Immunizations: Who Calls the Shots?

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Atlantic Health System
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Pharmacist Learning Objectives

- Identify the clinical and financial implications that drive the recommendation to immunize
- Compare and analyze Td/Tdap, pneumococcal, and meningococcal vaccine recommendations
- Demonstrate appropriate clinical decisions regarding patient immunizations using a knowledge of immunization schedules and current guidelines

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Overview

- Background
  - Clinical implications
  - Financial implications
  - Vaccine recommendations overview

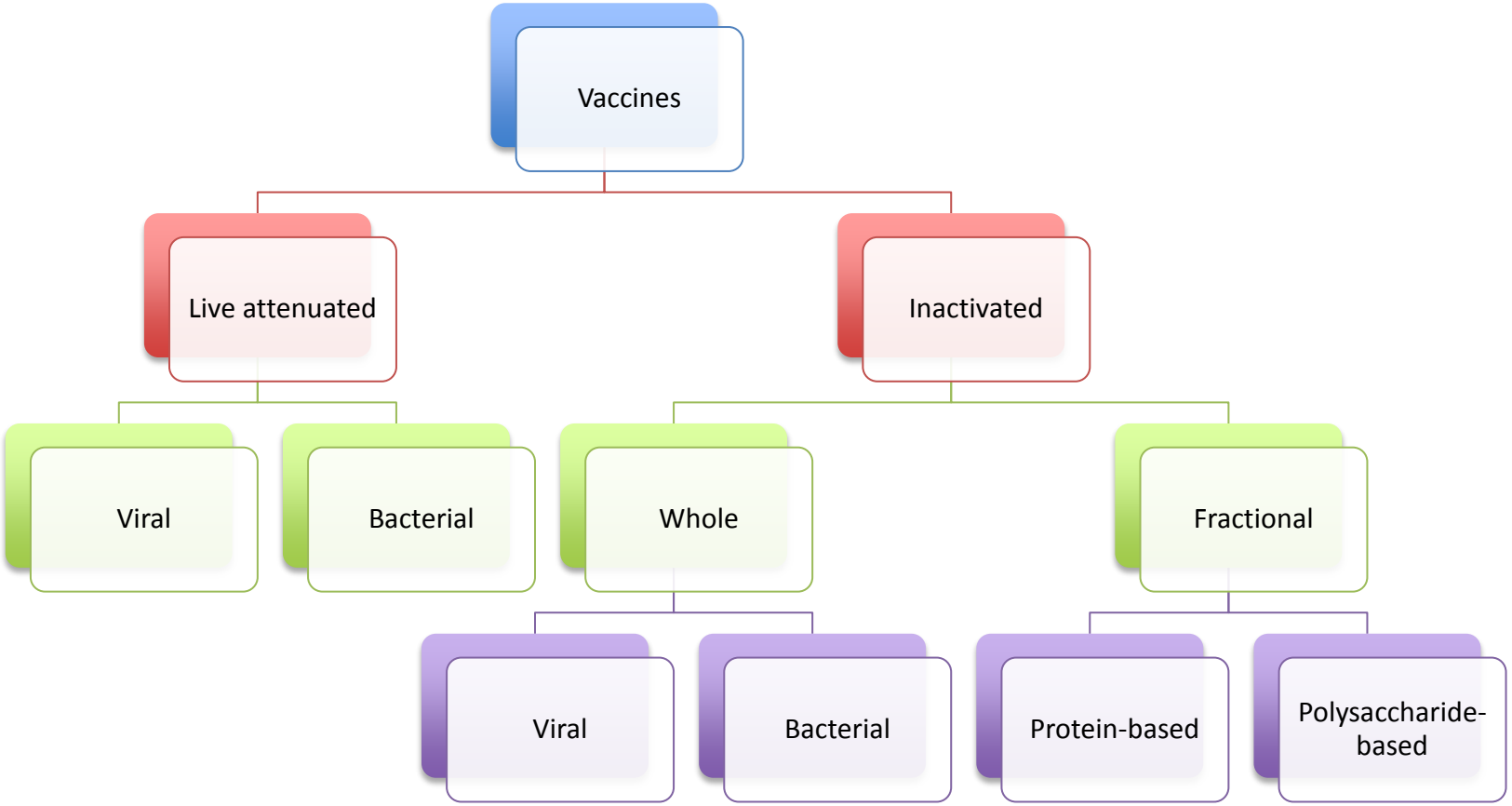
- Specific recommendations
  - Td/Tdap (tetanus, diphtheria, pertussis)
  - Pneumococcal (PPSV23/PCV13)
  - Meningococcal (MenACWY/MPSV4/MenB)

Immunity

- "Self" versus "nonself"
- Basic mechanisms of acquiring immunity:
  - Active
    - Immune system produces
    - Lasts many years
  - Passive
    - Transfer of antibody
    - Temporary protection

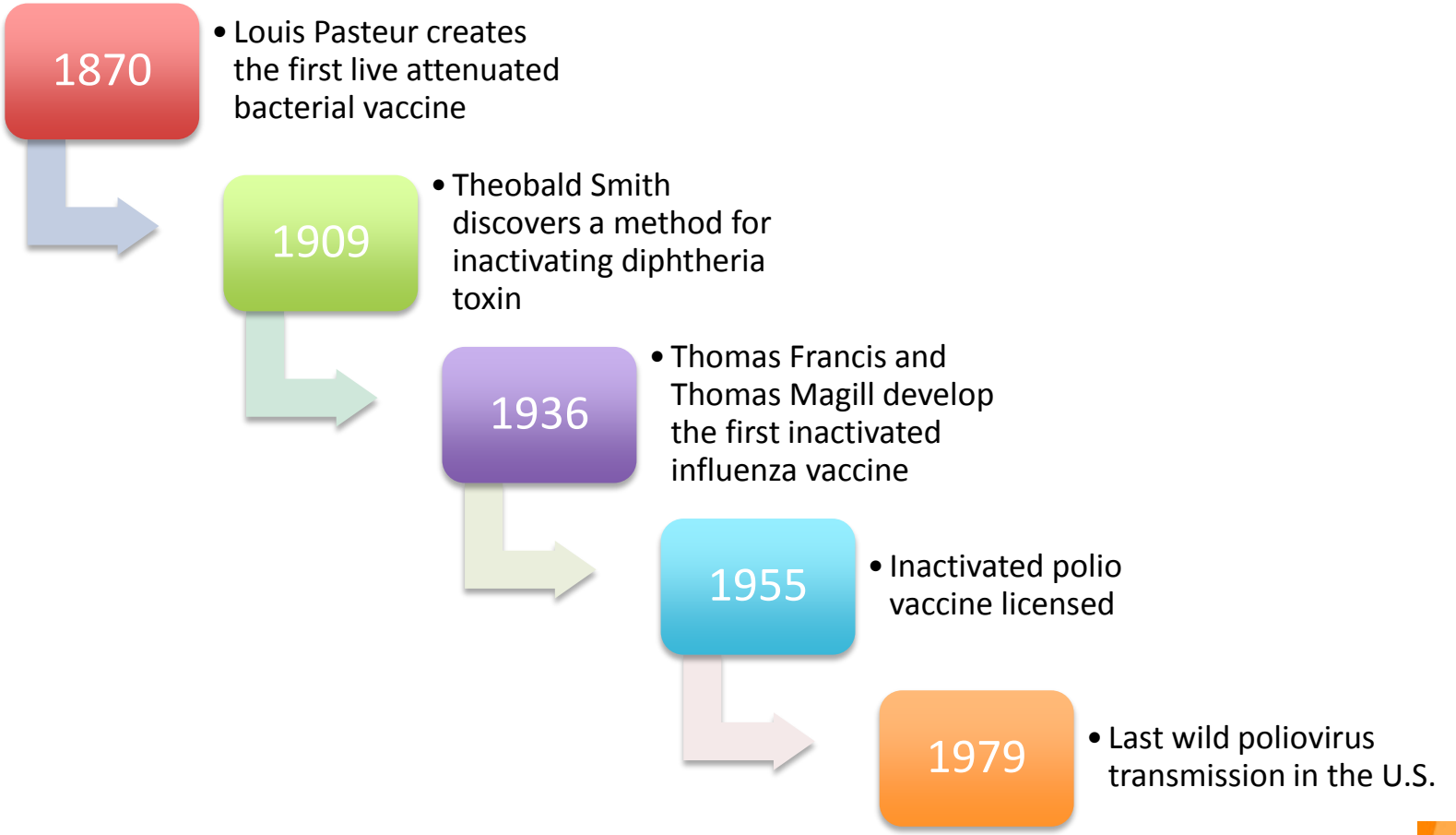
Hamborsky J, et al. CDC. 2015;13:1-376.

Classification of Vaccines



Hamborsky J, et al. CDC. 2015;13:1-376.
Plotkin SA. *J Infect Dis* 2003;187(9):1349-59.

