

Centers for Disease Control and Prevention  
National Center for Immunization and Respiratory Diseases



## Meningococcal Disease and Meningococcal Vaccine

Adult Track  
Chapter 14

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### *Neisseria meningitidis*

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

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### 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

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***Neisseria meningitidis***

**Clinical Features**

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

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**Meningococcal Meningitis**

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

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**Meningococcal Sepsis**

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

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### Meningococcal Disease



N Engl J Med. 2001;344:137

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### *Neisseria meningitidis* Risk Factors for Invasive Disease

- Host Factors
  - Deficiencies in the terminal common complement pathways
  - Functional or anatomic asplenia
  - Chronic underlying disease
  - Certain genetic factors (altered genes: mannose-binding lectin and tumor necrosis factor)
- Environmental factors
  - Household crowding
  - Active and passive smoking
  - Antecedent viral infection
- Occupational (microbiologists)

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### *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.

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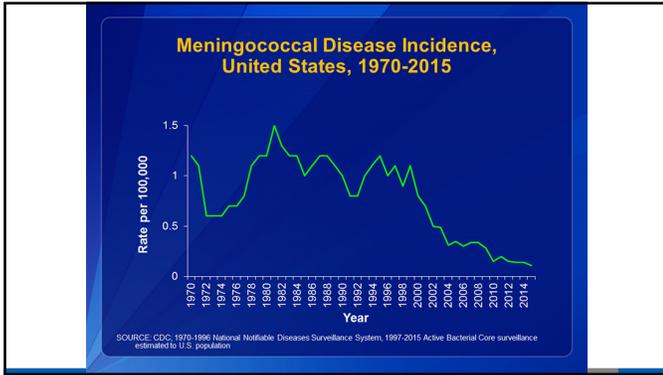
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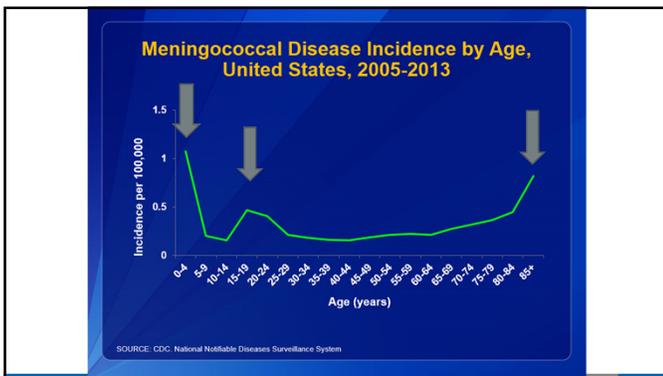
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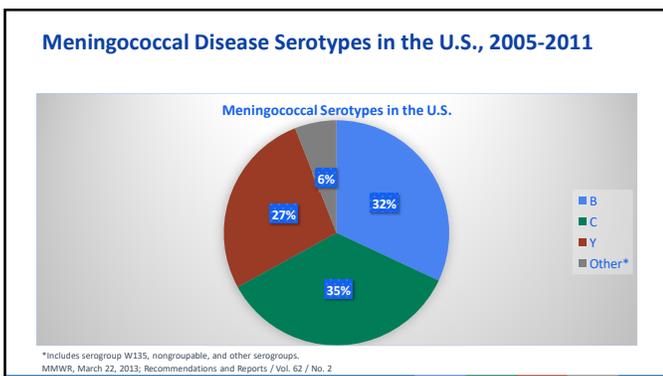
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### Meningococcal Outbreaks in the United States

- Outbreaks account for 2%-3% of reported cases
- Most recent outbreaks caused by serogroup C and B

MMWR March 22, 2013 Recommendations and Reports / Vol. 62 / No. 2, at <http://www.cdc.gov/mmwr/pdf/rr/rr6202.pdf>, and <http://www.cdc.gov/meningococcal/outbreaks/index.html>

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### Meningococcal Vaccines

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### Meningococcal Conjugate Vaccines

- Meningococcal polysaccharide conjugated to protein carrier
- Elicit both T- and B-cell immunity (T-cell dependent immunity)
- 2 brands currently licensed in the United States
  - Menactra (Sanofi Pasteur); Abbr: MenACWY-D
  - Menveo (Novartis); Abbr: MenACWY-CRM

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### Menactra (MenACWY-D) 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

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### Menveo (MenACWY-CRM) Vaccine

- Licensed by FDA in February 2010
- Lyophilized serogroup A vaccine reconstituted with liquid containing serogroups C, Y, and W135 (MenACWY-CRM)
- May be used for any person 2 months through 55 years of age for whom MCV4 is indicated, including revaccination
- Intermuscular injection
- Single dose vials

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### 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

MMWR 2013;62(NR-2):10-11

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**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)

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**MenACWY Vaccine Recommendations for Persons at Increased Risk for Meningococcal Disease**

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

- 24 months or older who have not received a complete series
  - 2-dose primary series of either MenACWY 8-12 weeks apart

\*Including sickle-cell disease  
\*\* Doses valid if 8 weeks apart

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**High-risk Groups: Persistent Complement Component Deficiency\***

- 24 months or older who have not received a complete series of MenACWY
  - 2-dose primary series of MenACWY-D starting at least 12 weeks apart\*\*

\* Including persons taking Soliris (eculizumab)  
\*\* Doses valid if 8 weeks apart

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**Meningococcal Vaccine Recommendations for Persons 2 through 55 years at High Risk**

- Persons who:
  - Are first-year college students aged ≤21 years 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

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**Meningococcal Vaccine Use in Outbreaks**

- Both MenACWY recommended for use in control of outbreaks caused by A, C, W, and Y
- 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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### Meningococcal Vaccine Booster Doses

