Immunization: Varicella, Zoster, Hepatitis A and Hepatitis B Vaccines

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Presentation Outline

- Adult Immunization Schedule review
- Specific vaccines: limited disease epidemiology in adults, and vaccine recommendations
  - Varicella vaccine
  - Zoster vaccine
  - Hepatitis A vaccine
  - Hepatitis B vaccine

Recommended Adult Immunization Schedule

United States - 2014

The 2014 ACIP Adult Immunization Schedule was approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), the American College of Obstetricians and Gynecologists (ACOG), and the American College of Nurse-Midwives (ACNM). On February 3, 2014, the adult immunization schedule and a summary of changes from 2013 were published in Annals of Internal Medicine, and a summary of changes was published in the MMWR on February 7, 2014.

All clinically significant postvaccination reactions should be reported to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967.

Additional details regarding ACIP recommendations for each of the vaccines listed in the schedule can be found at: http://www.cdc.gov/vaccines/hcp/acip-recs/index.html

American Academy of Family Physicians (AAFP)

http://www.aafp.org/home.html

American College of Physicians (ACP)

http://www.acponline.org/

American College of Obstetricians and Gynecologists (ACOG)

http://www.acog.org/

American College of Nurse-Midwives (ACNM)

http://www.midwife.org/

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Recommended Adult Immunization Schedule—United States - 2014

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[1]

VACCINE ▼ / AGE GROUP ▶	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years
Influenza [2,*]	1 dose annually					
Tetanus, diphtheria, pertussis (Td/Tdap) [3,*]	Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs					
Varicella [4,*]	2 doses					
Human papillomavirus (HPV) Female [5,*]	3 doses					
Human papillomavirus (HPV) Male [5,*]	3 doses					
Zoster [6]					1 dose	
Measles, mumps, rubella (MMR) [7,*]	1 or 2 doses					
Pneumococcal 13-valent conjugate (PCV13) [8,*]	1 dose					
Pneumococcal polysaccharide (PPSV23) [9,10]	1 or 2 doses					1 dose
Meningococcal [11,*]	1 or more doses					
Hepatitis A [12,*]	2 doses					
Hepatitis B [13,*]	3 doses					
Haemophilus influenzae type b (Hib) [14,*]	1 or 3 doses					

*Covered by the Vaccine Injury Compensation Program

- **For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster**
- **Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indication)**
- **No recommendation**

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967.

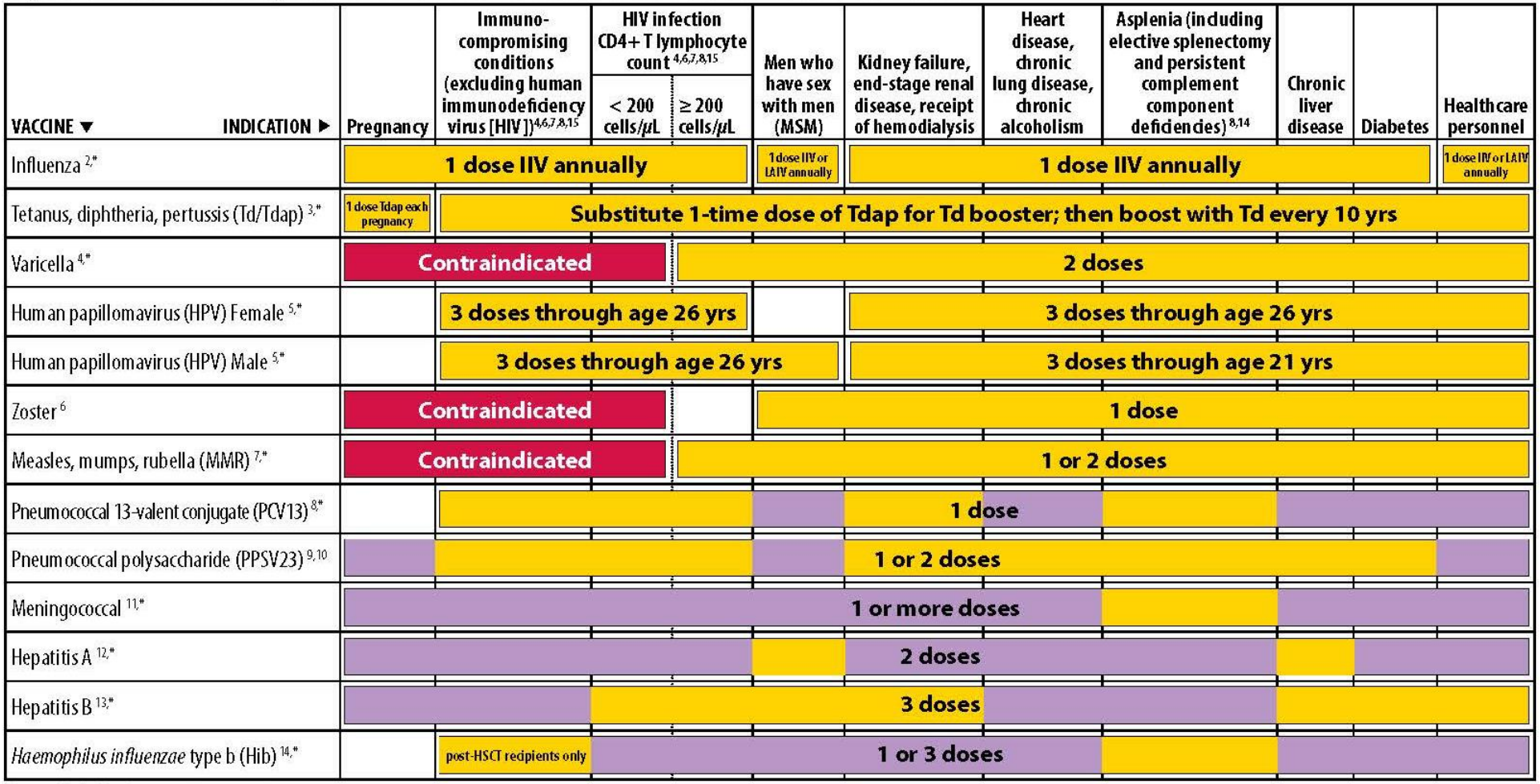
Information on how to file a Vaccine Injury Compensation Program claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400.

Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at www.cdc.gov/vaccines or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), American College of Obstetricians and Gynecologists (ACOG) and American College of Nurse-Midwives (ACNM).

Figure 2. Vaccines that might be indicated for adults based on medical and other indications[1]



*Covered by the Vaccine Injury Compensation Program

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

No recommendation

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

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 1, 2014. For all vaccines being recommended on the Adult Immunization Schedule: a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated and when the vaccine's other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturers' package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/hcp/acip-recs/index.html). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

Varicella Zoster Virus

- Herpes virus (DNA)
- Primary infection results in varicella (chickenpox)
- Recurrent infection results in herpes zoster (shingles)
- Short survival in environment

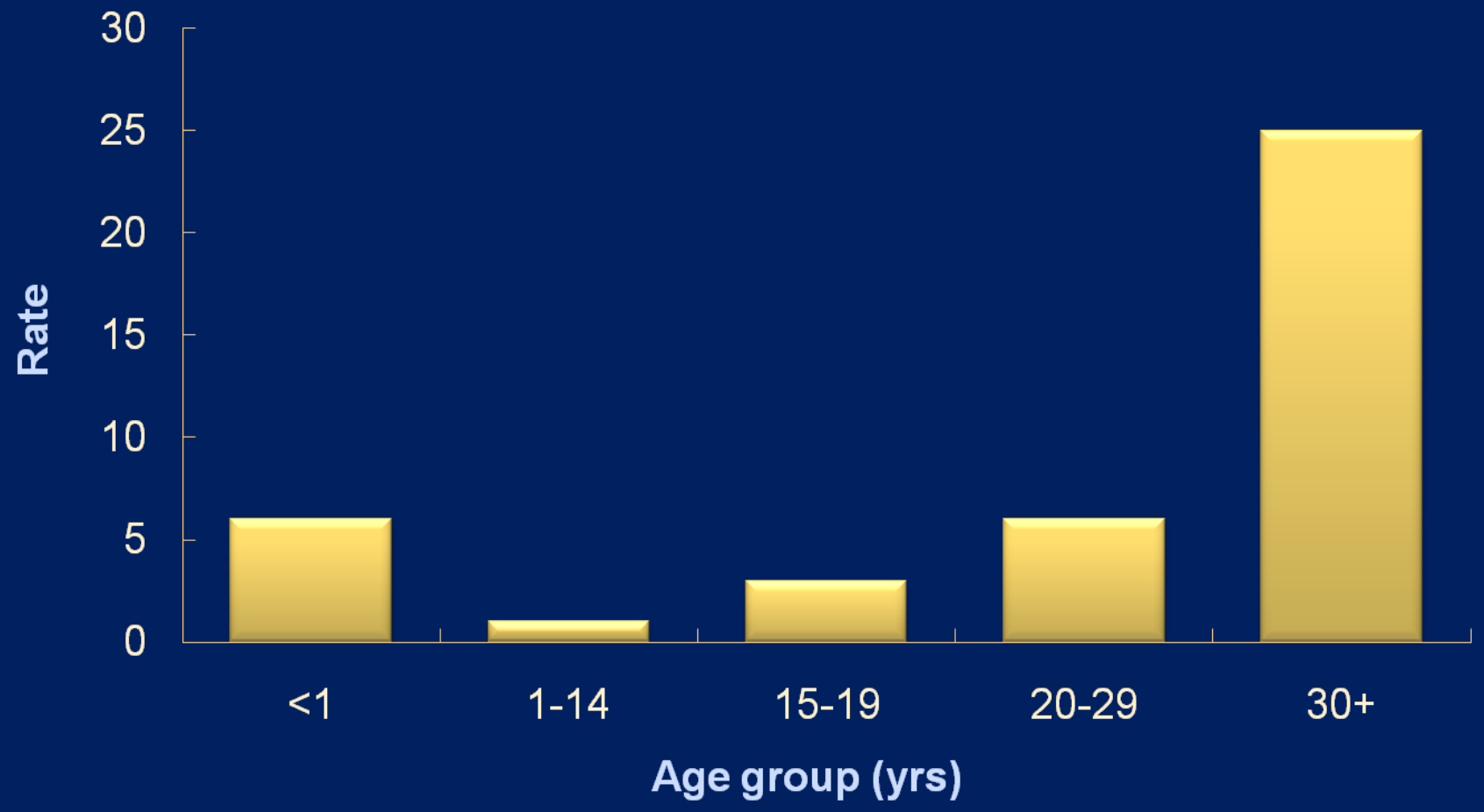
Varicella Complications

- Bacterial infection of lesions
- Hemorrhagic varicella
- CNS manifestations
- Pneumonia (rare in children)
- Congenital varicella
- Perinatal varicella
- Hospitalization ~3 per 1000 cases
  - (11,000/year)
- Death ~ 1 per 60,000 cases
  - (100/year)

Groups at Increased Risk of Complications of Varicella

- Persons older than 15 years
- Infants younger than 1 year
- Immunocompromised persons
- Newborns of women with rash onset within 5 days before to 48 hours after delivery

Varicella Fatality Rate in Healthy Persons



*Deaths per 100,000 cases

Varicella-Containing Vaccines

- Varicella vaccine (Varivax)
