



EpiVac Pink Book Web-on-Demand Series

Meningococcal–2020

Immunization Services Division

National Center for Immunization and Respiratory Diseases

Centers for Disease Control and Prevention

Atlanta, GA

Learning Objectives

- For each vaccine-preventable disease, identify those for whom routine immunization is recommended.
- For each vaccine-preventable disease, describe characteristics of the vaccine used to prevent the disease.
- Describe an emerging immunization issue.
- Locate current immunization resources to increase knowledge of team's role in program implementation for improved team performance.
- Implement disease detection and prevention health care services (e.g., smoking cessation, weight reduction, diabetes screening, blood pressure screening, immunization services) to prevent health problems and maintain health.

Today's Agenda

EpiVac Pink Book Web-on-Demand Series: Meningococcal–2020

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- CE credit, go to: www.cdc.gov/GetCE
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- CE credit expires: July 1, 2022
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Meningococcal Disease and Meningococcal Vaccine

August 19, 2020

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Disease

Neisseria meningitidis

- Aerobic gram-negative bacteria
- At least 13 serogroups based polysaccharide capsule
- Most invasive disease caused by serogroups A, B, C, W, X, and Y
- Relative importance of serogroups depends on geographic location and other factors (e.g., age)

Meningococcal Disease Pathogenesis

- Organism colonizes nasopharynx
- In some persons organism enters the bloodstream and causes infection at distant site
- Antecedent URI may be a contributing factor

Neisseria meningitidis

Clinical Features

- Incubation period 3-4 days (range 2-10 days)
- Abrupt onset of fever, meningeal symptoms, confusion, hypotension, and rash
- Fatality rate 10%-15%, up to 40% in meningococemia

Meningococcal Meningitis

- Most common presentation of invasive disease
- Results from hematogenous dissemination
- Clinical findings
 - fever
 - headache
 - stiff neck

Meningococcal Sepsis

- Bloodstream infection
- Meningococemia
- May occur with or without meningitis
- Clinical findings
 - fever
 - petechial or purpuric rash
 - hypotension
 - shock
 - acute adrenal hemorrhage
 - multi-organ failure

Meningococcal Disease



Meningococcal Disease



Neisseria meningitidis

Risk Factors for Invasive Disease

- Host Factors
 - Persistent complement component deficiency
 - Functional or anatomic asplenia
 - Human immunodeficiency virus (HIV)
 - Receipt of complement inhibitors (e.g. eculizumab, ravlizumab)

- Environmental factors
 - Household crowding
 - Active and passive smoking
 - Antecedent viral infection

- Occupational (microbiologists)