Milestones in Vaccination History



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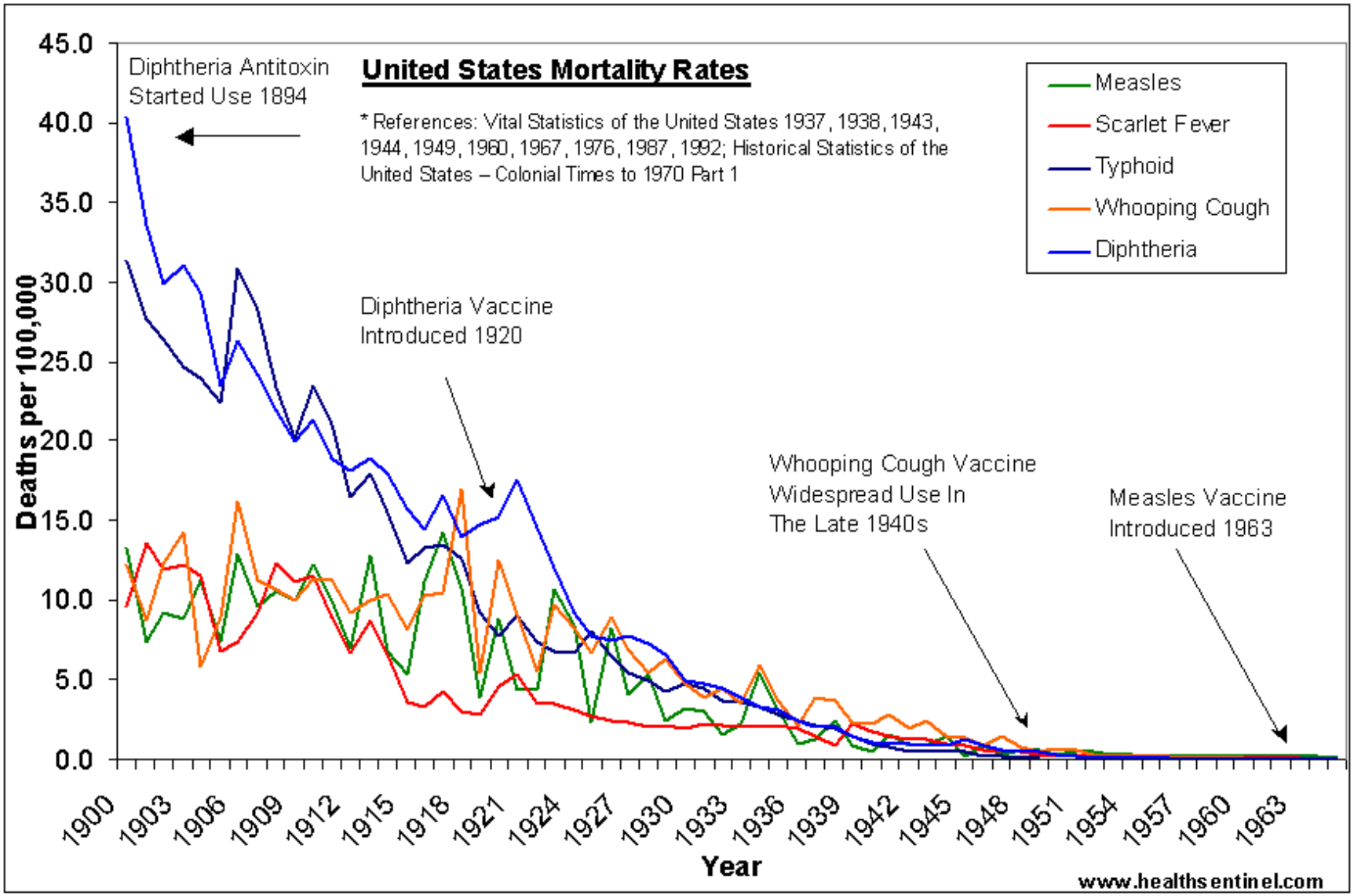
Hamborsky J, et al. CDC. 2015;13:1-376.



https://childhealthsafety.files.wordpress.com/2009/01/us-deaths-1900-1965.gif

Why Vaccinate?

- Many epidemic infectious diseases have virtually disappeared in industrialized countries

Disease	Pre-vaccine Era*	2006§	% decrease
Diphtheria	175,885	0	100
Measles	503,282	55	99.9
Mumps	147,271	6,584	95.7
Pertussis	16,316	15,632	89.4
Polio (paralytic)	47,745	0	100
Rubella	1,314	11	99.9
Tetanus	1,314	41	99.9

*Baseline 20th century annual morbidity
§Source: MMWR 2007;56(33):851-64

Hamborsky J, et al. CDC. 2015;13:1-376.
Plotkin SA. *J Infect Dis* 2003;187(9):1349-59.

Probability and Cost of Hospitalization

Disease	Probability of Hospitalization	Cost of Hospitalization	Cost of Outpatient Visit
Diphtheria	100%	$16,982	$100
Tetanus	100%	$102,584	$100
Pertussis	0.65-30%	$10,765-22,410	$100-173
Measles	11-100%	$4,032-46,060	$88-526
Mumps	1-100%	$11,196-46,060	$110-556
Rubella	0.1-100%	$4,886-46,060	$89-651
Pneumococcal Diseases	0-100%	$3,798-25,848	$86-272

CDC. *MMWR* 2014;63:352-5.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/programs/vfc/pubs/methods/. Accessed May 11, 2017.

Barriers to Vaccinate

- Vaccine refusal
  - No belief in efficacy or value
  - Safety concerns
- Vaccine hesitancy
  - Issues of confidence in vaccine or provider
  - Low perceived need for vaccine
  - Lack of convenience/access

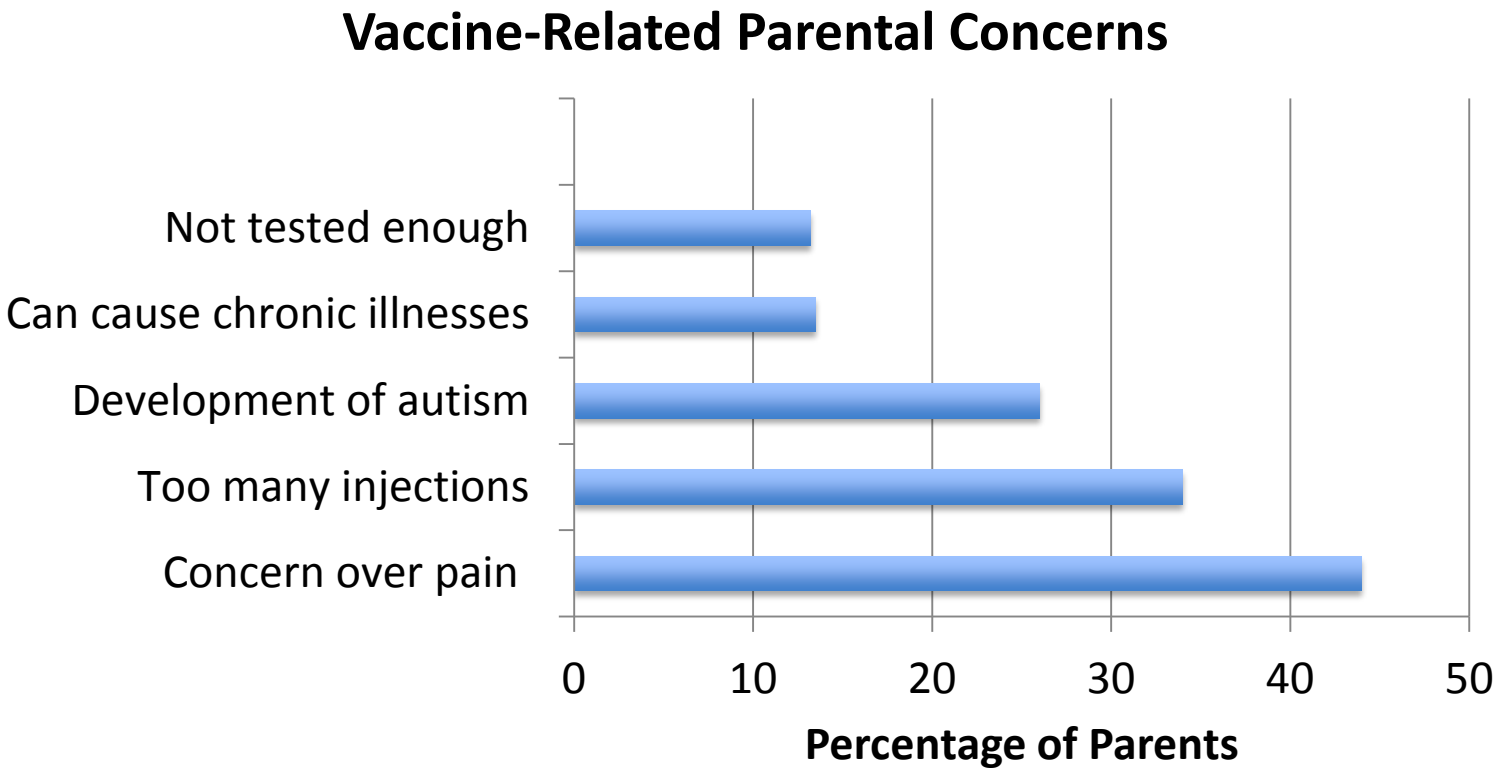
Edwards KM, et al. *Pediatrics* 2016; 138(3):e2016-46.

Invalid Contraindications to Vaccination

- Mild illness
- Antimicrobial therapy
- Disease exposure or convalescence
- Pregnant or immunosuppressed person in the household
- Breastfeeding
- Preterm birth
- Allergy to products not present in vaccine or allergy that is not anaphylactic
- Family history of adverse events
- Tuberculin skin testing
- Multiple vaccines

Hamborsky J, et al. CDC. 2015;13:1-376.

Barriers in Pediatrics



Kennedy A, et al. *Pediatrics* 2011;127(suppl 1): S92-S99.

Strategies to Overcome Barriers

- Ensure patients that vaccines are tested thoroughly
- Educate that vaccine safety is actively monitored
  - Vaccine Adverse Events Reporting System (VAERS)
  - Vaccine Safety Datalink (VSD)
- Administer vaccine quickly without aspirating
- Show visual images of patients who have diseases prevented by the vaccine

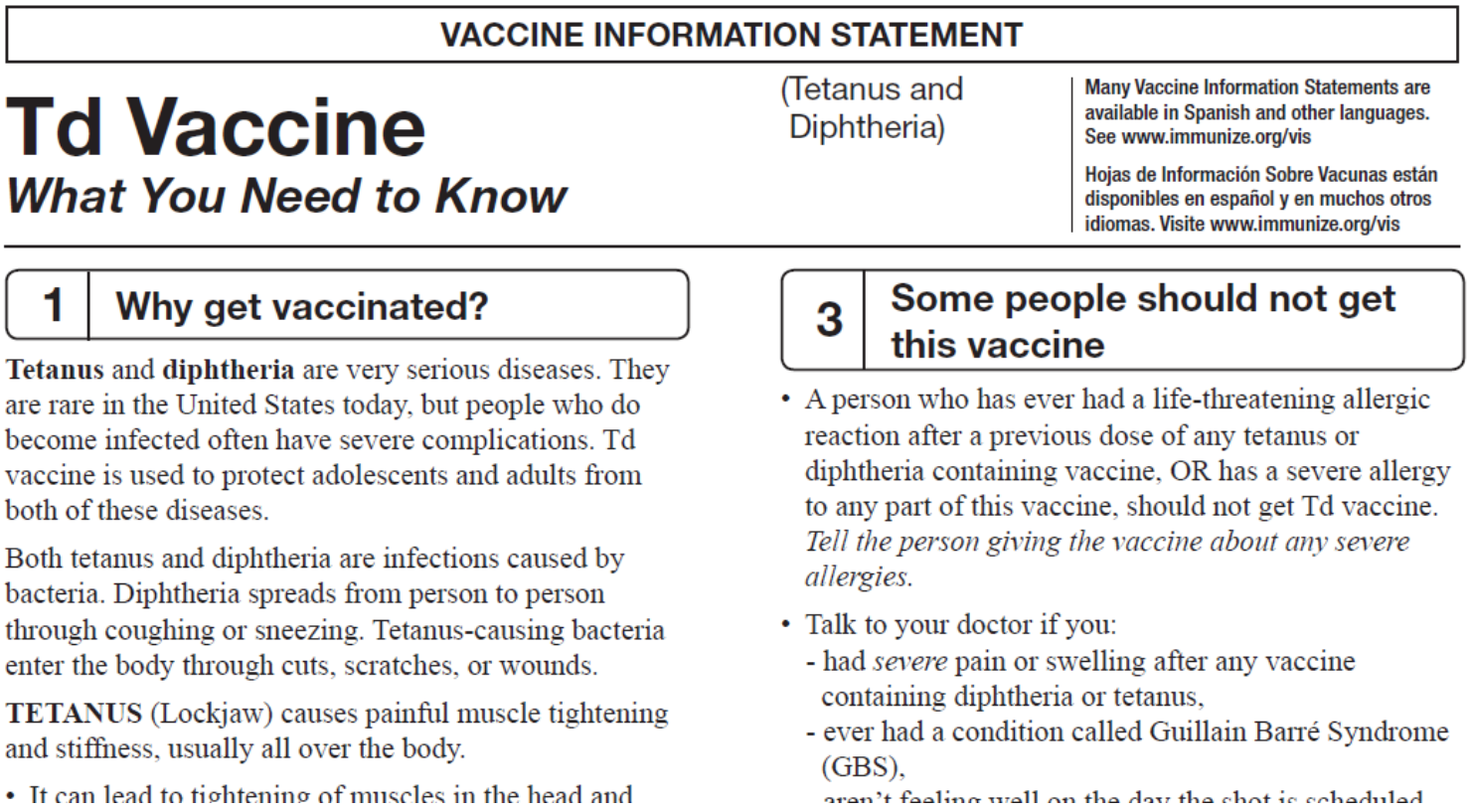
Edwards KM, et al. *Pediatrics* 2016; 138(3):e2016-46.

