Vaccine Preventable Diseases and Healthcare Personnel: How Do You Protect One From the Other?

April 19-20, 2017

Presenting To

24th Annual Arizona Immunization Conference

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What Will We Cover Today?

- Terminology
- Recommended healthcare personnel vaccinations
  - MMR, Hepatitis B, Influenza, Varicella, Tdap
    - Who?
    - What?
    - When?
    - Why?
- Resources

Who Are We Talking About Today?

- Healthcare Personnel (HCP)
  - 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.
  - HCP 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
    - Persons not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from HCP and patients
      - E.g., clerical, dietary, housekeeping, laundry, security, maintenance, administrative, billing, and volunteers

Vaccine vs. Immunization

- Vaccine is derived from vaccinia
  - A virus that was used in smallpox vaccines
  - Thus, "vaccination" actually refers to the prevention of smallpox
- Immunization is a broader term that encompasses the use of any immunobiologic to prevent infectious diseases by inducing immunity
  - Immunobiologic is the antigenic substance or antibody containing preparation used to induce or produce immunity

Active vs. Passive Immunization

- Active
  - Involves the development of antibodies or cellular immune response following administration of a vaccine or toxoid
- Passive
  - Refers to the temporary immunity that follows exogenous antibody administration

Active Immunization

- Vaccines consist of live (usually attenuated, i.e., "weakened") or inactivated microorganisms or fractions thereof
- Toxoids are modified bacterial toxins
- Inactivated or killed immunobiologics may consist of
  - Whole microorganism (whole cell pertussis)
  - Detoxified exotoxins (diphtheria and tetanus toxoids)
  - Soluble capsular material (pneumococcal polysaccharide)
  - Surface antigen (hepatitis B)
  - Components of the organism (subunit influenza)

Passive Immunization

- Sources of antibodies include
  - Human immunoglobulin (IG)
  - Specific immunoglobulin preparations
    - E.g., Hepatitis B immune globulin [HBIG]
  - Antitoxins
    - E.g., diphtheria or botulinum antitoxin

Why is Vaccination Important?

- An essential part of occupational health programs is to ensure HCP are protected against vaccine-preventable diseases (VPDs)

- Protecting HCP can help protect
  - Patients
  - Visitors
  - Family
  - Others

- Disease prevention through immunization is much less resource intensive compared to exposure management and outbreak control

	2017**	2016
Haemophilus influenzae Type B	2	5
Measles	0	32
Meningococcal Invasive Disease	2	3
Mumps	4	7
Pertussis	99	280
Tetanus	0	2
Varicella	51	282

*There were no cases of rubella, congenital rubella syndrome or polio reported to public health *
Date as of 04/03/2017

Who is the Advisory Committee on Immunization Practices (ACIP)?

- Candidates for ACIP membership are screened carefully prior to being selected to join the committee.

- Before recommending a vaccine the ACIP considers many factors, including the safety and effectiveness of the vaccine.

- The ACIP develops vaccine recommendations for children and adults that the CDC uses to set immunization schedules, the recommendations include
  - Age(s) when the vaccine should be given
  - Number of doses needed
  - Amount of time between doses
  - Precautions/contraindications.

Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017

Vaccine	Pregnancy[1-6,9]	Immuno-compromised (excluding HIV infection)[3-7,11]	HIV infection CD4+ count (cells/µL)[3-7,9-11]		Asplenia, persistent complement deficiencies[7,10,11]	Kidney failure, end-stage renal disease, on hemodialysis[7,9]	Heart or lung disease, chronic alcoholism[7]	Chronic liver disease[7-9]	Diabetes[7,9]	Healthcare personnel[3,4,9]	Men who have sex with men[6,8,9]
			< 200	≥ 200							
Influenza[1]	1 dose annually										
Td/Tdap[2]	1 dose Tdap each pregnancy	Substitute Tdap for Td once, then Td booster every 10 yrs									
MMR[3]	contraindicated		contraindicated	1 or 2 doses depending on indication							
VAR[4]	contraindicated		contraindicated	2 doses							
HZV[5]	contraindicated			1 dose							
HPV–Female[6]		3 doses through age 26 yrs									
HPV–Male[6]		3 doses through age 26 yrs		3 doses through age 21 yrs							3 doses through age 26 yrs
PCV13[7]		1 dose									
PPSV23[7]		1, 2, or 3 doses depending on indication									
HepA[8]	2 or 3 doses depending on vaccine										
HepB[9]	3 doses										
MenACWY or MPSV4[10]	1 or more doses depending on indication										
MenB[10]	2 or 3 doses depending on vaccine										
Hib[11]	1 dose	3 doses post-HSCT recipients only									

Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended for adults with additional medical conditions or other indications

Contraindicated

No recommendation

https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf

Are There Federal or State HCP Vaccination Requirements?

- There are no federal requirements that HCP be vaccinated for or have immunity to any VPD, as for Arizona:

Immunization Administration Requirements
For State: AZ

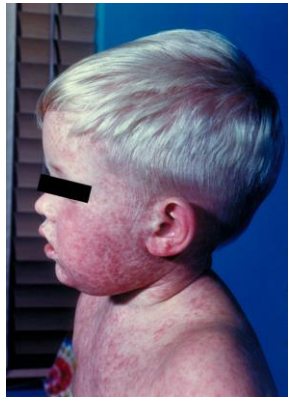
** Click on each result to read the abridged text of the state immunization law.

Patient Type	Vaccine	Requirement
Hospital Employees	Hepatitis B[1]	Offer[30]
	Influenza[2]	No
	MMR[3]	No
	Varicella[4]	No
	Pneumococcal[5]	No
	Medical(M),Religious(R), or Philosophical(P) Exemptions[6]	No
Hospital Inpatients	Influenza[7]	No
	Pneumococcal[8]	No
	Medical(M),Religious(R), or Philosophical(P) Exemptions[9]	No
Individual Providers' Patients	Any Immunization[10]	No
	Medical(M),Religious(R), or Philosophical(P) Exemptions[11]	No
Ambulatory Care Facilities Employees	Any Immunization[12]	Offer[31]
	Medical(M),Religious(R), or Philosophical(P) Exemptions[13]	No
Ambulatory Care Facilities Patients	Any Immunization[14]	No
	Medical(M),Religious(R), or Philosophical(P) Exemptions[15]	No
Correctional Inmates and Residents	Any Immunization[16]	Ensure[32]
	Medical(M),Religious(R), or Philosophical(P) Exemptions[17]	No
Developmentally Disabled Facility Residents	Any Immunization[18]	Ensure[33]
	Medical(M),Religious(R), or Philosophical(P) Exemptions[19]	No
	[]	

https://www2a.cdc.gov/vaccines/statevaccsApp/

Measles, Mumps, and Rubella (MMR)

Measles (Rubeola)



- Can lead to serious complications and death
- In the United States, from 1987 to 2000, the most commonly reported complications associated with measles infection were
  - Pneumonia (6%)
  - Otitis media (7%)
  - Diarrhea (8%)
- For every 1,000 reported measles cases in the United States, approximately one case of encephalitis and two to three deaths resulted
- Healthcare providers should suspect measles in patients with a febrile rash illness and the clinically compatible symptoms
  - 3 Cs
    - Cough
    - Coryza
    - Conjunctivitis
- Providers should immediately isolate and report suspected measles cases to their local health department and obtain specimens for measles testing
  - Measles virus can remain infectious in the air for up to two hours after an infected person leaves an area
  - Airborne Precautions

http://www.immunize.org/askexperts/experts_mmr.asp

Immunity to Measles (Rubeola)

