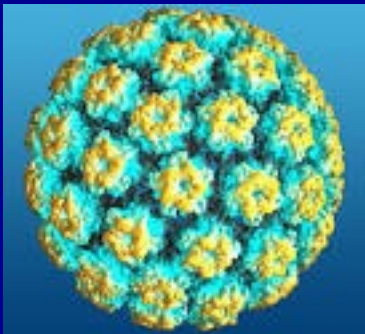


# ADULT IMMUNIZATIONS: ARE YOU UP TO DATE?

2017 Emerald Coast Conference  
SanDestin Hilton Beach Resort  
July 24, 2017

Kenneth Greenberg D.O., Pharm.D.  
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# Disclosure Information

Kenneth Greenberg D.O., Pharm.D.

Grants/Research Support:

CDC-HIV Outpatient Study

Consultant:

Prescribers Letter, Liver Health Connection, Gilead,  
Merck, Chairman P&T Committee Rose Medical Center

Speaker's Bureau:

Gilead, Merck

Honoraria:

none

Stock Shareholder:

none

Other Financial or Material Support:

none

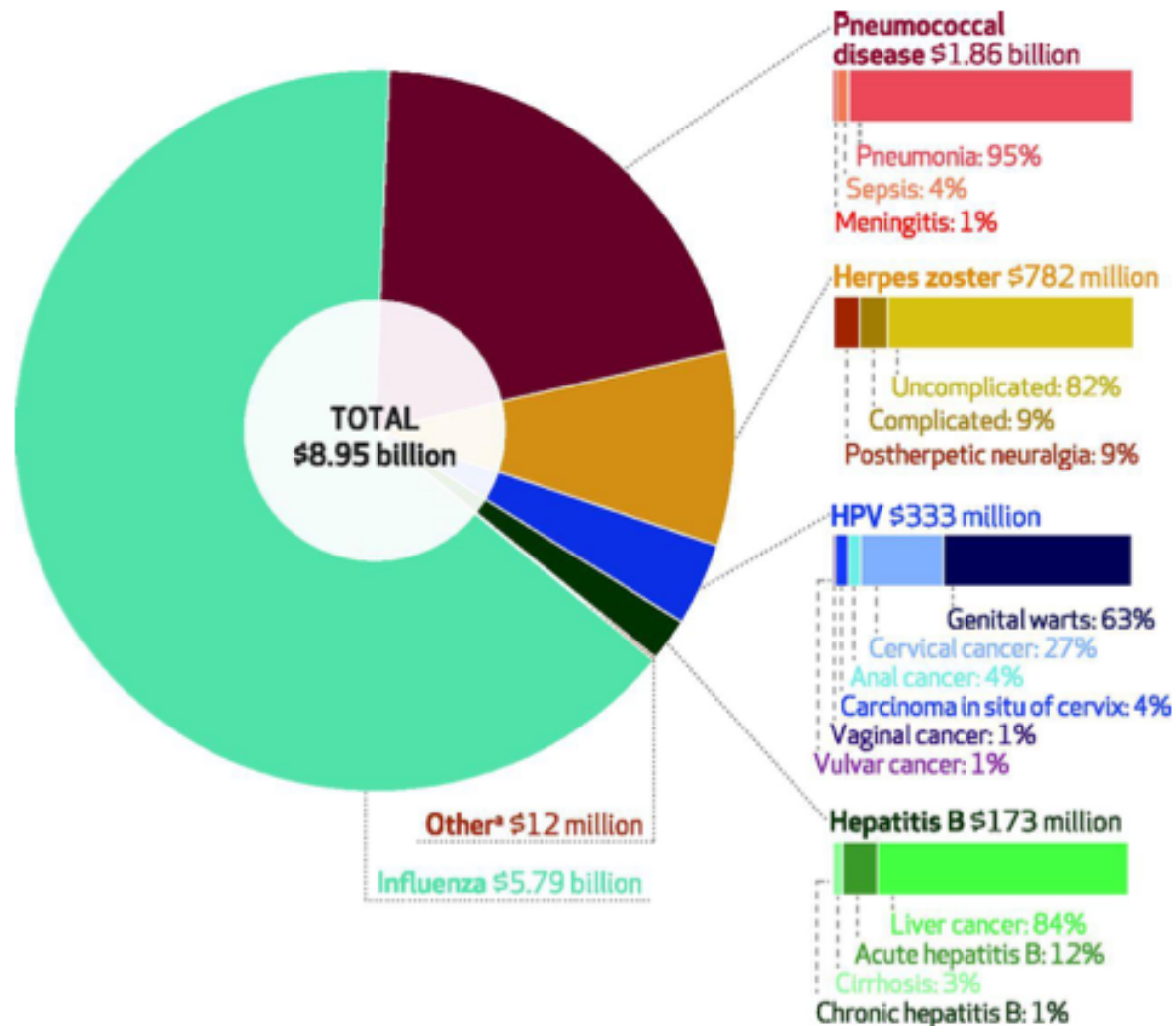
# Objectives

- ② The purpose of today's discussion is to review, define and appraise adult vaccinations as determined by the ACIP/CDC.
  - ⑩ routine administration of vaccines to adults
  - ⑩ age for vaccine administration
  - ⑩ number of doses and dosing interval
  - ⑩ precautions and contraindications
- ⑩ With this knowledge base the health care provider, will be able to identify and formulate appropriate vaccinations for our adult patients

# New Vaccines Against Epidemic Infectious Diseases

- ⌘ Vaccines can prevent outbreaks of emerging infectious disease from becoming humanitarian crises
- ⌘ World Health Organization along Coalition for Epidemic Preparedness Innovations plan for a 1 billion dollar budget
- ⌘ Top Emerging Pathogens Likely to Cause Severe Outbreaks in the Near Future
  - ⌘ Crimean Congo Hemorrhagic Fever Virus
  - ⌘ Filovirus diseases-Ebola, Marburg
  - ⌘ Coronavirus:Middle East Respiratory Syndrome (MERS) Severe Acute Respiratory Syndrome (SARS)
  - ⌘ Lassa Fever Virus
  - ⌘ Rift Valley Fever Virus

# Annual economic burden of vaccine-preventable diseases, by pathogen, 2015.



Sachiko Ozawa et al. Health Aff  
doi:10.1377/hlthaff.2016.0462

HealthAffairs

# Buga-Buga Myths on Immunizations

- **NO** contraindication for immunization under the following circumstances
  - mild acute illness with low-grade fever
  - current antimicrobial therapy
    - exception of oral typhoid which can be inactivated
  - recent exposure to an infectious disease
