Vaccine Updates: Meningococcal and Pneumococcal Vaccines

Stephen C. Eppes, MD

ChristianaCare

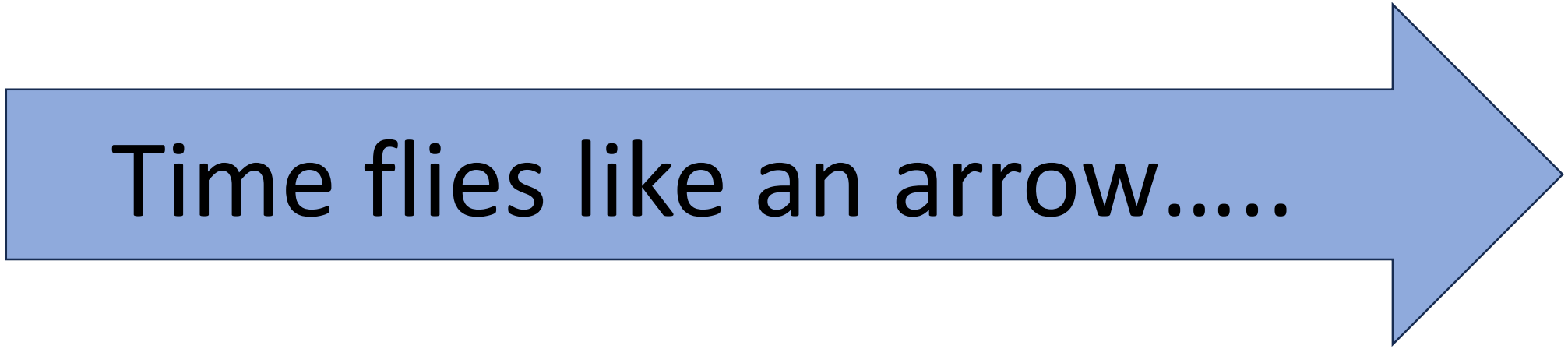
"Lyme Disease and Lyme Disease Vaccine", Delaware County Memorial Hospital, Feb. 2001.

"Antibiotics in Primary Care Pediatrics", Family Medicine Grand Rounds, Jefferson Medical College, Phila., PA, Feb. 2001.

"Vaccination Against Pneumococcus and Meningococcus", Pediatric Kaleidoscope / duPont Hospital for Children, Conshohocken, PA, March 2001.

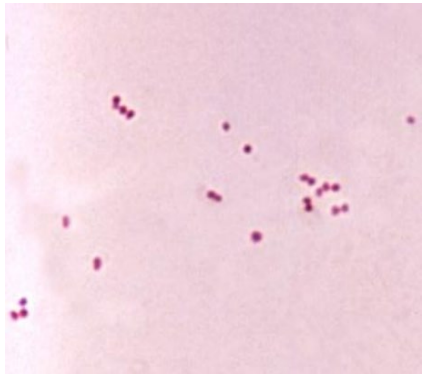
"Resistant Pathogens in Pediatrics", Pediatric Grand Rounds, Fairfax Hospital, Fairfax, VA, March 2001.

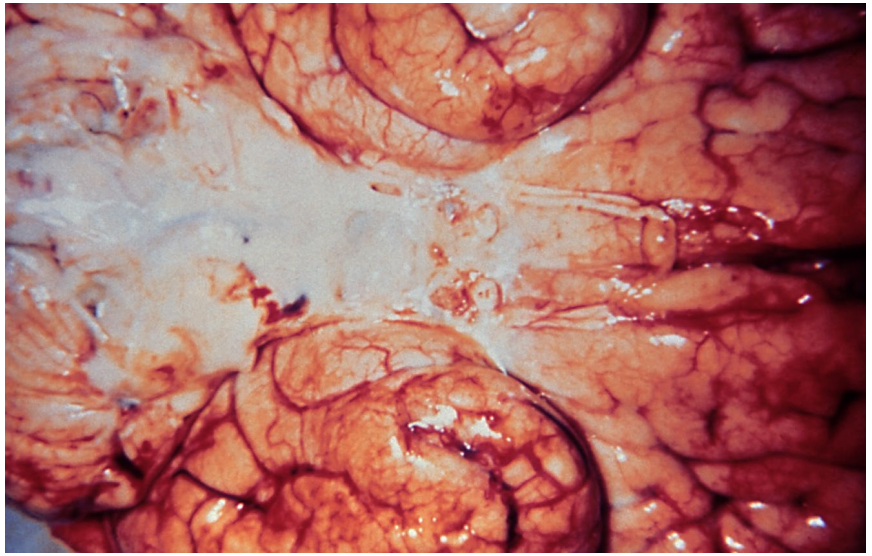
"Lyme Disease and Lyme Disease Vaccine", Chester County Hospital, West Chester, PA, April 2001.

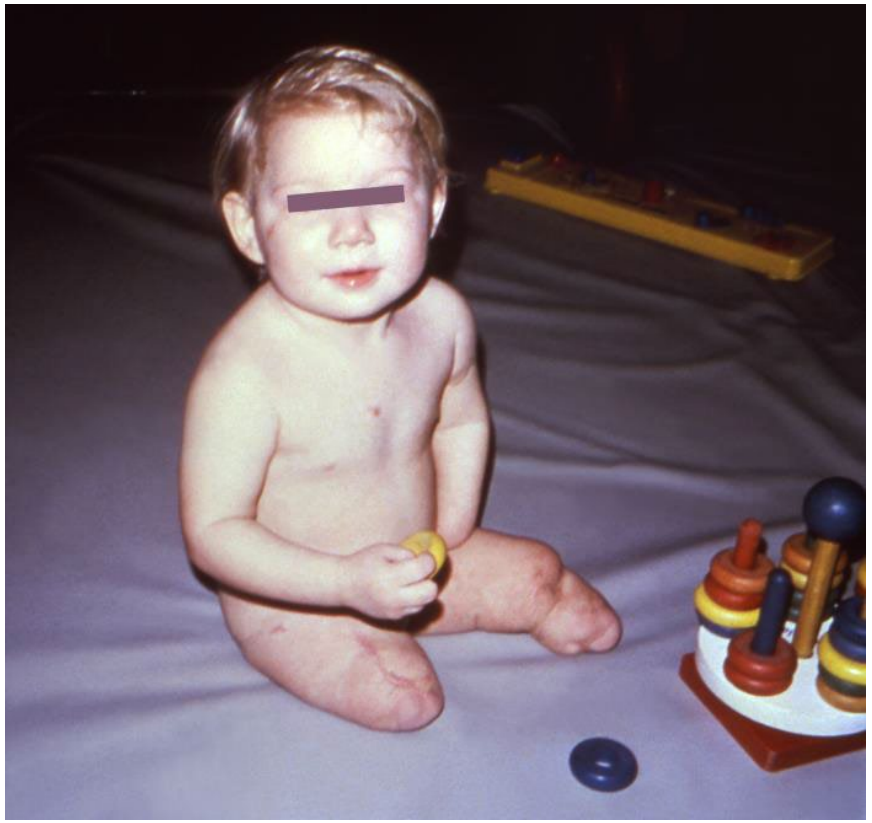

Time flies like an arrow……

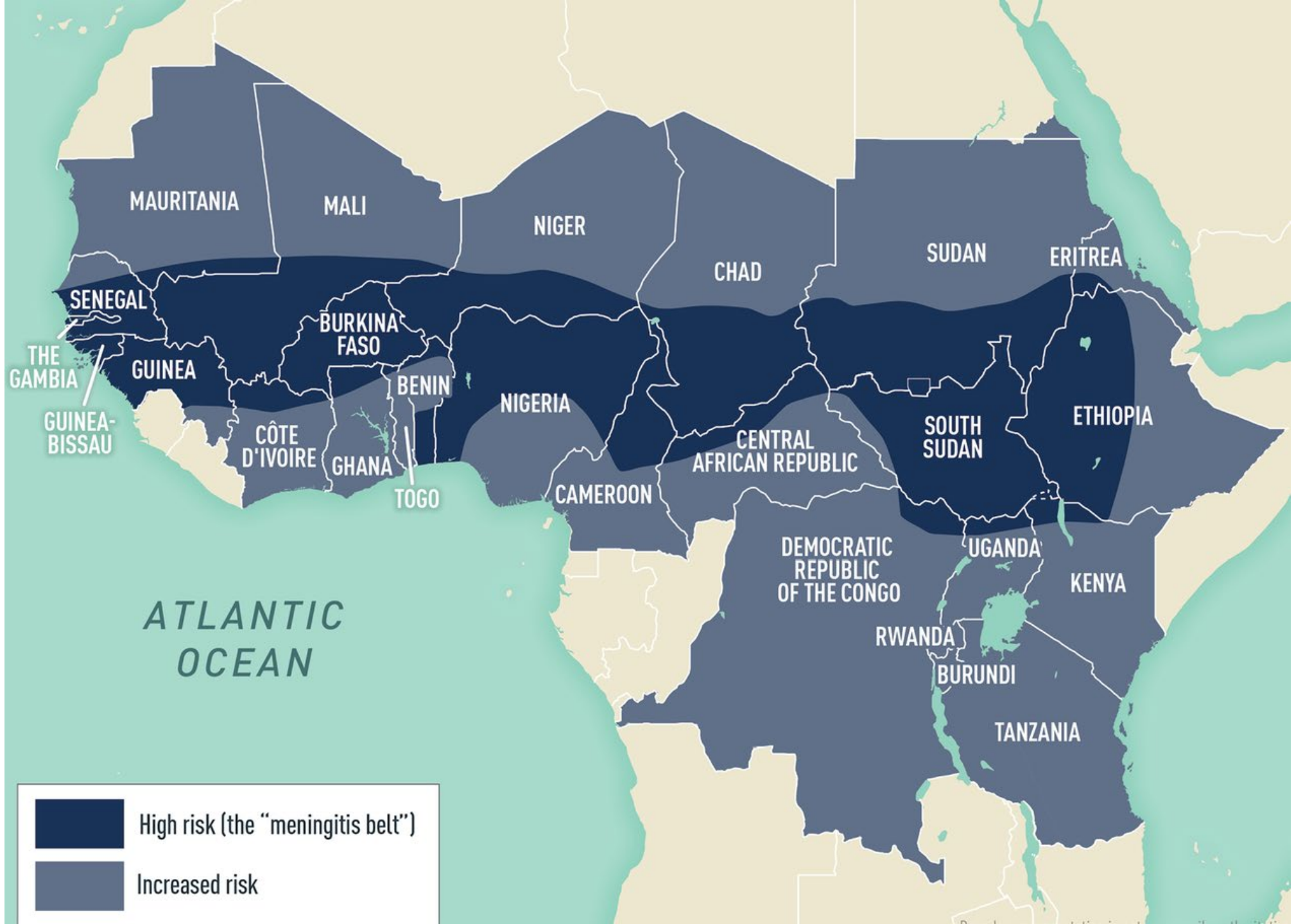
Neisseria meningitidis

- Gram negative diplococcus
- Capsular polysaccharides define serogroups
  - A, B, C, W-135 and Y
- Invasive disease includes meningococcemia and meningitis with 10-15% fatality rate
- 20% of survivors have sequelae
  - Neurologic, hearing loss, amputations








MAURITANIA
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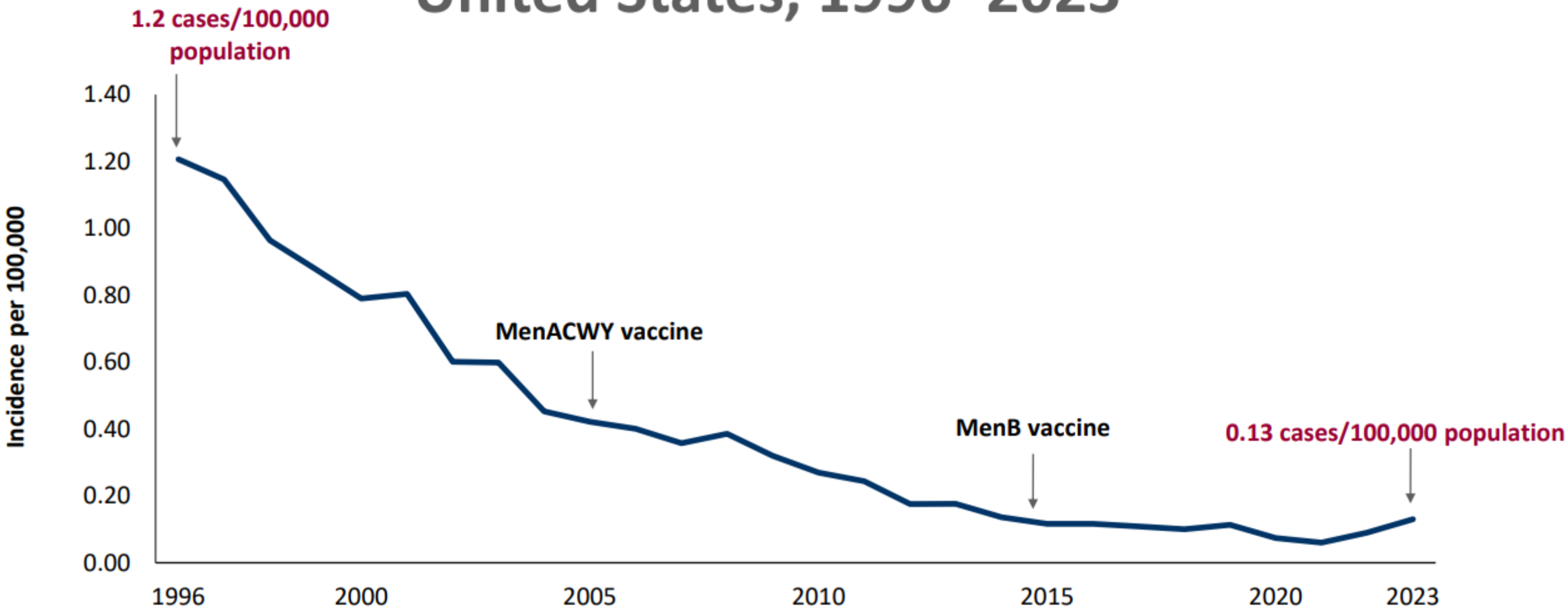
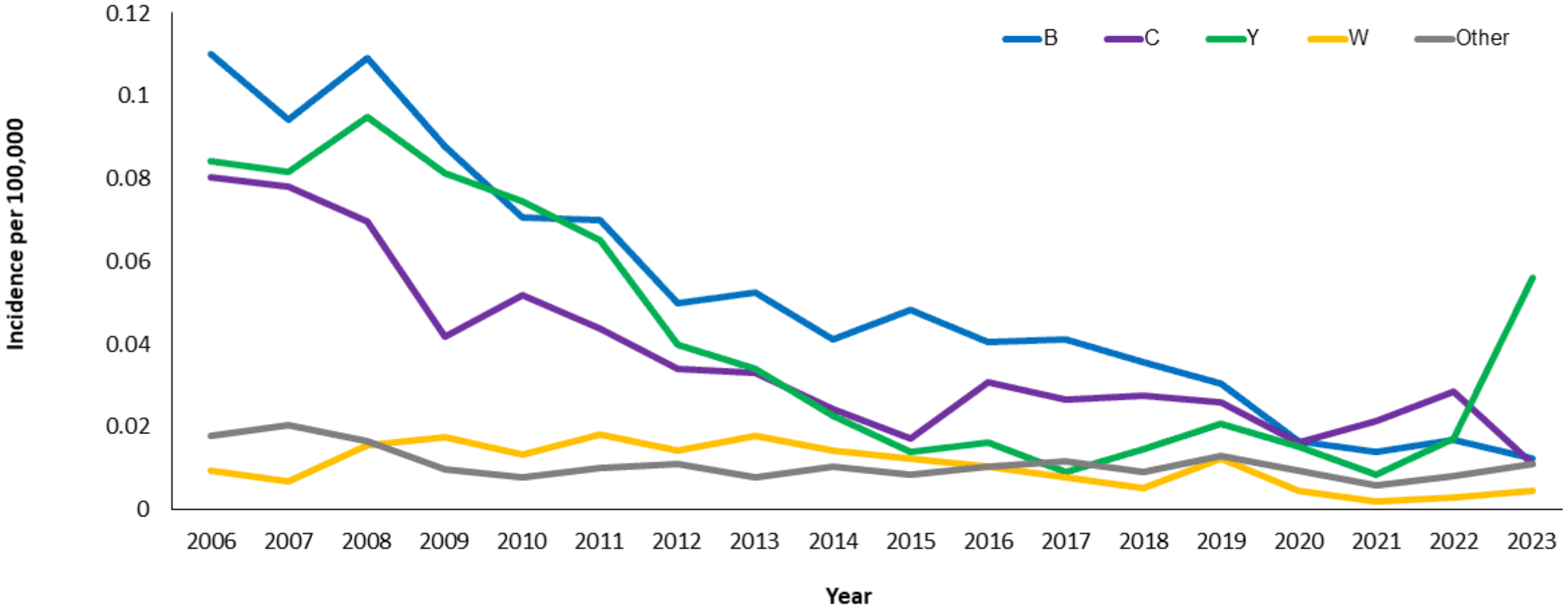
NIGERIA
GUINEA-BISSAU
CÔTE D'IVOIRE
GHANA
TOGO
CAMEROON
CENTRAL AFRICAN REPUBLIC
SOUTH SUDAN
ETHIOPIA
DEMOCRATIC REPUBLIC OF THE CONGO
UGANDA
KENYA
RWANDA
BURUNDI
TANZANIA
ATLANTIC OCEAN
High risk (the "meningitis belt")
Increased risk