HCP Born 1957 and Later

- Two MMR separated by at least 28 days
- Serologic evidence showing a positive measles titer
- Two documented MMR vaccines and test negative or equivocal for measles are still presumed immune

HCP Born before 1957

- Presumed immune to measles
- HCPs encouraged to have two doses of MMR

Arizona measles outbreak, 2008

- In February 2008, an infected Swiss traveler sparked a measles outbreak in Arizona involving 14 cases
  - 7 of whom were infected in healthcare facilities; measles was not suspected until after the index patient had been hospitalized, not isolated, for 2 days
- Of the 11 secondary cases who accessed healthcare
  - 10 didn't receive a prompt measles diagnosis after rash onset
  - Only 1 was masked and isolated promptly
- 8231 people were potentially exposed
  - 4793 were hospital or clinic patients and 2868 were HCP
- 25% of 7195 HCP who were screened lacked evidence of measles immunity
  - 1583 underwent IgG testing
    - 121 (11%) of 1077 HCPs born >1957
    - 18 (4%) of 506 HCPs born <1957 were seronegative, including 1 who developed measles
- The two hospitals involved spent **~$800,000** responding to and containing the seven measles cases in their facilities

Chen et al. J Infect Dis. 2011 Jun 1;203(11).

Is Mumps An Issue For HCP?

American Journal of Infection Control

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Mumps exposure of a health care provider working in a neonatal intensive care unit leads to a hospital-wide effort that prevented an outbreak

Shelley A. Gilroy, MD, Joseph B. Domachowske, MD, Lynette Johnson, MS, David Martin, RN, Steven Gross, MD, Michelle Bode, MD, Kathy Costello, RN, Ruth Sikora, RN, Dawn Richey, BS, Jennifer Watkins, MS, Ronald Stahl, MD

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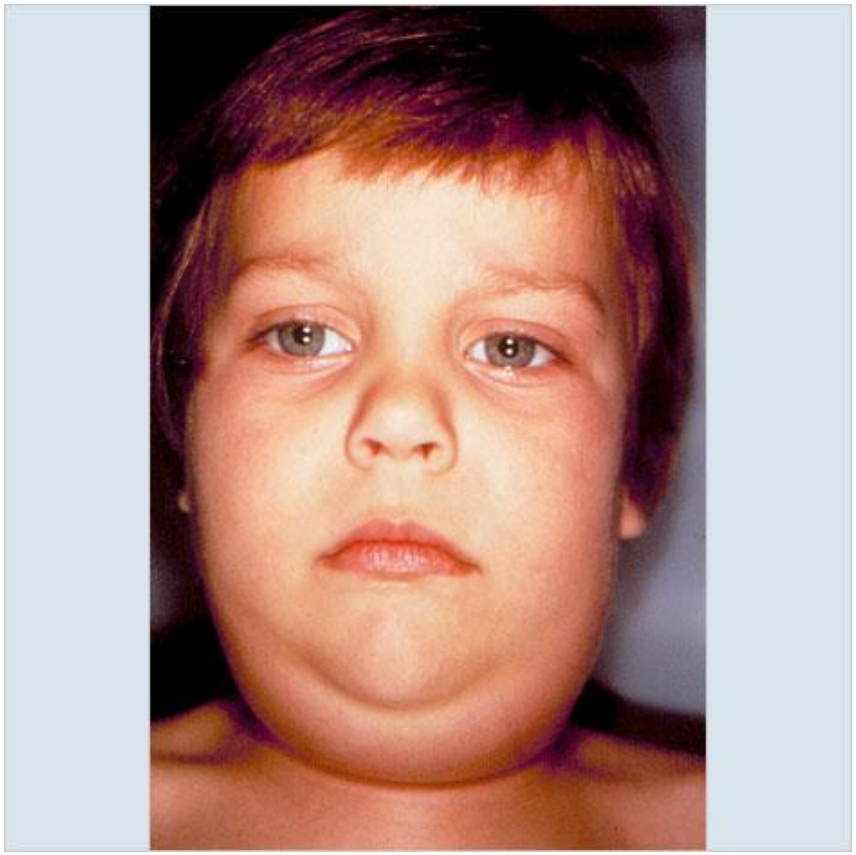
http://www.ajicjournal.org/article/S0196-6553(11)00112-X/abstract?cc=y=

Mumps



- Parotid gland inflammation
- Orchitis
  - Inflammation of the testicle
- Oophoritis
  - Inflammation of the ovary
- Mastitis
- Encephalitis
- Unilateral deafness
- Pancreatitis

Up to 25% of persons with mumps have few or no symptoms

Droplet Precautions are a key component of healthcare prevention

Immunity to Mumps

Born 1957 and later

- Two MMR separated by at least 28 days
- Serologic evidence showing a positive mumps titer
- Two documented MMR vaccines and test negative or equivocal for mumps are still presumed immune

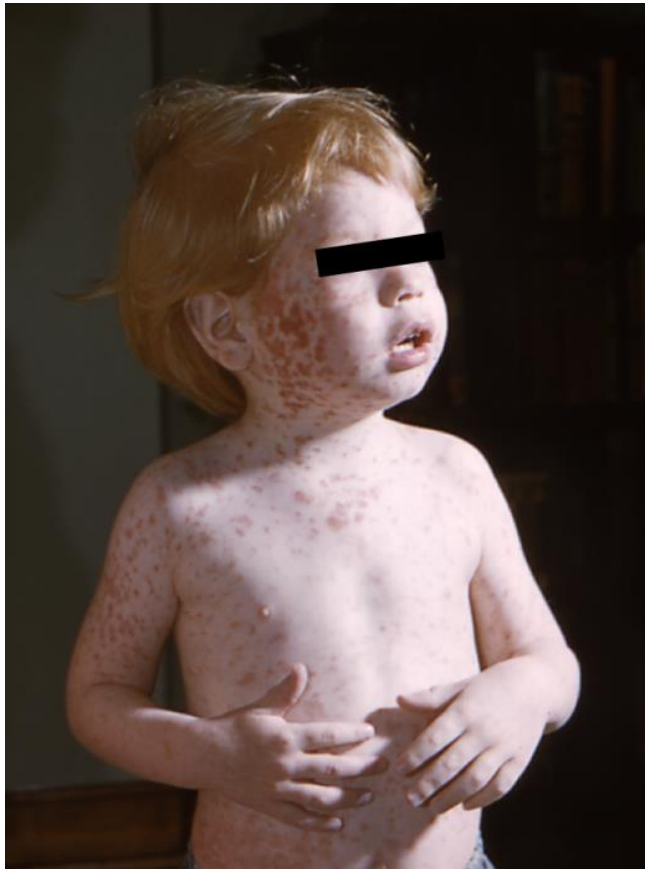
Born before 1957

- Presumed immune to mumps
- HCP encouraged to have two doses of MMR

Rubella

- Generally a mild illness with
  - Low-grade fever
  - Lymphadenopathy (lymph node enlargement)
  - Malaise (general feeling of discomfort, illness, or uneasiness)
    - Up to 50% of rubella virus infections are subclinical
- Droplet Precautions are a key component of healthcare prevention
- Complications can include
  - Thrombocytopenic purpura
    - Bruising or purplish areas on the skin or mucous membranes caused by bleeding under the skin
  - Encephalitis
  - Rubella virus is teratogenic
    - Causing developmental malformations
  - Congenital→