Neisseria meningitidis

Risk Factors for Invasive Disease

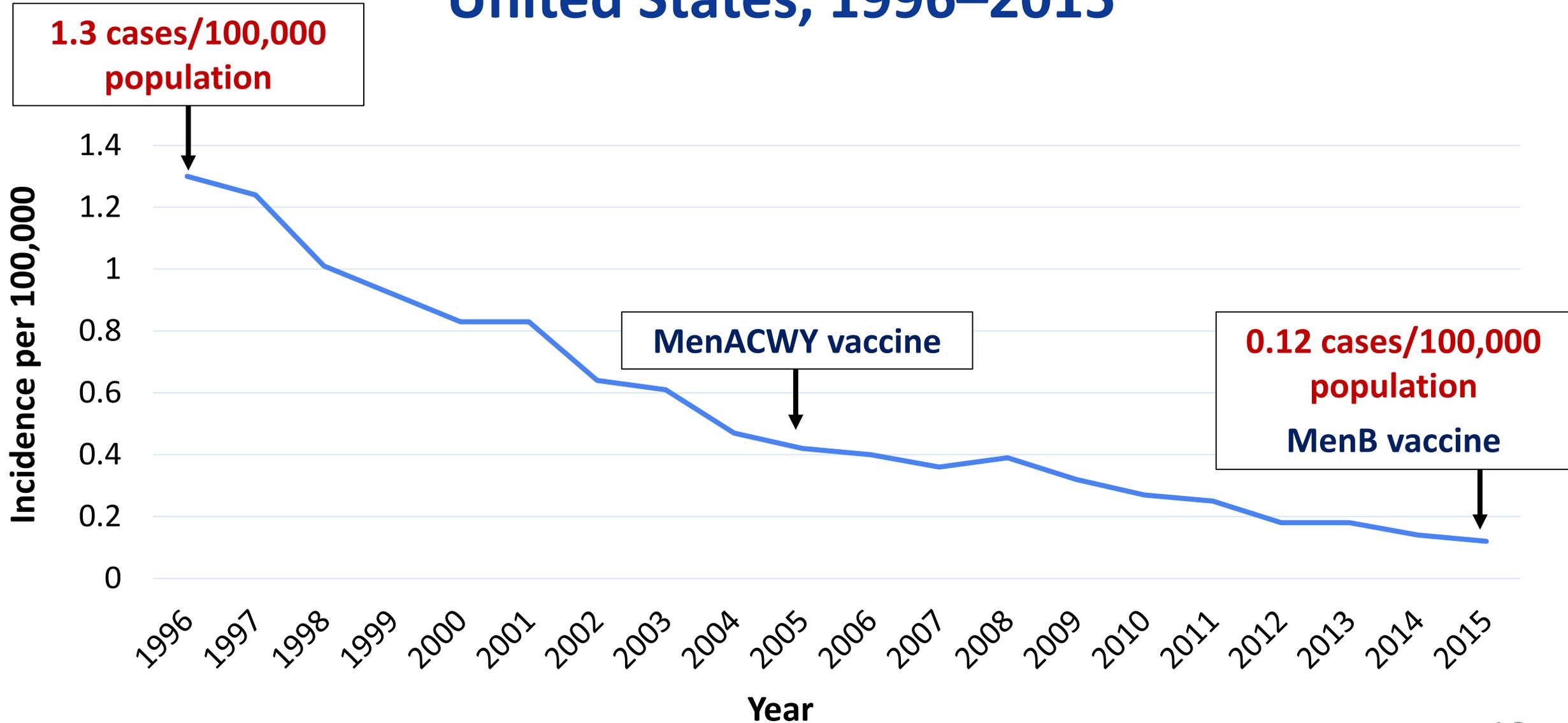
- College Students
 - Studies in 1990s – overall incidence similar to or lower than their counterparts in general population*
 - Case control study of 50 cases and other studies in the 1990s#
 - First-year college students living in residence halls at higher risk

*JAMA 1999;281:1906-10

#Abstracts of the 39th Meeting of the IDSA. Philadelphia, PA: IDSA; 1999:276

Epidemiol Infect 1999;122:351–7. Clin Infect Dis 1999;29:215–6.