Meningococcal Disease Incidence – United States, 1996–2023*



Trends in Meningococcal Disease Incidence by Serogroup – United States, 2006–2023*



Source: NNDSS data with additional serogroup data from Active Bacterial Core surveillance (ABCs) and state health departments
*2022 and 2023 data are preliminary

This is an official

CDC HEALTH ADVISORY

Distributed via the CDC Health Alert Network
March 28, 2024, 1:30 PM ET
CDCHAN-00505

Increase in Invasive Serogroup Y Meningococcal Disease in the United States

Summary

The Centers for Disease Control and Prevention (CDC) is issuing this Health Alert Network (HAN) Health Advisory to alert healthcare providers to an increase in invasive meningococcal disease, mainly attributable to *Neisseria meningitidis* serogroup Y (Figure). In 2023, 422 cases were reported in the United States, the highest annual number of cases reported since 2014. As of March 25, 2024, 143 cases have been reported to CDC for the current calendar year, an increase of 62 cases over the 81 reported as of this date in 2023. A specific meningococcal strain, sequence type (ST) 1466, is responsible for most (101 of 148, 68%) serogroup Y cases with available sequence type data that were reported across the United States in 2023. Cases caused by this strain are disproportionately occurring in people ages 30–60 years (65%), Black or African American people (63%), and people with HIV (15%). In addition, most cases of invasive meningococcal disease caused by ST-1466 in 2023 had a clinical presentation other than meningitis: 64% presented with bacteremia, and at least 4% presented with septic arthritis. Of 94 patients with known outcomes, 17 (18%) died; this case-fatality rate is higher than the historical case-fatality rate of 11% reported for serogroup Y cases in 2017–2021. **Healthcare providers should 1) have a heightened suspicion for meningococcal disease, particularly among populations disproportionately affected by the current increase, 2) be aware that patients may present without symptoms typical of meningitis, and 3) ensure that all people recommended for meningococcal vaccination, including people with HIV, are up to date for meningococcal vaccines.**

- Risk factors
  - Black race
  - HIV infection
  - Not having had quadrivalent vaccine (only 4, many others eligible)

Meningococcal Disease Outbreaks 2022-Present

Outbreak	Outbreak Period	Serogroup	Cases (deaths)
Florida MSM	December 2021 – February 2023	C	46 (9)
New York PEH	February 2022	C	3
Florida College	February – March 2022	B	3
Virginia Statewide	June 2022 – Present	Y	36 (8)*
Iowa Community	November 2022 – July 2023	W	12 (2)
Ohio Amish Community	December 2023 – January 2024	B	6[†]
Colorado PEH	Jan 2024 – Present	Y	6*
Oklahoma Correctional Facility	March 2024 – May 2024	C	2 (1)
Kingdom of Saudi Arabia Travel	April 2024 – Present	W[§]	14*

CDC Morbidity and Mortality Weekly Report (*MMWR*) Search

Cases of Meningococcal Disease Associated with Travel to Saudi Arabia for Umrah Pilgrimage — United States, United Kingdom, and France, 2024

Weekly / June 6, 2024 / 73(22);514–516

Print

On May 31, 2024, this report was posted online as an MM

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Meningococcal Disease Cases Linked to Travel to the Kingdom of Saudi Arabia (KSA): Ensure Pilgrims are Current on Meningococcal Vaccination

Print

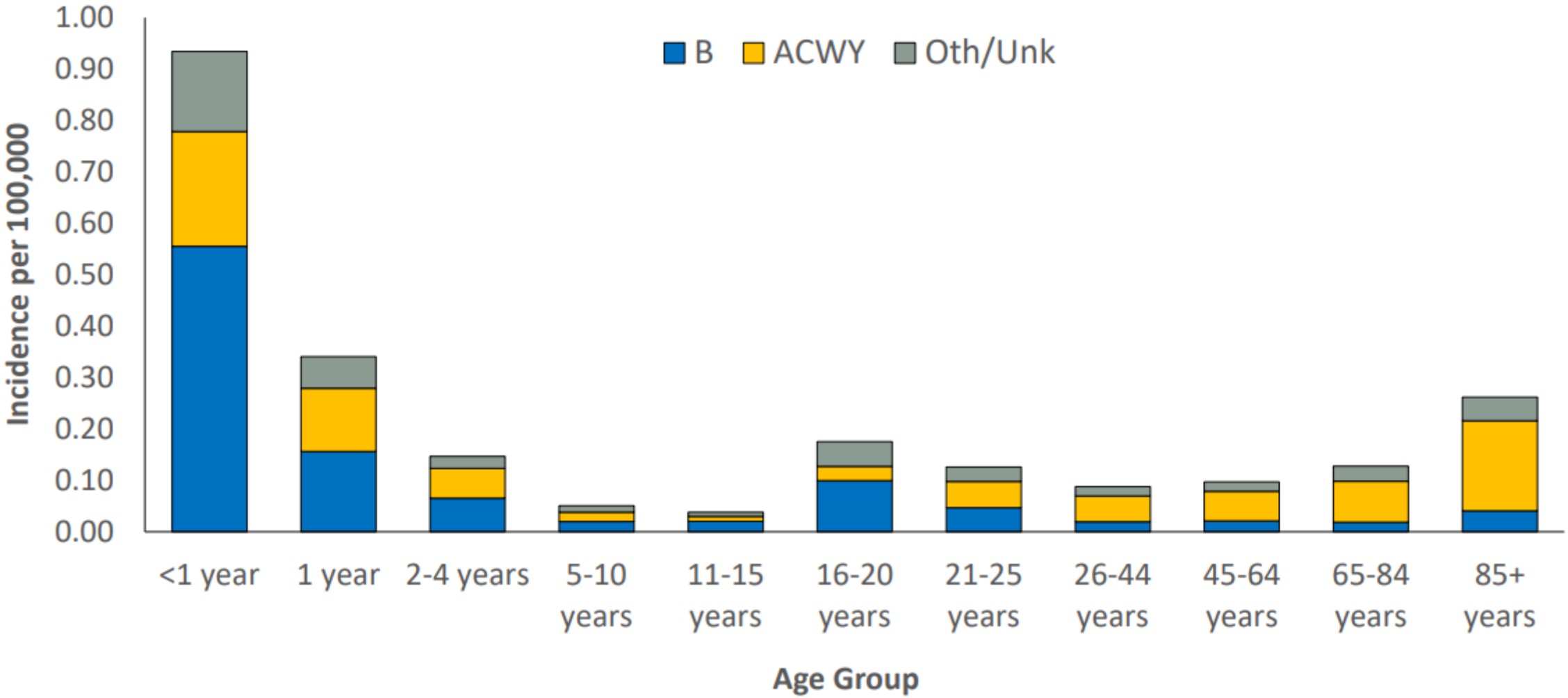
HAN HEALTH ALERT NETWORK

NVH This is an official CDC HEALTH ADVISORY

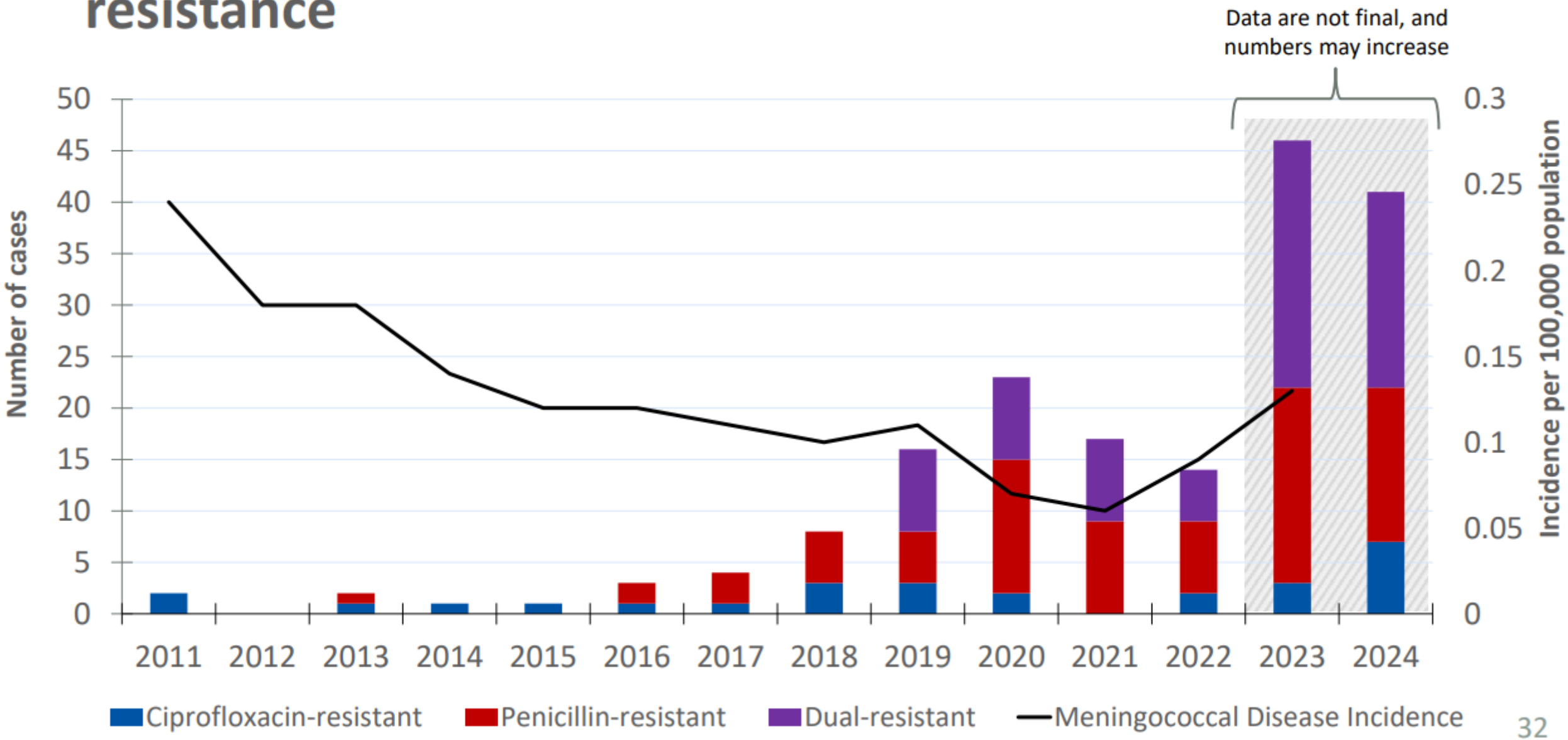
Distributed via the CDC Health Alert Network
May 20 2024, 10:30 AM ET
CDCHAN-00508

- Recommend preferential use of alternative prophylaxis agents for cases associated with KSA travel

Average Annual Meningococcal Disease Incidence by Age Group and Serogroup—United States, 2012–2021



N. meningitidis isolates with penicillin or ciprofloxacin resistance



Meningococcal Disease

EXPLORE TOPICS

SEARCH

FEBRUARY 8, 2024

Public Health Strategies for Antibiotic-resistant *Neisseria meningitidis*

KEY POINTS

- CDC has detected penicillin- and ciprofloxacin-resistant serogroup Y meningococcal isolates in the United States.
- Using these antibiotics for invasive meningococcal disease in areas with resistance can increase suffering and death.
- Due to these concerns, CDC issued updated guidance related to treatment, prophylaxis, and surveillance.

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Search

Morbidity and Mortality Weekly Report (*MMWR*)

Selection of Antibiotics as Prophylaxis for Close Contacts of Patients with Meningococcal Disease in Areas with Ciprofloxacin Resistance — United States, 2024

Weekly / February 8, 2024 / 73(5);99–103

Print

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Meningococcal Vaccination: Recommendations of the Advisory Committee on Immunization Practices, United States, 2020

2005 FDA licensed MenACWY-D for persons aged 11–55 years. ACIP recommended routine vaccination of adolescents with a single MenACWY-D dose at age 11–12 years and persons aged 11–55 years at increased risk for meningococcal disease.

2006 Because of limited vaccine supply, MenACWY-D vaccination was limited to cohorts of adolescents entering high school and college and persons aged 11–55 years at increased risk for meningococcal disease.

2007 After vaccine supply became sufficient, ACIP recommended vaccination for all adolescents aged 11–18 years. FDA expanded licensure of MenACWY-D to children aged 2–10 years, and ACIP recommended routine vaccination of children in this age group at increased risk for meningococcal disease.

2010 FDA licensed a second vaccine, MenACWY-CRM, for persons aged 11–55 years. ACIP added a MenACWY booster dose at age 16 years and recommended a 2-dose primary series be used for certain persons aged 11–55 years at increased risk for meningococcal disease because of asplenia, persistent complement component deficiency, or human immunodeficiency virus (HIV) infection (with another indication for vaccination).

2011 FDA extended licensure of MenACWY-CRM to children aged 2–10 years and of MenACWY-D to those aged 9–23 months. ACIP recommended a 2-dose primary series of MenACWY-D for children aged 9–23 months at increased risk for meningococcal disease.

2012 FDA licensed Hib-MenCY-TT and ACIP recommended a 4-dose primary series for children aged 2–8 months at increased risk for meningococcal disease.

2013 FDA extended licensure of MenACWY-CRM to children aged 2–23 months and ACIP recommended a 4-dose primary series for children in this age group at increased risk for meningococcal disease.

2014 FDA licensed MenB-FHbp as a 3-dose series for persons aged 10–25 years.

2015 FDA licensed MenB-4C as a 2-dose series for persons aged 10–25 years. ACIP recommended persons at increased risk for serogroup B meningococcal disease receive a MenB series, and persons aged 16–23 years were recommended to be vaccinated with a MenB series on the basis of shared clinical decision-making.

2016 FDA licensed MenB-FHbp as a 2-dose series for persons aged 10–25 years.

2016 ACIP recommended persons with HIV infection be routinely vaccinated with a 2-dose MenACWY primary series.

2017 ACIP updated its recommendations for use of MenB-FHbp following a change in licensure that allowed both a 2- and 3-dose series. Distribution of MPSV4 and Hib-MenCY-TT was discontinued in the United States.

2019 ACIP recommended that persons with certain medical conditions and microbiologists routinely exposed to *Neisseria meningitidis* isolates receive a MenB booster dose 1 year after primary series completion, then every 2–3 years thereafter. During an outbreak, a single MenB booster dose was recommended if it had been ≥1 year since primary series completion (interval of ≥6 months may be considered if recommended by public health officials).

2020 FDA licensed MenACWY-TT for persons aged ≥2 years.

2023: New pentavalent vaccine approved and recommended.
2024: New recommendations for MenB-4C.
2025: Major new recommendations anticipated in June.

Meningococcal Conjugate Vaccines (MCV4)

- MenACWY conjugate vaccines protect against serogroups A, C, W-135 and Y
  - MenACWY-TT (MenQuadfi®)
  - MenACWY-CRM (Menveo®)
- ~70% of cases in intended adolescent / young adult age range
- High quality immune response with T-cell memory
- Reduction of NP carriage – herd protection

Meningococcal Conjugate Vaccines (MCV4)

- Routine vaccination at 11-12 years
- Booster dose at 16 years
- Individuals age ≥ 2 months with risk factors:
  - Certain complement deficiencies
    - Including eculizumab and ravulizumab use
  - Functional or anatomic asplenia
  - HIV infection

  1-4 dose primary series

  - Travelers to endemic countries
  - Microbiologists with occupational exposure
  - Military recruits
  - First year college students living in dormitory

  Usually 1 dose
- Booster dose every 5 years as long as risk persists

Meningococcal Conjugate Vaccines for High Risk Young Children

TABLE 3. Recommended meningococcal vaccines for persons at increased risk for meningococcal disease — Advisory Committee on Immunization Practices, United States, 2020

Risk group	MenACWY vaccine	MenB vaccine	Table
Persons with complement component deficiency (e.g., C5–C9, properdin, factor H, or factor D), including patients using a complement inhibitor	Aged ≥2 mos	Aged ≥10 yrs	4
Persons with functional or anatomic asplenia (including sickle cell disease)	Aged ≥2 mos	Aged ≥10 yrs	5
Persons with HIV infection	Aged ≥2 mos	No recommendation	6
Microbiologists routinely exposed to *Neisseria meningitidis*	Age appropriate*	Age appropriate†	7
Persons exposed during an outbreak of meningococcal disease due to a vaccine-preventable serogroup	Aged ≥2 mos	Aged ≥10 yrs	8
Persons who travel to or live in countries where meningococcal disease is hyperendemic or epidemic	Aged ≥2 mos	No recommendation	9
College freshmen living in residence halls	Age appropriate*	No recommendation	10
Military recruits	Age appropriate*	No recommendation	10

Abbreviations: HIV = human immunodeficiency virus; MenACWY = meningococcal groups A, C, W, and Y; MenB = meningococcal group B.
* Persons aged ≥2 months in these risk groups are recommended to receive MenACWY vaccination.
† Persons aged ≥10 years in this risk group are recommended to receive MenB vaccination.