Rubella



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- Congenital
  - Cataracts
  - Retinitis
  - Deafness
  - Microcephaly
  - Heart defects

Immunity to Rubella

Born 1957 and later

- One MMR.
- Serologic evidence showing a positive rubella titer
- One documented MMR vaccine and test negative or equivocal for rubella are still presumed immune

Born before 1957

- Presumed immune to rubella
- HCP encouraged to have two doses of MMR

MMR (Measles, Mumps, & Rubella) Vaccine

- Why?
  - Measles
    - Highly contagious viral rash illness transmitted by respiratory droplets and airborne spread
  - Mumps & Rubella
    - Acute viral infection transmitted by respiratory droplets

Contraindications to MMR

- Pregnancy
- HIV infection with CD4 counts < 200 (adult)
- Immune compromised
- Anaphylaxis to neomycin, any vaccine component, or previous MMR

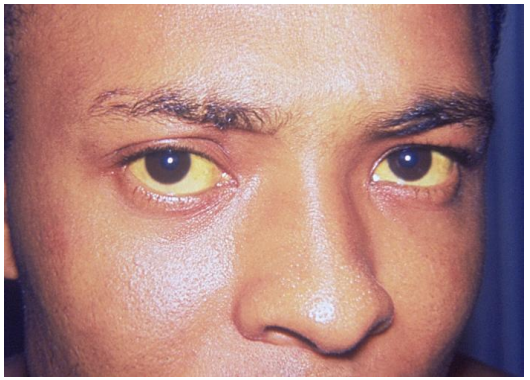
Vaccine Immunity

- Measles
  - 99% of persons who receive two doses of measles vaccine develop serologic evidence of measles immunity
    - First dose administered no earlier than the first birthday
- Mumps
  - One dose of mumps or MMR vaccine was 78% (49% to 92%) effective
  - Two dose mumps vaccine effectiveness is 88% (66% to 95%)
- Rubella
  - 95% or more of persons aged 12 months and older developed serologic evidence of rubella immunity after a single dose

Hepatitis B

Hepatitis B

- About 7 out of 10 people who are 5 years of age or older adults with acute hepatitis B have initial signs or symptoms when infected with hepatitis B virus (HBV)
- Signs and symptoms of hepatitis B might include:
  - Nausea
  - Lack of appetite
  - Tiredness
  - Muscle, joint, or stomach pain
  - Fever
  - Diarrhea or vomiting
  - Headache
  - Dark urine
  - Clay-colored stools
  - Yellowing of the skin and whites of the eyes (jaundice)



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- Children younger than age 5 years and newly infected immunosuppressed adults rarely show any symptoms
- If signs or symptoms of illness occur, they begin an average of 120 days (range: 45-160 days) after exposure to HBV

http://www.immunize.org/askexperts/experts_hepb.asp

Hepatitis B & HCP

- Percutaneous or mucosal exposure to HBsAg positive blood or body fluid
- Risk higher in training period and HCP with more exposure to blood and body fluids
- 1982: About 10,000 cases/year in US HCPs
- 2004: Estimated 304 HCP infections
  - Largely resulting from the implementation of routine pre-exposure vaccination and improved infection control precautions
- Chronic infection → cirrhosis, liver cancer, death

MMWR, November 25, 2011 (RR-07), https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6007a1.htm

Risk Factors for HBV Infection

- Healthcare Personnel
- Hemodialysis patients
- Men who have sex with men
- Injection drug users
- Sexual contacts to an HBV infected person
- Multiple sex partners
- Diagnosed with a STD

- Born in/parent born in a country with high levels of **chronic HBV infection**
  - Asia or Pacific Islands
  - Indigenous populations of Alaska, Australia, and New Zealand
  - Areas of South America
  - Areas of the Middle East
  - Africa
  - Caribbean

Hepatitis B Vaccine

- Why?
  - Transmitted through percutaneous or mucosal exposure to infectious blood or body fluids
  - Highly infectious for nonimmune persons
    - Disease transmission from HBeAg positive blood exposure needlestick is **100 times more likely** than HIV positive blood
  - Can survive on environmental surfaces for at least 7 days
  - A Federal Standard issued in December 1991
    - The Occupational Safety and Health Act mandates that hepatitis B vaccine be made available at the employer's expense to all healthcare personnel who are exposed occupationally to blood or other potentially infectious materials
  - Arizona 2016 confirmed and probable cases
    - 20 Hep B acute
    - 1,256 Hep B non-acute

Who Needs Hepatitis B Vaccine?

- All unvaccinated, uninfected persons who can reasonably be anticipated for exposure to blood or other infectious body fluids:
  - ≥ 3 **documented** doses of hepatitis B vaccine
  - Series completed before contact with blood
  - Post vaccination serology if high risk for occupational exposure to blood or body fluids

- Contraindication: Severe yeast allergy or severe allergic reaction to previous dose

Hepatitis B Vaccines

- Recombinant DNA technology
- Efficacy: 90-95%
- 3 doses, IM
- Formulations:
  - Pediatric (0-19 yrs.)
  - Adult (≥ 20 yrs.)
  - Hemodialysis (Merck)

Monovalent:

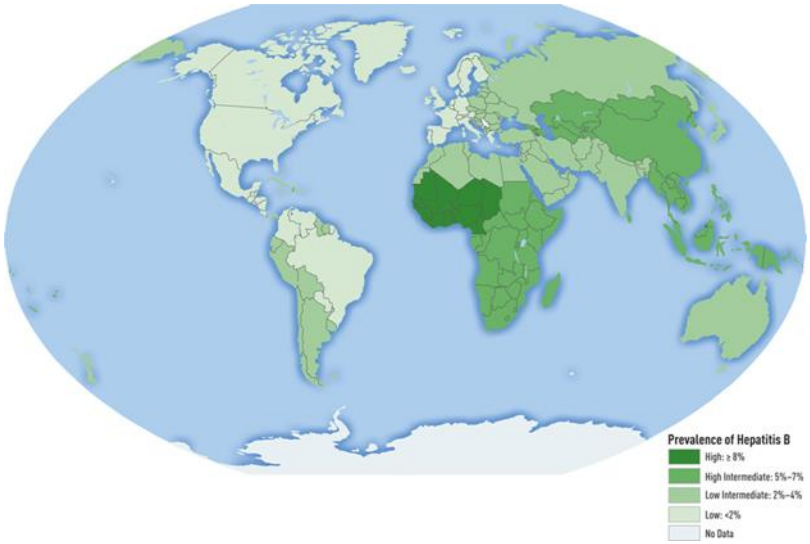
- Recombivax HB (Merck)
- Engerix-B (GSK)

Combined:

- Adults—Twinrix (A & B) (≥ 18 yrs.)
- Children—Pediarix (DTaP-IPV-HBV)

Pre-Vaccine Serology Recommended Only for HCPs with Higher Risk

- Born in/parent born in a country with high levels of chronic HBV infection
- On hemodialysis
- HIV+
- Immune suppressed
- High-risk drug use
- High-risk sexual activity