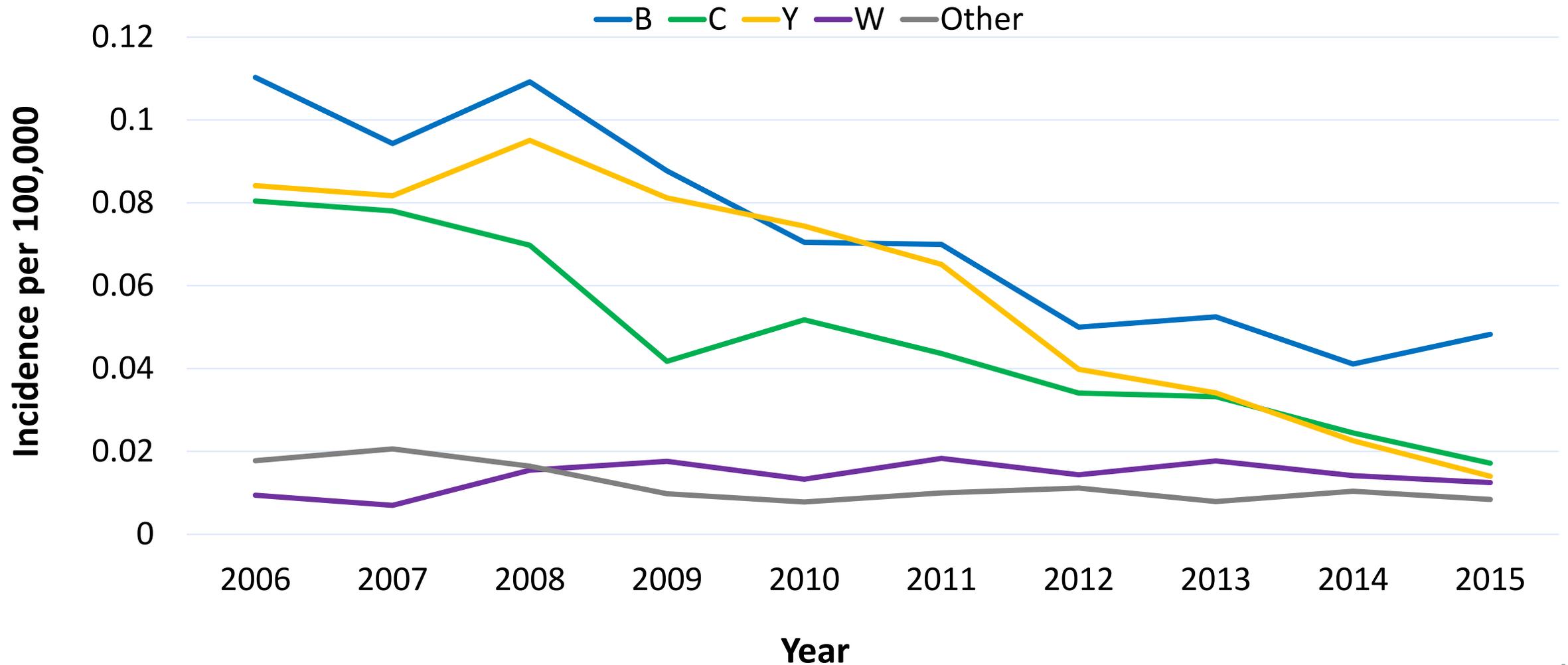
Meningococcal Disease Incidence – United States, 1996–2015



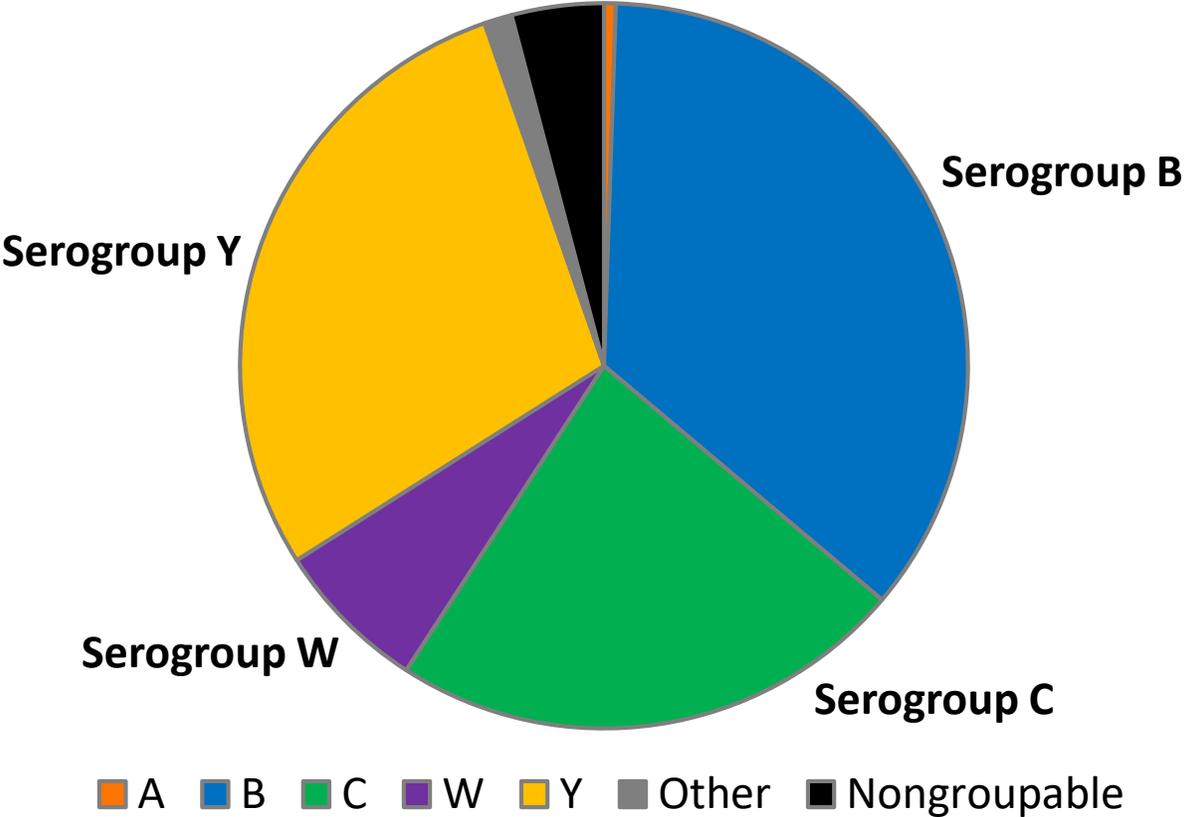
Abbreviations: MenACWY = quadrivalent meningococcal conjugate vaccine; MenB vaccine = serogroup B meningococcal vaccines