Menveo FDA approved for ≥ 2 months
Menquadfi FDA approved for ≥ 2 years

Meningococcal B Vaccines
FDA-Approved For Ages 10-25 Years

- Trumenba (Pfizer)
  - consists of two factor H binding proteins
- Bexsero (Novartis / GSK)
  - consists of four different proteins:
    - a *Neisseria meningitidis* adhesion molecule
    - one factor H binding protein
    - a heparin binding antigen
    - a porin protein that is associated with an outer membrane vesicle

Meningococcal B Vaccines

- Trumenba
  - Low risk adolescent / young adult
    - Give at 0 and 6 months
  - Outbreak situation or high risk patient
    - 0, 1-2, and 6 months
- Bexsero
  - Low risk adolescent / young adult
    - Give at 0 and 6 months
      - If 2nd dose < 6 months, give 3rd dose 4 months after 2nd dose
  - High risk patient
    - 0, 1-2, and 6 months
- For patients desiring more rapid protection, either product can be given at 0, 1-2 and 6 months

New recommendations based on new immunogenicity data and to harmonize with Trumenba recommendations

Recommendations for Meningococcal B Vaccines

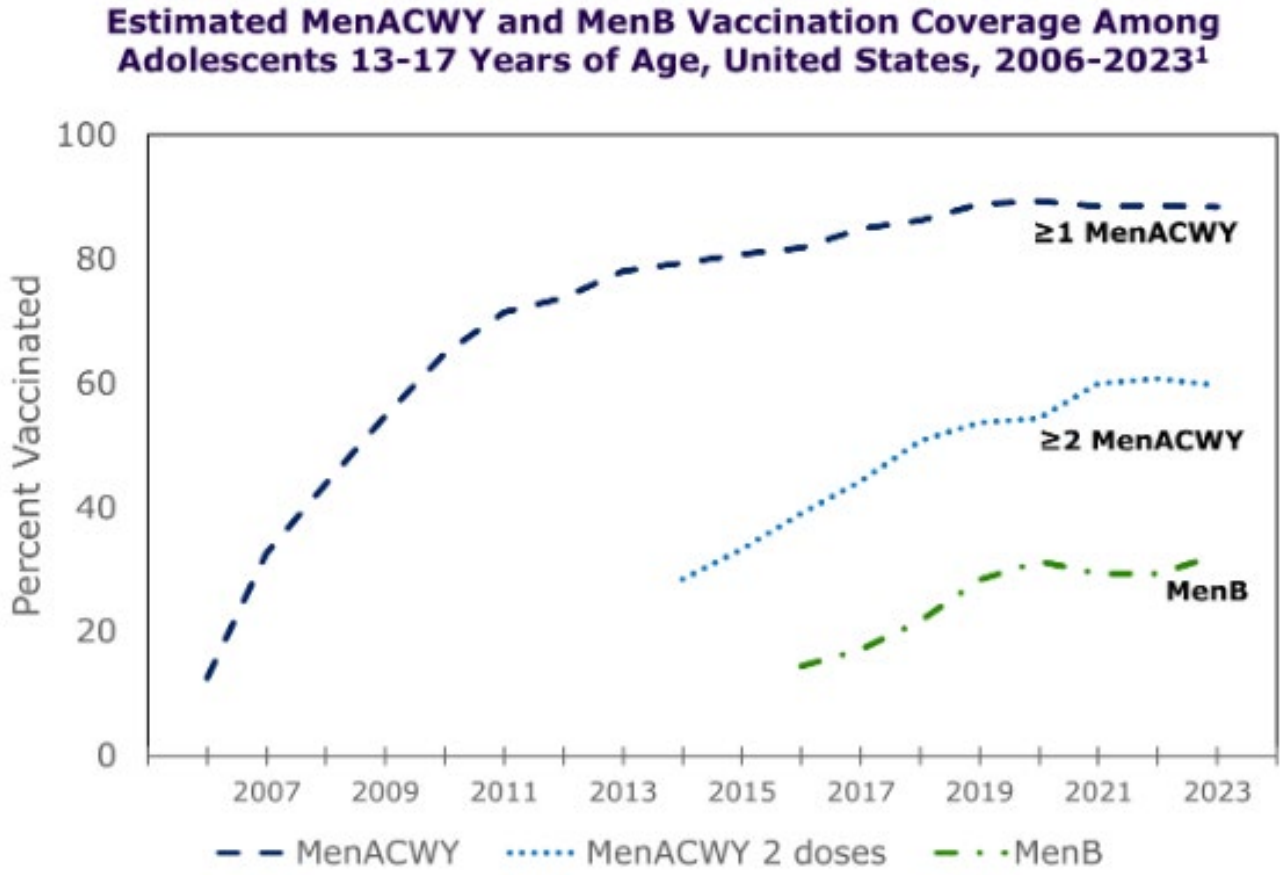
- High risk persons ≥ 10 yr
  - Complement deficiencies
    - Including eculizumab use
  - Asplenia
  - Microbiologists exposed to meningococcus
  - Outbreaks (e.g. college campuses)
- Booster dose 1 year after completion of primary series
  - And every 2-3 years thereafter as long as risk persists

Meningococcal B Vaccines For 16-23 Year Olds

- ACIP recommended MenB vaccines in June 2014 based on clinical, immunologic, epidemiologic and cost-effectiveness data (Category B recommendation)
  - Insufficient for Category A (universal)
- Vaccination should be done based on ***shared clinical decision making***
  - In context of provider-patient relationship
  - Highest risk: first year dorms, Greek life
- Preferred at age 16-18 years

Meningococcal Vaccine Coverage for Pre-Teens and Teens

- 1 dose of MCV4 91%
- 2 doses of MCV4 61%
- 1 dose of MenB 29%
- 2 doses of MenB 12%



Meningitis B Action Project Survey

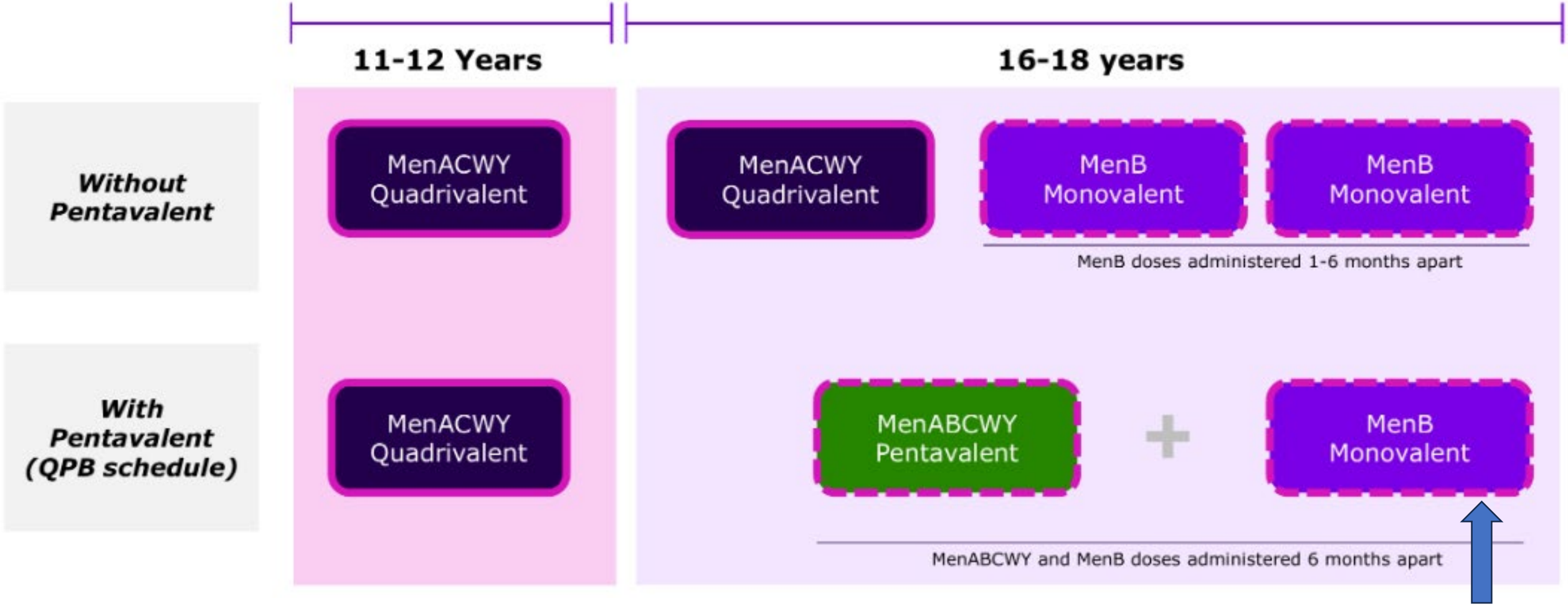
N = 524 Providers

- Routinely discuss men B with 16-23 y.o.
  - Yes 68%
  - Sometimes 21%
  - No 11%
- Top 5 reasons for not discussing
  - Not mandated by patient's college
  - ACIP recommendation not strong
  - Not enough time
  - Patient not in high-risk category
  - Patient not going to college

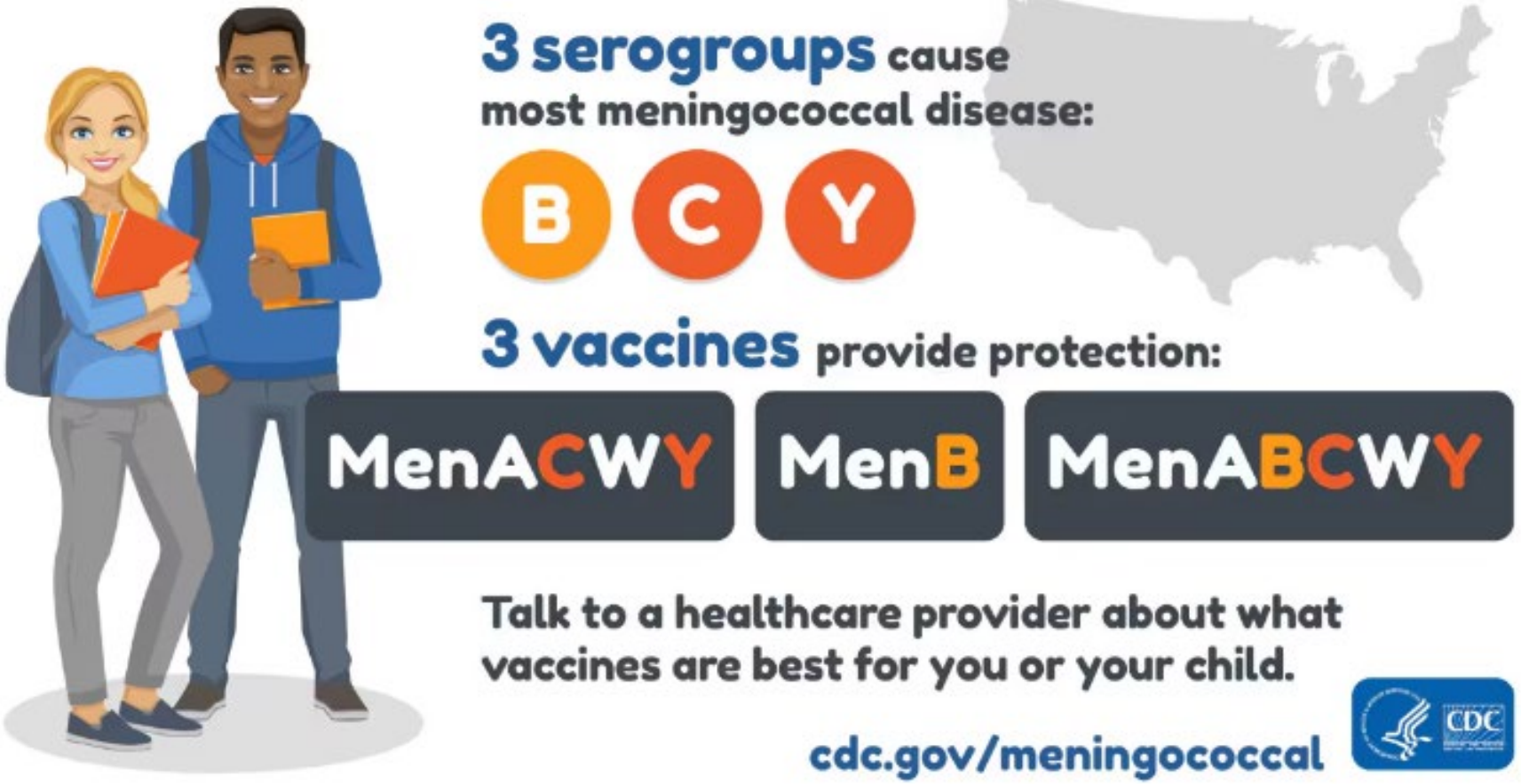
Pentavalent Meningococcal Vaccine: Penbraya

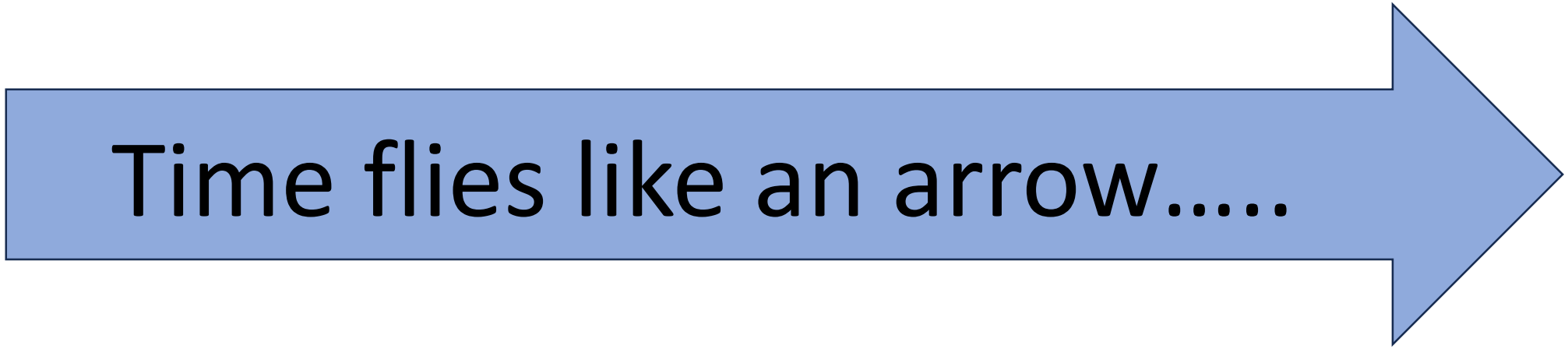
- Contains MCV4 and Trumenba
  - Protects against disease due to serogroups A, B, C, W-135, and Y
- FDA-approved and CDC-recommended in 2023
  - Noninferior to individual vaccines
- May be used when both vaccines are indicated at same visit (i.e. age 16)
  - Saves one injection
  - 30% cost reduction compared with 2 doses each of MCV4 and MenB

ACIP Meningococcal Vaccination Recommendations For Healthy Adolescents as of October 2023



Trumenba


3 serogroups cause
most meningococcal disease:
B C Y
3 vaccines provide protection:
MenACWY
MenB
MenABCWY
Talk to a healthcare provider about what
vaccines are best for you or your child.
cdc.gov/meningococcal
CDC


Time flies like an arrow……

Schedule Options Under Consideration

Option	ACWY Dose#1	ACWY Dose#2	B Dose#1	B Dose#2
Current recomm.	11–12 yrs	16 yrs	16 yrs – 23 years (preferred 16–18 yrs) SCDM	
1	11–12 yrs	16 yrs	16 yrs	17–18 yrs
2	11–12 yrs	16 yrs	16 yrs risk-based	17–18 yrs risk-based
3	No dose	16 yrs	16 yrs risk-based	17–18 yrs risk-based
4	15 yrs	17–18 yrs	17–18 yrs	17–18 yrs
5 (ACIP)	No dose	16 yrs	16 yrs	17–18 yrs