Vaccine Safety

- Decreased knowledge of disease risk
- Higher standard of safety than other medical interventions
- Vaccine Information Statement (VIS)
- True adverse events:
  1. Plausible time period
  2. Previously associated with vaccine or disease
  3. Laboratory result confirmation
  4. Positive re-challenge
  5. Link confirmed in studies

Hamborsky J, et al. CDC. 2015;13:1-376.

Vaccine Information Sheet (VIS) Example



VACCINE INFORMATION STATEMENT

Td Vaccine

What You Need to Know

(Tetanus and Diphtheria)

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vis

Hojas de Información Sobre Vacunas están disponibles en español y en muchos otros idiomas. Visite www.immunize.org/vis

1 Why get vaccinated?

Tetanus and **diphtheria** are very serious diseases. They are rare in the United States today, but people who do become infected often have severe complications. Td vaccine is used to protect adolescents and adults from both of these diseases.

Both tetanus and diphtheria are infections caused by bacteria. Diphtheria spreads from person to person through coughing or sneezing. Tetanus-causing bacteria enter the body through cuts, scratches, or wounds.

TETANUS (Lockjaw) causes painful muscle tightening and stiffness, usually all over the body.

- It can lead to tightening of muscles in the head and

3 Some people should not get this vaccine

- A person who has ever had a life-threatening allergic reaction after a previous dose of any tetanus or diphtheria containing vaccine, OR has a severe allergy to any part of this vaccine, should not get Td vaccine. *Tell the person giving the vaccine about any severe allergies.*
- Talk to your doctor if you:
  - had *severe* pain or swelling after any vaccine containing diphtheria or tetanus,
  - ever had a condition called Guillain Barré Syndrome (GBS),
  - aren't feeling well on the day the shot is scheduled

https://www.cdc.gov/vaccines/hcp/vis/current-vis.html

Adverse Event Reporting

- Providers should report any clinically significant event
- Vaccine Adverse Event Reporting System (VAERS)
  - http://vaers.hhs.gov
  - (800) 822-7967
- Vaccine Safety Datalink (VSD)

Hamborsky J, et al. CDC. 2015;13:1-376.

Immunization Schedules

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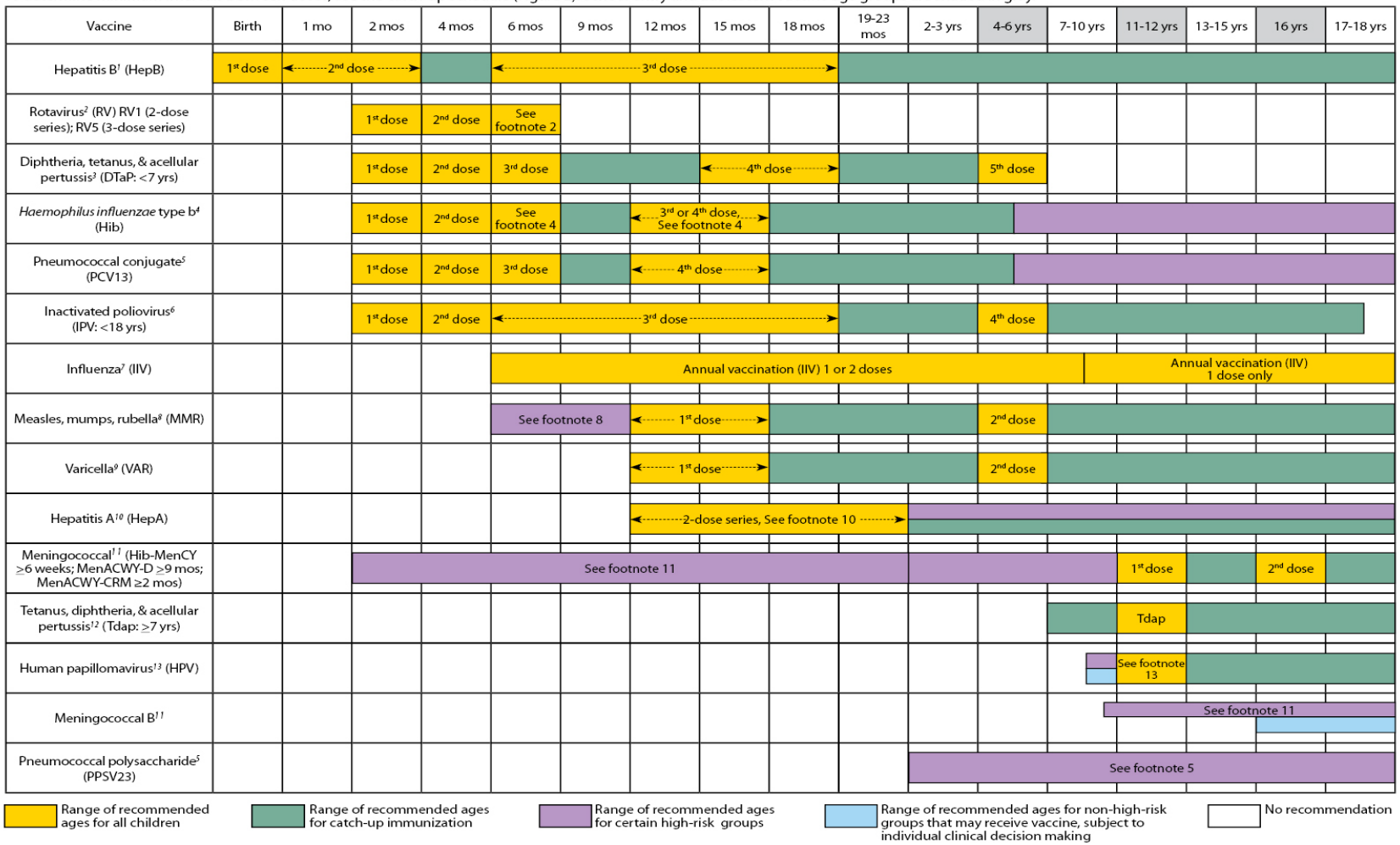
Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger – United States 2017

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.



NOTE: The above recommendations must be read along with the footnotes of this schedule.

Printed with permission from CDC. https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html. Accessed March 5, 2017.

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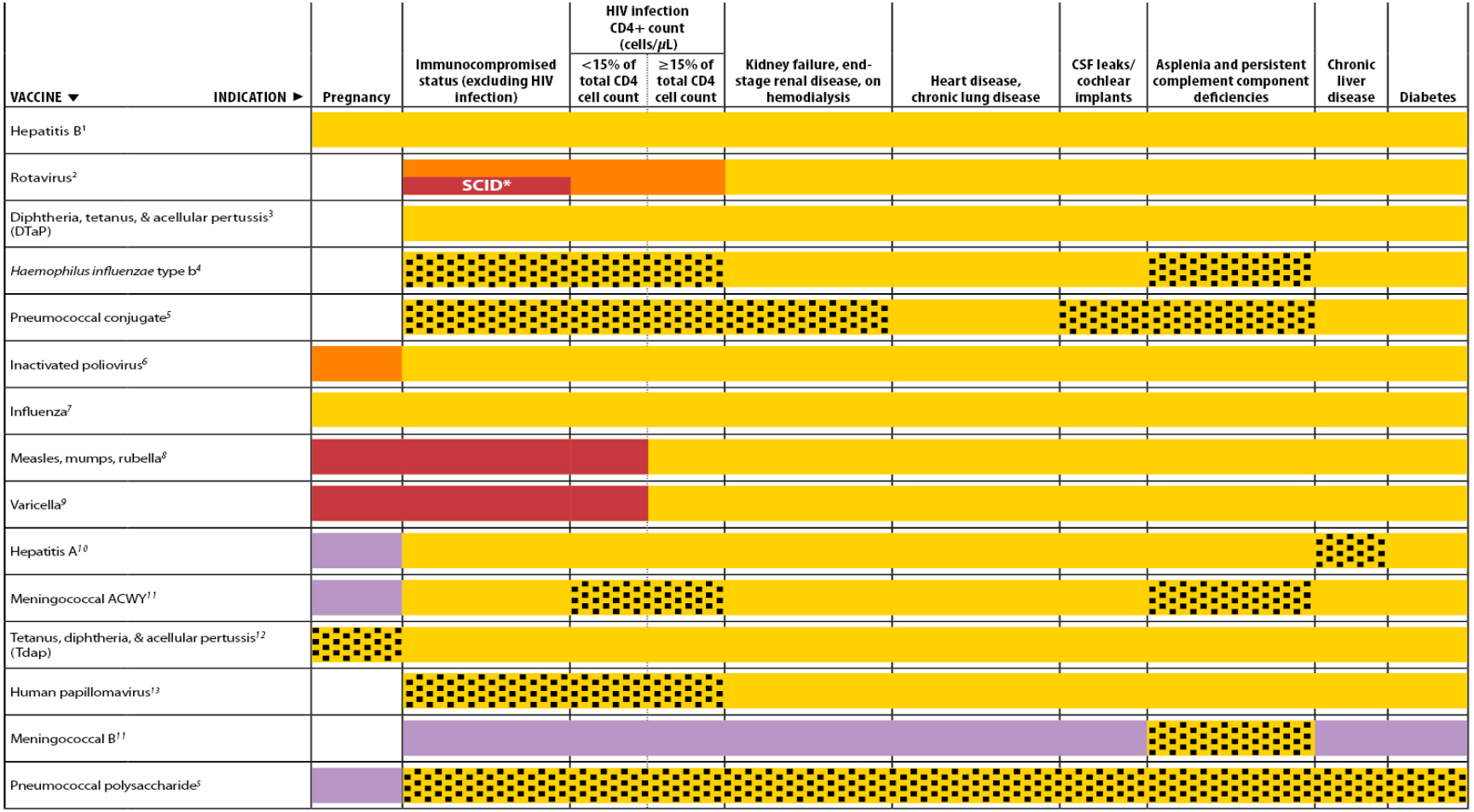
Vaccines that Might be Indicated for Children and Adolescents Aged 18 Years or Younger Based on Medical Indications



*Severe Combined Immunodeficiency

NOTE: The above recommendations must be read along with the footnotes of this schedule.

