic area
HAV/IG	2mL IM < 3mo 5ML IM ≥ 3mo	age ≥ 40 yrs
Hepatitis B	3 dose series	travel to endemic area [≥2% prevalence]
Measles/MMR	0.5mL SQ	born after 1956 all international travel

Travel: Routine Vaccines

Vaccine	Adult dose	Indication
Poliomyelitis	IPV [one lifetime booster post 1° series]	last dose ≥ 5yrs Eastern hemisphere
Tetanus/ diphtheria	Td Tdap	q10 years x 1
Typhoid (rural areas)	oral live 4 doses qod	age ≥ 6 yr booster q5yr
	polysaccharide 0.5 ml SQ	age ≥ 2 yr booster q2yr

Travel: Special Vaccines

Vaccine	Adult Dose	Indication
Japanese B encephalitis	1 mL IM X 2 Day 0, 28	rural Asia (>30d) summer
Meningococcal	0.5mL SQ	epidemic areas SS Africa/Mecca Dec-June
Rabies	3 doses IM	endemic area > 1month
Yellow Fever	0.5mL SQ booster q10 yr	endemic area SS Africa, S America

Case 5: Patient with a rash



Courtesy of John Marcinak, University of Chicago

Which of the following is true?

- ⦿ 1. Vaccinia should not be administered to patients with a history of inactive eczema
- ⦿ 2. Vaccinia is only contraindicated in patients with active eczema or family members with active eczema
- ⦿ 3. Pregnancy is not a contraindication for vaccinia
- ⦿ 4. Generalized/progressive vaccinia should be treated with high-dose Acyclovir 10 mg/kg/d

Which of the following is true?

- ⦿ 1. **Vaccinia should not be administered to patients with a history of inactive eczema**
- ⦿ 2. Vaccinia is only contraindicated in patients with active eczema or family members with active eczema
- ⦿ 3. Pregnancy is not a contraindication for vaccinia
- ⦿ 4. Generalized/progressive vaccinia can be treated with high-dose Acyclovir 10 mg/kg/d

Vaccination



Case 6: HBV Exposure

An agency RN, pricks herself with a needle from a patient with known chronic active HBV. She received the HBV vaccine series 10 years ago but does not know her antibody status. You recommend:

- No intervention, she received vaccine and can be considered immune
- Check her HBsAb, if ≥ 10 mIU/ml give HBIG
- Check her HBsAb if < 10 mIU/ml do nothing as she has waning antibody
- Check her HBsAb if < 10 mIU/ml, give HBIG and re-vaccinate

2011 Recommendations from ACIP

- HCW who perform tasks that may involve exposure to blood or body fluids should receive 3-dose series Hepatitis B vaccine
- HCW should be tested for Hepatitis B surface antibody (anti-HBs) 1-2 months after receipt of the complete HBV series to determine their response to vaccine and guide postexposure prophylaxis.
 - If anti-HBs is positive the patient is immune; they have long term immunity and do not need periodic anti-HBs re-testing
 - If anti-HBs is < 10 mIU/mL the patient is unprotected, revaccinate with a 3-dose series. Re-test anti-HBs 1-2 months after dose #3
 - If anti-HBs is positive the patient is immune
 - If anti-HBs is negative after 6 doses, the patient is a non-responder
- Non-responders are considered susceptible to HBV infection and should receive HBIG prophylaxis for any known parenteral exposure to Hepatitis B
- Note: Anti-HBs testing is not recommended for HCW who have completed a 3-dose HBV series and did not undergo testing
 - Test for anti-HBs only in event of a blood or body fluid exposure

HBIG: Occupational PEP

Exposed person	Source			
	HBsAg+	HBsAg -	Unknown	
			High-risk	Low-risk
No vaccine	HBIG + V	V	V	V
V Responder	No Rx	No Rx	No Rx	No Rx
Nonresponder not revax	HBIG + V	V	HBIG + V	V
Nonresponder s/p revax	HBIG x 2	No Rx	HBIG x 2	No Rx
? Response	Anti-HBs neg: HBIG + V	No Rx	Anti-HBs neg: V + f/u anti-HBs	

Note: HBIG should be administered within 7 days of percutaneous exposure

Case 7: Rabies PEP

A 7 yo girl awakens in a room with a bat. She recalls no bites. The bat escapes before the parents can capture it. The parents bring the patient to the ED and she is examined and no visible bites are seen. The appropriate care for the girl is:

- a. No Treatment as there was no exposure
- b. RIG
- c. RIG + rabies vaccine

Rabies Vaccine

- 2 vaccines available
- Pre-exposure: Occupational/travel risk
 - Primary series: 1 ml IM deltoid only 0, 7 and 21 (or 28)d
 - Booster (1ml IM deltoid) q2yr or if low titer
- Post-exposure:
 - Contact saliva/CNS tissue of ?rabid animal
 - raccoons, skunks, foxes
 - Treat children exposed to bats
 - No time limit on effectiveness of PEP
 - 1 year incubation period reported

Rabies: PEP

Not Previously Vaccinated

Clean wound soap and water

RIG 20 IU/kg; 100% dose around wound if possible, rest IM away from vaccine site

Vaccine (IM)
Day 0, 3, 7, 14
Add 1 day 28 dose if immunosuppressed

Vaccinated

Clean wound

No RIG [unless immunosuppressed then check titer]

Vaccine (IM)
Day 0, 3

Anaphylactic Antigens in Vaccines

Chicken Egg	Neomycin	Gelatin	Diphtheria
Influenza-both	Measles	Measles	MCVs
Yellow Fever	Mumps	Mumps	HibTITER
	Rubella	Rubella	PCVs
	MMR	MMR	
	Varicella-both	Varicella-both	
Yeast	IPV/OPV	Yellow Fever	
HPV4	Rabies HDCV		
HBV	Rabies Rabavert	Rabies Rabavert	
	vaccinia	JE-MB	

Acti-HIB contains Tetanus toxoid

Parting advice

“If you have understood what I said, then I must have misspoken”

Alan Greenspan (ex-Chairman, Federal Bank)