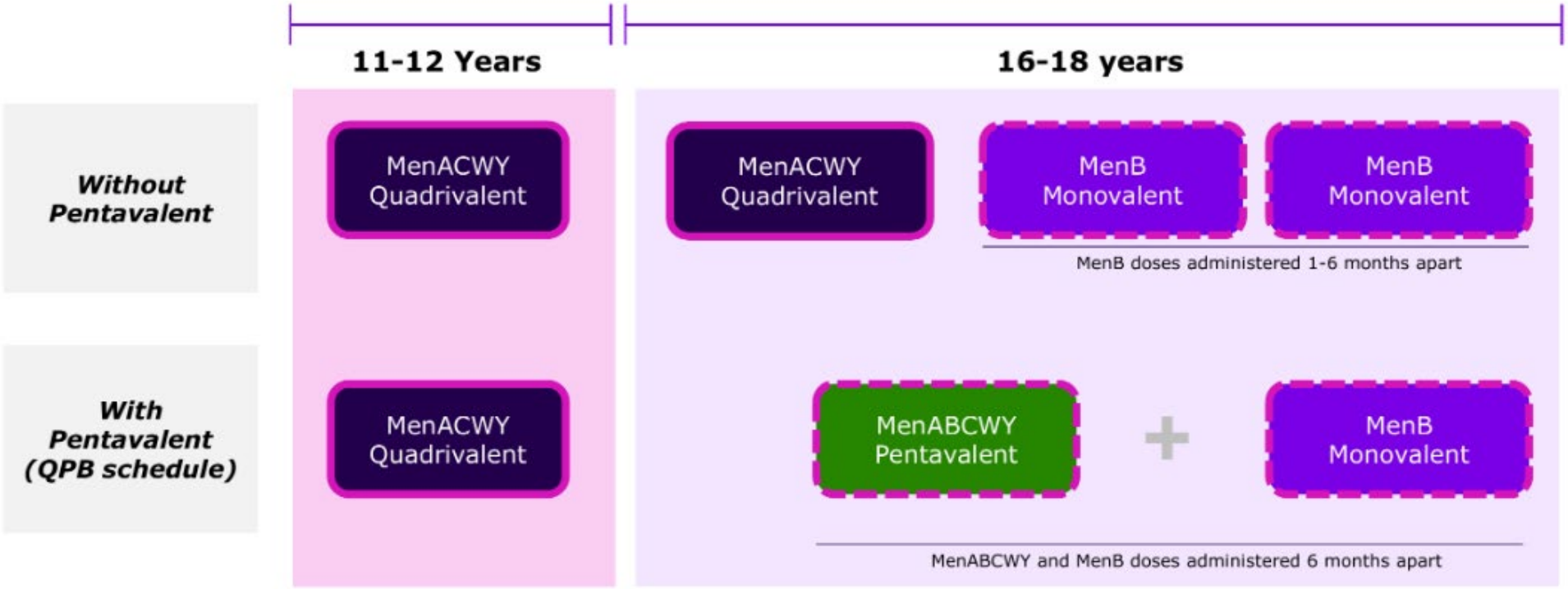
Proposed recommendations are for routine vaccination unless specified as "risk-based"; option numbers do not represent ordering of preference

Potential Risk Groups for MenB Vaccination

- College students (4-year students, 1st year students, on-campus residence)
- Boarding schools
- Congregate foster care
- Correctional or detention facilities
- Homeless or emergency shelters
- Institutions for persons with developmental disabilities
- Psychiatric institutions
- Residential treatment centers
- Religious academies
- Wilderness programs, summer camps
- Seasonal worker housing (including agricultural workers)
- College preparatory experiences
- Hotels, motels, and hostels

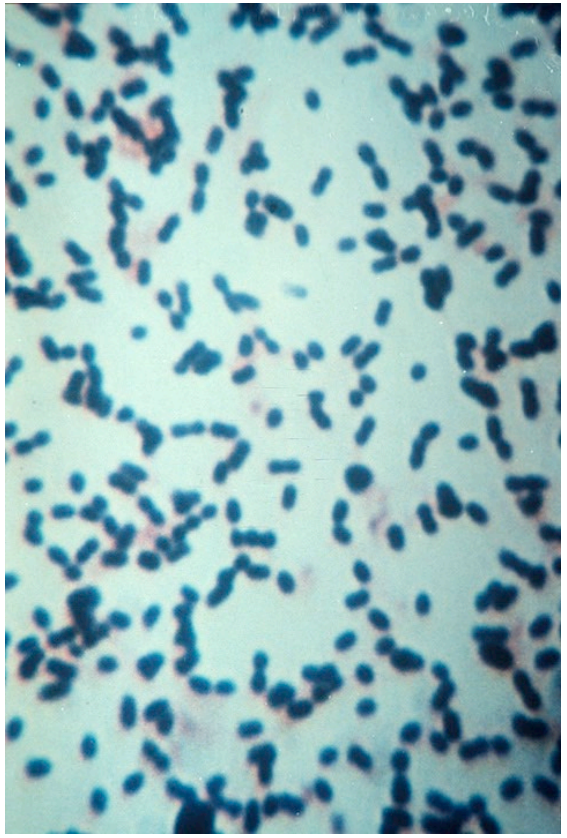
Also Coming Soon to a Refrigerator Near You

- GSK pentavalent vaccine
  - A, B, C, Y and W-135
  - FDA approval expected Feb. 2025



Streptococcus pneumoniae

- First isolated by Pasteur in 1881
- Encapsulated Gram-positive diplococci
- Capsular polysaccharides help determine pathogenicity
- Currently 100 serotypes identified
- Serotype prevalence varies by age and geography
- Prior to vaccines, the 7 most common serotypes accounted for 50% of disease
- Type-specific antibody protects against disease due to that serotype



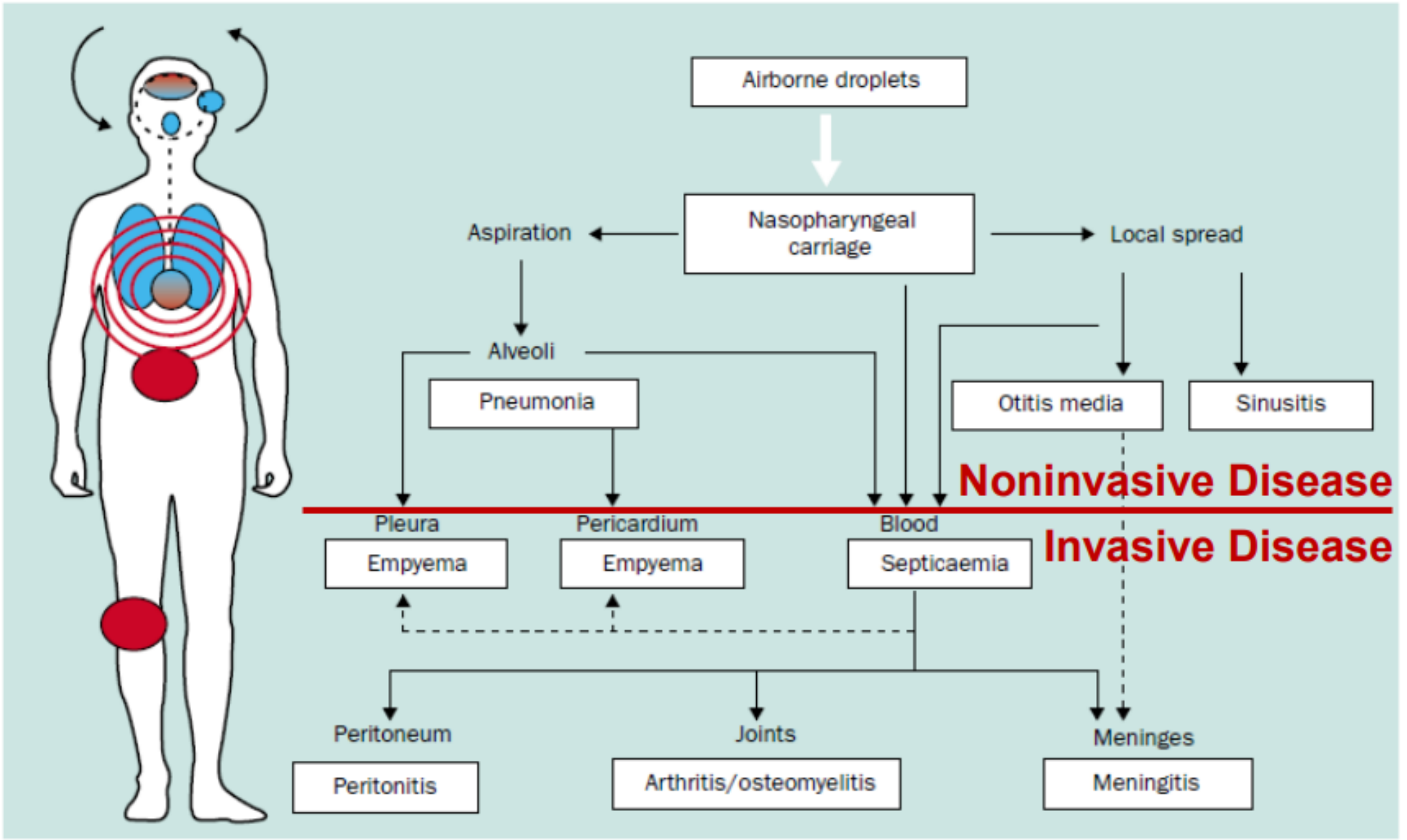
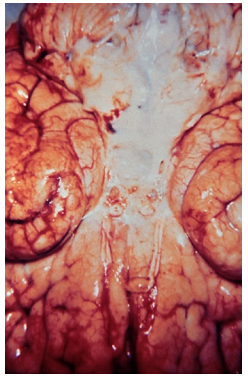


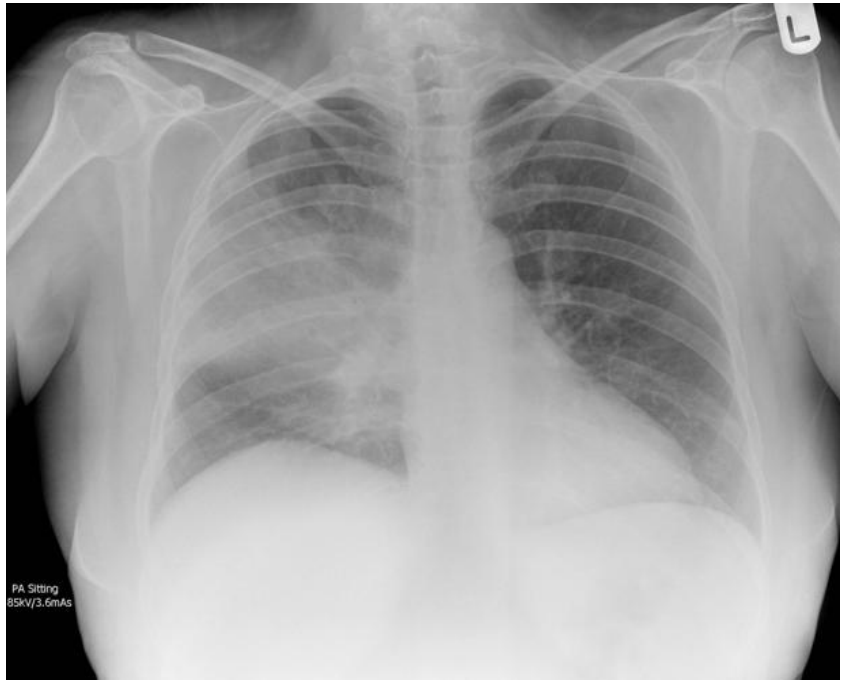
Figure 1. Pathogenic route for S pneumoniae infection. Redrawn from reference 2. Organs infected through the airborne and haematogenic routes are depicted in blue and red, respectively.

Bogaert, Lancet Infect Dis 2004;4:144-54

More frequent

Less frequent



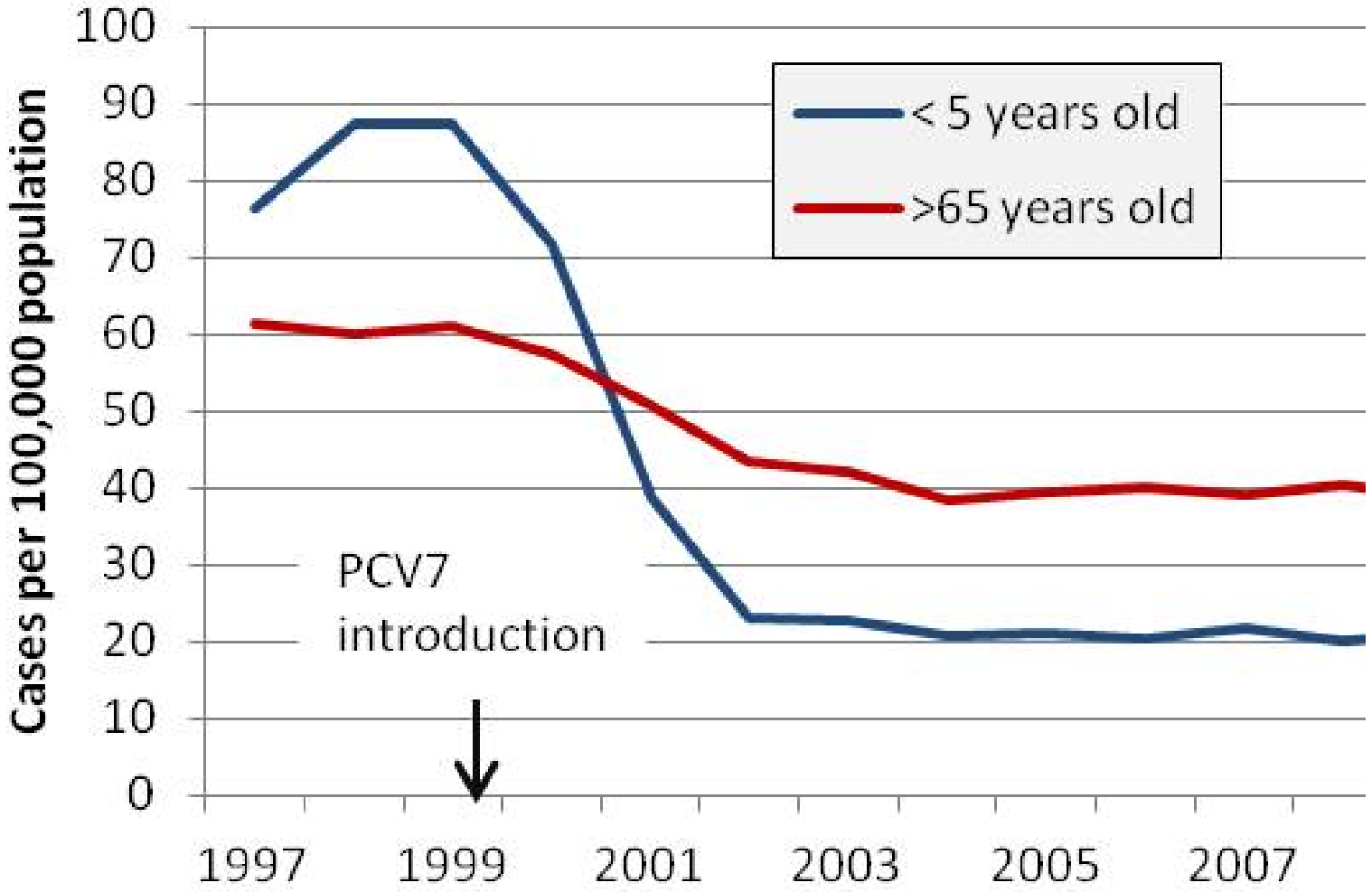


- Pneumococcal pneumonia causes 150,000 hospitalizations per year in U.S.
- > 20,000 deaths
  - Mostly in adults with risk factors

FDA-Approved Pneumococcal Vaccines

- PPSV14 1977 (Adults)
- PPSV23 (Pneumovax) 1983 (Mostly adults)
- PCV7 (Prevnar) 2000 (Children)

Prevalence of Invasive Pneumococcal Infections in U.S. Before and After PCV7



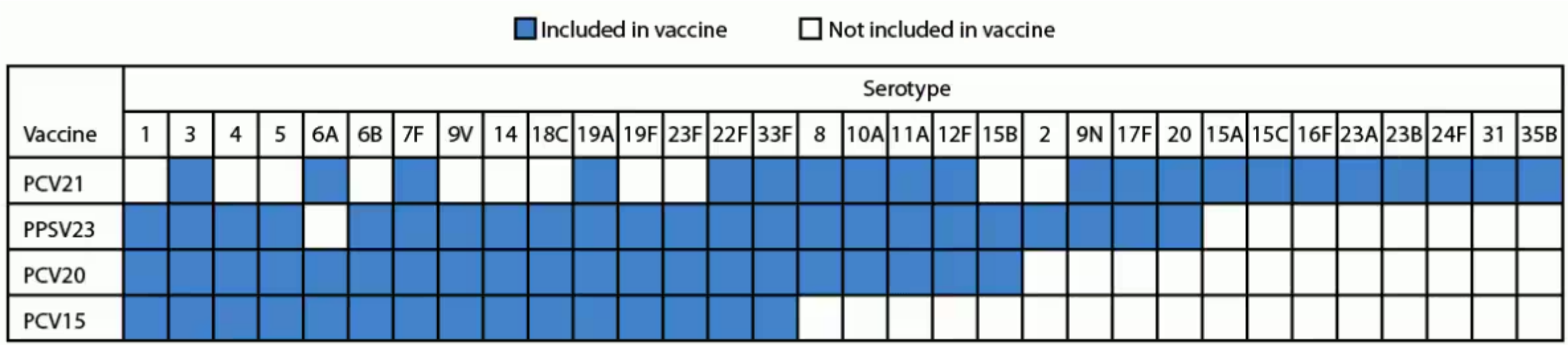
FDA-Approved Pneumococcal Vaccines

- PPSV-14 1977 (Adults)
- PPSV-23 (Pneumovax) 1983 (Mostly adults)
- PCV7 (Prevnar) 2000 (Children)
- PCV13 (Prevnar)
  - 2010 (Children)
  - 2012 (Adults with high-risk conditions)
  - 2014 (Adults ≥ 65 years)
- PCV15 (Vaxneuvance)
  - 2021 (Adults)
  - 2022 (Children)
- PCV20 (Prevnar)
  - 2021 (Adults)
  - 2023 (Children)
- PCV21 (Capvaxive)
  - 2024 (Adults)