Printed with permission from CDC. https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html. Accessed March 5, 2017.

Recommended Immunization Schedules for Adults Aged 19 or Older by Age Groups – United States 2017

Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥ 65 years
Influenza[1]	1 dose annually				
Td/Tdap[2]	Substitute Tdap for Td once, then Td booster every 10 yrs				
MMR[3]	1 or 2 doses depending on indication				
VAR[4]	2 doses				
HZV[5]				1 dose	
HPV–Female[6]	3 doses				
HPV–Male[6]	3 doses				
PCV13[7]	1 dose				
PPSV23[7]	1 or 2 doses depending on indication				1 dose
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 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

Printed with permission from CDC. https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed March 5, 2017.

Recommended Immunization Schedules for Adults Aged 19 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	1 or 2 doses depending on indication									
VAR[4]	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]	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

Printed with permission from CDC. https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed March 5, 2017.

Immunization Schedules
2017 Updates

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Changes in the 2017 Immunization Schedules

Influenza vaccination

- Low effectiveness of the live attenuated vaccine (LAIV)
- Revised recommendations for patients with egg allergy

Human papillomavirus vaccination

- If < 15 years, 2 doses; if ≥ 15 years, 3 doses
- Males 22 to 26 years may be vaccinated

Hepatitis B vaccination

- Updated chronic liver disease condition recommendations

Meningococcal vaccination

- Human immunodeficiency virus (HIV) patients
- Trumenba®

Kim DK, et al. *MMWR Morb Mortal Wkly Rep* 2017;66:136-8.

Focused Review

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Tetanus, Diphtheria, Pertussis Formulations

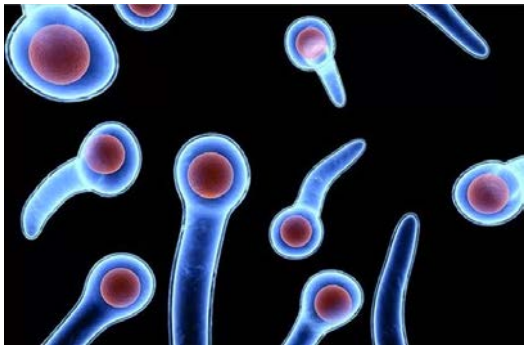
- Pediatric diphtheria-tetanus toxoid (DT)
- Adult tetanus-diphtheria (Td)
- Tetanus, diphtheria toxoid and acellular pertussis
  - Pediatric: DTaP
  - Adult: Tdap (Boostrix® and Adacel®)
- Other formulations:
  - DTaP-HepB-IPV
  - DTaP-IPV/Hib

Hamborsky J, et al. CDC. 2015;13:1-376.

Tetanus

- Caused by an exotoxin produced by *Clostridium tetani*
  - Gram-positive anaerobic rod
  - Usually enters the body through a wound
  - Interferes with release of neurotransmitters

- Characterized by generalized rigidity and convulsive spasms of skeletal muscles
  - Usually involves the jaw and neck (“lockjaw”)
  - Acute and often fatal



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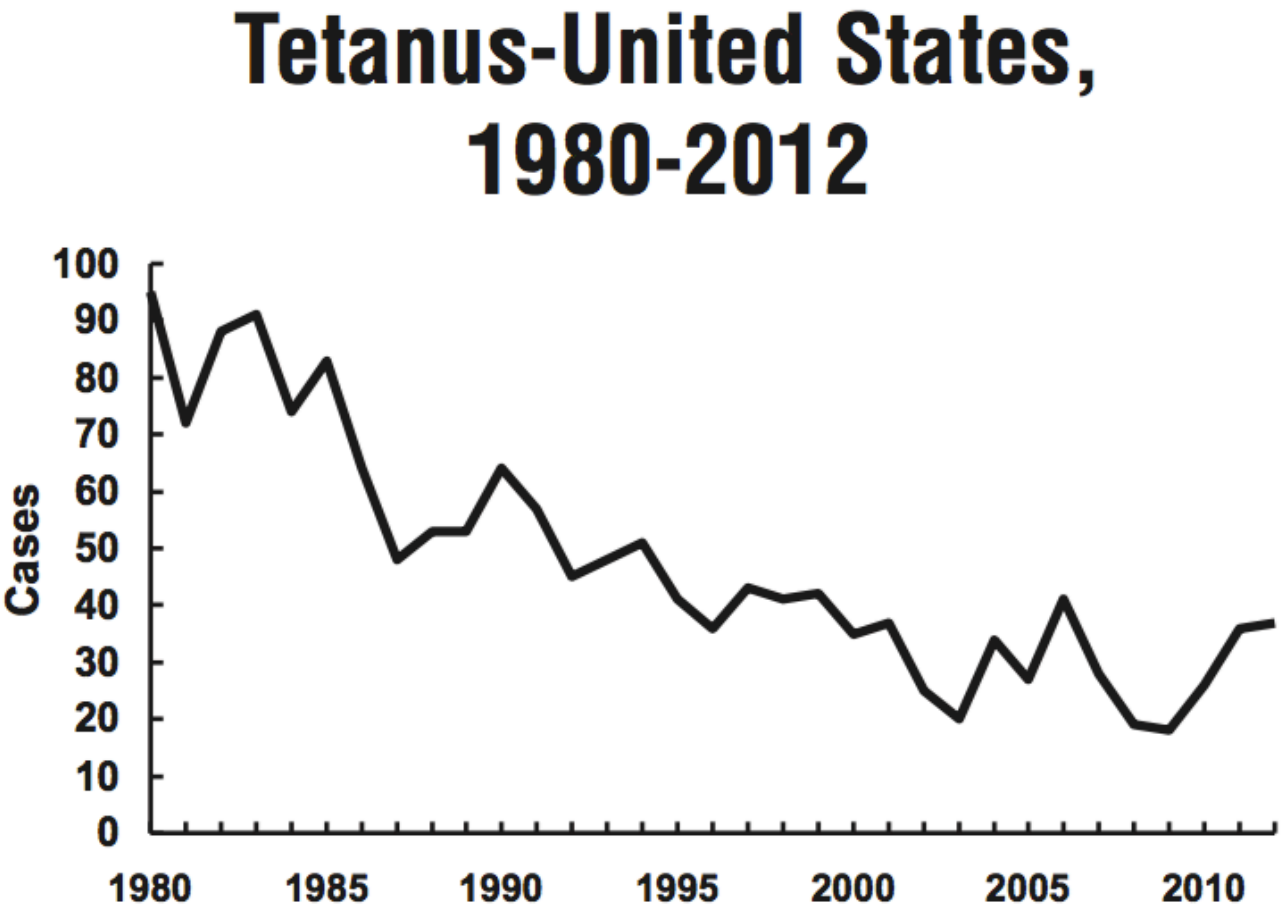
Tetanus Incidence



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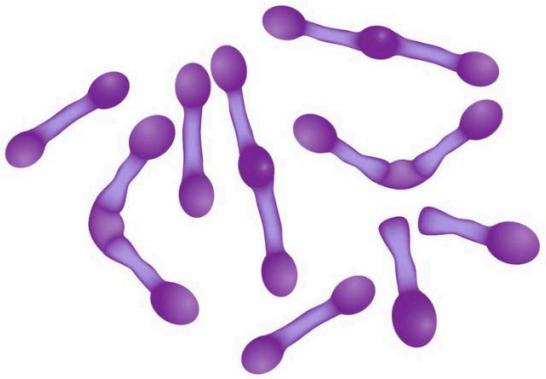
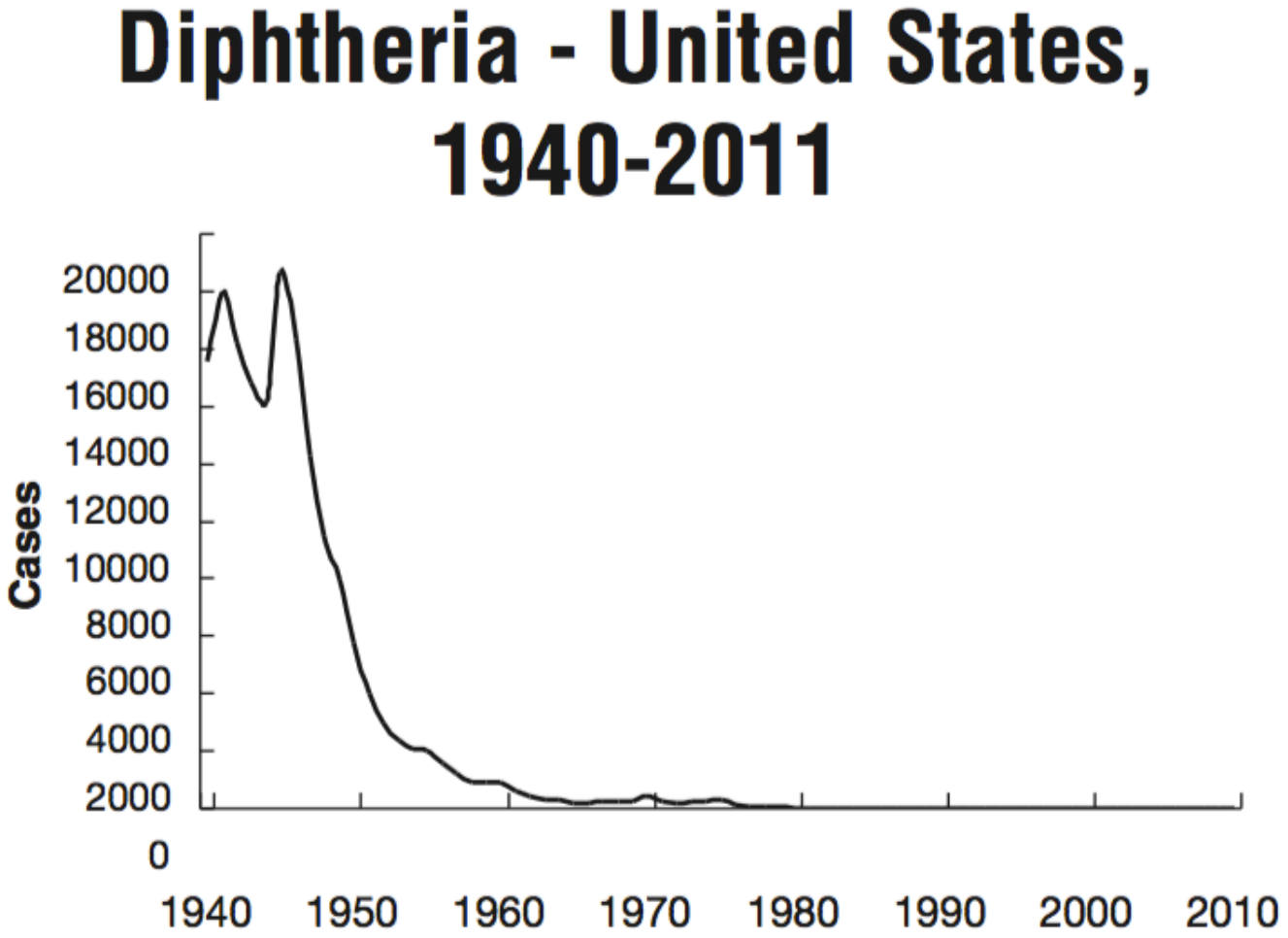
Diphtheria