CDC 2016 Yellow Book

Serologic Testing of HCP After Hepatitis B Vaccination

- Test for hepatitis B surface antibody (anti-HBs) 1-2 months **after** 3rd vaccine
- Protective level ≥ 10 mIU/mL
  - Immune competent need no further testing
- If hepatitis B surface antibody (anti-HBs) is negative:
  - Repeat another 3 Hep B vaccine doses
  - Retest for Hepatitis B surface antibody (anti-HBs)
  - If negative, test for hepatitis B surface antigen (HBsAg) and hepatitis B core antibodies (anti-HBc)

MMWR, Nov. 25, 2011 (RR-07)

“Nonresponders”

- Hepatitis B surface antibody (anti-HBs) < 10 mIU/mL after 6 doses of hepatitis B vaccine

  And

- Hepatitis B surface antigen (HBsAg) negative

➢ Considered susceptible to hepatitis B infection

➢ Will need Hepatitis B Immune Globulin (HBIG) for exposure to blood or body fluid from a hepatitis B infected person

  ➢ Optimally within 24 hours of exposure

Immunity

- Immunologic memory remains intact for ≥20 years among healthy vaccinated individuals

- Cellular immunity appears to persist even though antibody levels might become low or decline below detectable levels

Influenza

SYMPTOMS OF INFLUENZA

- Rapid onset
- High fever, chills
- Extreme exhaustion
- Muscle aches
- Dry cough
- Runny nose
- Sore throat

Gesundheit!

Transmitted from person to person primarily via virus-laden droplets
Droplet Precautions are a key component of healthcare prevention
Most commonly reported HAI VPD Outbreak

Increased Risk For Influenza Complications

- Elderly, young children, infants
- Immune compromised
- Native American/Alaskan Native
- Pregnancy
- Underlying chronic medical condition
- Morbidly obese BMI > 40
- Long-Term Care residents
- ≤ 18 years old on chronic aspirin therapy

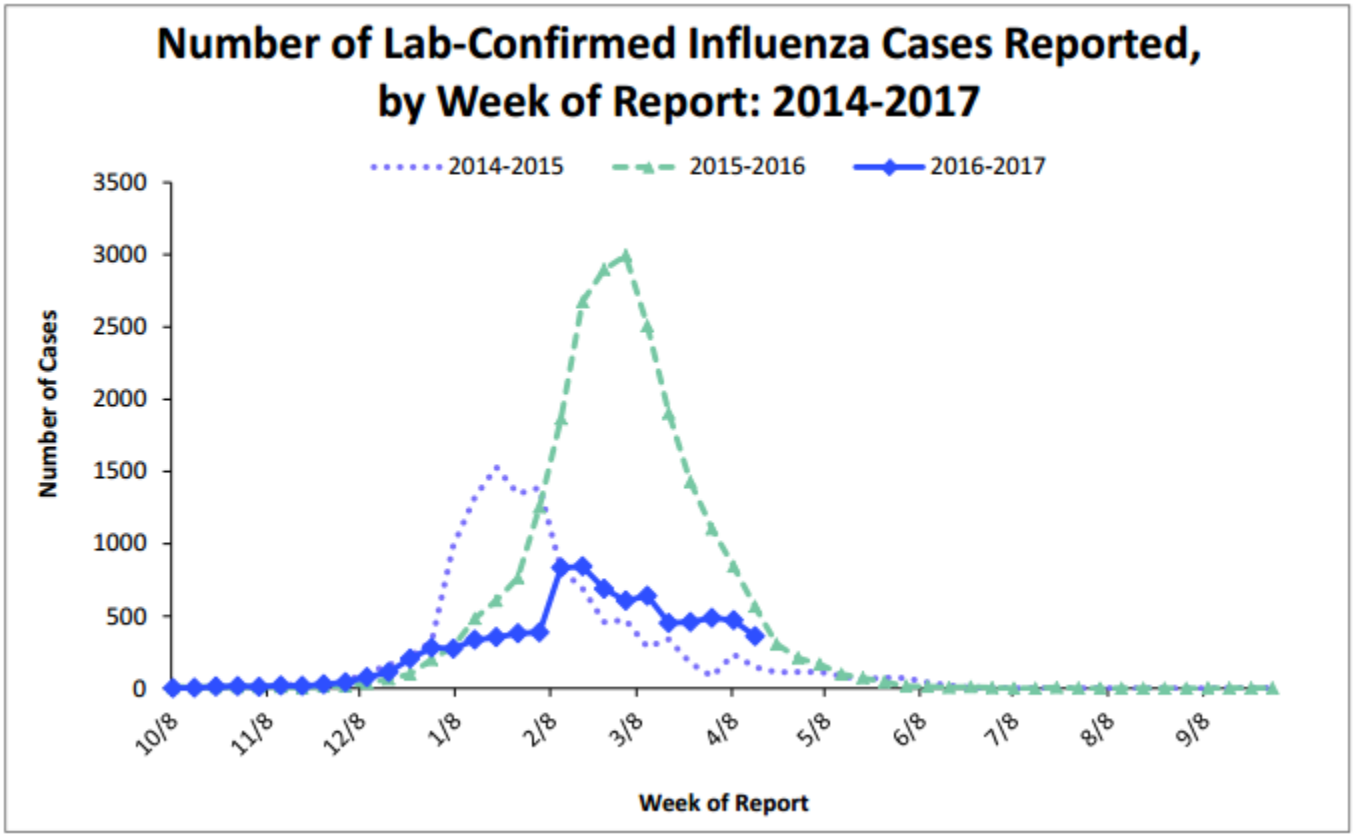
Flu (Influenza)Vaccine

- Why?
  - Reduce the risk that the HCP will become infected with influenza
  - Absenteeism leads to staffing issues
  - Serve as a vehicle for spread of flu
  - Infected HCP may shed virus before the development of clinical symptoms
  - Frequent contact with high-risk patients
  - Set an example concerning the importance of vaccination for everyone
  - Influenza vaccination of HCP reduces patient mortality
  - From August, 2005 through June, 2014, more than 40,000 deaths were averted by influenza vaccination

http://www.azdhs.gov/phs/oids/epi/flu/

http://www.sciencedirect.com/science/article/pii/S0264410X15002315

ARIZONA Week 15 (4/09/2017 – 4/15/2017)



http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/flu/surveillance/2016-2017/influenza-2016-17-week15.pdf?utm_medium=email&utm_source=govdelivery

Who?

- All HCP
  - Annual influenza vaccination is recommended for all persons aged ≥6 months who have no medical contraindication

Inactivated Influenza Vaccine

- Contraindications
  - Anaphylaxis to influenza vaccine or vaccine components
  - Anaphylactic reaction to eggs
- Precaution
  - History of Guillain-Barre Syndrome within 6 weeks following a previous dose
  - Severe to moderate illness

Immunity

- Duration of immunity following inactivated influenza vaccination is less than 1 year
- Influenza vaccine efficacy varies
- An annual flu vaccination is still the **best tool** currently available to protect you against the flu and its potentially serious complications