Conjugate vaccines

- Capsular polysaccharides linked to protein carrier
- High quality immune response
- T-cell memory
- More robust immune response
  - Especially for children

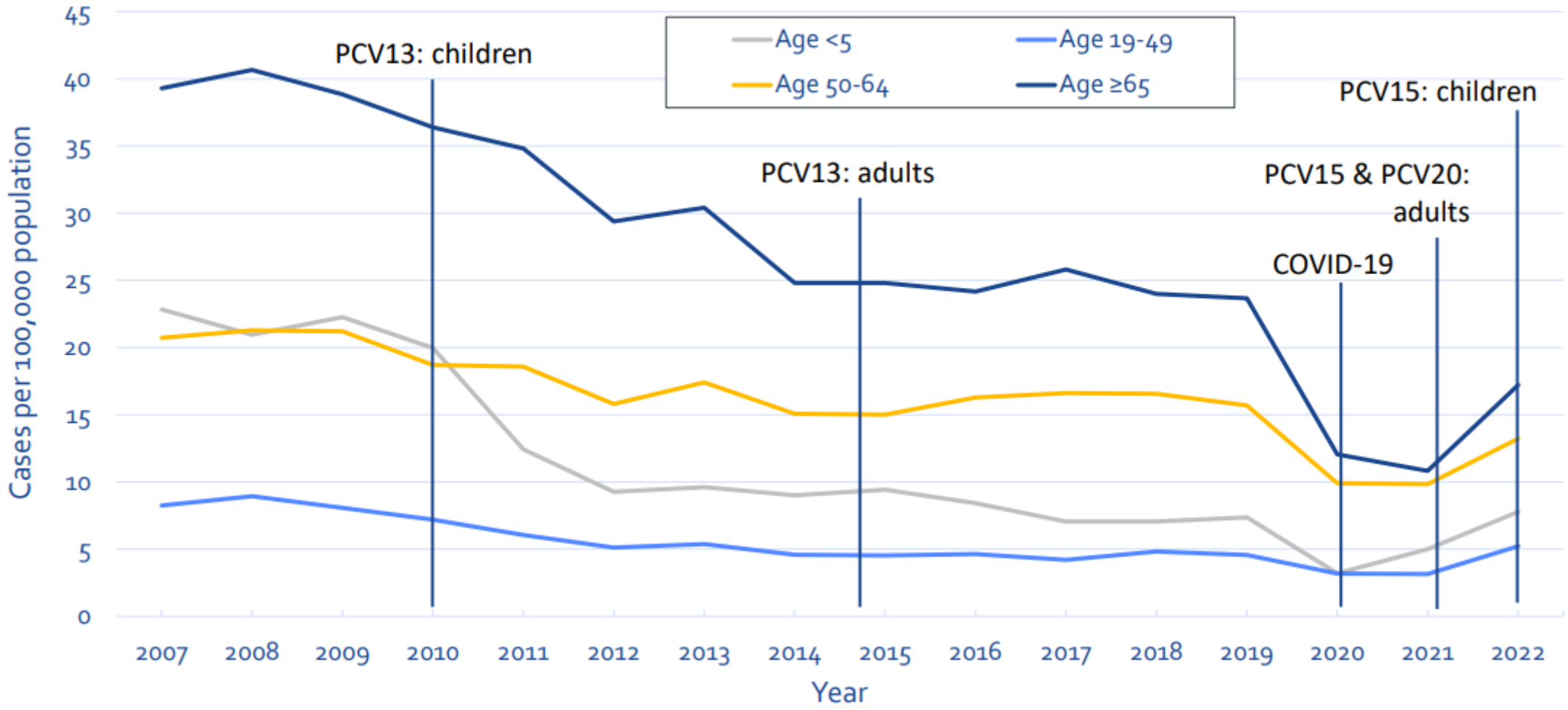
FIGURE. Serotypes*,† included in pneumococcal vaccines currently recommended for adults — United States, 2024



Vaccine	Serotype																												
	1	3	4	5	6A	6B	7F	9V	14	18C	19A	19F	23F	22F	33F	8	10A	11A	12F	15B	2	9N	17F	20	15A	15C	16F	23A	23B	24F	31	35B
PCV21		■			■		■				■			■	■	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■
PPSV23	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
PCV20	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■												
PCV15	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																	

Abbreviations: PCV = pneumococcal conjugate vaccine; PCV15 = 15-valent PCV; PCV20 = 20-valent PCV; PCV21 = 21-valent PCV; PPSV23 = 23-valent pneumococcal polysaccharide vaccine.

IPD Incidence, U.S.



Pneumococcal Vaccination for Adults: Improved and Simplified

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 71 / No. 4
January 28, 2022

Use of 15-Valent Pneumococcal Conjugate Vaccine and 20-Valent Pneumococcal Conjugate Vaccine Among U.S. Adults: Updated Recommendations of the Advisory Committee on Immunization Practices — United States, 2022

Miwako Kobayashi, MD[1]; Jennifer L. Farrar, MPH[1]; Ryan Gierke, MPH[1]; Amadea Britton, MD[1,2]; Lana Childs, MPH[3]; Andrew J. Leidner, PhD[1]; Doug Campos-Outcalt, MD[4]; Rebecca L. Morgan, PhD[5]; Sarah S. Long, MD[6]; H. Keipp Talbot, MD[7]; Katherine A. Poehling, MD[8]; Tamara Pilishvili, PhD[1]

Pneumococcal Vaccine for Adults Aged ≥19 Years: Recommendations of the Advisory Committee on Immunization Practices, United States, 2023

Miwako Kobayashi, MD[1]; Tamara Pilishvili, PhD[1]; Jennifer L. Farrar, MPH[1]; Andrew J. Leidner, PhD[1]; Ryan Gierke, MPH[1]; Namrata Prasad, PhD[1]; Pedro Moro, MD[2]; Doug Campos-Outcalt, MD[3]; Rebecca L. Morgan, PhD[4]; Sarah S. Long, MD[5]; Katherine A. Poehling, MD[6]; Adam L. Cohen, MD[1]

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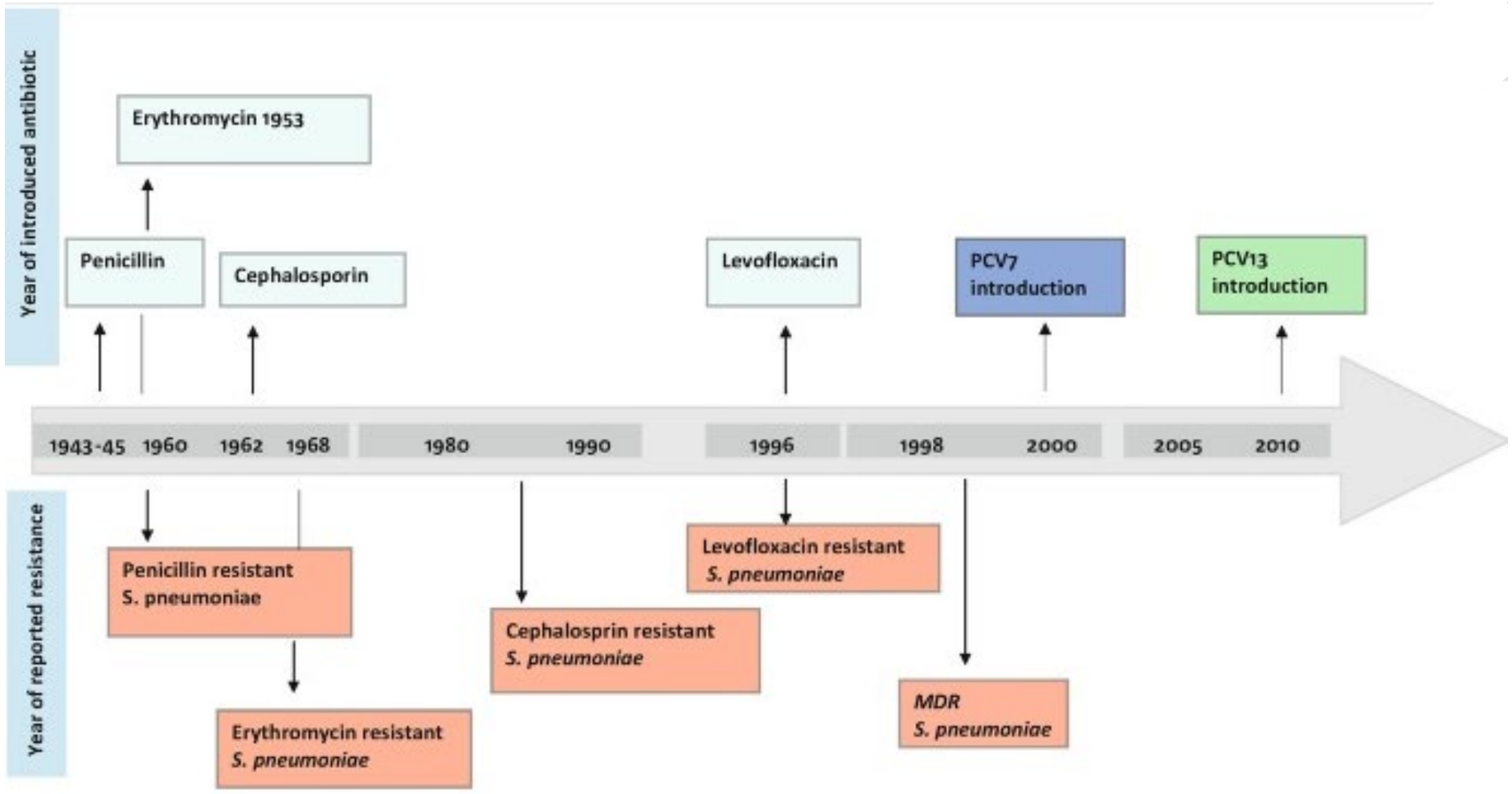
Immunization: Important Tool to Combat Antimicrobial Resistance in Pneumococci



Abbreviation: MDR (multidrug-resistant); PCV (pneumococcal conjugate vaccine)

From CDC, October 26, 2024

OCTOBER 26, 2024

Pneumococcal Vaccine Recommendations

KEY POINTS

- CDC recommends pneumococcal vaccination for children younger than 5 years and adults 50 years or older.
- CDC also recommends pneumococcal vaccination for children and adults at increased risk for pneumococcal disease.
- Follow the recommended immunization schedule to ensure that your patients get the pneumococcal vaccines that they need.

Infants and children

Routine vaccination

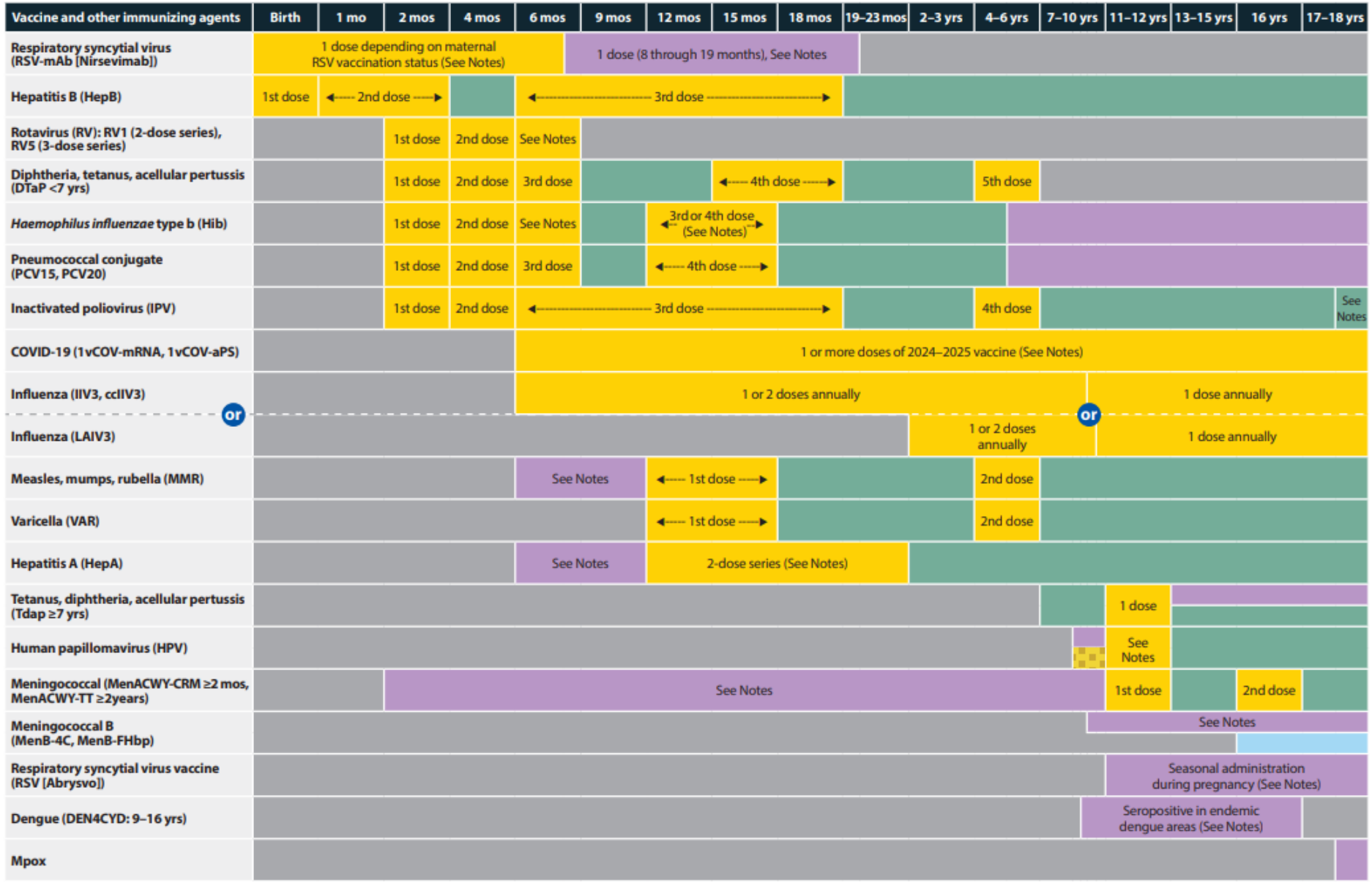
CDC recommends routine pneumococcal vaccination for all children younger than 5 years old.

Administer a 4-dose PCV series (PCV15 or PCV20), 1 dose at each of the following ages:

- 2 months
- 4 months
- 6 months
- 12 through 15 months

Table 1 Recommended Child and Adolescent Immunization Schedule for Ages 18 Years or Younger, United States, 2025

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars.
To determine minimum intervals between doses, see the catch-up schedule (Table 2).



Adults 50 years or older

Routine vaccination

Administer PCV15, PCV20, or PCV21 for all adults 50 years or older

- Who have never received any pneumococcal conjugate vaccine
- Whose previous vaccination history is unknown

PCV15: Additional vaccination needed

If PCV15 is used, administer a dose of PPSV23 [A] one year later, if needed [B].
Their pneumococcal vaccinations are complete.