  - approved for persons 12 months and older
- Herpes zoster vaccine (Zostavax)
  - FDA approved for persons 50 years and older

Varicella Vaccine Immunogenicity and Efficacy

- Detectable antibody
  - 97% of children 12 months-12 years after 1 dose
  - 99% of persons 13 years and older after 2 doses

- 70%-90% effective against any varicella disease (1 dose)
- 95%-100% effective against severe varicella disease (1 dose)

- 98% effective against any varicella disease (2 doses)

Shapiro ED ,et al. J Infect Dis. 2011 Feb 1;203(3):312-5

MMWR
Morbidity and Mortality Weekly Report
Recommendations and Reports June 22, 2007 / Vol. 56 / No. RR-4

Prevention of Varicella

Recommendations of the Advisory Committee on Immunization Practices (ACIP)

Varicella Vaccine
Minimum Age and Intervals

	Minimum Intervals
Persons 13 years & older	4 weeks

Varicella Vaccine Recommendations Older Children and Adults

- Two doses are recommended for all persons 4 years of age and older who do not have evidence of varicella immunity

- Second dose recommended for persons of any age who have only received one dose

Acceptable Evidence of Varicella Immunity

- Written documentation of age-appropriate vaccination
- Laboratory evidence of immunity or laboratory confirmation of varicella disease
- U.S. born before 1980*
- Healthcare provider diagnosis or verification of varicella disease
- History of herpes zoster based on healthcare provider diagnosis

*Birth year immunity criterion does not apply to healthcare personnel or pregnant women. MMWR 2007;56(RR-4):16-17

Varicella and HCP

- Recommended for all susceptible healthcare workers
- Pre-vaccination serologic screening probably cost-effective
- Post vaccination testing not necessary or recommended
- Give 2 doses, 4 weeks apart to susceptible persons