- Caused by the bacterium *Corynebacterium diphtheriae*
  - Aerobic gram-positive bacillus
  - Only toxigenic strains can cause severe disease
- Clinical features may involve any mucous membrane
- Classified based on site of disease
  - Anterior nasal, pharyngeal and tonsillar, or laryngeal
  - Cutaneous
  - Ocular
  - Genital



Hamborsky J, et al. CDC. 2015;13:1-376.

Diphtheria Incidence

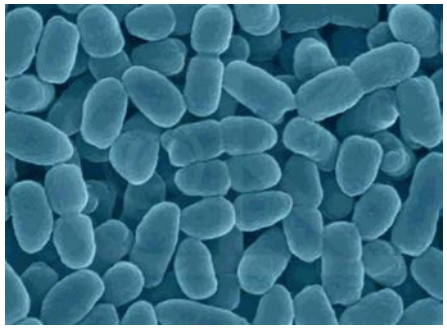


Hamborsky J, et al. CDC. 2015;13:1-376.

Pertussis

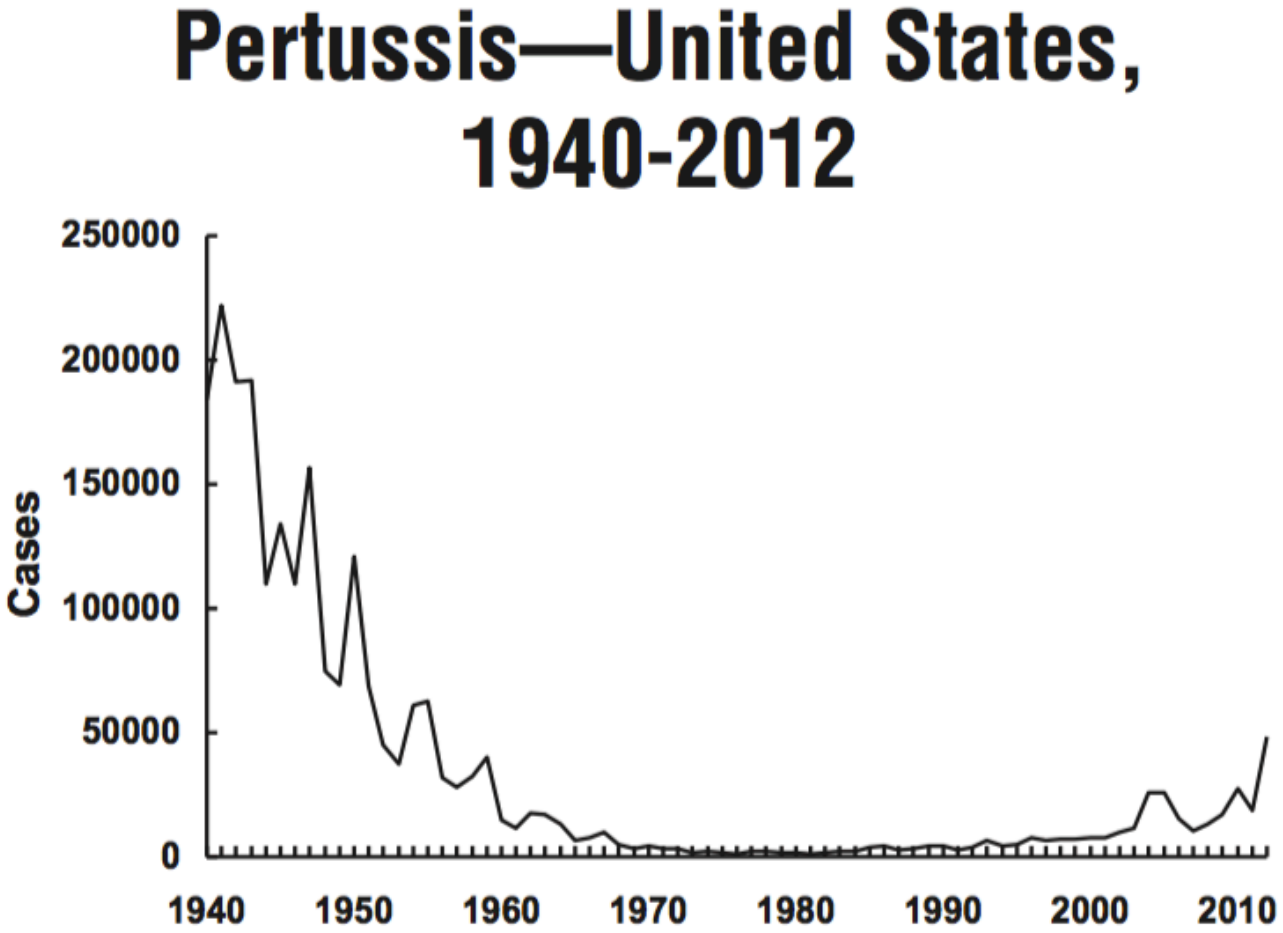
- Caused by the bacterium *Bordetella pertussis*
  - Small, aerobic gram-negative rod
  - Primarily a toxin-mediated disease
  - Toxins cause inflammation of the respiratory tract, which interferes with clearing of pulmonary secretions

- "Whooping cough"
  - Milder among adolescents and adults than in infants and young children
  - Secondary bacterial pneumonia



Hamborsky J, et al. CDC. 2015;13:1-376.

Pertussis Incidence



Hamborsky J, et al. CDC. 2015;13:1-376.

Tdap Vaccination Schedule

- Primary series confers protective level
  - Four spaced doses for <12 months of age
  - Three spaced doses for ≥12 months of age
- Routine tetanus boosters are recommended every 10 years
- Unclean and/or major wounds require a tetanus booster if more than 5 years have elapsed since last dose

Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Tdap Recommendations for Pregnant Women

- Healthcare providers should implement a Tdap vaccination program for pregnant women

- Administer Tdap during each pregnancy
  - Preferably between 27 and 36 weeks gestation
    - **2017 update**: preference for vaccination earlier in this time period to maximize passive antibody transfer to the infant
  - If not during pregnancy, immediately postpartum

Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Td/Tdap Contraindications & Precautions

Contraindications

- Severe allergic reaction after a previous dose or to a vaccine component
- Pertussis-containing vaccines: encephalopathy within 7 days of administration of a previous dose

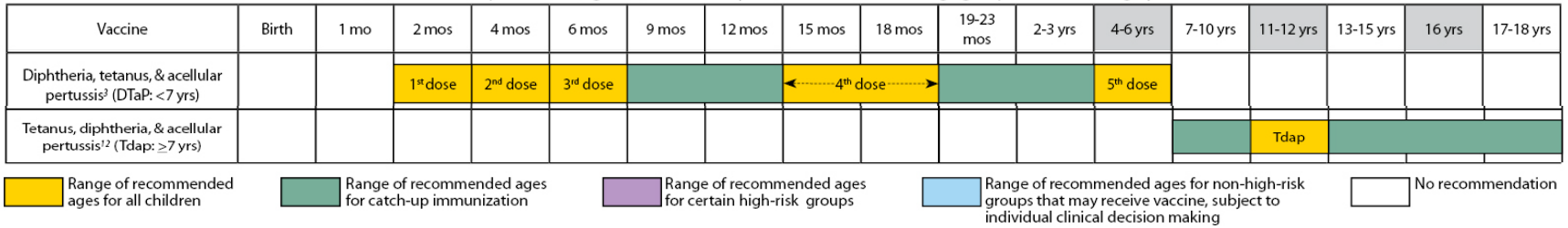
Precautions

- Moderate or severe acute illness +/- fever
- Guillain-Barré syndrome (GBS) within 6 weeks of previous dose
- Arthus-type hypersensitivity reactions after a previous dose
- For pertussis-containing vaccines: progressive or unstable neurologic disorder, uncontrolled seizures, or progressive encephalopathy
- DTaP only, if after receiving a previous dose:
  - Within 48 hours: temperature ≥ 105° F, collapse or shock-like state, or inconsolable crying lasting 3 or more hours
  - Within 3 days: seizure

CDC. *MMWR* 2011;60(No. RR-2):40-1.
Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2017.
(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.



NOTE: The above recommendations must be read along with the footnotes of this schedule.