Source: 1996-2015 NNDSS Data

Trends in Meningococcal Disease Incidence by Serogroup – United States, 2006-2015

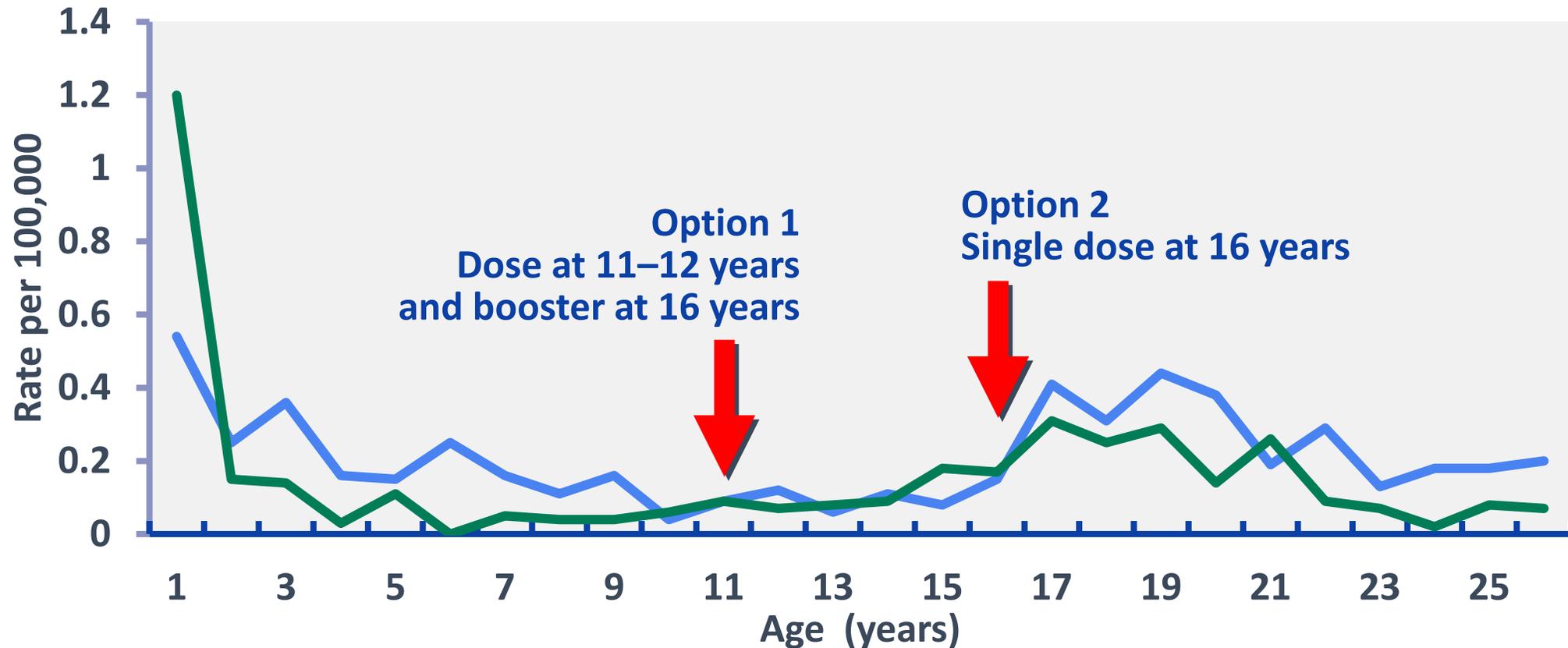


Meningococcal Disease by Serogroup, All Ages – United States, 2006-2015



Source: National Notifiable Diseases Surveillance System (NNDSS) data with additional serogroup data from Active Bacterial Core surveillance (ABCs) and state health departments
Excludes 20% with unknown serogroup