Varicella Vaccine
Post exposure Prophylaxis

- Varicella vaccine is recommended for use in susceptible persons after exposure to varicella
  - 70%-100% effective if given within 72 hours of exposure
  - Not effective if administered more than 5 days after exposure but will produce immunity if not infected

Varicella-Containing Vaccine Contraindications and Precautions

- Severe allergy to prior dose or vaccine component
- Pregnancy
- Immunosuppression
- Moderate or severe acute illness
- Recent blood product (except zoster vaccine)
- MMRV ONLY: a personal or family (i.e., sibling or parent) history of seizure is a precaution

Varicella-Containing Vaccines Use in Immunocompromised Persons

- Most immunocompromised persons should not receive varicella-containing vaccines
- Varicella vaccine may be administered to persons with isolated humoral immunodeficiency
- Do not administer zoster vaccine to immunosuppressed persons

Varicella Vaccine and HIV Infection

- Consider varicella vaccination for HIV-infected children with CD4 % of 15% or higher
- Consider varicella vaccination for HIV-infected older children and adults with CD4 count of 200 or higher
- MMRV not approved for use in persons with HIV infection

Varicella Vaccine Adverse Reactions

- Local reactions (pain, erythema)
  - 19% (children)
  - 24% (adolescents and adults)
- Rash – 3%-4%
  - may be maculopapular rather than vesicular
  - average 5 lesions
- Systemic reactions not common

Zoster Vaccine

Zoster Vaccine

- Now licensed for adults 50-59 years of age
- Routine vaccination of adults younger than 60 years NOT recommended by ACIP
- Rationale
  - reduced supply
  - burden of complications highest in persons older than 60 years

ACIP Recommendations for Zoster Vaccine

- 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)

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

Zoster Vaccine Contraindications

- Severe allergic reaction to a vaccine component or following a prior dose
- Pregnancy or planned pregnancy within 4 weeks
- Immunosuppression

MMWR 2008;57(RR-5)

Zoster Vaccine Contraindications Immunosuppression

- Leukemia, lymphoma or other malignant neoplasm affecting the bone marrow or lymphatic system
  - persons whose leukemia or lymphoma is in remission and who have not received chemotherapy or radiation for at least 3 months can be vaccinated

- AIDS or other clinical manifestation of HIV infection
  - includes persons with CD4+ T-lymphocyte values less than 200 per mm^3, or less than 15% of total lymphocytes

any vaccine. For information or a copy of the vaccine reporting form, call the VAERS toll-free number at 1-800-822-7967 or report online to www.vaers.hhs.gov.[2]

7 DRUG INTERACTIONS

7.1 Concomitant Administration with Other Vaccines

In a randomized clinical study, a reduced immune response to ZOSTAVAX as measured by gpELISA was observed in individuals who received concurrent administration of PNEUMOVAX® 23 and ZOSTAVAX compared with individuals who received these vaccines 4 weeks apart. Consider administration of the two vaccines separated by at least 4 weeks *[see Clinical Studies (14.3)]*.

For concomitant administration of ZOSTAVAX with trivalent inactivated influenza vaccine, *[see Clinical Studies (14.3)]*.

7.2 Antiviral Medications

Concurrent administration of ZOSTAVAX and antiviral medications known to be effective against VZV has not been evaluated.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category: Contraindication *[see Contraindications (4.3)]*