The minimum interval is 8 weeks and can be considered in adults with:

- An immunocompromising condition
- A cochlear implant
- A cerebrospinal fluid leak

Final recommendation of the WG

1. **Lower the age-based recommendation for all PCVs to age ≥50 years**
   - Majority supported this option after targeted discussion of the policy question
   - Future booster dose may be needed to avoid increased pneumococcal disease burden in older adults
   - Key uncertainties remain:
     - Indirect effects from new pediatric pneumococcal vaccines
     - Duration of protection from adult vaccination
     - Impact of new higher-valency vaccines for adults

Key factors in the WG recommendations

1. Health equity: Higher pneumococcal disease rates in Black/African American adults, with earlier peak

2. Risk prevalence: 33–54% of adults aged 50–64 years already with indication for risk-based pneumococcal vaccination*

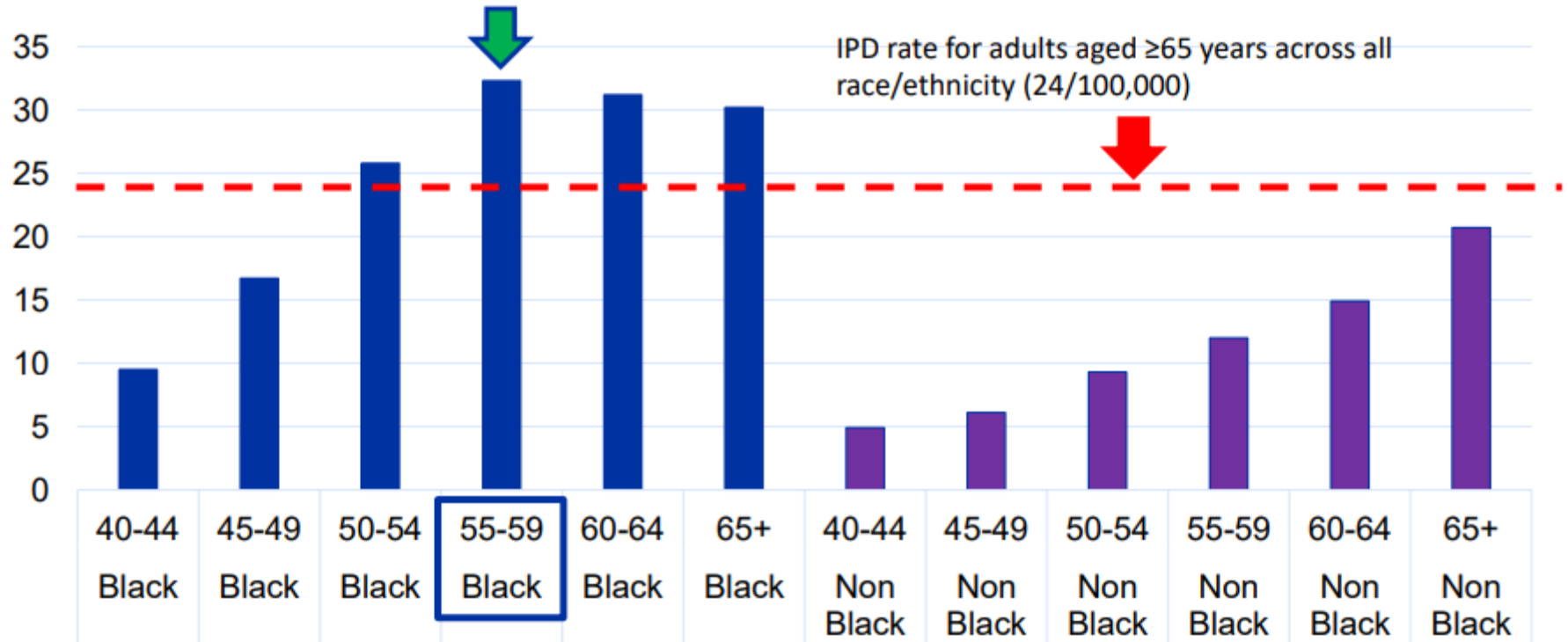
3. Vaccine coverage: Age-based recommendation likely to improve uptake vs. risk-based recommendation

4. Simplicity: Easier to implement uniform recommendation across all PCVs

5. Economic consideration: PCV21 at age 50 (and 65 years) had lower cost/QALY gained than PCV20, while both PCV21 and PCV20 improved health outcomes

6. Serotype coverage: the serotype compositions of PCV20 and PCV21 are quite different

IPD rates (any pneumococcal serotype) in Black adults peak at a younger age compared with Non-Black adults



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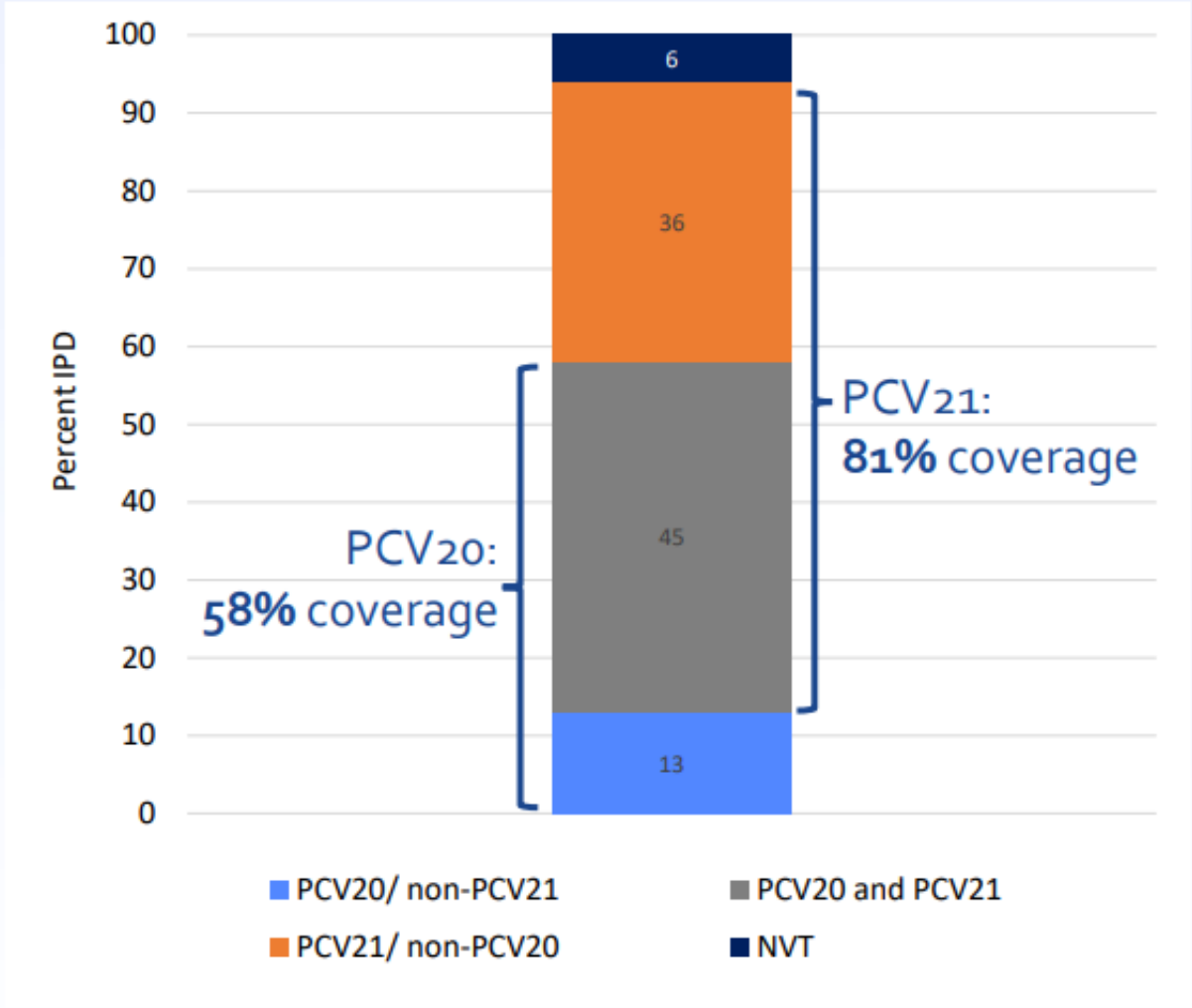
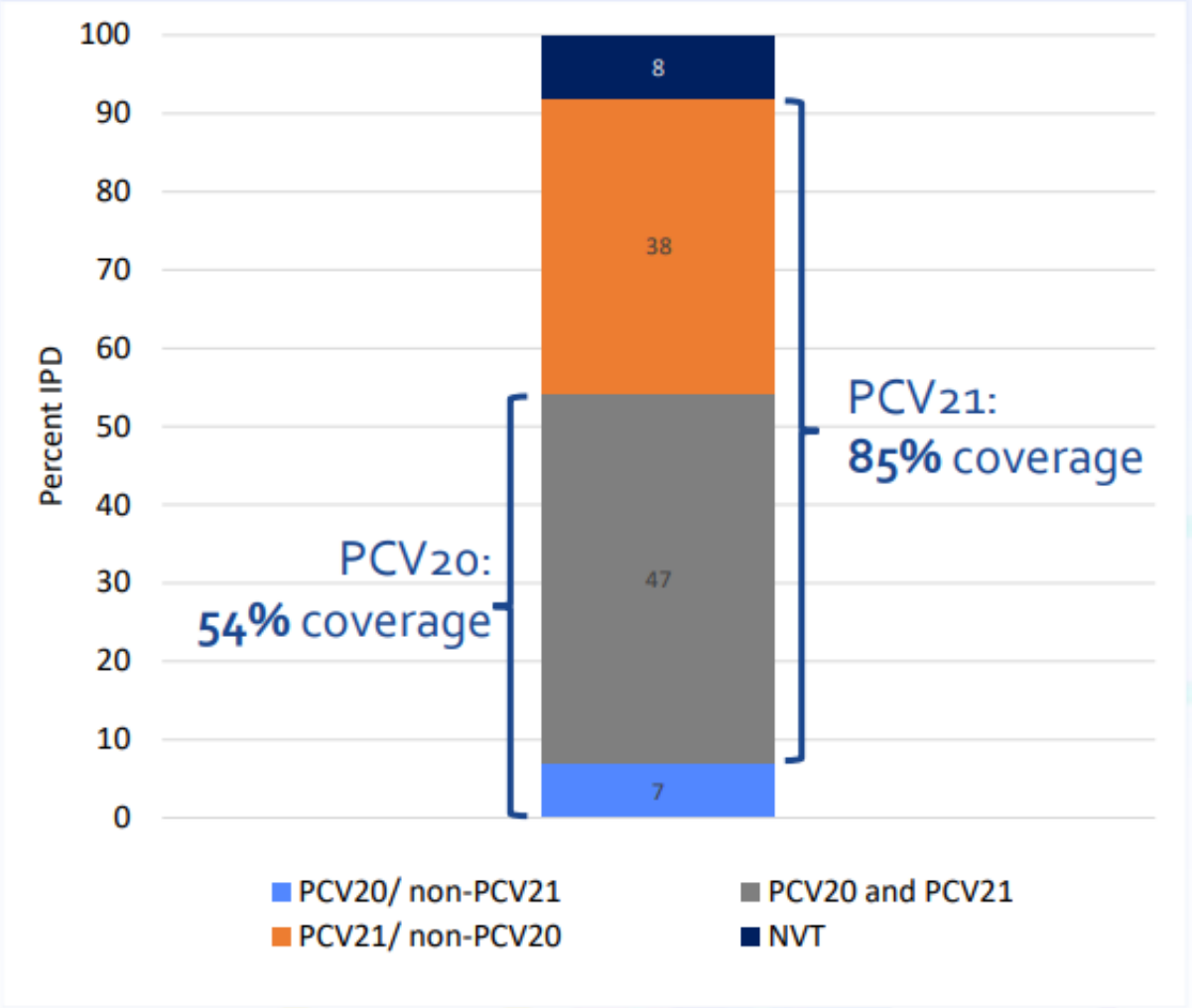
Proportion of IPD by vaccine-type among adults with a pneumococcal vaccine indication, 2018 – 2022

19-64 years old (*with a risk-based indication*)