Figure 1. Recommended immunization schedule for adults aged 19 years or older by age group, United States, 2017

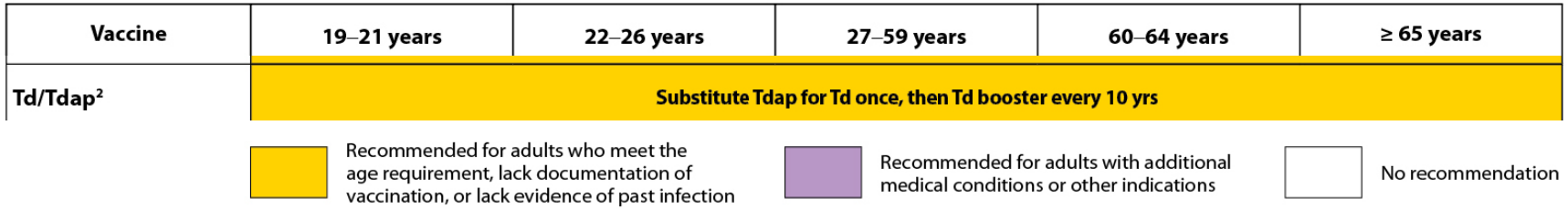
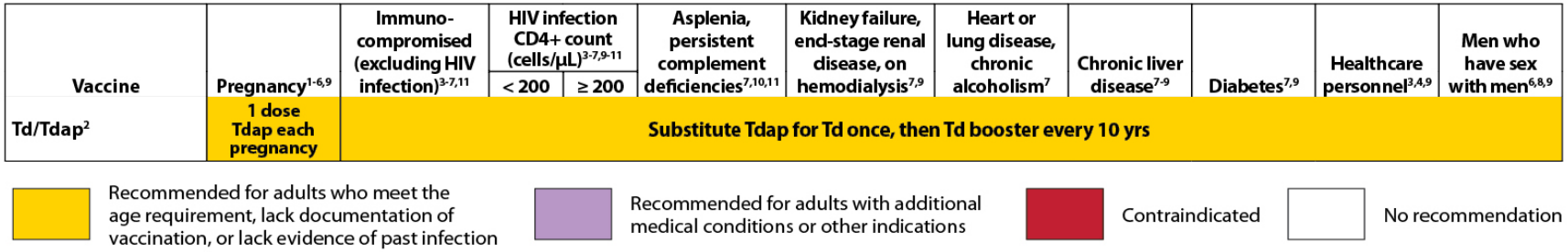


Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017



CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Patient Case

- DV is a 2-month-old female who received her first dose of DTaP 5 days ago who now presents with encephalopathy. Which component of the vaccine is she contraindicated to receive in the future?

  a) Diphtheria-containing

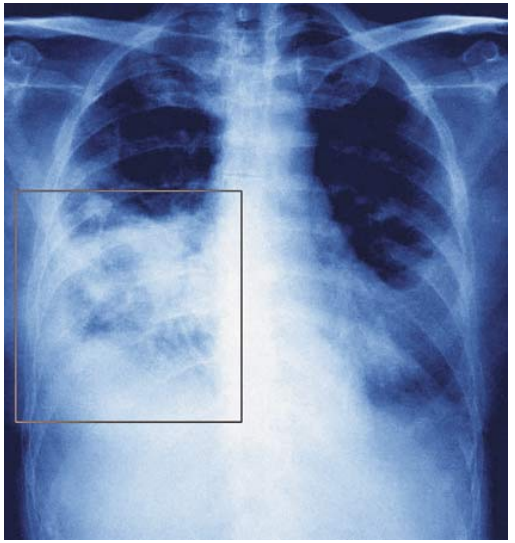
  b) Tetanus-containing

  c) Pertussis-containing

Pneumococcal Disease

- Caused by *Steptococcus pneumoniae*
  - Gram-positive, facultative anaerobic organism
  - Most are encapsulated

- Major clinical syndromes
  - Pneumonia
    - Most common clinical presentation
    - Abrupt onset of fever and chills
  - Bacteremia
  - Meningitis



Hamborsky J, et al. CDC. 2015;13:1-376.

Pneumococcal Vaccine Formulations

- PCV13
  - Prevnar®
  - 13-valent pneumococcal conjugate vaccine

- PPSV23
  - Pneumovax®
  - 23-valent polysaccharide vaccine

Hamborsky J, et al. CDC. 2015;13:1-376.

Pneumococcal Vaccine Formulations

PCV13

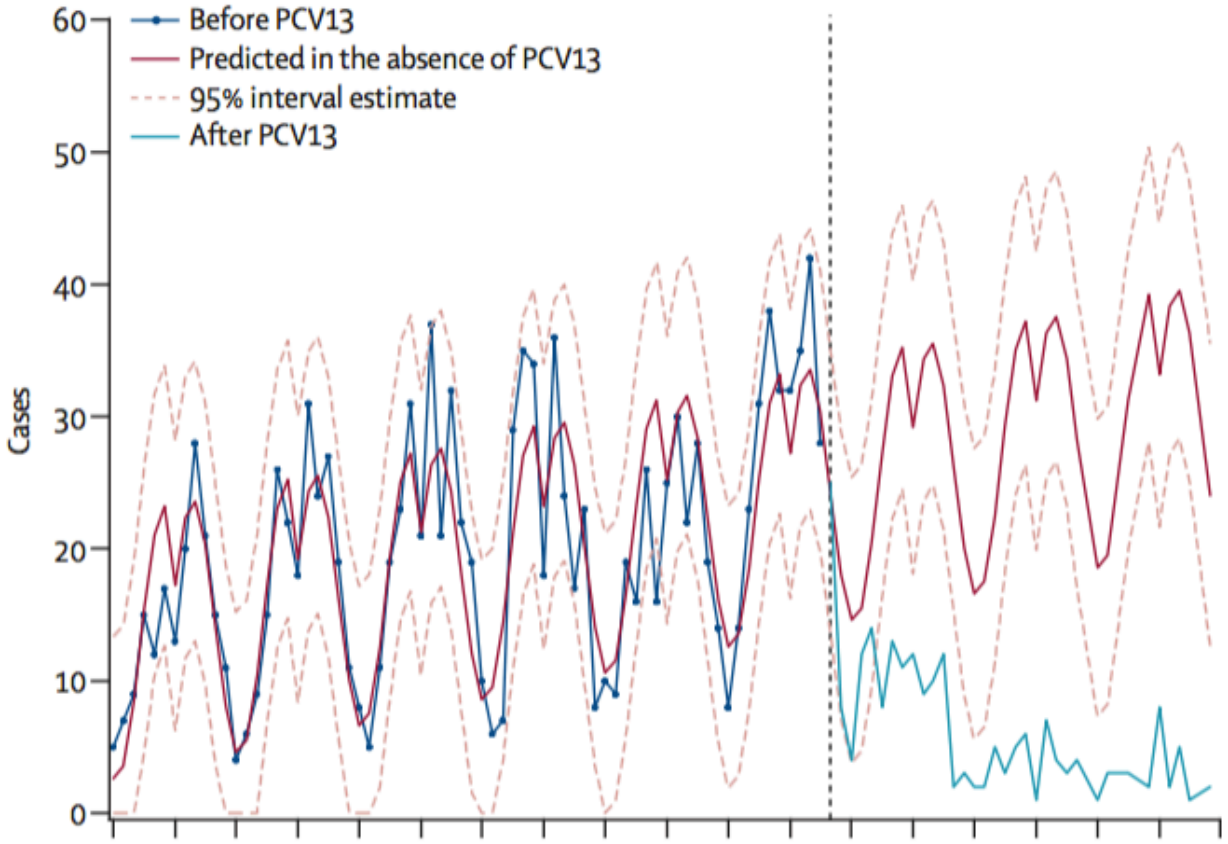
- >90% effective against invasive diseases caused by vaccine serotypes in children
- 75% effective against vaccine-type invasive disease in adults > 65 years

PPSV23

- Not effective in children < 2 years
- 60-70% effective against invasive disease
- Less effective in preventing pneumococcal pneumonia

Hamborsky J, et al. CDC. 2015;13:1-376.

Effect of PCV13 in Children < 5 Years on Invasive Pneumococcal Disease



Moore MR, et al. *Lancet Infect Dis* 2015;15(3):301-9.

Pneumococcal Vaccine Recommendations

- Routine vaccination for aged 2 through 59 months

- Patients aged 65 years or older
  - Single dose if no dose of PCV13 previously received
  - Space from PPSV23 by at least 1 year unless medical indication (8 weeks)

Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Pneumococcal Vaccination for High-Risk: Children Aged 2 Through 5 Years

Chronic heart disease	Chronic lung disease	Diabetes mellitus	Cerebrospinal fluid leak	Cochlear implant
Sickle cell disease	Anatomic or functional asplenia	HIV infection	Chronic renal failure	Immuno-suppressed

- Complete PCV13 series if incomplete schedule
  - 1 dose if 3 doses received
  - 2 doses (8 weeks apart) if < 3 doses received

- Administer PPSV23 dose at least 8 weeks after the most recent dose of PCV13

CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Pneumococcal Vaccination for High-Risk: Children Aged 6 Through 18 Years

- Cerebrospinal fluid leak
- Cochlear implant
- Sickle cell disease
- Anatomic or functional asplenia
- HIV infection
- Chronic renal failure
- Immuno-suppressed

PCV13	PPSV23	
✗	✗	Administer 1 dose of PCV13 now and 1 dose of PPSV23 at least 8 weeks later
✔	✗	Administer 1 dose of PPSV23 at least 8 weeks after PCV13
✗	✔	Administer 1 dose of PCV13 at least 8 weeks after PPSV23

CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Pneumococcal Vaccination for High-Risk: Children Aged 6 Through 18 Years

- Chronic heart disease
- Chronic lung disease
- Diabetes mellitus
- Chronic liver disease

Administer 1 dose of PPSV23

- Sickle cell disease
- Anatomic or functional asplenia
- HIV infection/ Immuno-suppressed
- Chronic renal failure

Administer single revaccination of PPSV23 at least 5 years after the first dose

CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Pneumococcal Vaccination for High-Risk: Adults Aged 19 Through 64 Years

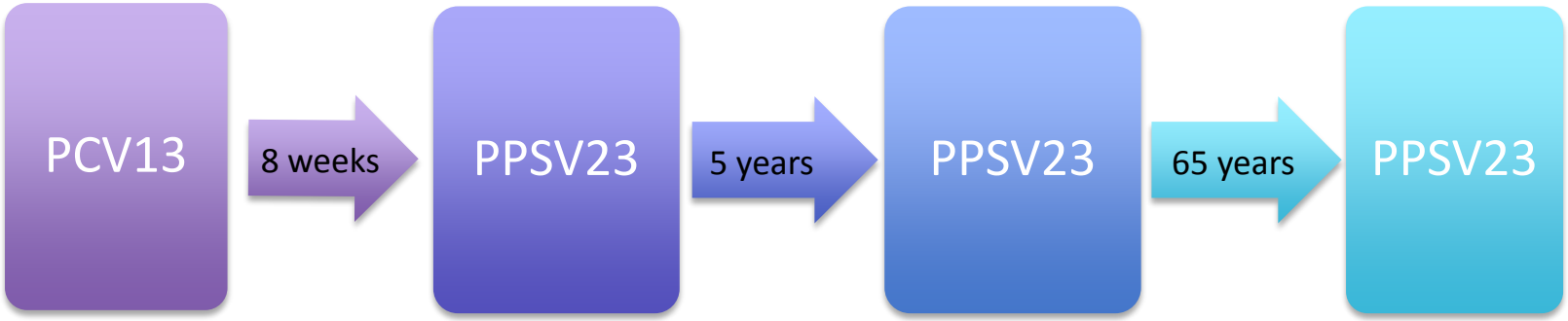
- Special populations
  - Chronic heart disease (excluding hypertension)
  - Chronic lung disease
  - Chronic liver disease
  - Alcoholism
  - Diabetes
  - Cigarette smokers

- Recommendations
  - Single dose of PPSV23
  - Dose of PCV13 at 65 years or older
  - Revaccinate with PPSV23 at least 1 year after PCV13 dose

CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Pneumococcal Vaccination for High-Risk: Adults Aged 19 Years or Older

Immunocompromising conditions or anatomical/functional asplenia:



Cerebrospinal fluid leak or cochlear implant:

CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

PCV13/PPSV23 Contraindications & Precautions

- Contraindications
  - Severe allergic reaction after a previous dose or to a vaccine component

- Precautions
  - Moderate or severe acute illness +/- fever

ATLANTIC HEALTH SYSTEM

CDC. *MMWR* 2011;60(No. RR-2):40-1.
Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Patient Case

- EF is a 6-year-old male who presents for a pneumococcal vaccine who has sickle cell disease. He has never before received a pneumococcal vaccine. What would you recommend as a proposed schedule for EF?