- **Once adult completes primary immunization**
  - first booster should be 5 years after primary immunization and every 5 years thereafter if at continued risk

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### MenACWY Revaccination Recommendations

- **Other high-risk persons recommended for boosters:**
  - Microbiologists with prolonged exposure to *Neisseria meningitidis*
  - Frequent travelers to or persons living in areas with high rates of meningococcal disease (see next slide)
- **Revaccinate every 5 years as long as the person remains at increased risk**
  - MenACWY for persons 2 through 55 years of age
  - MenACWY for persons 56 years and older also (off-label recommendation) if repeated vaccination anticipated

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### 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

\*CDC Travelers Health website at <http://www.cdc.gov/travel>

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### Meningococcal Vaccines Adverse Reactions

	MenACWY
Local reactions for 1-2 days	11%-59%
Low-grade fever	5%-17%
Systemic reactions (headache, malaise, fatigue)	4%-54%

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### MenB Vaccine Recommendations

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### Meningococcal B Vaccines

Product Name (ACIP Abbreviation)	FDA Age Indications	Dosage/Route/Schedule
Trumenba® (MenB-FHbp)	10 through 25 years of age	<ul style="list-style-type: none"> <li>• 3 doses—0.5 mL each</li> <li>• IM injection</li> <li>• 0, 1–2, and 6-month <i>QR</i></li> <li>• 2 doses – 0.5 mL each</li> <li>• IM injection</li> <li>• 0, 6 month</li> </ul>
Bexsero® (MenB-4C)	10 through 25 years of age	<ul style="list-style-type: none"> <li>• 2 doses—0.5 mL each</li> <li>• IM injection</li> <li>• 0, 1–6 month</li> </ul>

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### Meningococcal B Recommendations

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

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### ACIP MenB Recommendations

- Certain persons aged  $\geq 10$  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?\\_cid=mm6422a3\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6422a3.htm?_cid=mm6422a3_w)

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### 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

\* Permissive recommendation (Category B)  
MMWR October 23, 2015 / 64(41):1171-6

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**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

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**ACIP MenB Recommendations**

- MenB should be administered as either a 2-dose series of MenB-4C or a 2 or 3-dose series of MenB-FHbp
- The same vaccine product should be used for all doses
- MenB-4C and MenB-FHbp may be administered concomitantly with other vaccines indicated for this age, but at a different anatomic site, if feasible
- No product preference to be stated

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**ACIP MenB Recommendations**

- Certain other groups included in MenACWY recommendations for persons at increased risk, are not in this recommendation
- MenB – NOT currently recommended for:
  - 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

[http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6422a3.htm?\\_cid=mm6422a3\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6422a3.htm?_cid=mm6422a3_w)

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### Meningococcal Vaccine Contraindications and Precautions

- Severe allergic reaction to vaccine component or following prior dose
- Moderate or severe acute illness

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### Vaccine Administration Meningococcal-containing Vaccine

- Route: IM injection**
  - Needle gauge: 23 – 25 gauge
  - Needle length\*: 1 – 1.5 inch depending on the patient’s age and/or weight
- IM injection Site\*:**
  - 4 years and older: Deltoid muscle is preferred; vastus lateralis muscle may be used
- Note: MPSV4 may also be administered by Subcut injection in the upper outer triceps area**
- Vaccine administration error:**
  - Wrong product based on age or medical indications

\*Professional judgement should be used to determine the proper needle length and site. Influencing factors include injection technique, local reaction, number of vaccines to be administered, patient age, size and muscle mass

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### Vaccine Storage and Handling

- Store MenACWY and MenB vaccines in a refrigerator between 2°C - 8°C (36°F - 46°F)**
- Store meningococcal vaccines:**
  - In the original packaging with the lids closed
  - In a clearly labeled bin and/or area of the storage unit
- Do not freeze vaccine**

**MenACWY-D (Menactra)**  
Ages: 9 months through 55 years (contains pertussis 56 years and older at increased risk)  
Use for: Any dose in the series  
Route: Intramuscular (IM) injection

**MenACWY-CRM (Menveo)**  
Ages: 2 months through 55 years (contains pertussis 56 years and older at increased risk)  
Use for: Any dose in the series  
Route: Intramuscular (IM) injection  
Menveo is a live, attenuated meningococcal conjugate vaccine. It contains a live, attenuated meningococcal component. Do NOT administer Menveo to MenB. Beyond Use Time: Should be used immediately after receipt and not be stored at room temperature and discarded 8 hours after 8 hours.

**MenB-4C (Bexsero)**  
Ages: 10 years and older  
Use for: Any dose in the series  
Route: Intramuscular (IM) injection  
Bexsero and Trumenba are NOT interchangeable. Complete series with same vaccine product. Syringe tip cap of prefilled syringe contains latex.

**MenB-FHbp (Trumenba)**  
Ages: 10 years and older  
Use for: Any dose in the series  
Route: Intramuscular (IM) injection  
Bexsero and Trumenba are NOT interchangeable. Complete series with same vaccine product.

Vaccine storage label example  
Available at [www.cdc.gov/vaccines/hcp/admin/storage/guide/vaccine-storage-labels.pdf](http://www.cdc.gov/vaccines/hcp/admin/storage/guide/vaccine-storage-labels.pdf)

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### Meningococcal Resources

- ACIP's Meningococcal Recommendations web page  
[www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html](http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html)
- CDC's Meningococcal Infection web page  
[www.cdc.gov/meningococcal/index.html](http://www.cdc.gov/meningococcal/index.html)
- CDC's Meningococcal Vaccination web page  
[www.cdc.gov/vaccines/vpd-vac/mening/default.htm](http://www.cdc.gov/vaccines/vpd-vac/mening/default.htm)
- Immunization Action Coalition Meningococcal web page  
[www.immunize.org/meningococcal/](http://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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