TABLE 1. Influenza vaccines — United States, 2016–17 influenza season*

Trade name	Manufacturer	Presentation	Age indication	Mercury (from thimerosal), µg/0.5mL	Latex	Route
Inactivated Influenza Vaccine, quadrivalent (IIV4), standard dose†						
Fluarix Quadrivalent	GlaxoSmithKline	0.5 mL single-dose prefilled syringe	≥3 yrs	NR	No	IM§
Flulaval Quadrivalent	ID Biomedical Corp. of Quebec (distributed by GlaxoSmithKline)	0.5 mL single-dose prefilled syringe	≥3 yrs	NR	No	IM
		5.0 mL multi-dose vial	≥3 yrs	<25	No	IM
Fluzone Quadrivalent	Sanofi Pasteur	0.25 mL single-dose prefilled syringe	6 through 35 mos	NR	No	IM
		0.5 mL single-dose prefilled syringe	≥36 mos	NR	No	IM
		0.5 mL single-dose vial	≥36 mos	NR	No	IM
		5.0 mL multi-dose vial	≥6 mos	25	No	IM
Fluzone Intradermal Quadrivalent¶	Sanofi Pasteur	0.1 mL single-dose prefilled microinjection system	18 through 64 yrs	NR	No	ID**
Inactivated Influenza Vaccine, quadrivalent, cell culture-based (ccIIV4), standard dose†						
Flucelvax Quadrivalent	Seqirus	0.5 mL single-dose prefilled syringe	≥4 yrs	NR	No	IM
Inactivated Influenza Vaccine, trivalent (IIV3), standard dose†						
Afluria	Seqirus	0.5 mL single-dose prefilled syringe	≥9 yrs††	NR	No	IM
		5.0 mL multi-dose vial	≥9 yrs†† (needle and syringe) 18 through 64 years (jet injector)	24.5	No	IM
Fluvirin	Seqirus	0.5 mL single-dose prefilled syringe	≥4 yrs	≤1	Yes§§	IM
		5.0 mL multi-dose vial	≥4 yrs	25	No	IM
Adjuvanted Inactivated Influenza Vaccine, trivalent (aIIV3), standard dose†						
Fluad	Seqirus	0.5 mL single-dose prefilled syringe	≥65 yrs	NR	Yes§§	IM
Inactivated Influenza Vaccine, trivalent (IIV3), High Dose¶¶						
Fluzone High-Dose	Sanofi Pasteur	0.5 mL single-dose prefilled syringe	≥65 yrs	NR	No	IM
Recombinant Influenza Vaccine, trivalent (RIV3)* **						
Flublok	Protein Sciences	0.5 mL single-dose vial	≥18 yrs	NR	No	IM
**Live Attenuated Influenza Vaccine, quadrivalent (LAIV4) ††† **						
FluMist Quadrivalent	MedImmune	0.2 mL single-dose prefilled intranasal sprayer	2 through 49 yrs	NR	No	NAS

https://www.cdc.gov/flu/pdf/protect/vaccine/rr6505-table-1.pdf

Support for mandatory vaccination policy?

IDSA

PEDIATRIC INFECTIOUS DISEASES SOCIETY

SHEA
The Society for Healthcare Epidemiology of America

December 2013

IDSA, SHEA, and PIDS Joint Policy Statement on Mandatory Immunization of Health Care Personnel According to the ACIP-Recommended Vaccine Schedule

The Infectious Diseases Society of America (IDSA), the Society for Healthcare Epidemiology of America (SHEA), and the Pediatric Infectious Diseases Society (PIDS) ("Societies") support universal immunization of health care personnel (HCP) by health care employers (HCEs) as recommended by the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) for HCP.*

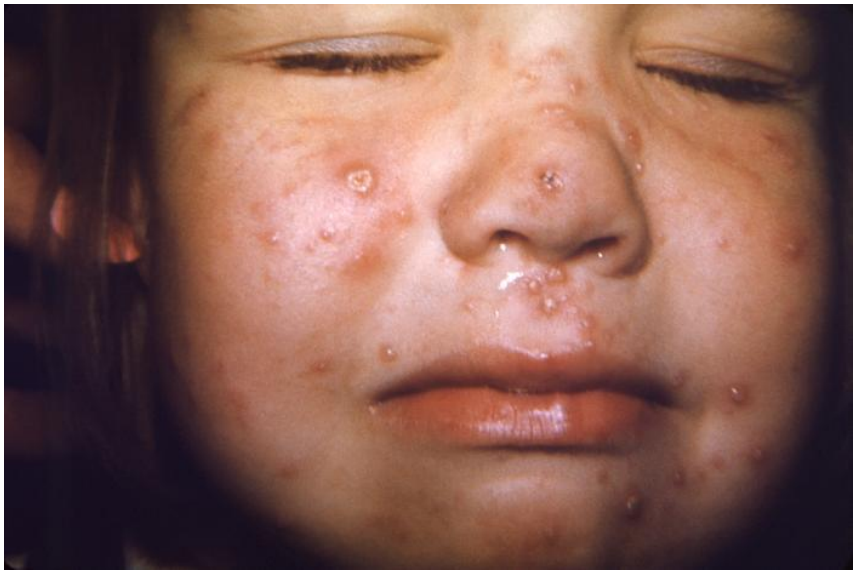
When voluntary programs fail to achieve immunization of at least 90% of HCP, the Societies support health care employers (HCEs) policies that require HCP documentation of immunity or receipt of ACIP-recommended vaccinations as a condition of employment, unpaid service, or receipt of professional privileges.

http://www.idsociety.org/uploadedFiles/IDSA/Policy_and_Advocacy/Current_Topics_and_Issues/Immunizations_and_Vaccines/Health_Care_Worker_Immunization/Statements/IDSA_SHEA_PIDS%20Policy%20on%20Mandatory%20Immunization%20of%20HCP.pdf

Varicella

Varicella

Chicken Pox



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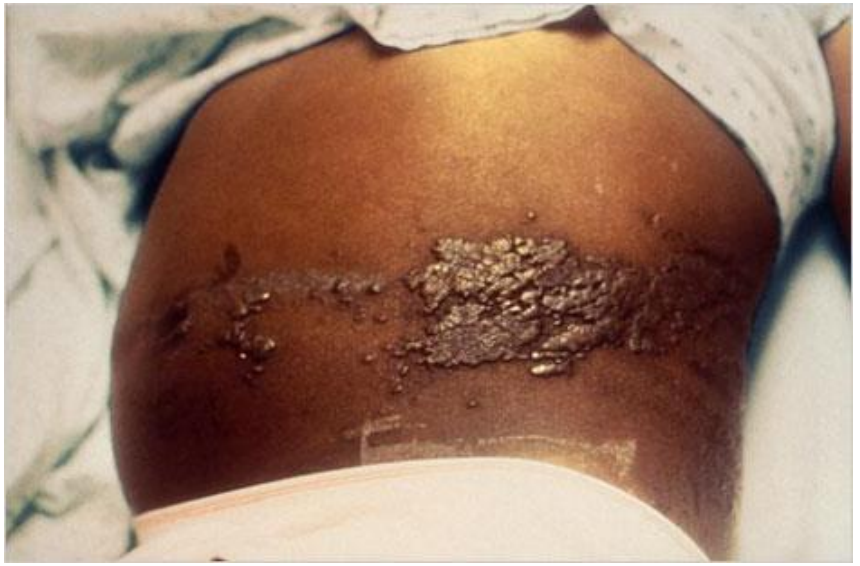
Shingles



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Varicella (Chickenpox)

- Why?
  - Prior to the availability of varicella vaccine there were approximately 4 million cases of varicella a year in the U.S
  - Highly contagious acute viral infectious disease
  - Varicella spreads from person to person by direct contact or through the air by coughing or sneezing
  - Secondary attack rates among susceptible household contacts of persons with varicella are as high as 90%

http://www.immunize.org/askexperts/experts_var.asp

Management of Patients with Varicella

- Follow standard, contact, and airborne (negative air-flow rooms) precautions until lesions are dry and crusted
  - Varicella zoster
  - Herpes zoster
    - Disseminated disease in any patient
    - Localized disease in immunocompromised patient until disseminated infection ruled out
  - If negative air-flow rooms are not available, patients with varicella should be isolated in closed rooms with no contact with persons without evidence of immunity
- Follow standard precautions
  - Localized herpes zoster in patient with intact immune system with lesions that can be contained/covered
- Patients with varicella should be cared for by staff with evidence of immunity

https://www.cdc.gov/chickenpox/hcp/healthcare-setting.html
https://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

Varicella

- Presumed immunity
  - Written documentation of two Varicella vaccines spaced at least 28 days apart
  - Laboratory evidence of immunity
  - Laboratory confirmation of disease
  - HCP verification of varicella or zoster

Who?