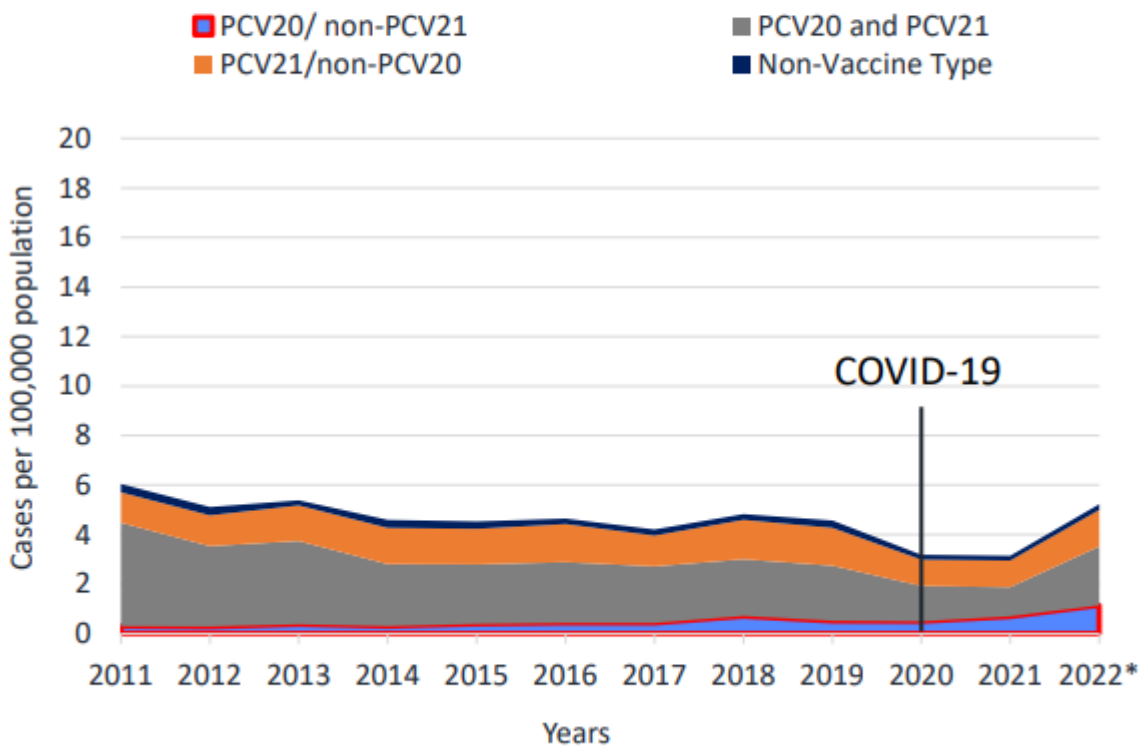


≥65 years old

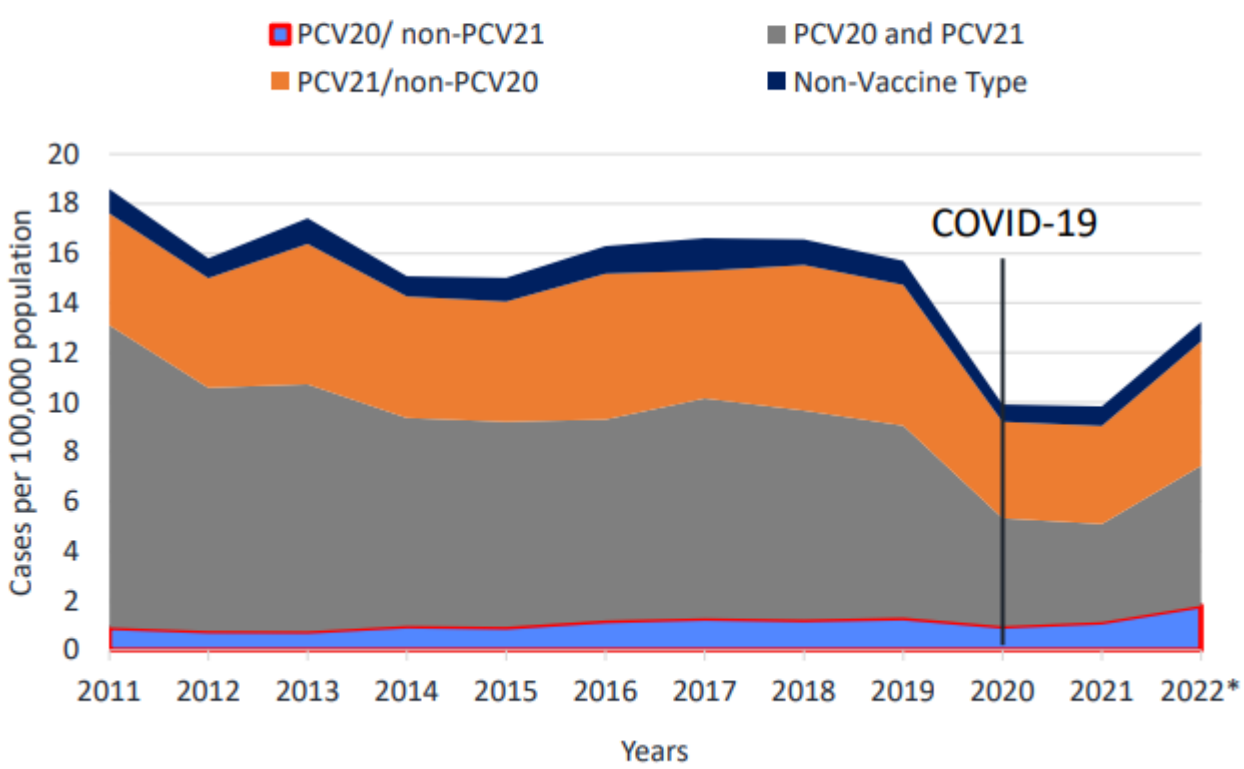


IPD incidence rates among adults 19-64 years old, by vaccine type, 2011 – 2022

19-49 years old



50-64 years old

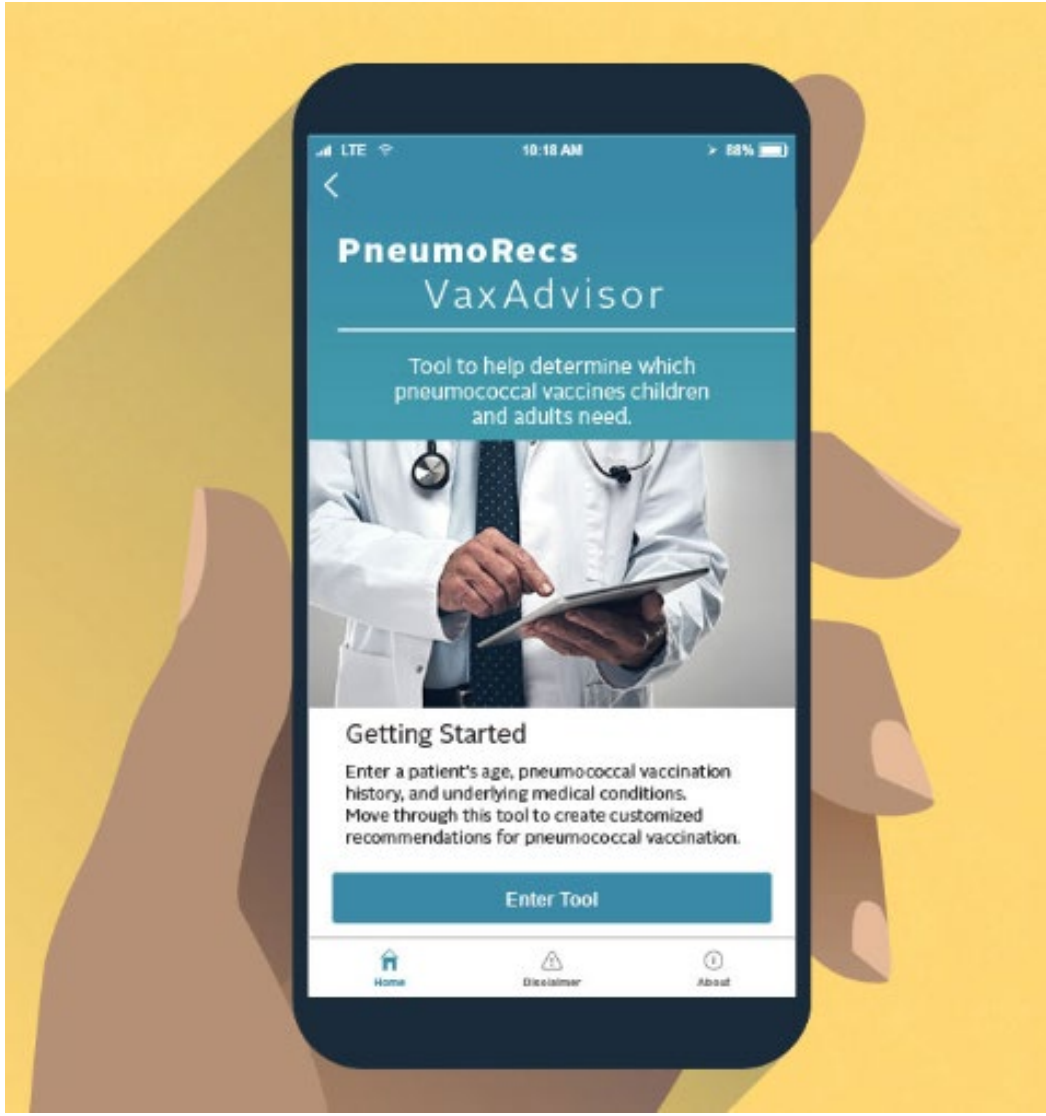


Guidance From MMWR / PneumoRecs VaxAdvisor

- “PCV 21 contains eight new pneumococcal serotypes not included in PCV15, PCV20 or PPSV23. However, PCV21 doesn’t contain certain pneumococcal serotypes (e.g. serotype 4) included in other pneumococcal vaccines.”
- “In certain adult populations in the Western U.S. with data (Alaska, Colorado, New Mexico, Navajo nation, and Oregon) serotype 4 has caused high percentages (i.e., ≥ 30%) of invasive pneumococcal disease (IPD). We currently do not know if this is seen in other parts of the western United States that do not routinely monitor IPD data.”
- “Typically, individuals living within these geographic areas who develop serotype 4 IPD are adults under 65 years with specific underlying conditions or risk factors such as alcoholism, chronic lung disease, cigarette smoking, homelessness, and injection drug use. Importantly, these individuals usually have not received a PCV containing serotype 4. In such populations, other recommended pneumococcal vaccines (e.g., PCV20 alone or both PCV15 and PPSV23) are expected to provide broader serotype coverage against locally circulating strains compared to PCV21 alone.”

TABLE. Clinical guidance for implementing pneumococcal vaccine recommendations for adults aged ≥19 years — United States, 2024

Risk or age group	Vaccine received previously	Options for vaccination
Adults aged ≥65 years	None or PCV7 only at any age	A single dose of PCV21, PCV20, or PCV15. If PCV15 is administered, a single dose of PPSV23* should be administered ≥1 year after the PCV15 dose. A minimum interval of 8 weeks can be considered if PCV15 is used in adults with an immunocompromising condition,† cochlear implant, or CSF leak.
	PPSV23 only	A single dose of PCV21, PCV20, or PCV15 ≥1 year after the last PPSV23 dose.
	PCV13 only	A single dose of PCV21, PCV20, or PPSV23≥1 year after the PCV13 dose. When PPSV23 is used for adults with an immunocompromising condition,† cochlear implant, or CSF leak, administer PPSV23 ≥8 weeks after the PCV13 dose.
	PCV13 at any age and PPSV23 at age <65 years	A single dose of PCV21, PCV20, or PPSV23. If PCV21 or PCV20 is used, it should be administered ≥5 years after the last pneumococcal vaccine dose. If PPSV23 is used, it should be administered ≥1 year after the PCV13 dose (or ≥8 weeks since the PCV13 dose for adults with an immunocompromising condition,† cochlear implant, or CSF leak) and ≥5 years after the previous PPSV23 dose.
	PCV13 at any age and PPSV23 at age ≥65 years	Shared clinical decision-making is recommended regarding administration of either a single dose of PCV21 or PCV20 for any adult aged ≥65 years who has completed the recommended vaccination series with both PCV13 and PPSV23 (i.e., PPSV23 administered at age ≥65 years) but PCV21, PCV20 or PCV15 not yet received. If a decision to administer PCV21 or PCV20 is made, a single dose is recommended ≥5 years after the last pneumococcal vaccine dose.
Adults aged 19–64 years with an immunocompromising condition,† a CSF leak, or a cochlear implant	None or PCV7 only at any age	A single dose of PCV21, PCV20, or PCV15. If PCV15 is used, administer a single dose of PPSV23* ≥8 weeks after the PCV15 dose.
	PPSV23 only	A single dose of PCV21, PCV20, or PCV15 ≥1 year after the last PPSV23 dose.
	PCV13 only	A single dose of PCV21, PCV20, or PPSV23. If PCV21 or PCV20 is used, it should be administered ≥1 year after the PCV13 dose. If PPSV23 is used, administer PPSV23 ≥8 weeks after the PCV13 dose. When PPSV23 is used instead of PCV21 or PCV20 for these adults, a single dose of PCV21, PCV20 or PPSV23 dose is recommended ≥5 years after the first PPSV23 dose.
	PCV13 and 1 dose of PPSV23	A single dose of PCV21 or PCV20, or ≥1 dose of PPSV23. If PCV21 or PCV20 is used, it should be administered ≥5 years after the last pneumococcal vaccine dose. When a second PPSV23 dose is used instead of PCV21 or PCV20, it should be administered ≥8 weeks after the PCV13 dose and ≥5 years after the first PPSV23 dose. The pneumococcal vaccination recommendations should be reviewed again when the person reaches age 65 years. If PCV21 or PCV20 is used in place of any dose of PPSV23, the series is complete, and it need not be followed by additional pneumococcal vaccine doses.
	PCV13 and 2 doses of PPSV23	The pneumococcal vaccination recommendations should be reviewed again when the person turns age 65 years. Alternatively, a single dose of either PCV21 or PCV20 should be administered ≥5 years after the last pneumococcal vaccine dose. If PCV21 or PCV20 is used, the series is complete, and it need not be followed by additional pneumococcal vaccine doses.
Adults aged 19–64 years with chronic medical conditions§	None or PCV7 only at any age	A single dose of PCV21, PCV20, or PCV15. If PCV15 is administered, a single dose of PPSV23* should be administered ≥1 year after the PCV15 dose.
	PPSV23 only	A single dose of PCV21, PCV20, or PCV15 ≥1 year after the last PPSV23 dose.
	PCV13 only	A single dose of PCV21, PCV20, or PPSV23 ≥1 year after the PCV13 dose.
	PCV13 and 1 dose of PPSV23	The pneumococcal vaccination recommendations should be reviewed again when the person reaches age 65 years.



Adults 19–49 years old with chronic health conditions
Complete pneumococcal vaccine schedules

Prior vaccines	Option A	Option B
None*	**PCV20 or PCV21**	**PCV15** → ≥1 year → **PPSV23**[¶]
PPSV23 only	≥1 year → **PCV20 or PCV21**	≥1 year → **PCV15**
PCV13[†] **only**	≥1 year → **PCV20 or PCV21**	NO OPTION B
PCV13[†] and **PPSV23**	**No vaccines** are recommended at this time. Review pneumococcal vaccine recommendations again when your patient turns 50 years old.	
Chronic health conditions	• Alcoholism • Chronic heart disease, including congestive heart failure and cardiomyopathies • Chronic liver disease	• Chronic lung disease, including chronic obstructive pulmonary disease, emphysema, and asthma • Cigarette smoking • Diabetes mellitus

* Also applies to people who received PCV7 at any age and no other pneumococcal vaccines
¶ If PPSV23 is not available, PCV20 or PCV21 may be used
† Adults with chronic medical conditions were previously not recommended to receive PCV13

Adults 19–49 years old with a cochlear implant or cerebrospinal fluid leak
Complete pneumococcal vaccine schedules

Prior vaccines	Option A	Option B
None*	**PCV20 or PCV21**	**PCV15** → ≥8 weeks → **PPSV23¶**
PPSV23 only	≥1 year → **PCV20 or PCV21**	≥1 year → **PCV15**
PCV13 only	≥1 year → **PCV20 or PCV21**	NO OPTION B
PCV13 and **1 dose of PPSV23**	≥5 years → **PCV20 or PCV21**	**No vaccines** recommended at this time. Review pneumococcal vaccine recommendations again when your patient turns 50 years old.

* Also applies to people who received PCV7 at any age and no other pneumococcal vaccines

¶ If PPSV23 is not available, PCV20 or PCV21 may be used

Adults 19–49 years old with specified immunocompromising conditions
Complete pneumococcal vaccine schedules

Prior vaccines	Option A	Option B
None*	**PCV20 or PCV21**	**PCV15** → ≥8 weeks → **PPSV23**[†]
PPSV23 only	≥1 year → **PCV20 or PCV21**	≥1 year → **PCV15**
PCV13 only	≥1 year → **PCV20 or PCV21**	NO OPTION B
PCV13 and **1 dose of PPSV23**	≥5 years → **PCV20 or PCV21**	NO OPTION B
PCV13 and **2 doses of PPSV23**	≥5 years → **PCV20 or PCV21**	**No vaccines** recommended at this time. Review pneumococcal vaccine recommendations again when your patient turns 50 years old.
Immunocompromising conditions	• Chronic renal failure • Congenital or acquired asplenia • Congenital or acquired immunodeficiency[§] • Generalized malignancy • HIV infection • Hodgkin disease • Iatrogenic immunosuppression[¶] • Leukemia • Lymphoma • Multiple myeloma • Nephrotic syndrome • Sickle cell disease/other hemoglobinopathies • Solid organ transplant	

* Also applies to people who received PCV7 at any age and no other pneumococcal vaccines
[¶] If PPSV23 is not available, PCV20 or PCV21 may be used
[†] The minimum interval for PPSV23 is ≥8 weeks since last PCV13 dose and ≥5 years since last PPSV23 dose
[§] Includes B- (humoral) or T-lymphocyte deficiency, complement deficiencies (particularly C1, C2, C3, and C4 deficiencies), and phagocytic disorders (excluding chronic granulomatous disease)
[¶] Includes diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy

Adults ≥50 years old
Complete pneumococcal vaccine schedules

Prior vaccines	Option A	Option B
None*	**PCV20 or PCV21**	**PCV15** → ≥1 year† → **PPSV23¶**
PPSV23 only at any age	≥1 year → **PCV20 or PCV21**	≥1 year → **PCV15**
PCV13 only at any age	≥1 year → **PCV20 or PCV21**	NO OPTION B
PCV13 at any age & **PPSV23** at <65 yrs	≥5 years → **PCV20 or PCV21**	

* Also applies to people who received PCV7 at any age and no other pneumococcal vaccines
¶ If PPSV23 is not available, PCV20 or PCV21 may be used
† Consider minimum interval (8 weeks) for adults with an immunocompromising condition, cochlear implant, or cerebrospinal fluid leak (CSF) leak
§ For adults with an immunocompromising condition, cochlear implant, or CSF leak, the minimum interval for PPSV23 is ≥8 weeks since last PCV13 dose and ≥5 years since last PPSV23 dose; for others, the minimum interval for PPSV23 is ≥1 year since last PCV13 dose and ≥5 years since last PPSV23 dose

Shared clinical decision-making for those who already completed the series with PCV13 and PPSV23

Prior vaccines	Shared clinical decision-making option for adults ≥65 years old
Complete series: PCV13 at any age & **PPSV23** at ≥65 yrs	≥5 years → **PCV20 or PCV21** — Together, with the patient, vaccine providers **may choose** to administer PCV20 or PCV21 to adults ≥65 years old who have already received PCV13 (but not PCV15, PCV20, or PCV21) at any age and PPSV23 at or after the age of 65 years old.

Shared Clinical Decision-Making

PCV20 or PCV21 Vaccination for Adults 65 Years or Older

Adults 65 years of age or older have the option to receive supplemental PCV20 or PCV21 (not both) if they previously completed the pneumococcal vaccine series with both PCV13 and PPSV23 and meet the following criteria:

- Previously received one dose of PCV13 (but not PCV15, PCV20, or PCV21) at any age, and
- Previously received all recommended doses of PPSV23 (including 1 dose of PPSV23 at or after 65 years of age)

The determination to administer PCV20 or PCV21 is based on a shared clinical decision-making (SCDM) process between a patient and their health care provider. SCDM recommendations are optional and informed by the characteristics, values, and preferences of the patient, and the clinical discretion of the health care provider.

If you discuss supplemental PCV20 or PCV21 vaccination with a patient 65 years of age or older who previously completed the pneumococcal vaccine series with both PCV13 and PPSV23:

Remember:

PCV20 or PCV21 is not routinely recommended for these individuals as their risk of disease is lower due to prior vaccinations. Their remaining risk depends on:

- Their risk of exposure to serotypes contained in PCV20 or PCV21
- The presence of underlying medical conditions or other risk factors that increase the risk of developing severe disease
- Time since last pneumococcal vaccination (i.e., 5 or more years)

Consider:

Increased risk of exposure to PCV20 or PCV21 serotypes may occur among people who are living in:

- Nursing homes or other long-term care facilities
- Areas with low pediatric pneumococcal conjugate vaccine uptake

If exposed, people with one or more of the following health issues are at increased risk of developing severe pneumococcal disease:

- Immunocompromising condition*
- Cochlear implant
- Cerebrospinal fluid leak
- One or more of these chronic medical conditions: alcoholism; chronic heart, liver, or lung disease; cigarette smoking; or diabetes

Protection against disease from both PCV13 and PPSV23 is expected to decrease over time.

If you vaccinate:

If you and your patient decide PCV20 or PCV21 is appropriate, give one dose of PCV20 or PCV21 (no preference) at least 5 years after the patient's last pneumococcal vaccine dose.

PCV20 and PCV21 should not be administered to a patient who has had a severe allergic reaction (e.g., anaphylaxis) to a:

- Previous dose of PCV
- Component of the vaccine
- Vaccine containing diphtheria toxoid
- Component of a vaccine containing diphtheria-toxoid

*Chronic renal failure, nephrotic syndrome, immunodeficiency, iatrogenic immunosuppression, generalized malignancy, HIV, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplant, congenital or acquired asplenia, sickle cell disease or other hemoglobinopathies.