    - exception of HIV disease and utilization of live vaccines
  - a history of nonspecific allergies or relatives with allergies
  - non-anaphylactic allergies to eggs or egg products
  - breast feeding
  - need for PPD skin test

# What Vaccines are Indicated for a Patient With Splenectomy?

- Patients who do not have a functioning spleen or who have had a splenectomy do not handle encapsulated bacteria well and are at increased risk for infection with:
  - *N. meningitidis*
  - *S. pneumoniae*
  - *H. influenzae* type b.
- Vaccinate with age-appropriate:
  - pneumococcal
  - meningococcal (ACWY and B)
  - *Haemophilus influenzae* type b (Hib) vaccine generally is not recommended for patients age 5 years and older, studies suggest good immunogenicity in patients who have had a splenectomy.

# Should Vaccines be Withheld for Patients on Steroids?

- Steroid therapies that are short term-less than two weeks
  - alternate-day
  - physiologic replacement
  - topical (skin or eyes) or aerosol
  - given by intra-articular, bursal, or tendon injection

Are not considered contraindications to the use of live virus vaccines.

- The immunosuppressive effects of corticosteroid treatment vary, consider a dose equivalent to either 2 mg/kg of body weight or a total of 20 mg per day of prednisone for 2 or more weeks as sufficiently immunosuppressive to raise concern about the safety of vaccination with live virus vaccines (e.g., MMR, varicella, zoster, yellow fever, typhoid)



# Should Vaccines be Withheld for Patients on Steroids?

- Providers should:
  - wait at least 1 month after discontinuation of therapy
  - wait for reduction of dose before administering a live virus vaccine to patients who have received systemically absorbed doses of corticosteroids for 2 weeks or more.
- Inactivated vaccines and toxoids can be administered to all immunocompromised patients in usual doses and schedules
  - the response to these vaccines may be suboptimal.

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

Figures 1 and 2 must be read with the footnotes that contain important general information and considerations for special populations.

Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥65 years
Influenza <sup>1</sup>	1 dose annually				
Td/Tdap <sup>2</sup>	Substitute Tdap for Td once, then Td booster every 10 yrs				
MMR <sup>3</sup>	1 or 2 doses depending on indication				
VAR <sup>4</sup>	2 doses				
HZV <sup>5</sup>				1 dose	
HPV – Female <sup>6</sup>	3 doses				
HPV – Male <sup>6</sup>	3 doses				
PCV13 <sup>7</sup>					1 dose
PPSV23 <sup>7</sup>	1 or 2 doses depending on indication				1 dose
HepA <sup>8</sup>	2 or 3 doses depending on vaccine				
HepB <sup>9</sup>	3 doses				
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication				
MenB <sup>10</sup>	2 or 3 doses depending on vaccine				
Hib <sup>11</sup>	1 or 3 doses depending on indication				



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



No recommendation

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

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

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

# Influenza Vaccination

- 2016-2017 changes are related to concerns regarding low effectiveness of the live attenuated influenza vaccine
  - (FluMist, MedImmune) against influenza A(H1N1) in the United States during:
    - 2013–2014 and 2015–2016 influenza seasons
- Revised recommendations on the use of the influenza vaccine among patients with egg allergy.
- Interim Influenza analysis 2016-2017 season vaccine reduced the risk for influenza ~ medical visits by 48%
  - predominant virus: influenza A (H3N2) 43% protection
  - influenza B 73% protection<sup>1</sup>

# Influenza Vaccination

- All persons aged 6 months or older who do not have a contraindication should receive annual influenza vaccination with an age-appropriate formulation of inactivated influenza vaccine or recombinant influenza vaccine.
- Available options for adults in specific age groups include:
  - high-dose or adjuvanted inactivated influenza vaccine for adults aged 65 years or older,
  - IM/intradermal inactivated influenza vaccine for adults aged 18 through 64 years, and recombinant influenza vaccine for adults aged 18 years or older.
- Live attenuated influenza vaccines are **NOT** indicated for the 2016-2017 influenza season

# Influenza Vaccination

- Adults with a history of egg allergy who have only hives after exposure to egg
  - should receive age-appropriate inactivated influenza vaccine or recombinant influenza vaccine.
- Adults with a history of egg allergy with symptoms other than hives
  - angioedema, respiratory distress, lightheadedness, recurrent emesis, required epinephrine or another emergency medical intervention
- May receive age-appropriate inactivated influenza vaccine or recombinant influenza vaccine.
  - The selected vaccine should be administered in an inpatient or outpatient medical setting and supervised by a health care provider who is able to recognize and manage severe allergic conditions

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

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VAR <sup>4</sup>	2 doses				
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HPV – Female <sup>6</sup>	3 doses				
HPV – Male <sup>6</sup>	3 doses				
PCV13 <sup>7</sup>					1 dose
PPSV23 <sup>7</sup>	1 or 2 doses depending on indication				1 dose
HepA <sup>8</sup>	2 or 3 doses depending on vaccine				
HepB <sup>9</sup>	3 doses				
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication				
MenB <sup>10</sup>	2 or 3 doses depending on vaccine				
Hib <sup>11</sup>	1 or 3 doses depending on indication				



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



No recommendation



# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

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

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



# Measles, Mumps Rubella Vaccination (MMR)

- ⌘ Adults born in 1957 or later without acceptable evidence of immunity to measles, mumps, or rubella should receive 1 dose of MMR unless they have a medical contraindication to the vaccine,
  - ⌘ Acceptable evidence of immunity to MMR in adults is:
    - ⌘ born before 1957
    - ⌘ documentation of receipt of MMR
    - ⌘ laboratory evidence of immunity or disease
  - ⌘ Documentation of healthcare provider-diagnosed disease without laboratory confirmation is not acceptable evidence of immunity.

## Special populations

- ⌘ Pregnant women who do not have evidence of immunity to rubella should receive 1 dose of MMR upon completion or termination of pregnancy and before discharge from the healthcare facility;
- ⌘ Non-pregnant women of childbearing age without evidence of rubella immunity should receive 1 dose of MMR.

# Measles, Mumps Rubella Vaccination (MMR)

⌘ Adults patients with:

⌘ primary or acquired immunodeficiency including malignant conditions affecting the bone marrow or lymphatic system

⌘ systemic immunosuppressive therapy

⌘ cellular immunodeficiency

⌘ adults with HIV infection with CD4 counts  $<200$  cells/ $\mu$ l

⌘ Should **NOT** receive MMR.