Rates of Meningococcal Disease (C and Y) by Age, 1999–2008



Meningococcal Outbreaks in the United States

- Outbreaks account for 5% of reported cases
- Most recent outbreaks caused by serogroup C and B

Serogroup B meningococcal disease outbreaks on college campuses[†], 2013 to/through 2018

State of University	Year started	Cases (deaths)	Undergraduate population
New Jersey	2013	9 (1)	5,000
California	2013	4*	19,000
Rhode Island	2015	2	4,000
Oregon	2015	7 (1)	20,000
California	2016	2**	5,000
New Jersey	2016	2	35,000
Wisconsin	2016	3	30,000
Oregon	2016	5	25,000
Massachusetts	2017	3	30,000
Pennsylvania	2017	2	3,600

During 2014 to/through 2016, 31.7% of serogroup B cases in college students were outbreak-related.

[†]Where CDC consulted; * 1 additional associated case identified after retrospective case review; ** 1 additional patient with inconclusive laboratory results

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Vaccine

Vaccine product	Age indications
MenACWY Vaccines	
Menactra	
MenACWY-D	9 months through 55 years
Menveo	
MenACWY-CRM	2months through 55 years
MenB Vaccines	
Trumemba	
MenB-FHbp	10 through 25 years
Bexsero	
Men B-4C	10 through 25 years

Meningococcal Conjugate Vaccines

- Meningococcal polysaccharide conjugated to protein carrier
- Elicit both T- and B-cell immunity (T-cell dependent immunity)
 - Menactra = MenACWY-D (Sanofi Pasteur)
 - Menveo = MenACWY-CRM (GlaxoSmithKline)

Menactra MenACWY Vaccine

- Licensed by FDA in January 2005
- Quadrivalent polysaccharide vaccine conjugated to diphtheria toxoid (MenACWY-D)
- Approved for persons 9 months through 55 years of age
- Intramuscular injection
- Single dose vials

Menveo MenACWY Vaccine

- Licensed by FDA in February 2010
- Lyophilized serogroup A vaccine reconstituted with liquid containing serogroups C, W, and Y (MenACWY-CRM)
- May be used for any person 2 months through 55 years of age for whom MenACWY is indicated, including revaccination
- Intermuscular injection
- Single dose vials

Interchangeability of Conjugate Vaccine Brands

- Limited data suggest that different conjugate vaccine products can be used interchangeably.
- Whenever feasible, the same brand of vaccine should be used for all doses of the vaccination series
- If vaccination providers do not know or have available the type of vaccine product previously administered, any product should be used to continue or complete the series

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**Clinical
Considerations**

MenACWY Recommendations

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 (MenACWY-D ≥9 mos; MenACWY-CRM ≥2 mos)			See Notes											1 st dose		2 nd dose	

- Administer MenACWY at age 11 or 12 years with a booster dose at 16 years of age
- Administer 1 dose at age 13 through 15 years if not previously vaccinated
- For persons vaccinated at age 13 through 15 years, administer a one-time booster dose, preferably at or after 16 through 18 years of age
 - The minimum interval between doses is 8 weeks

MenACWY Adolescent Vaccination Recommendations

- A booster dose is not recommended for healthy persons if the first dose is administered at or after 16 years of age
- A booster dose is not recommended for healthy persons after 21 years of age who are not at increased risk of exposure
 - A booster dose is not recommended for healthy persons 22 years of age and older even if the first dose was administered at 11-15 years of age

MenACWY Vaccine Recommendations for Persons at Increased Risk for Meningococcal Disease