CDC

Additional Information:

CDC Adult Immunization Schedule by Age:
www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

CDC PneumoRecs VaxAdvisor App for Vaccine Providers:
www.cdc.gov/pneumococcal/hcp/vaccine-recommendations/app.html

CDC Pneumococcal Vaccine Recommendations:
www.cdc.gov/pneumococcal/hcp/vaccine-recommendations/index.html

ACIP Contraindications Guidelines for Immunization:
www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html

STANDING ORDERS FOR
Administering Pneumococcal Vaccines to Adults

Purpose

To reduce morbidity and mortality from pneumococcal disease by vaccinating all adults who meet the criteria established by the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices.

Policy

Where allowed by state law, standing orders enable eligible nurses, pharmacists, and other healthcare professionals to assess the need for vaccination and to vaccinate adults who meet any of the criteria below.

Procedure

1 **Assess Adults for Need of Vaccination** against *Streptococcus pneumoniae* (pneumococcus) infection according to the following criteria:

Routine Pneumococcal Vaccination

Age 50 years or older

Risk-Based Pneumococcal Vaccination

Age 19 through 49 years with any of the following conditions:

- **Non-immunocompromising chronic health conditions:** Alcoholism, chronic heart disease[1], chronic liver disease, chronic lung disease[2], cigarette smoking, diabetes mellitus, cochlear implant, cerebrospinal fluid (CSF) leak
- **Immunocompromising conditions:** Chronic renal failure, congenital or acquired asplenia, congenital or acquired immunodeficiencies[3], generalized malignancy, HIV infection, Hodgkin disease, iatrogenic immunosuppression[4], leukemia, lymphoma, multiple myeloma, nephrotic syndrome, sickle cell disease and other hemoglobinopathies, solid organ transplant

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[1] Chronic heart disease includes congestive heart failure and cardiomyopathies

[2] Chronic lung disease includes chronic obstructive pulmonary disease, emphysema, and asthma

[3] Congenital or acquired immunodeficiency include B- (humoral) or T-lymphocyte deficiency, complement deficiencies (particularly C1, C2, C3, and C4 deficiencies), and phagocytic disorders (excluding chronic granulomatous disease)

[4] Iatrogenic immunosuppression includes diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids, and radiation therapy

2 **Screen for Contraindications and Precautions**

Contraindications

Do not give pneumococcal conjugate vaccine (PCV15 [Vaxneuvance] or PCV21 [Capvaxive], Merck; PCV20, Prevnar20, Pfizer) or pneumococcal polysaccharide vaccine (PPSV23, Pneumovax 23, Merck) to a person who has experienced a serious systemic or anaphylactic reaction to a prior dose of the vaccine or to any of its components. For a list of vaccine components, refer to the manufacturer's package insert (www.immunize.org/fda) or go to www.fda.gov/vaccines-blood-biologics/vaccines/vaccines-licensed-use-united-states).

Precautions

Moderate or severe acute illness with or without fever

CONTINUED ON THE NEXT PAGE ▶

Risk-based recommendations

In certain situations, children 2 through 18 years of age may need additional pneumococcal vaccine doses. In addition, adults younger than age 50 years of age may be recommended to receive pneumococcal vaccines.

Risk-based indications for pneumococcal vaccination vary by patient age. The type of vaccine and number of doses can also vary by age and vaccination history.

Risk Factors for Pneumococcal Infections: Both Adults and Children

- CSF leak
- Chronic liver disease
- Cochlear implant
- Immunocompromising conditions
  - Asplenia / splenic dysfunction
  - Congenital or acquired immune deficiency
  - Immunosuppressive drugs or radiation therapy
  - HIV infection
  - Sickle cell disease / hemoglobinopathy
- Diabetes mellitus

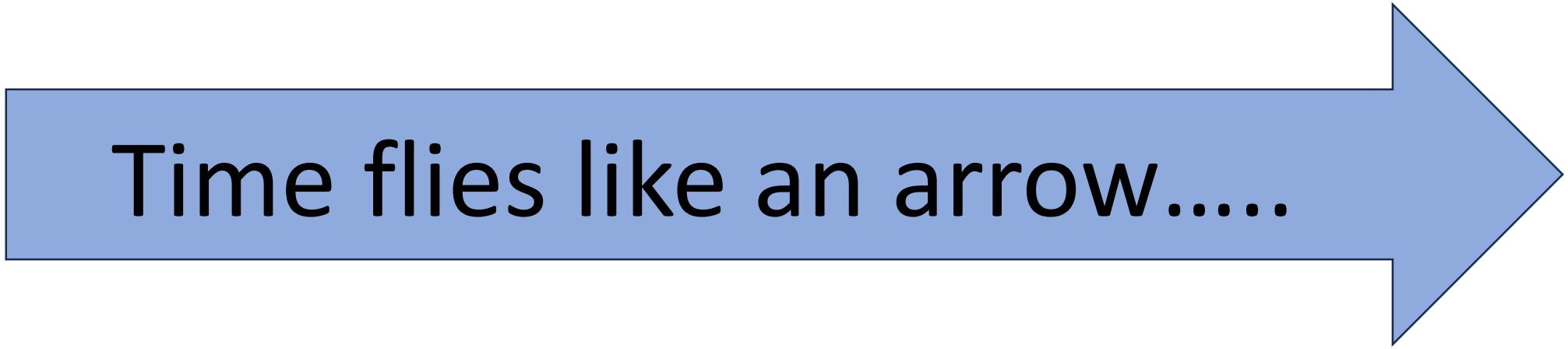
Risk Factors for Pneumococcal Infection

Children

- Heart disease
  - Particularly cyanotic or heart failure
- Chronic kidney disease
- Chronic lung disease
  - Including moderate persistent or severe persistent asthma

Adults

- Alcoholism or cigarette smoking
- Chronic heart disease
  - CHF and cardiomyopathies
  - *Not* isolated hypertension
- Chronic lung disease
- Chronic renal failure or nephrotic syndrome


Time flies like an arrow……

New Adult Pneumococcal Vaccines in Advanced Stages of Development

	1	3	4	5	6A	6B	7F	9V	14	18C	19A	19F	23F	22F	33F	8	10A	11A	12F	15B	2	9N	17F	20	15A	15C	16F	23A	23B	24F	31	35B	7C
PCV15																																	
PCV20																																	
PPSV23																																	
PCV21																																	
Pn-MAPS24v																																	
VAX-24																																	
VAX-31																																	

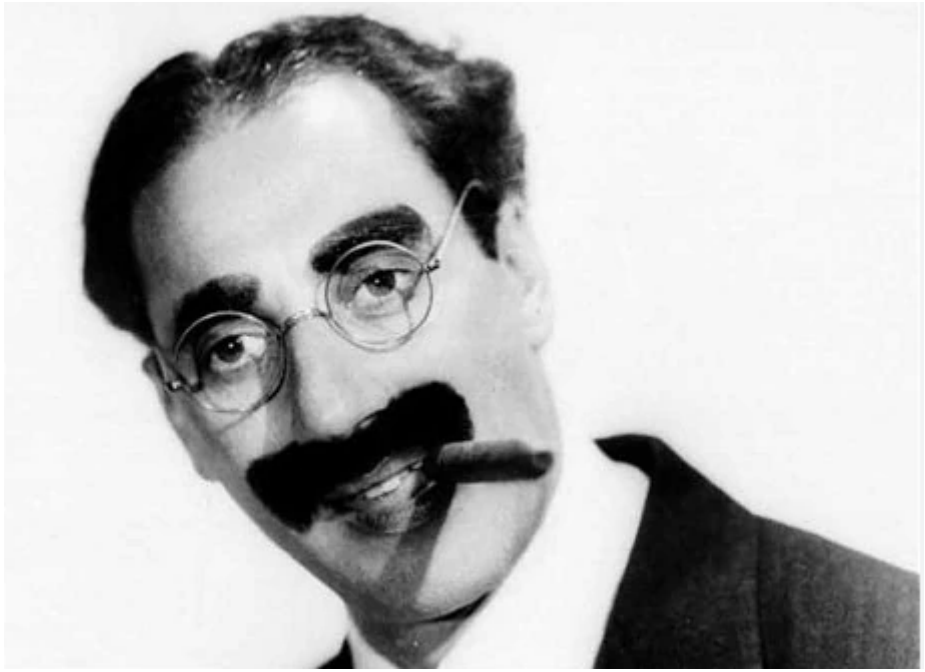
24-valent pneumococcal vaccines:

- **Pn-MAPS24v (GSK):** Completed phase 1/2 study for adults; Breakthrough Therapy Designation granted and next steps in preparation; undergoing phase 2 studies in infants[1]
- **VAX-24 (Vaxcyte):** Completed enrollment for phase 2 studies in infants[2]; topline results anticipated **in 2025**

31-valent pneumococcal vaccine (VAX-31, Vaxcyte):

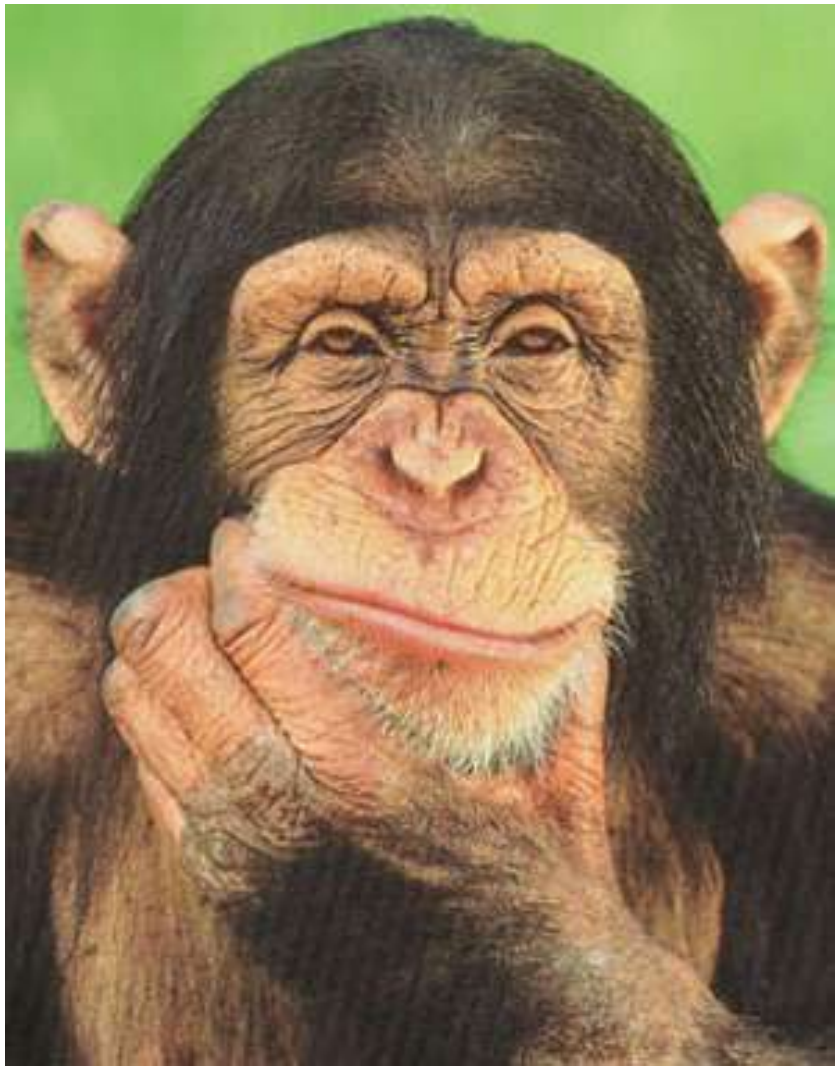
- Reported topline results of phase 1/2 study in adults aged ≥50 years[3]; plan to initiate phase 3 pivotal non-inferiority study by **mid-2025**
- Plans to initiate VAX-31 Infant Phase 2 Study in **Q1 of 2025** following IND submission and clearance

Time flies like an arrow…..



“Fruit flies like a banana.”

- Groucho Marx



PCV21 is unique from other PCVs in that it was developed to target adult disease

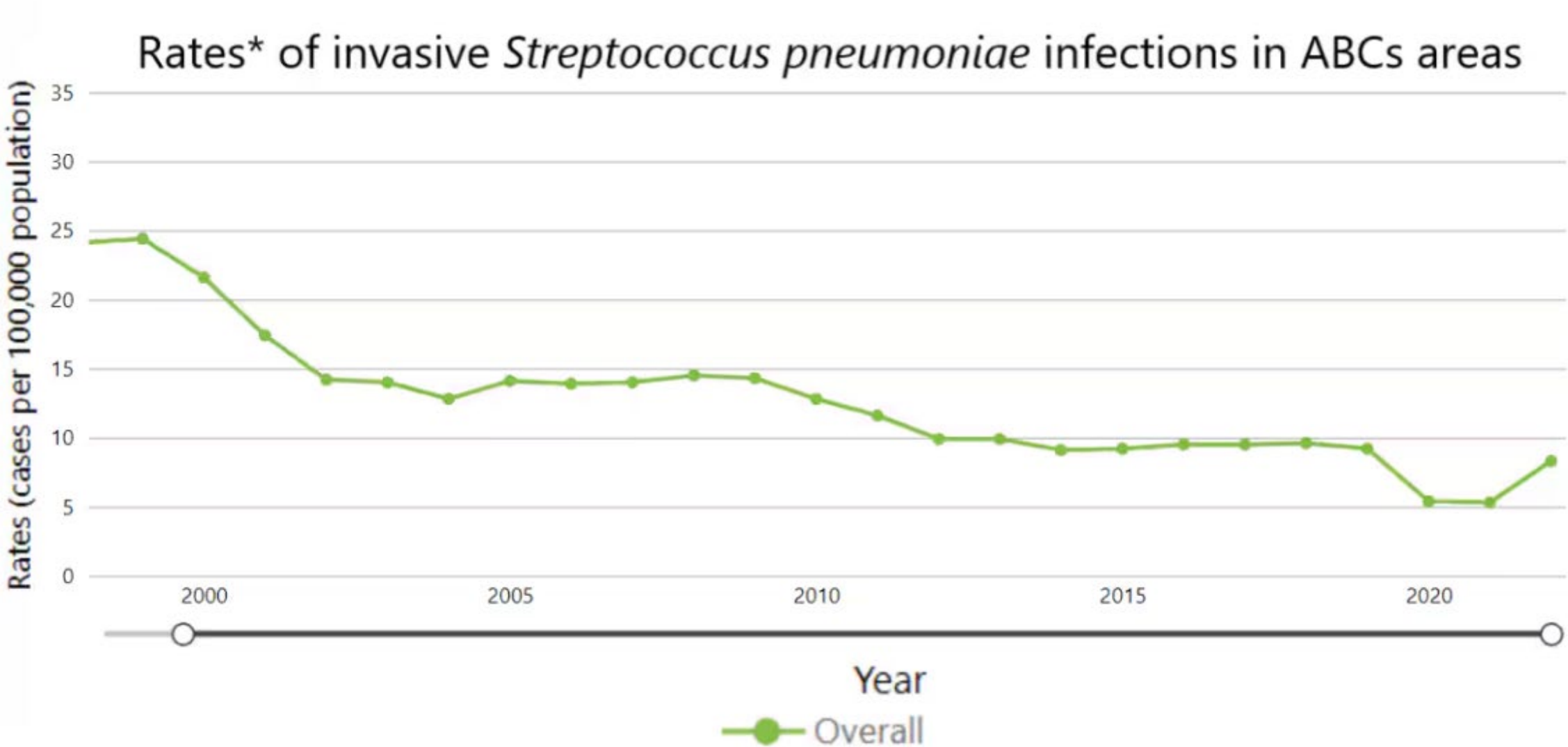
- **PCV21 was developed to target pneumococcal serotypes that commonly cause disease in adults.**
- **The manufacturer currently does not have plans to seek an indication for routine PCV21 use in infants.**
- **The manufacturer will seek an indication for use of PCV21 in children aged 2–18 years with a risk condition for which there is a phase 3 trial currently in progress.***
  - PCV7 and PCV13 provided indirect protection against vaccine serotypes when used in children.
  - We do not expect PCV21 to offer similar indirect protection from its additional serotypes.

Factors Considered in Recommending Immunization of Adults 50-64 Years of Age

EtR Domains	Work Group Interpretation
Public Health Problem	Yes
Equity	Probably increased
Benefits and Harms	
a. Benefits	Moderate
b. Harms	Minimal
c. Benefit>Harm?	Favors intervention
Values and Preferences	
a. Desirable>Undesirable?	Probably yes/yes
b. Uncertainty?	Probably not important uncertainty or variability
Acceptability	Yes
Resource Use	Probably yes/Yes
Feasibility	Probably yes/Yes

Key considerations: factors supporting lowering the PCV age-based recommendation to age ≥50 years

1. The relatively high burden of pneumococcal disease in adults aged 50–64 years, particularly among those with risk conditions
2. Potential for improved vaccine uptake through an age-based recommendation, which is easier to implement compared with the current risk-based recommendation
3. Potential to reduce pneumococcal disease incidence in demographic groups experiencing the highest burden
4. Projected health benefits from economic models* despite increased net costs



* Rates are calculated as cases per 100,000 population.

Source: ABCs Bact Facts Interactive Data Dashboard