- For HCP who do not have one of the following
  - Documentation of 2 doses of varicella vaccine given at least 28 days apart
  - Verification of a history of varicella or herpes zoster (shingles) by a healthcare provider
  - Laboratory evidence of immunity or confirmation of disease
    - IgG

Contraindications

- Severe allergic reaction after a previous dose or to a vaccine component
- Known severe immunodeficiency
- Pregnancy

Administration

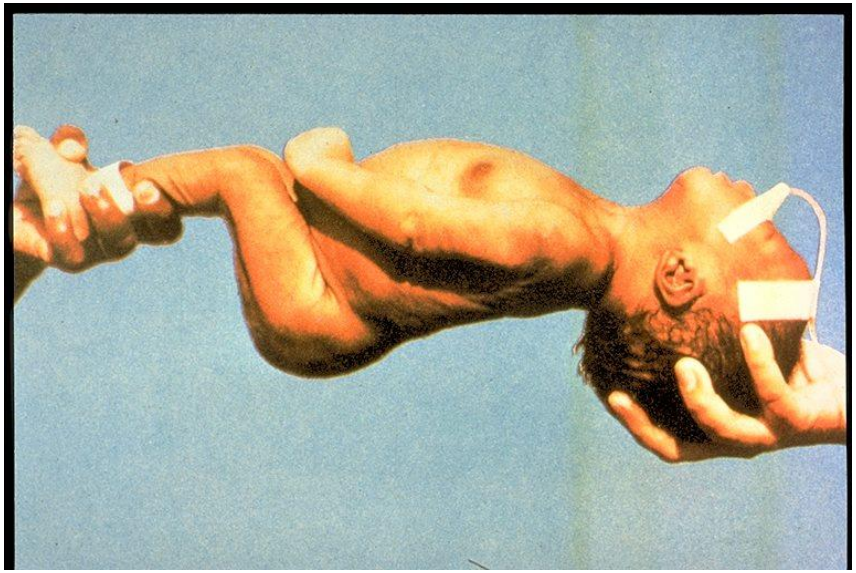
- 2 doses of varicella vaccine
  - 4 weeks apart for all ≥ 13 years of age
- Given subcutaneous (SC)

Immunity

- 99% of persons are seropositive after the second dose
  - Routine testing after 2 doses of vaccine is not recommended

Pertussis, Tetanus, Diphtheria (Tdap)

Tetanus



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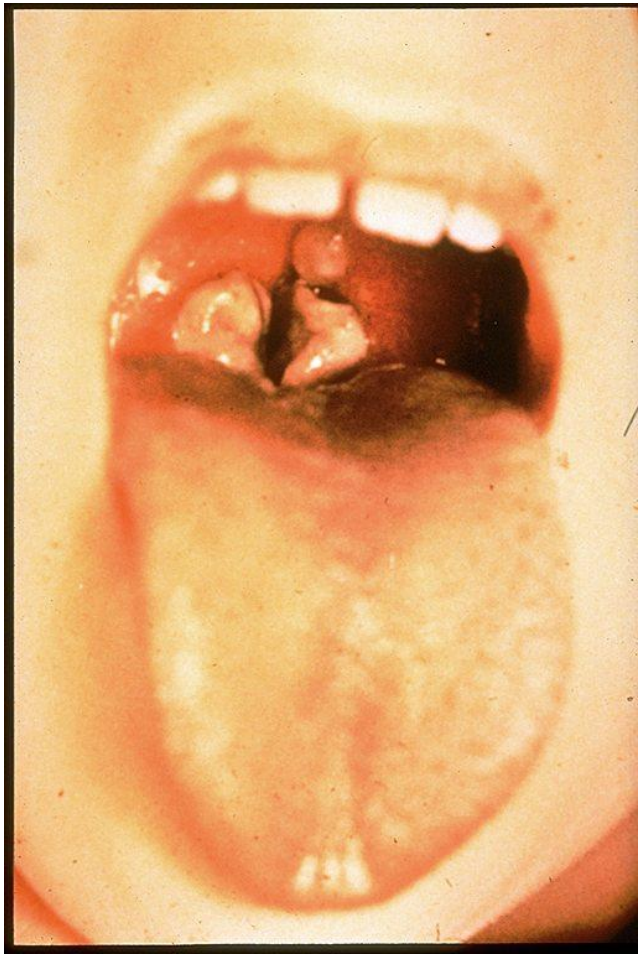
Diphtheria



CDC (IAC)

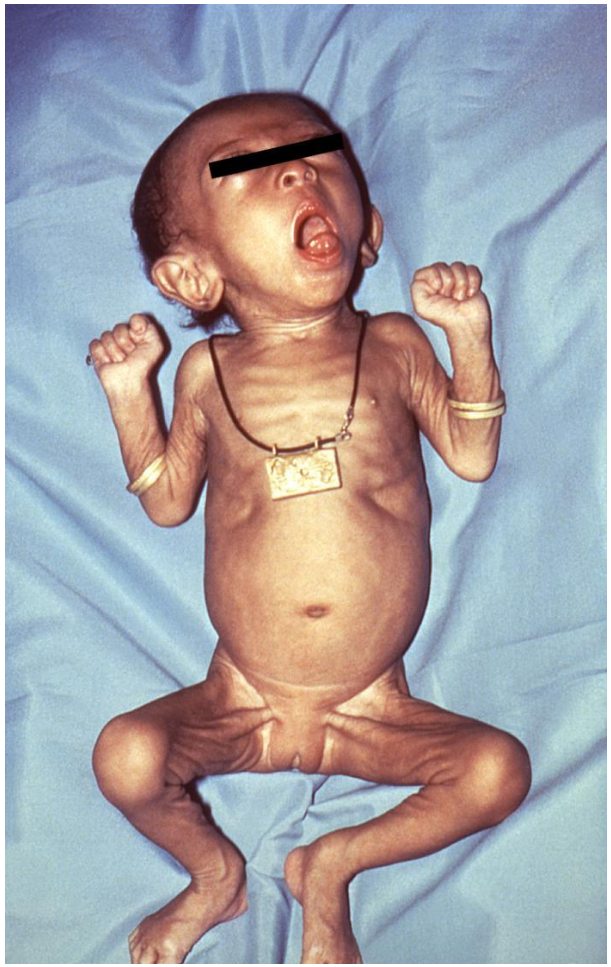
Pertussis

- Caused by *Bordetella pertussis*
- Bacteria attach to cilia of respiratory epithelial cells
- Inflammation occurs which interferes with clearance of pulmonary secretions
- Pertussis antigens allow evasion of host defenses
- Incubation period 7-10 days (range 4-21 days)
- Common cold like onset with nonspecific cough
- Fever usually minimal throughout course of illness
  - Catarrhal stage: 1-2 weeks
  - Paroxysmal cough stage: 1-6 weeks
  - Convalescence: weeks to months

Complications from Pertussis Paroxysmal Coughing

- Subconjunctival hemorrhage
- Epistaxis
- Pneumothorax
- Subdural hematoma
- Rib fracture
- Hernias
- Rectal prolapse
- Sleeping problems
- Laryngeal damage
- Urinary incontinence

Pertussis



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CDC (IAC)

Tdap (Tetanus, Diphtheria, Pertussis) Vaccine

- Why?
  - Pertussis is a highly contagious bacterial infection transmitted by respiratory droplets
  - Secondary attack rates among susceptible household contacts exceed 80%
  - Communicability starts with the onset of the catarrhal stage and extends into the paroxysmal stage
  - Immunity via vaccine or disease wanes over time
  - 2016 pertussis cases
    - 280 confirmed and probable cases
    - 151 confirmed cases

Who?