High-risk Groups: Functional or Anatomic Asplenia or HIV Infection*

- Younger than 19 months
 - Infant series at 2, 4, 6, and 12 through 15 months with Menveo
- 19 through 23 months
 - 2-dose primary series of Menveo 12 weeks**
- 24 months or older
 - 2-dose primary series of either MenACWY 8-12 weeks apart

*Including sickle-cell disease

** Doses valid if 8 weeks apart

High-risk Groups: Persistent Complement Component Deficiency*

- Children 2 through 18 months
 - Infant series at 2, 4, 6, and 12 through 15 months with Menveo; OR
 - 2-dose primary series of Menactra starting at 9 months at least 12 weeks apart**
- 19 months or older
 - 2-dose primary series of either MenACWY at least 12 weeks apart**

* Including persons taking Soliris (eculizumab) or Ultomiris (ravulizumab)

** Doses valid if 8 weeks apart

Meningococcal Vaccine Recommendations for Persons 2 Years Old or Older

- Persons who:
 - Are first-year college students living in residential housing
 - Travel to, or are residents of, countries where meningococcal disease is hyperendemic or epidemic
 - Are microbiologists routinely exposed to isolates of *Neisseria meningitidis*
 - Military recruits

- Administer: 1 dose of MenACWY

Meningococcal ACWY Vaccine Booster Doses

- Person who receive primary immunization and remain at increased risk should receive booster doses
 - If primary immunization complete **before** 7 years of age:
 - first booster should be 3 years after primary immunization and every 5 years thereafter if at continued risk
 - If primary immunization complete **on or after** 7 years of age
 - first booster should be 5 years after primary immunization and every 5 years thereafter if at continued risk

International Travelers and Revaccination*

- International travelers should receive a booster dose of MenACWY if the last dose was administered 5 or more years previously
 - Vaccination in the 3 years before the date of travel is required by the government of Saudi Arabia for all travelers to Mecca during the annual Hajj

Updated Guidance for Use of Meningococcal Vaccines in Persons Aged ≥ 56 Years

- Meningococcal vaccines that are licensed for use in person aged ≥ 56 year are not currently available in the United States
- Persons aged ≥ 56 years who are recommended meningococcal vaccination because they are at increased risk for meningococcal disease should receive MenACWY conjugate vaccine
 - This includes, meningococcal vaccine-naïve persons aged ≥ 56 years who anticipate requiring only a single dose of meningococcal vaccine (e.g. travelers and persons at risk as a risk of a community outbreak)
 - And persons who were vaccinated previously with MenACWY conjugate vaccine and are recommended for revaccination or for whom multiple doses are anticipated (e.g., person with asplenia, HIV, and microbiologists)

Knowledge Check

- A healthy 16 year old previously received two doses of MenACWY separated by 8 weeks, both doses administered 5 years ago. Is another dose of MenACWY recommended today?

A) Yes

B) No



Answer

- A healthy 16 year old previously received two doses of MenACWY separated by 8 weeks, both doses administered 5 years ago. Is another dose of MenACWY recommended today?

— Yes



Meningococcal ACWY Adverse Reactions

	MenACWY
Local reactions	11%-59%
Low-grade fever	5%-17%
Systemic reactions (headache, malaise, fatigue)	4%-54%

MenB Vaccine Recommendations

Meningococcal B Vaccines

Product Name (ACIP Abbreviation)	FDA Age Indications	Schedule/Dosage/Route
Trumenba [®] (MenB-FHbp)	10 through 25 years of age	<ul style="list-style-type: none">• 3-dose series<ul style="list-style-type: none">- 0, 1–2, and 6-month <p><u>OR</u></p> <ul style="list-style-type: none">• 2-dose series<ul style="list-style-type: none">- 0, 6 month• 0.5 mL dose• IM injection
Bexsero [®] (MenB-4C)	10 through 25 years of age	<ul style="list-style-type: none">• 2-dose<ul style="list-style-type: none">- 0, 1–6 month• 0.5 mL dose• IM injection

Meningococcal B Recommendations

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 B														See Notes			

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			

- Recommendation for use in individuals ≥ 10 years of age at increased risk of disease
- Recommendation for use in adolescents and young adults not at increased risk for disease