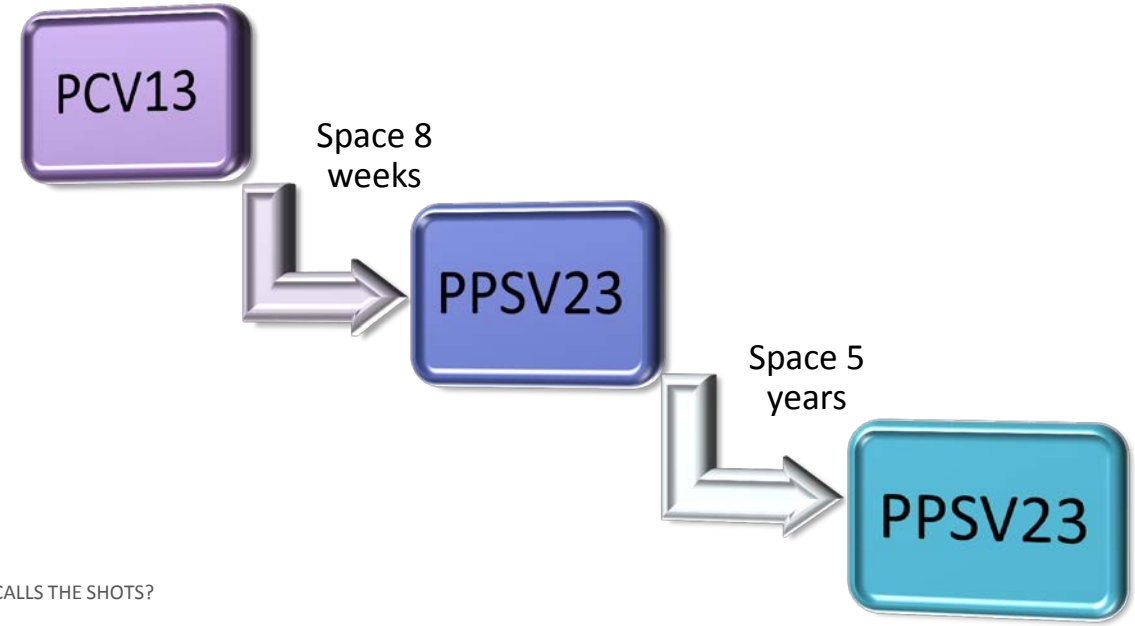
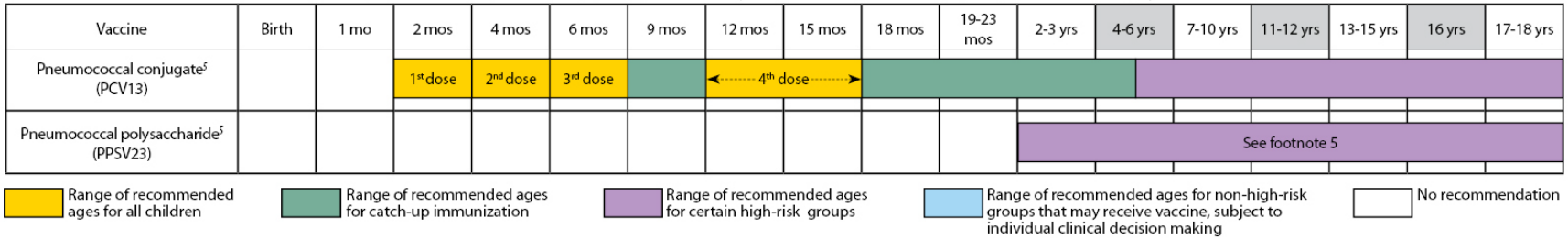


Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2017.
(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.



NOTE: The above recommendations must be read along with the footnotes of this schedule.

Figure 1. Recommended immunization schedule for adults aged 19 years or older by age group, United States, 2017

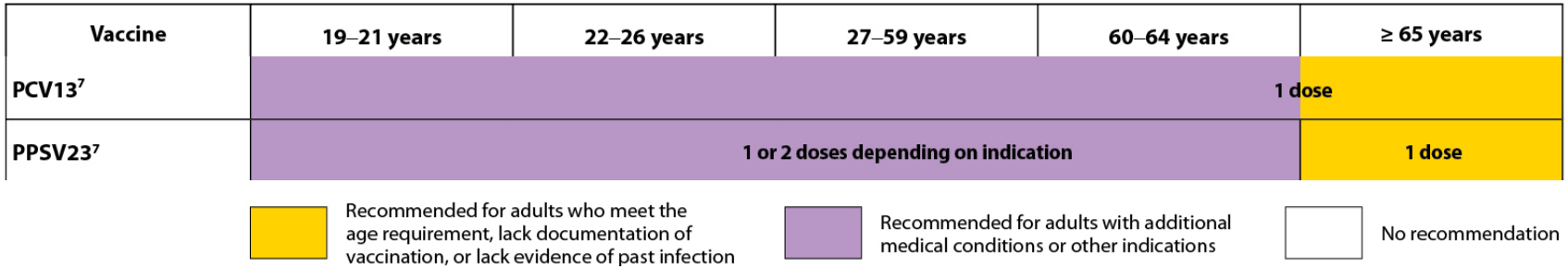
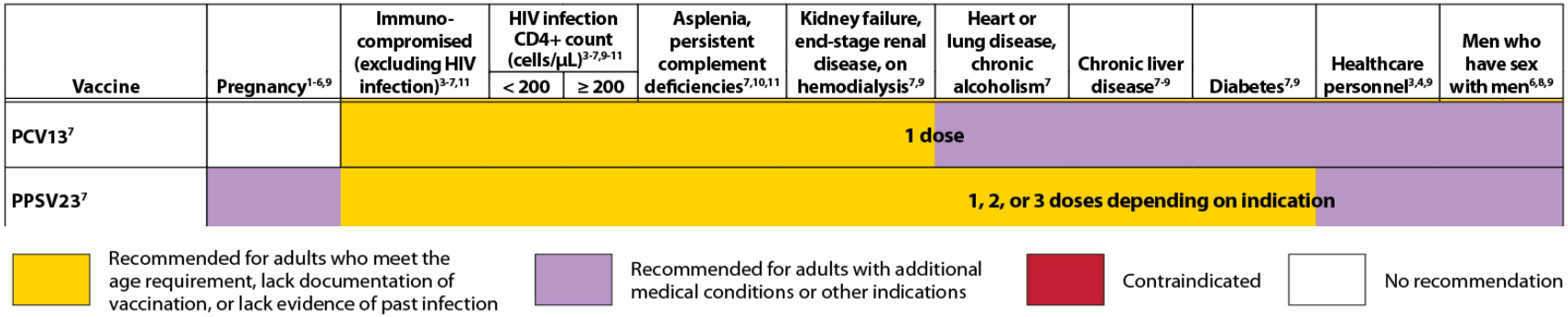


Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017



CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Meningococcal Disease

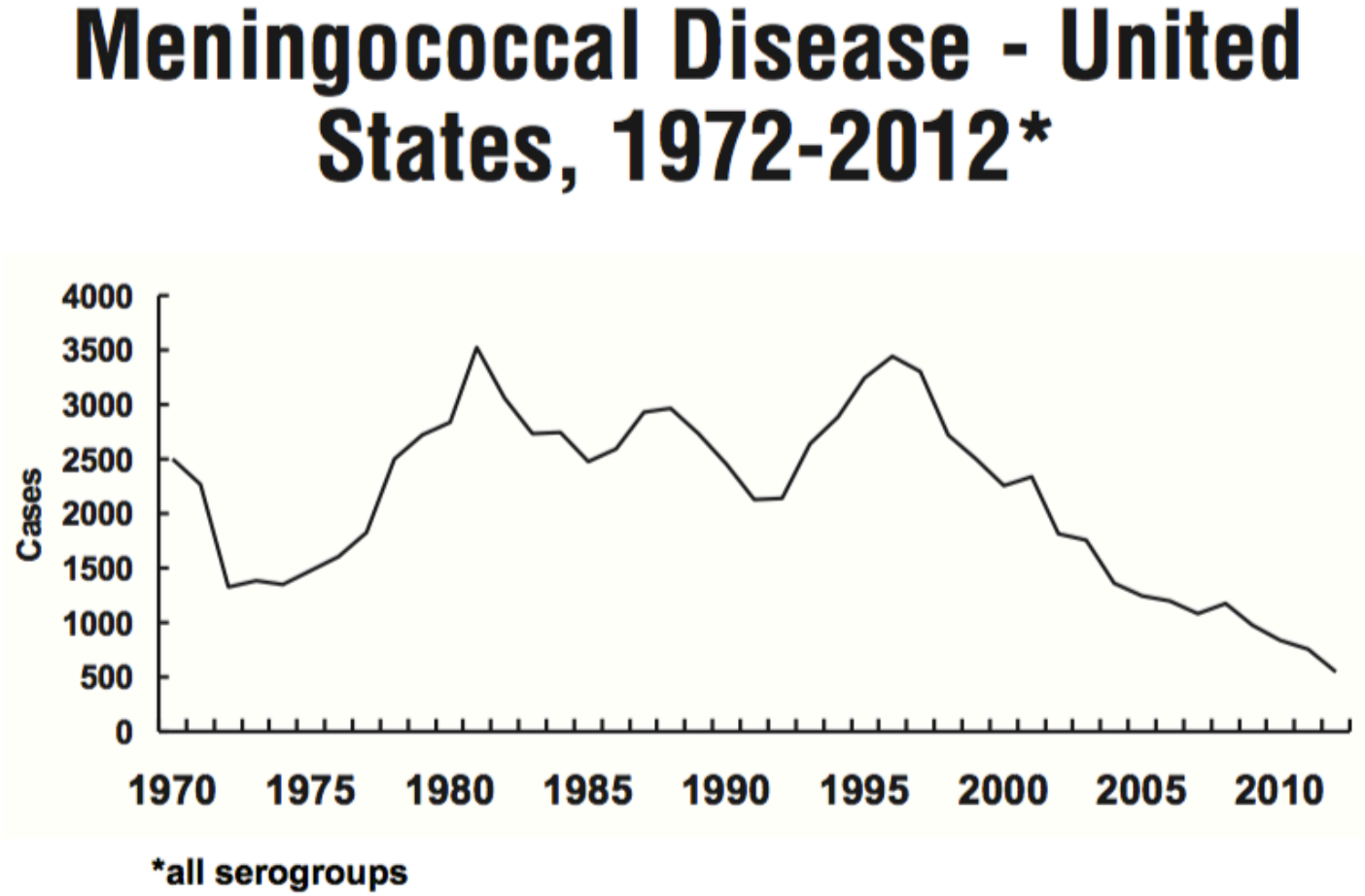
- Caused by the bacterium *Neisseria meningitidis*
  - Aerobic, gram-negative diplococcus
  - Nearly all invasive diseases caused by serogroups A, B, C, W, and Y

- Meningococcal meningitis
  - Most common presentation of invasive disease as a result from hematogenous dissemination
  - Fever, headache, and stiff neck

- Case fatality of meningococcal disease: 10 to 15%

Hamborsky J, et al. CDC. 2015;13:1-376.