# Measles, Mumps Rubella Vaccination (MMR)

- ⌘ Adults with HIV infection and CD4 counts  $\geq 200$  cells/ $\mu$ l for at least 6 months who do not have evidence of MMR immunity should receive 2 doses of MMR at least 28 days apart.
- ⌘ High-risk patients include adults who work in healthcare facilities should receive 2 doses of MMR at least 28 days apart
  - ⌘ healthcare personnel born before 1957 who are unvaccinated or lack laboratory evidence of MMR immunity
  - ⌘ adults who are students in postsecondary educational institutions or plan to travel internationally should receive 2 doses of MMR at least 28 days apart.

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Td/Tdap <sup>2</sup>	Substitute Tdap for Td once, then Td booster every 10 yrs				
MMR <sup>3</sup>	1 or 2 doses depending on indication				
VAR <sup>4</sup>	2 doses				
HZV <sup>5</sup>				1 dose	
HPV – Female <sup>6</sup>	3 doses				
HPV – Male <sup>6</sup>	3 doses				
PCV13 <sup>7</sup>					1 dose
PPSV23 <sup>7</sup>	1 or 2 doses depending on indication				1 dose
HepA <sup>8</sup>	2 or 3 doses depending on vaccine				
HepB <sup>9</sup>	3 doses				
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication				
MenB <sup>10</sup>	2 or 3 doses depending on vaccine				
Hib <sup>11</sup>	1 or 3 doses depending on indication				



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



No recommendation

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

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

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

# Human Papillomavirus Vaccine (HPV)

- Healthy adolescents who start their human papillomavirus vaccine series before age 15 years are recommended to receive 2 doses of HPV.
- Current recommendation remains at 3 doses for adults/adolescents who did not start their vaccination series before age 15 years.
- Changes in recommendations in the adult immunization schedule regarding HPV vaccination for adults who did not complete HPV series as adolescents.
  - Women through age 26 years and men through age 21 years who have not received any HPV
    - receive a 3-dose series of HPV at 0, 1-2, and 6 months.
  - MSM aged 22 through 26 years may be vaccinated with a 3-dose series of HPV

# Human Papillomavirus Vaccine (HPV)

- Changes in recommendations in the adult immunization schedule include updates regarding HPV vaccination for adults who did not complete HPV series as adolescents.
  - Women through age 26 years
  - Men through age 21 years
  - MSM men aged 22 through 26 years who may receive HPV
- If patients initiated HPV series before age 15 years and received 2 doses at least 5 months apart are considered adequately vaccinated and do not need an additional dose of HPV.
- If patients initiated HPV series before age 15 years and received only 1 dose, or 2 doses less than 5 months apart, are not considered adequately vaccinated and should receive 1 additional dose of HPV.



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MMR <sup>3</sup>	1 or 2 doses depending on indication				
VAR <sup>4</sup>	2 doses				
HZV <sup>5</sup>				1 dose	
HPV – Female <sup>6</sup>	3 doses				
HPV – Male <sup>6</sup>	3 doses				
PCV13 <sup>7</sup>					1 dose
PPSV23 <sup>7</sup>	1 or 2 doses depending on indication				1 dose
HepA <sup>8</sup>	2 or 3 doses depending on vaccine				
HepB <sup>9</sup>	3 doses				
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication				
MenB <sup>10</sup>	2 or 3 doses depending on vaccine				
Hib <sup>11</sup>	1 or 3 doses depending on indication				



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



No recommendation



# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

Vaccine	Pregnancy <sup>1-6,9</sup>	Immuno-compromised (excluding HIV infection) <sup>3-7,11</sup>	HIV infection CD4+ count (cells/ $\mu$ L) <sup>3-7,9-11</sup>		Asplenia, persistent complement deficiencies <sup>7,10,11</sup>	Kidney failure, end-stage renal disease, on hemodialysis <sup>7,9</sup>	Heart or lung disease, chronic alcoholism <sup>7</sup>	Chronic liver disease <sup>7-9</sup>	Diabetes <sup>7,9</sup>	Health care personnel <sup>3,4,9</sup>	Men who have sex with men <sup>6,8,9</sup>
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MMR <sup>3</sup>	contraindicated		1 or 2 doses depending on indication								
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HPV-Female <sup>6</sup>		3 doses through age 26 yrs									
HPV-Male <sup>6</sup>		3 doses through age 26 yrs	3 doses through age 21 yrs							3 doses through age 26 yrs	
PCV13 <sup>7</sup>		1 dose									
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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