ACIP MenB Recommendations

- Certain persons aged ≥ 10 years* who are at increased risk for meningococcal disease ***should*** receive MenB vaccine. These persons include:
 - Persons with persistent complement component deficiencies
 - Persons with anatomic or functional asplenia**
 - Microbiologists routinely exposed to isolates of *Neisseria meningitidis*
 - Persons identified as at increased risk because of a serogroup B meningococcal disease outbreak

*ACIP off-label recommendation

**Including sickle cell disease

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6422a3.htm?s_cid=mm6422a3_w

ACIP MenB Recommendations

- Certain other groups included in MenACWY (MCV4) recommendations for persons at increased risk, are not in this recommendation
- MenB – **NOT currently recommended for:**
 - Children aged 2 months – 9 years of age
 - Persons who travel to or reside in countries where meningococcal disease is hyperendemic or epidemic because risk is generally not caused by serogroup B
 - Routine use in first-year college students living in residence halls, military recruits, or all adolescents

Use of 2- and 3-Dose Schedules of MenB-FHbp (Trumenba) Meningococcal Serogroup B Vaccine

- For persons at increased risk for meningococcal disease and for use during serogroup B outbreaks, 3 doses of MenB-FHbp should be administered at 0, 1-2, 6 months
- When given to healthy adolescents who are not at increased risk for meningococcal disease, 2 doses of MenB-FHbp should be administered at 0 and 6 months

Trumenba Timing and Spacing Errors

- If a patient is recommended for 3 doses of Trumenba, but the second dose is delayed beyond a 6-month interval, a third dose is NOT necessary
- If a patient is recommended for 2 doses of Trumenba, and the second dose is given less than 6 months after the first dose, then a repeat (3rd) dose must be administered 4 months after the second dose

MenB for Adolescents and Young Adults

- A MenB vaccine series *may* be administered to adolescents and young adults aged 16–23 years to provide short-term protection against most strains of serogroup B meningococcal disease*
- The preferred age for MenB vaccination is 16–18 years

* Recommendation based on shared clinical decision-making

Other Serogroup B Meningococcal Vaccine Updates – Booster Doses

- A booster dose is recommended for high-risk persons 1 year after the primary series, and every 2-3 years thereafter
- High-risk groups
 - Complement component deficiency
 - Complement inhibitor therapy – eculizumab, revulizumab
 - Functional and anatomic asplenia
 - Microbiologists handling commercial specimens

Other Serogroup B Meningococcal Vaccine Updates – Booster Doses

- A booster dose is recommended for persons exposed in an outbreak who previously received a primary series
- Non-high risk groups
 - A booster dose is needed if 1 year has passed since the last dose in the primary series.
 - With provider discretion, an interval of 6 months may be used.

MenB Vaccine Brand Error

- If a dose of MenB vaccine is administered and found to be a different brand from a dose previously administered:
 - Pick the brand with which you want to continue the series
 - Invalidate the dose of the other brand
 - Continue the series
 - Need a 4 week minimum interval from any invalid doses
 - Need to follow the minimum intervals between doses of the chosen brand

Meningococcal B Adverse Reactions

	Adverse Reactions
Pain at injection site, injection site reactions, erythema	28%-85%
fatigue, headache, chills, nausea, arthralgia	13%-60%

Meningococcal Vaccine

Contraindications and Precautions

- Severe allergic reaction to vaccine component, including diphtheria toxoid, or following prior dose

- Moderate or severe acute illness

Meningococcal Vaccine Use in Outbreaks

- MenACWY and MenB recommended for use in control of outbreaks caused by A, C, W, Y, or B
- Outbreak definition:
 - at least 3 confirmed or probable primary cases of the same serogroup
 - period of 3 months or less
 - primary attack rate of more than 10 cases per 100,000 population

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Resources

Meningococcal Resources

- ACIP's Meningococcal Recommendations web page

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html

- CDC's Meningococcal Infection web page

www.cdc.gov/meningococcal/index.html

- CDC's Meningococcal Vaccination web page

www.cdc.gov/vaccines/vpd-vac/mening/default.htm

- Immunization Action Coalition Meningococcal web page

www.immunize.org/meningococcal/

- Children's Hospital of Philadelphia Vaccine Education Center Meningococcal web page