Zostavax product information, June 2011

Zoster and PPSV Vaccines

- 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

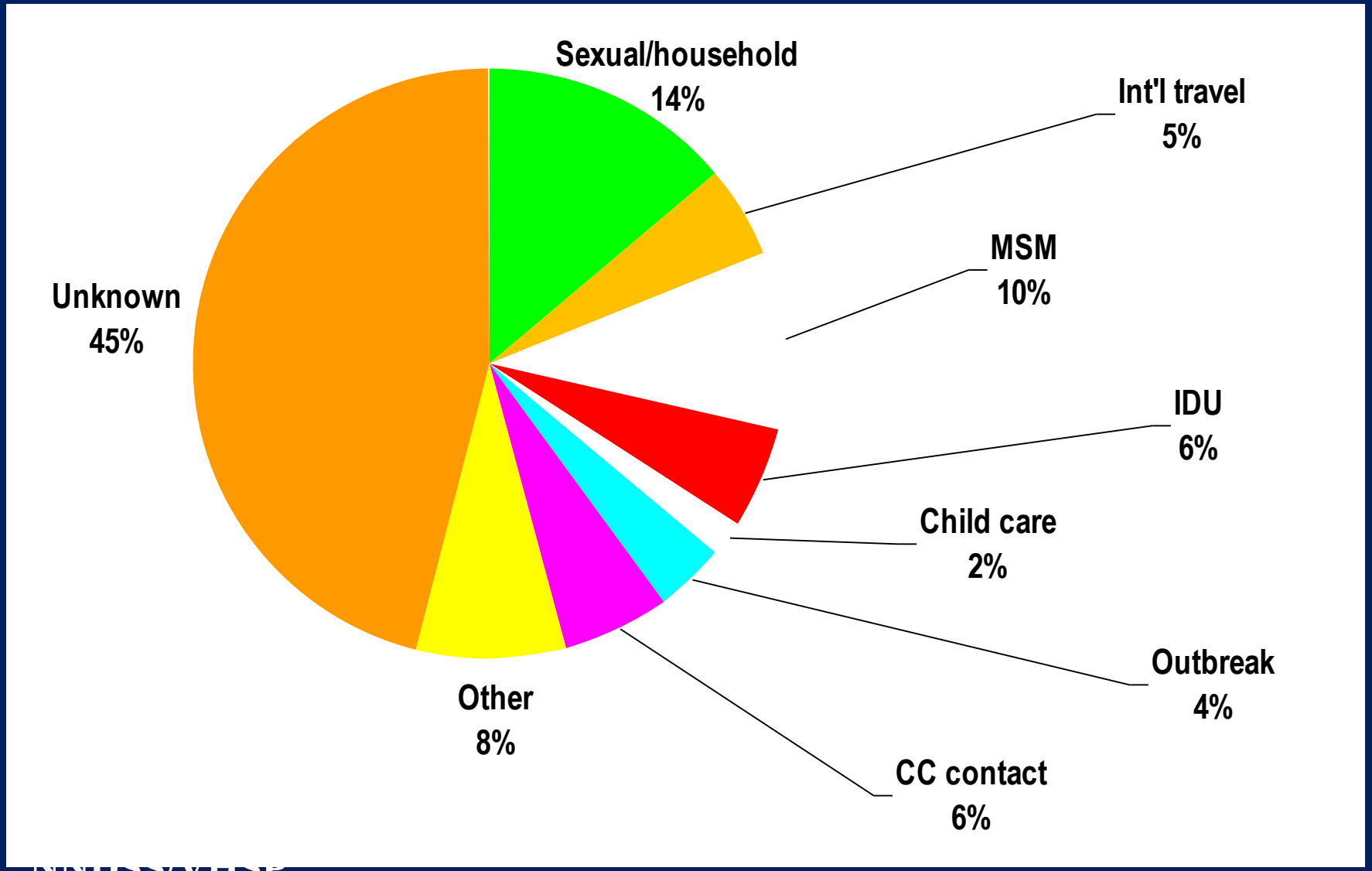
Hepatitis A

Hepatitis A Epidemiology

❑ Reservoir	Human (endemic)
❑ Transmission	Fecal-oral
❑ Temporal pattern	None
❑ Communicability*	2 weeks before to 1 week after onset

** HAV infection confers lifelong immunity*

Hepatitis A—United States, 1990-2000
Risk Factors



NNDSS/VHSP

Hepatitis A Vaccination Recommendations

- Travelers to areas with moderate or high incidence of hepatitis A
- Men who have sex with men
- Illegal drug users
- Persons with occupational risk
- Persons with clotting-factor disorders
- Persons with chronic liver disease, including hepatitis C
- Household contacts of international adoptees within 60 days of the adoptee's arrival in U.S.

Hepatitis A Vaccination Recommendations

- Health care workers: not routinely recommended
- Child care centers: not routinely recommended
- Sewer workers or plumbers: not routinely recommended
- Food handlers: may be considered based on local circumstances

Hepatitis A Vaccine

CDC Home | Search | Health Topics A-Z

MMWR Weekly

October 19, 2007 / 56(41);1080-1084

Update: Prevention of Hepatitis A After Exposure to Hepatitis A Virus and in International Travelers. Updated Recommendations of the Advisory Committee on Immunization Practices (ACIP)

In 1995, highly effective inactivated hepatitis A vaccines were first licensed in the United States for preexposure prophylaxis against hepatitis A virus (HAV) among persons aged ≥2 years. In 2005, vaccine manufacturers received Food and Drug Administration approval for use of the vaccines in children aged 12--23 months (*1*).