# Pneumococcal Vaccination

- ⌘ Vaccinate all persons with the following indications:
  - aged 65 years and older adults
  - Younger than age 65 years with:
    - chronic lung disease (including chronic obstructive pulmonary disease, emphysema, and asthma)
    - chronic cardiovascular diseases
    - **diabetes mellitus**
    - chronic liver disease (including cirrhosis); alcoholism
    - cochlear implants; cerebrospinal fluid leaks
    - immune compromised conditions
      - B- or T-lymphocyte deficiency, complement deficiencies, and phagocytic disorders excluding chronic granulomatous disease; HIV; chronic renal failure and nephrotic syndrome; leukemia, lymphoma, Hodgkin disease, generalized malignancy, multiple myeloma; solid organ transplant; iatrogenic immunosuppression including long-term systemic corticosteroid and radiation therapy

# Pneumococcal Vaccination

- ⌘ Vaccinate all persons with the following indications:
  - ⑩ Younger than age 65 years with:
    - ⑩ hemoglobinopathies, congenital or acquired asplenia, splenic dysfunction, or splenectomy
      - ⑩ if elective splenectomy is planned, vaccinate at least 2 weeks before surgery
- ⌘ Residents of nursing homes or long-term care facilities
- ⌘ Adults who smoke cigarettes.
- ⌘ Patients with asymptomatic or symptomatic HIV infection should be vaccinated as soon as possible after their diagnosis.

# Age 19-64 Years with Underlying Conditions

**Smoker,  
Long-term facility resident, or  
Chronic conditions:**

- heart disease (excluding hypertension)
- lung disease (including asthma)
- liver disease (including cirrhosis)
- diabetes
- alcoholism