- All HCPs who have not or are unsure if they have previously received a dose of Tdap

Tetanus, Diphtheria, Pertussis

- One Tdap regardless of last dose of Td
- Td every 10 years thereafter
- Exemption
  - Pregnant women should receive Tdap during every pregnancy, optimally during 3rd trimester
    - Ideally 27th through 36th week of their pregnancy
- Contraindication to Tdap
  - Encephalopathy (disease, damage, or malfunction of the brain) within 7 days of vaccine administration without other cause
  - Severe allergic reaction

Immunity

- Recent studies of Tdap demonstrate vaccine effectiveness at 78% and 66%
- Duration of immunity from vaccination has yet to be evaluated

HCP Vaccination Core Concepts

Vaccines	Schedule
Hepatitis B	Three doses
Influenza	One dose annually
Measles	Two doses
Mumps	Two doses
Rubella	One dose
Tetanus, diphtheria, and acellular pertussis (Tdap)	One dose
Varicella-zoster (VZV)	Two doses

*Meningococcal vaccines are recommended for microbiologists who work with *Neisseria meningitidis* isolates

http://www.immunize.org/catg.d/p2017.pdf

Situation Specific Vaccines

- HPV
- Polio
- Pneumococcal
  - PCV13/PPSV23
- Zoster
- Smallpox
- Adenovirus
- Hepatitis A
- Yellow fever
- Typhoid
- Japanese Encephalitis Virus
- Rabies
- Meningococcal

Call to action

- ✓ Be aware
- ✓ Be an advocate
- ✓ Be an example
- ✓ Be vaccinated
- ✓ Be a Hero!

ADHS

Pneumococcal Vaccination for Adults:

Who Wants to Know More?

Healthcare-Associated Infection Program
HAI Prevention
Education
Prevention
Surveillance
ARIZONA

Join us on April 28, 2017

For one of two webinars at 7:30 am or 12:30 pm

These will be identical sessions

Register at: https://azdhs.qualtrics.com/jfe/form/SV_8ll0WRytMIGWRN3

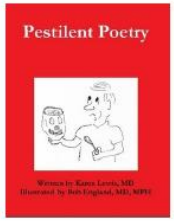
Presenters:

Karen Lewis, MD, FAAP
Medical Director
Arizona Immunization Program Office
Arizona Department of Health Services

Ozlem Equils, MD, FAAP
Adjunct Associate Professor
Pediatrics, CSMC/UCLA
Medical Director, Pfizer

Eugene Livar, MD, CIC
Healthcare-Associated Infection
Program Manager
Arizona Department of Health Services

All webinar attendees completing a post-survey will have a chance to win a copy of Pestilent Poetry!



Register at: https://azdhs.qualtrics.com/jfe/form/SV_8ll0WRytMIGWRN3

Why Vaccines Work

https://www.youtube.com/watch?v=3aNhzLUL2ys
(1:00 minute mark)

Resources

THANK YOU

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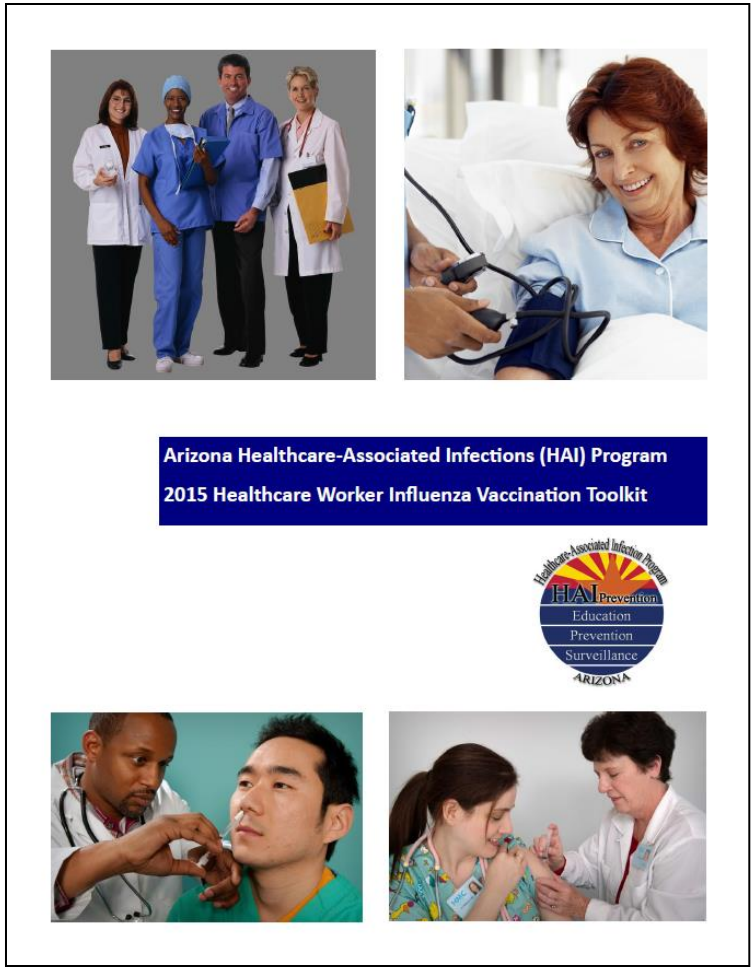
Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP)

November 25, 2011

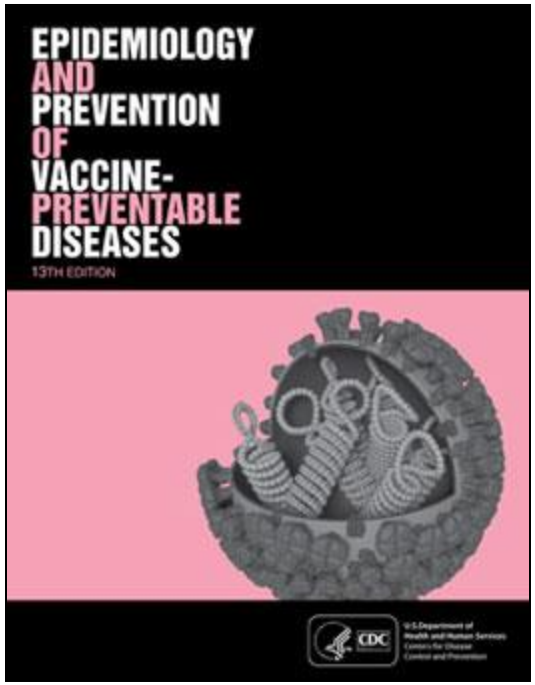
- The recommendations for vaccination of HCP are presented by disease
- Vaccine effectiveness and safety
- Pre and post-exposure management
- Special considerations
- Much more