The Advisory Committee on Immunization Practices (ACIP) issued recommendations for preexposure use of hepatitis A vaccine in 1996, 1999, and 2006 (*1*). Currently, ACIP recommends hepatitis A vaccination of all children at age 12--23 months, catch-up vaccination of older children in selected areas, and vaccination of persons at increased risk for hepatitis A (e.g., travelers to endemic areas, users of illicit drugs, or men who have sex with men) (*1*).

For decades, immune globulin (IG) has been recommended for prophylaxis after exposure to HAV (*1*). IG also has been recommended in addition to hepatitis A vaccine for preexposure prophylaxis for travelers to countries with high or intermediate hepatitis A endemicity who are scheduled to depart <4 weeks after receiving the initial vaccine dose. This report details updated recommendations, made by ACIP in June 2007, for prevention of hepatitis A after exposure to HAV and in departing international travelers (Box) and incorporates existing ACIP recommendations for prevention of hepatitis A (*1*).

Rationale and Methods for Updated Recommendations

HepA Vaccine Schedule

Adult

- 1 dose
- Booster 6-18 months after first dose

Hepatitis A Post-exposure Prophylaxis

- For healthy persons aged 12 months–40 years, single antigen hepatitis A vaccine at the age-appropriate dose is preferred.
- For persons aged >40 years, IG is preferred; vaccine can be used if IG cannot be obtained.
- For children aged <12 months, immunocompromised persons, persons who have had chronic liver disease diagnosed, and persons for whom vaccine is contraindicated, IG should be used.

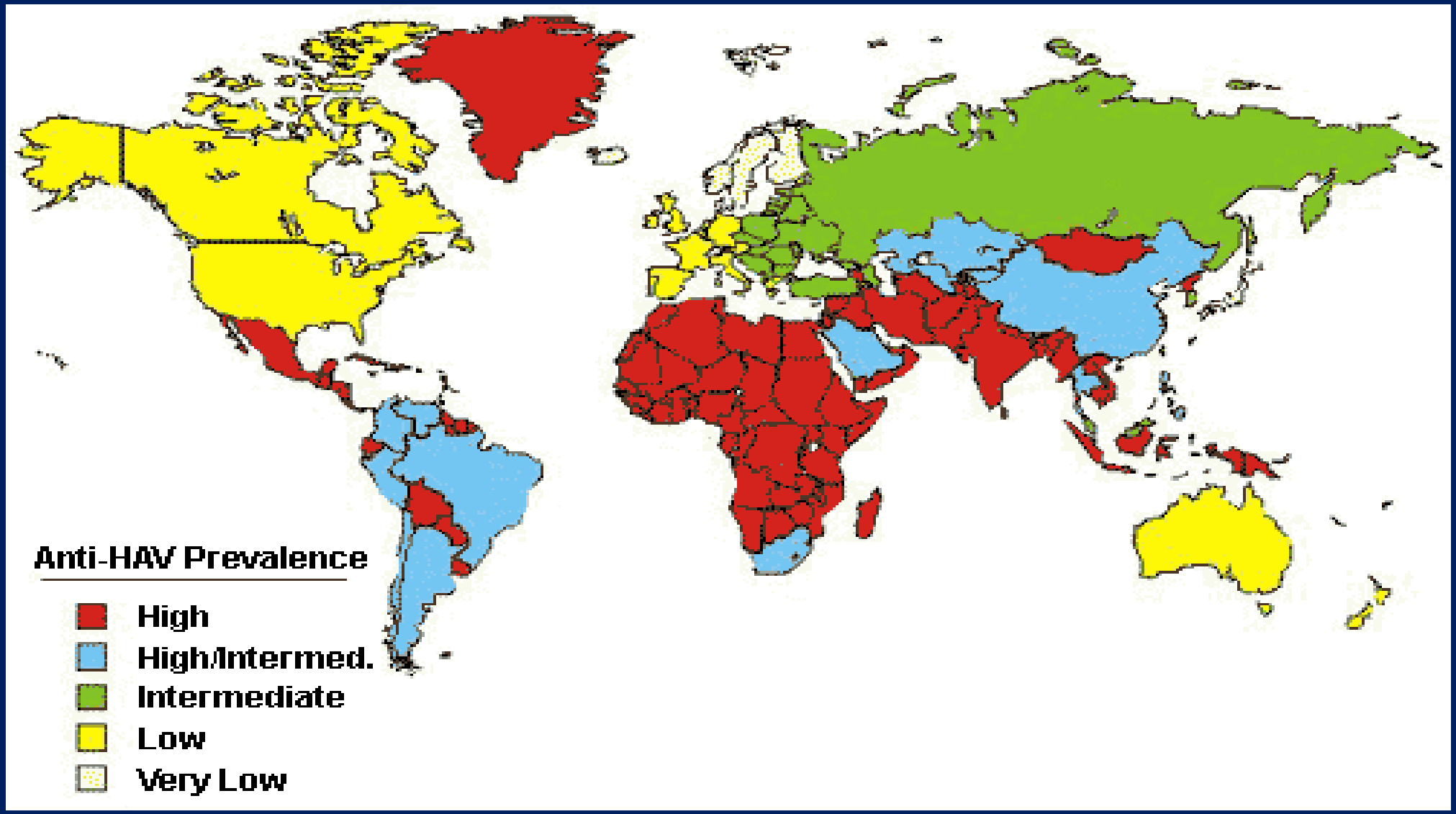
Hepatitis A: Susceptible International Travelers