**PPSV  
23**

**Immunocompromised**  
(including HIV infection),  
**Chronic renal failure,  
Nephrotic syndrome, or  
Asplenia**

**PCV  
13**

8 week  
interval

**PPSV  
23**

5 year  
interval

**PPSV  
23**

**CSF leaks or  
Cochlear implants**

**PCV  
13**

8 week  
interval

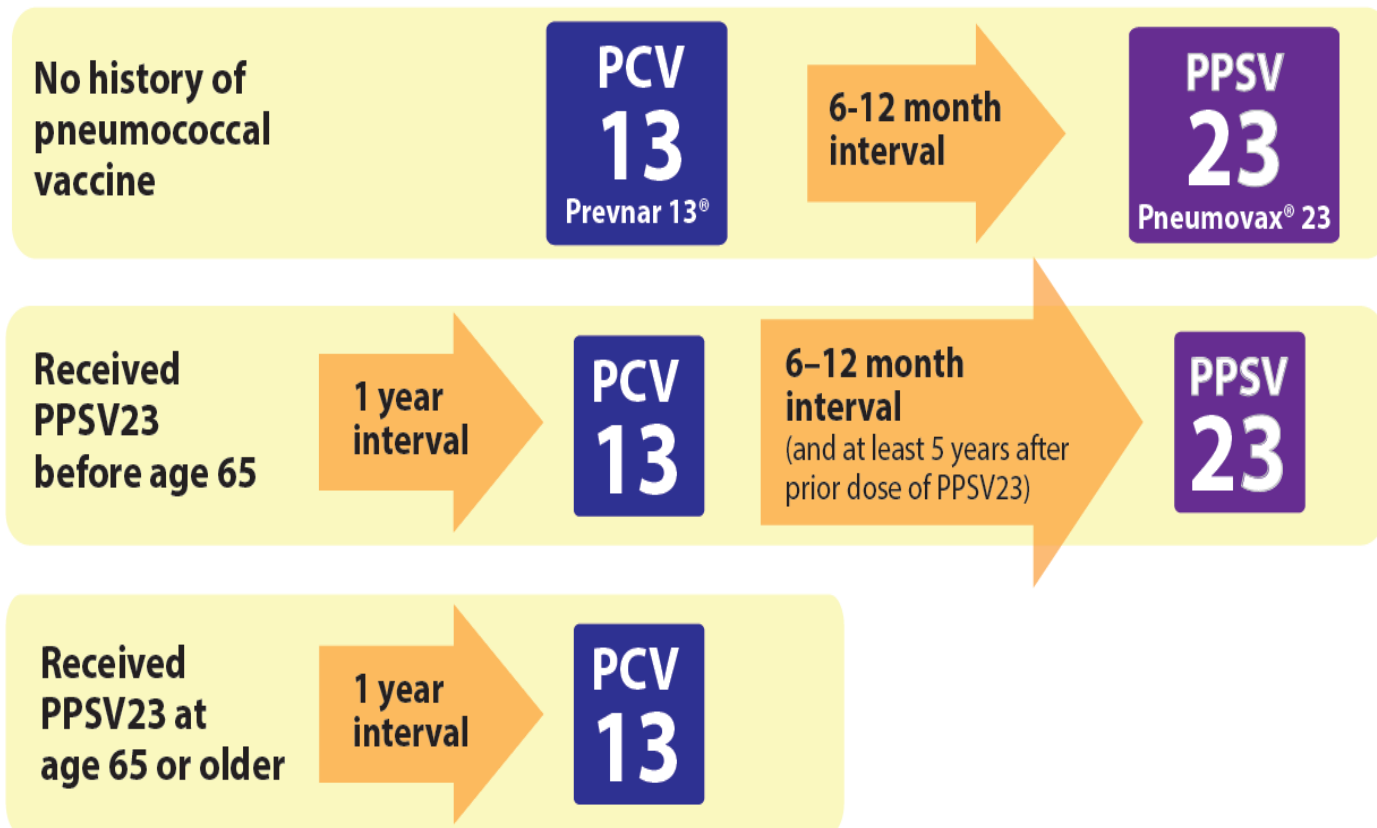
**PPSV  
23**



• **DO NOT administer PCV13 and PPSV23 at the same visit.**

# Age 65 Years or Older

- If PCV13 was given before age 65 years, no additional PCV13 is needed.



# Pneumococcal Vaccination Pearls

- ✧ When both PCV13 and PPSV23 are indicated
  - ✧ PCV13 should be administered first; PCV13 and PPSV23 should **NOT** be administered during the same visit.
- ✧ If PPSV23 has previously been administered, PCV13 should be administered at least 1 year after PPSV23.
- ✧ When two or more doses of PPSV23 are indicated, the interval between PPSV23 doses should be at least 5 years.
- ✧ No additional doses of PPSV23 are indicated for adults who received PPSV23 at age 65 years or older.

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HPV-Female <sup>6</sup>		3 doses through age 26 yrs									
HPV-Male <sup>6</sup>		3 doses through age 26 yrs			3 doses through age 21 yrs						3 doses through age 26 yrs
PCV13 <sup>7</sup>		1 dose									
PPSV23 <sup>7</sup>		1, 2, or 3 doses depending on indication									
HepA <sup>8</sup>	2 or 3 doses depending on vaccine										
HepB <sup>9</sup>	3 doses										
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication										
MenB <sup>10</sup>	2 or 3 doses depending on vaccine										
Hib <sup>11</sup>		3 doses post-HSCT recipients only		1 dose							

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



# Hepatitis B

- ⑩ Adults with chronic liver disease, including, but not limited to:
  - ✦ hepatitis C virus infection
  - ✦ cirrhosis, **fatty liver disease**
  - ✦ alcoholic liver disease
  - ✦ autoimmune hepatitis
  - ✦ alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal
- ✦ Hepatitis B vaccination is now recommended routinely for adults with diabetes
- ✦ In patients co-infected with HIV and Hep B traditionally have a disappointing response to HBV vaccination<sup>1</sup>
  - ✦ Hep B Surface Antibody seroconversion rate of 83% with an accelerated schedule of a 40ug HBV vaccination administered at 0 months, 1 month and 2 months; which increased to 91% with an additional dose administered at 6 months<sup>2</sup>

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

Figures 1 and 2 must be read with the footnotes that contain important general information and considerations for special populations.

Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥65 years
Influenza <sup>1</sup>	1 dose annually				
Td/Tdap <sup>2</sup>	Substitute Tdap for Td once, then Td booster every 10 yrs				
MMR <sup>3</sup>	1 or 2 doses depending on indication				
VAR <sup>4</sup>	2 doses				
HZV <sup>5</sup>				1 dose	
HPV – Female <sup>6</sup>	3 doses				
HPV – Male <sup>6</sup>	3 doses				
PCV13 <sup>7</sup>					1 dose
PPSV23 <sup>7</sup>	1 or 2 doses depending on indication				1 dose
HepA <sup>8</sup>	2 or 3 doses depending on vaccine				
HepB <sup>9</sup>	3 doses				
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication				
MenB <sup>10</sup>	2 or 3 doses depending on vaccine				
Hib <sup>11</sup>	1 or 3 doses depending on indication				



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



No recommendation

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

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

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

# Meningococcal Vaccination

- ⌘ ACIP recommends that adults with HIV infection should receive a 2-dose primary series of serogroups A, C, W, and Y meningococcal conjugate vaccine and revaccinate every 5 years
  - ⌘ Adults with HIV infection are not routinely recommended to receive MenB because meningococcal disease is caused primarily by serogroups C, W, and Y.
- ⌘ Adults with anatomical or functional asplenia or persistent complement component deficiencies should receive a 2-dose primary series of MenACWY at least 2 months apart and revaccinate every 5 years.
  - ⌘ They should also receive a series of MenB with either a 2-dose series of MenB-4C (Bexsero) at least 1 month apart or a 3-dose series of MenB-FHbp (Trumenba) at 0, 1-2, and 6 months.

# Meningococcal Vaccination

- Microbiologists/micro lab techs who are routinely exposed to isolates of *Neisseria meningitidis* should receive:
  - 1 dose of MenACWY and revaccinate every 5 years if the risk for infection remains
  - 2-dose series of MenB-4C at least 1 month apart or a 3-dose series of MenB-FHbp at 0, 1-2, and 6 months.
- Adults at risk due to a meningococcal disease outbreak should receive
  - 1 dose of MenACWY if the outbreak is attributable to serogroup A, C, W, or Y, or either a 2-dose series of MenB-4C or a 3-dose series of MenB-FHbp if the outbreak is attributable to serogroup B.

# Meningococcal Vaccination

- ⌘ Young adults aged 16 through 23 years (preferred age range is 16 through 18 years) who are healthy and not at increased risk for serogroup B meningococcal disease may receive:
  - ⌘ 2-dose series of MenB-4C at least 1 month apart or a 2-dose series of MenB-FHbp at 0 and 6 months for short-term protection against most strains of serogroup B meningococcal disease
    - ⌘ this represents a change in the 2017 guidelines

# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

Figures 1 and 2 must be read with the footnotes that contain important general information and considerations for special populations.

Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥65 years
Influenza <sup>1</sup>	1 dose annually				
Td/Tdap <sup>2</sup>	Substitute Tdap for Td once, then Td booster every 10 yrs				
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HZV <sup>5</sup>				1 dose	
HPV – Female <sup>6</sup>	3 doses				
HPV – Male <sup>6</sup>	3 doses				
PCV13 <sup>7</sup>					1 dose
PPSV23 <sup>7</sup>	1 or 2 doses depending on indication				1 dose
HepA <sup>8</sup>	2 or 3 doses depending on vaccine				
HepB <sup>9</sup>	3 doses				
MenACWY or MPSV4 <sup>10</sup>	1 or more doses depending on indication				
MenB <sup>10</sup>	2 or 3 doses depending on vaccine				
Hib <sup>11</sup>	1 or 3 doses depending on indication				



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



No recommendation



# ACIP-CDC 2017 Recommended Immunization Schedule for Adults Aged 19 Years or Older

Vaccine	Pregnancy <sup>1-6,9</sup>	Immuno-compromised (excluding HIV infection) <sup>3-7,11</sup>	HIV infection CD4+ count (cells/ $\mu$ L) <sup>3-7,9-11</sup>		Asplenia, persistent complement deficiencies <sup>7,10,11</sup>	Kidney failure, end-stage renal disease, on hemodialysis <sup>7,9</sup>	Heart or lung disease, chronic alcoholism <sup>7</sup>	Chronic liver disease <sup>7-9</sup>	Diabetes <sup>7,9</sup>	Health care personnel <sup>3,4,9</sup>	Men who have sex with men <sup>6,8,9</sup>
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HZV <sup>5</sup>	contraindicated			1 dose							
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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