Meningococcal Disease Incidence



Hamborsky J, et al. CDC. 2015;13:1-376.

Meningococcal Vaccine Formulations

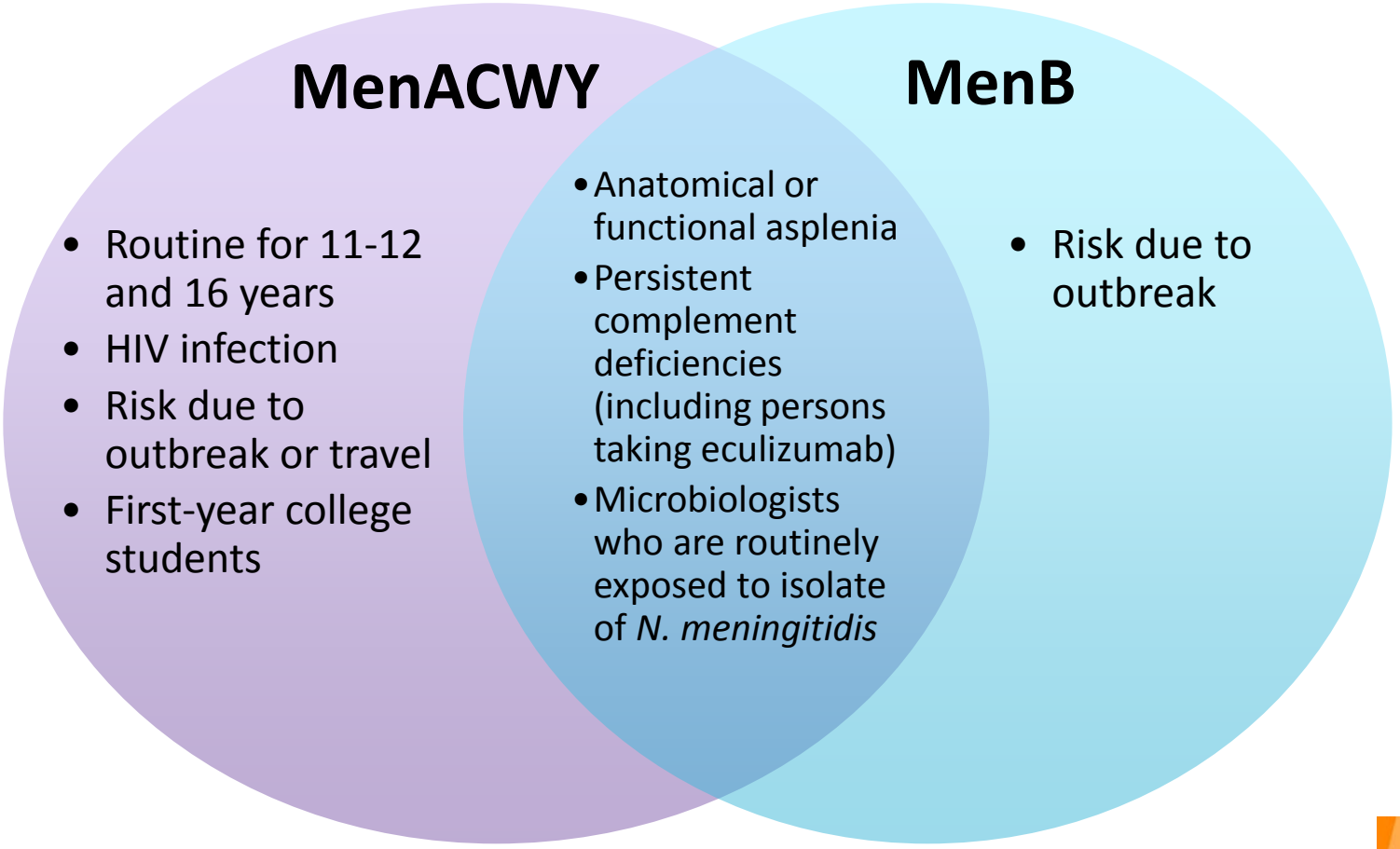
- MPSV4: meningococcal polysaccharide vaccine
  - Quadrivalent polysaccharide vaccine (A, C, W, Y)
  - Menomune®
  - Poor response in children aged < 2 years

- MenACWY: meningococcal conjugate vaccine
  - Menactra®
  - Menveo®
  - MenHibrix®

- MenB: mengingococcal group B vaccine
  - Trumenba®
  - Bexsero®

Hamborsky J, et al. CDC. 2015;13:1-376.

Meningococcal Vaccination Indications



Hamborsky J, et al. CDC. 2015;13:1-376.
Kim DK, et al. *MMWR Morb Mortal Wkly Rep* 2017;66:136-8.

Meningococcal Vaccination 2017 Updates

Adults with HIV infection

- Recommended to receive 2-dose primary series of MenACWY

Trumenba®

- 2-dose series at 0 and 6 months for healthy adolescents and young adults not at increased risk for meningococcal disease
- 3-dose series at 0, 2, and 6 months
  - Adults at increased risk for meningococcal diseases
  - Adults vaccinated during serogroup B meningococcal disease outbreaks

Kim DK, et al. *MMWR Morb Mortal Wkly Rep* 2017;66:136-8.

Review of Asplenic Patients

- Trumenba® or Bexsero® should be administered
- Menveo® or Menactra® should be administered
  - Booster every 5 years
  - Menactra® cannot be coadministered with Prevnar®
- Asplenic patients also requir:
  - Pneumococcal vaccinations
  - *Haemophilus influenzae* type b (Hib) vaccination

Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Meningococcal Contraindications & Precautions

- Contraindications
  - Severe allergic reaction after a previous dose or to a vaccine component

- Precautions
  - Moderate or severe acute illness +/- fever

ATLANTIC HEALTH SYSTEM

CDC. *MMWR* 2011;60(No. RR-2):40-1.
Hamborsky J, et al. CDC. 2015;13:1-376.
CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2017.
(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19-23 mos	2-3 yrs	4-6 yrs	7-10 yrs	11-12 yrs	13-15 yrs	16 yrs	17-18 yrs
Meningococcal[11] (Hib-MenCY ≥6 weeks; MenACWY-D ≥9 mos; MenACWY-CRM ≥2 mos)			See footnote 11											1st dose		2nd dose	
Meningococcal B[11]														See footnote 11			

Range of recommended ages for all children; Range of recommended ages for catch-up immunization; Range of recommended ages for certain high-risk groups; Range of recommended ages for non-high-risk groups that may receive vaccine, subject to individual clinical decision making; No recommendation

NOTE: The above recommendations must be read along with the footnotes of this schedule.

Figure 1. Recommended immunization schedule for adults aged 19 years or older by age group, United States, 2017

Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥ 65 years
MenACWY or MPSV4[10]	1 or more doses depending on indication				
MenB[10]	2 or 3 doses depending on vaccine				

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

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							
MenACWY or MPSV4[10]			1 or more doses depending on indication								
MenB[10]			2 or 3 doses depending on vaccine								

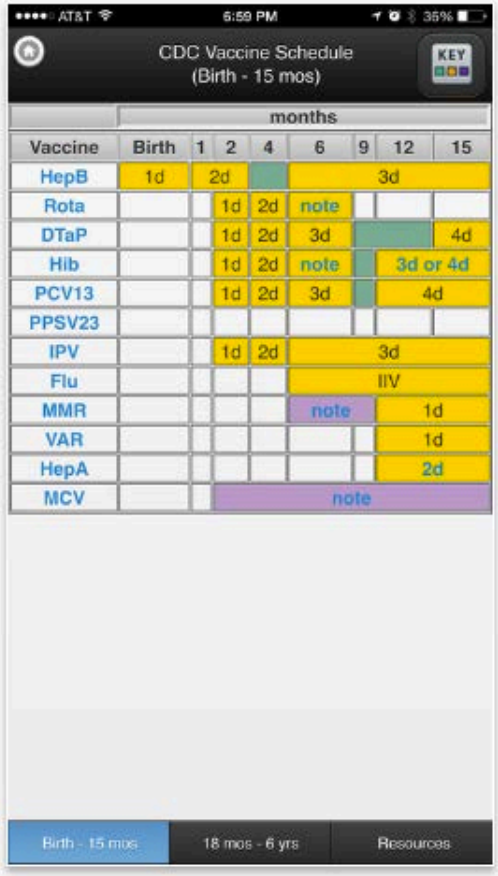
Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection; Recommended for adults with additional medical conditions or other indications; Contraindicated; No recommendation

CDC. Cdcgov. 2017. Available at: https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed May 11, 2017.

Patient Case

- TY is a 22-year-old asplenic male who presents to your clinic 8 weeks after receiving his first dose of Menactra® for his second dose. He has not yet received any other vaccines. Which of the following is he indicated to receive AND can be administered at this visit with the second dose of Menactra®?
  a) Influenza vaccine
  b) Prevnar®
  c) *Haemophilus influenzae* type b (Hib) vaccine
  d) A &C
  e) All of the above

Resources for Caregivers and Healthcare Personnel



Childhood Immunization Schedule
(for children 6 years of Age and Younger)

Summary

- Vaccine administration rates can greatly impact individual patients as well as society as a whole
- Utilizing immunization schedules facilitates identification of high-risk groups and timing of vaccines
- Familiarity with precautions and contraindication of vaccines can assist in screening patients for eligibility

Immunizations: Who Calls the Shots?

Danielle McDonald, PharmD
PGY-1 Pharmacy Resident

Atlantic Health System
May 17th, 2017

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