- Older adults, immunocompromised persons, and persons with chronic liver disease or other chronic medical conditions planning to depart to an area in <2 weeks should receive the initial dose of vaccine and also simultaneously

- can be administered IG (0.02 mL/kg) at a separate anatomic injection site.

- Travelers who elect not to receive vaccine, are aged <12 months, or are allergic to a vaccine component should receive a single dose of IG (0.02 mL/kg), which provides effective protection for up to 3 months.

Hepatitis A Vaccination Recommendations



Twinrix®

- Combination hepatitis B (adult dose) and hepatitis A vaccine (pediatric dose)
- Schedule: 0, 1, 6-12 months
- Approved for persons 18 years of age and older
- New schedule allows doses at 0, 7, 21-30 days, booster at 12 months

Hepatitis A and Pregnancy

- Pregnancy is no longer a precaution for Hepatitis A vaccine
- Inactivated vaccine
- Recommended if another high-risk condition is present

Hepatitis B

Hepatitis B Virus Infection

- More than 350 million carriers worldwide
- Established cause of chronic hepatitis and cirrhosis
- Human carcinogen – cause of up to 80% of hepatocellular carcinomas

Hepatitis B Epidemiology

- **Reservoir** — Human
- **Transmission** — Bloodborne
  Asymptomatic cases transmit
- **Communicability** — 1-2 months before and after onset of symptoms
  Chronic infection

Hepatitis B Vaccine

- Adolescent and adult recommended schedule
- Time 0,1 month,4 month
- Time 0,1 month,6 month
- Time 0,2 month,4 month
- Time 0,1 month,2 month, 12 months

Hepatitis B Vaccine
Adolescent and Adult Schedule

Dose	Minimum Interval
Primary 1	---
Primary 2	4 weeks
Primary 3	8 weeks*

*third dose must be separated from first dose by at least 16 weeks

Hepatitis B Vaccine
Long Term Efficacy

- Immunologic memory established following vaccination
- Exposure to HBV results in anamnestic anti-HBs response (50-75%)
- Chronic infection rarely documented among vaccine responders

Hepatitis B Vaccine Indications

- Medical
- AIDS
- chronic liver disease
- receipt of clotting factors
- Behavior
- multiple sexual partners
- injection drug use
- history of STD
- travel to endemic region
- Demographic
- household contact HBsAg +
- sex partner HBsAg+
- immigrant/refugee from endemic region
- Occupation
- exposure to blood or sharps injury
- staff/resident in developmental disability facility)