Healthcare Worker Influenza Vaccination Toolkit

- Universal Influenza Vaccination for Arizona Healthcare Workers letter of recommendation from ADHS
- 2015 Influenza Vaccination of Healthcare Workers Survey Summary
- Educational influenza pages
- Healthcare worker influenza promotional flyers
- References and Resources



The Pink Book: Course Textbook



- 22 chapters and many appendices of robust vaccine information
- Includes principles, recommendations and strategies
- HCP recommendations
  - http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/A/healthcare-rec.pdf

Healthcare Personnel Vaccination Recommendations

Healthcare Personnel Vaccination Recommendations

VACCINES AND RECOMMENDATIONS IN BRIEF

Hepatitis B – If previously unvaccinated, give 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2). Give intramuscularly (IM). For HCP who perform tasks that may involve exposure to blood or body fluids, obtain anti-HBs serologic testing 1–2 months after dose #3.

Influenza – Give 1 dose of influenza vaccine annually. Inactivated injectable vaccine is given IM, except when using the intradermal influenza vaccine. Live attenuated influenza vaccine (LAIV) is given 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 subcutaneously (SC).

Varicella (chickenpox) – For HCP who have no serologic proof of immunity, prior vaccination, or diagnosis or verification of a history of varicella or herpes zoster (shingles) by a healthcare provider, give 2 doses of varicella vaccine, 4 weeks apart. Give SC.

Tetanus, diphtheria, pertussis – Give 1 dose of Tdap as soon as feasible to all HCP who have not received Tdap previously and to pregnant HCP with each pregnancy (see below). Give Td boosters every 10 years thereafter. Give IM.

Meningococcal – Give 1 dose to microbiologists who are routinely exposed to isolates of *Neisseria meningitidis* and boost every 5 years if risk continues. Give MCV4 IM; if necessary to use MPSV4, give SC.

Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP who may have on-the-job exposure to fecal material.

Hepatitis B

Unvaccinated healthcare personnel (HCP) and/or those who cannot document previous vaccination should receive a 3-dose series of hepatitis B vaccine at 0, 1, and 6 months. HCP who perform tasks that may involve exposure to blood or body fluids should be tested for hepatitis B surface antibody (anti-HBs) 1–2 months after dose #3 to document immunity.

- If anti-HBs is at least 10 mIU/mL (positive), the vaccinee is immune. No further serologic testing or vaccination is recommended.
- If anti-HBs is less than 10 mIU/mL (negative), the vaccinee is not protected from hepatitis B virus (HBV) infection, and should receive 3 additional doses of HepB vaccine on the routine schedule, followed by anti-HBs testing 1–2 months later. A vaccinee whose anti-HBs remains less than 10 mIU/mL after 6 doses is considered a "non-responder."

For non-responders: HCP who are non-responders should be considered susceptible to HBV and should be counseled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to hepatitis B surface antigen (HBsAg)-positive blood or blood with unknown HBsAg status. It is also possible that non-responders are people who are HBsAg positive. HBsAg testing is recommended. HCP found to be HBsAg positive should be counseled and medically evaluated.

For HCP with documentation of a complete 3-dose HepB vaccine series but no documentation of anti-HBs of at least 10 mIU/mL (e.g., those vaccinated in childhood): HCP who are at risk for occupational blood or body fluid exposure might undergo anti-HBs testing upon hire or matriculation. See references 2 and 3 for details.

Influenza

All HCP, including physicians, nurses, paramedics, emergency medical technicians, employees of nursing homes and chronic care facilities, students in these professions, and volunteers, should receive annual vaccination against influenza. Live attenuated influenza vaccine (LAIV) may be given only to non-pregnant healthy HCP age 49 years and younger. Inactivated injectable influenza vaccine (IIV) is preferred over LAIV for HCP who are in close contact with severely immunosuppressed patients (e.g., stem cell transplant recipients) when they require protective isolation.

Measles, Mumps, Rubella (MMR)

HCP who work in medical facilities should be immune to measles, mumps, and rubella.

- HCP born in 1957 or later can be considered immune to measles, mumps, or rubella only if they have documentation of (a) laboratory confirmation of disease or immunity or (b) appropriate vaccination against measles, mumps, and rubella (i.e., 2 doses of live measles and mumps vaccines given on or after the first birthday and separated by 28 days or more, and at least 1 dose of live rubella vaccine). HCP with 2 documented doses of MMR are not recommended to be serologically tested for immunity; but if they are tested and results are negative or equivocal for measles, mumps, and/or rubella, these HCP should be considered to have presumptive evidence of immunity to measles, mumps, and/or rubella and are not in need of additional MMR doses.
- Although birth before 1957 generally is considered acceptable evidence of measles, mumps, and rubella immunity, 2 doses of MMR vaccine should be considered for unvaccinated HCP born before 1957 who do not have laboratory evidence of disease or immunity to measles and/or mumps. One dose of MMR vaccine should be considered for HCP with no laboratory evidence of disease or immunity to rubella. For these same HCP who do not have evidence of immunity, 2 doses of MMR vaccine are recommended during an outbreak of measles or mumps and 1 dose during an outbreak of rubella.

Varicella

It is recommended that all HCP be immune to varicella. Evidence of immunity in HCP includes documentation of 2 doses of varicella vaccine given at least 28 days apart, laboratory evidence of immunity, laboratory confirmation of disease, or diagnosis or verification of a history of varicella or herpes zoster (shingles) by a healthcare provider.

Tetanus/Diphtheria/Pertussis (Td/Tdap)

All HCPs who have not or are unsure if they have previously received a dose of Tdap should receive a dose of Tdap as soon as feasible, without regard to the interval since the previous dose of Td. Pregnant HCP should be revaccinated during each pregnancy. All HCPs should then receive Td boosters every 10 years thereafter.

Meningococcal

Vaccination with MCV4 is recommended for microbiologists who are routinely exposed to isolates of *N. meningitidis*.

REFERENCES

1 CDC. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*, 2011; 60(RR-7).

2 CDC. CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Postexposure Management. *MMWR*, 2013; 62(10):1–19.

3 IAC. Pre-exposure Management for Healthcare Personnel with a Documented Hepatitis B Vaccine Series Who Have Not Had Post-vaccination Serologic Testing. Accessed at www.immunize.org/catg.d/p2108.pdf.

For additional specific ACIP recommendations, visit CDC's website at www.cdc.gov/vaccines/hcp/acip-recs/index.html or visit IAC's website at www.immunize.org/acip.

Technical content reviewed by the Centers for Disease Control and Prevention

IMMUNIZATION ACTION COALITION Saint Paul, Minnesota • 651-647-9009 • www.immunize.org • www.vaccineinformation.org

www.immunize.org/catg.d/p2017.pdf • Item #P2017 (3/15)

2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings

Jane D. Siegel, MD; Emily Rhinehart, RN MPH CIC; Marguerite Jackson, PhD; Linda Chiarello, RN MS; the Healthcare Infection Control Practices Advisory Committee

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Suggested citation: Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee, 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings
http://www.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf

https://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf

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