<http://www.chop.edu/centers-programs/vaccine-education-center/vaccine-details/meningococcal-vaccine>

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- Comprehensive list of resources for ALL sessions
- Located on the web page for this web-on-demand session at www.cdc.gov/vaccines/ed/webinar-epv/index.html
- Additional materials located on this webpage include:
 - Principles of Vaccination slide set
 - Web-on-demand questions and answers
 - Transcript of this session
 - Continuing education instructions

COURSE RESOURCES

Epidemiology and Prevention of Vaccine-Preventable Diseases

- ▶ Epidemiology and Prevention of Vaccine-Preventable Diseases (Pink Book) Supplement: www.cdc.gov/vaccines/pubs/pinkbook/supplement.html

Overall Resources

- ▶ Current childhood and adult immunization schedules: www.cdc.gov/vaccines/schedules/index.html
- ▶ CDC Vaccine Schedules App for Health Care Providers: www.cdc.gov/vaccines/schedules/hcp/schedule-app.html
- ▶ Advisory Committee on Immunization Practices (ACIP) recommendations: www.cdc.gov/vaccines/hcp/acip-recs/index.html
- ▶ CDC General Best Practice Guidelines for Immunization: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- ▶ CDC Continuing Education Information: www.cdc.gov/vaccines/ed/ce-credit-how-to.html
- ▶ Health Care Personnel Vaccination Recommendations: www.immunize.org/catg.d/p2017.pdf
- ▶ Pink Book Webinar Series: www.cdc.gov/vaccines/ed/webinar-epv/index.html
- ▶ Vaccines Licensed for Use in the United States Package Inserts: www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm093833.htm
- ▶ You Call the Shots: www.cdc.gov/vaccines/ed/youcalltheshots.html

Course Intro and Objectives

- ▶ What is the Advisory Committee on Immunization Practices (ACIP)?: www.cdc.gov/vaccines/hcp/conversations/downloads/vacsafe-acip-color-office.pdf
- ▶ CDC Immunization Resources for You and Your Patients: www.cdc.gov/vaccines/hcp/admin/downloads/Resource-Booklet.pdf
- ▶ Parents' Guide to Childhood Immunizations: www.cdc.gov/vaccines/parents/tools/parents-guide/index.html
- ▶ Order Information for Free CDC Immunization Materials for Providers and Patients: www.cdc.gov/pubs/CDCInfoOnDemand.aspx

Principles of Vaccination

- ▶ Immune System Research: www.niaid.nih.gov/research/immune-system-research
- ▶ What is the Immune System?: www.vaccines.gov/basics/work/prevention
- ▶ Understanding How Vaccines Work: www.cdc.gov/vaccines/hcp/conversations/downloads/vacsafe-understand-color-office.pdf
- ▶ Vaccines Work: www.vaccines.gov/basics/work/index.html
- ▶ Vaccine Basics: How Vaccines Work: www.vaccineinformation.org/how-vaccines-work/
- ▶ The History of Vaccines: How Vaccines Work: www.historyofvaccines.org/content/how-vaccines-work

General Best Practice Guidelines

- ▶ Ask the Experts-Scheduling Vaccines FAQs: www.immunize.org/askexperts/scheduling-vaccines.asp
- ▶ Ask the Experts-Combination Vaccines FAQs: www.immunize.org/askexperts/experts_combo.asp
- ▶ Ask the Experts-Precautions and Contraindications FAQs: www.immunize.org/askexperts/precautions-contraindications.asp
- ▶ Foreign Language Vaccine-Preventable Disease Terms: www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/B/foreign-products-tables.pdf
- ▶ Guide to Contraindications and Precautions to Commonly Used Vaccines: www.immunize.org/catg.d/p3072a.pdf
- ▶ Guidelines for Vaccinating Pregnant Women: www.cdc.gov/vaccines/pregnancy/hcp/guidelines.html
- ▶ IDSA 2013 Clinical Practice Guideline for Vaccination of the Immunocompromised Host: www.idsociety.org/Guidelines/Patient_Care/IDSA_Practice_Guidelines/Vaccination_of_the_Immunocompromised_Host/
- ▶ Interval Between Antibody-Containing Products and Measles- and Varicella-Containing Vaccines: www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/a/mmr_ig.pdf



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