Hepatitis B

- **New Identified Risk Factors**

Diabetics age 23 – 59 years*

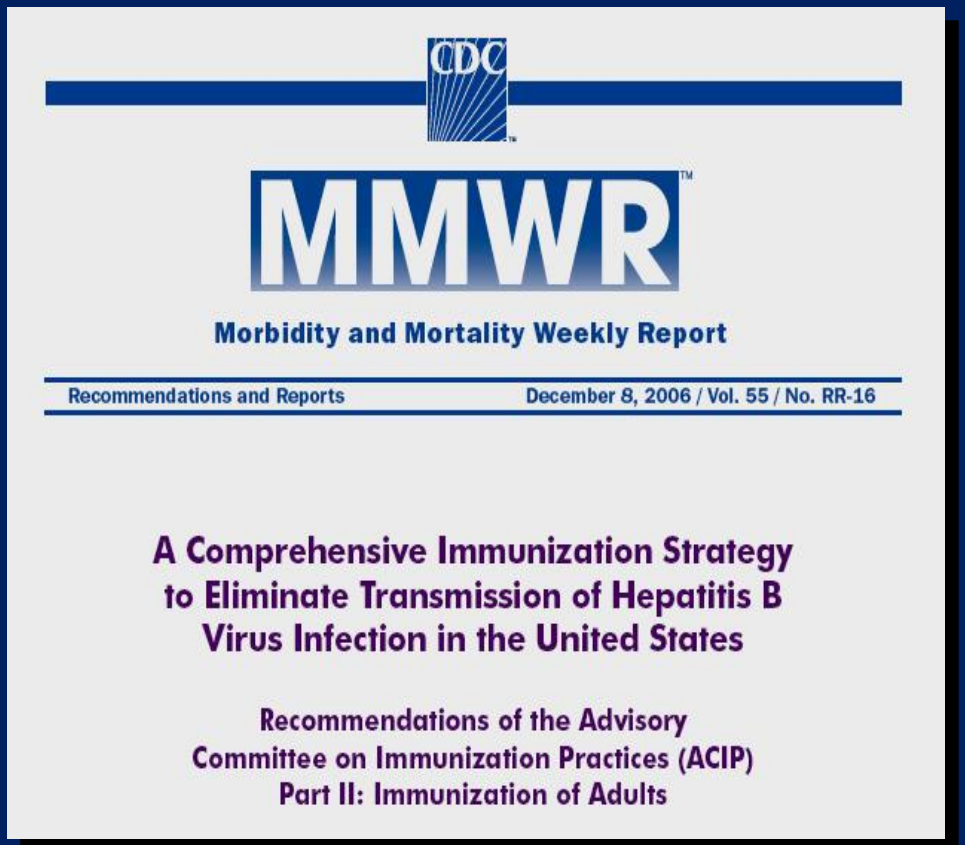
25 outbreaks in 1996-2011 involving blood glucose monitoring

Hepatitis B Vaccine Adult Recommendations

- Medical
  - AIDS
  - chronic liver disease
  - receipt of clotting factors
  - **DIABETES for persons 18-59 years**
- Behavior
  - multiple sexual partners
  - men who have sex with men
  - injection drug use
  - history of STD
  - travel to endemic region
- Demographic
  - household contact HBsAg +
  - sex partner HBsAg+
  - immigrant/refugee from endemic region
- Occupation
  - exposure to blood or sharps injury
  - staff/resident in developmental disability facility)

MMWR, December 23, 2011 / 60(50);1709-1711

Updated ACIP Adult Hepatitis B Recommendations



December 2006

- Vaccinate all high risk adults & all adults requesting vaccination
- In settings w/ large proportion of high risk adults, consider all unvaccinated adults at high risk
- Implement standing orders in primary care & specialty clinics to identify & vaccinate eligible adults

Hepatitis B Vaccination of Adults

- Many adults are at increased risk of hepatitis B virus infection and should be vaccinated
- ACIP recommends providing vaccine at facilities where adults at increased risk may be accessed
  - STD clinics
  - Prisons
  - HIV/AIDS clinics

Postvaccination Serologic Testing

- Not routinely recommended following vaccination of infants, children, adolescents, or most adults
- Recommended for:
  - Hemodialysis patients and other immunocompromised persons
  - Persons with HIV infection
  - Sexual partners of HBsAg+ persons
  - Certain healthcare personnel

Additional Guidance

TABLE 2. Postexposure management of health-care personnel after occupational percutaneous and mucosal exposure to blood and body fluids, by health-care personnel HepB vaccination and response status

Health-care personnel status	Postexposure testing		Postexposure prophylaxis		Postvaccination serologic testing†
	Source patient (HBsAg)	HCP testing (anti-HBs)	HBIG*	Vaccination	
Documented responder§ after complete series (≥3 doses)	**No action needed**				
Documented nonresponder¶ after 6 doses	Positive/unknown	—**	HBIG x2 separated by 1 month	—	No
	Negative	**No action needed**			
Response unknown after 3 doses	Positive/unknown	<10mIU/mL**	HBIG x1	Initiate revaccination	Yes
	Negative	<10mIU/mL	None		
	Any result	≥10mIU/mL	**No action needed**		
Unvaccinated/incompletely vaccinated or vaccine refusers	Positive/unknown	—**	HBIG x1	Complete vaccination	Yes
	Negative	—	None	Complete vaccination	Yes

- www.cdc.gov/mmwr/pdf/rr/rr6210.pdf

QUESTIONS?