Invasive Meningococcal Disease: Testing, reporting, and investigations in Massachusetts

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Presenter Disclosure Information Meagan Burns

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Off Label Use of Vaccines	Will be discussed, but in accordance with current ACIP recommendations

Summary

- Today we will:
  - Discuss a meningitis case investigation scenario.
  - Explain the role of MDPH throughout an investigation.
  - Discuss post-exposure prophylaxis decisions
  - Discuss criteria for vaccination as a part of outbreak control
  - Review meningococcal B vaccines.

MENINGITIS INVESTIGATION SCENARIO

- The emergency department calls MDPH at 617-983-6800 because invasive meningococcal disease is in the differential for this patient.
- The Epidemiologist is in touch with infection control, infectious disease, and laboratory, as well as the local board of health.
- Case information, including clinical and laboratory, is collected.


COMMUNICABLE AND OTHER INFECTIOUS DISEASES REPORTABLE IN MASSACHUSETTS BY HEALTHCARE PROVIDERS*

REPORT IMMEDIATELY BY PHONE!

All cases should be reported to your local board of health;

Clinical Manifestations of Meningococcal Disease

- Meningitis
  - inflammation of the meninges (tissues that surround the brain and spinal cord)
- Meningococcemia
  - infection of the blood
- Pneumonia
  - infection of the lungs
  - primarily affects older patients – CFR<10%
- Other
  - Synovial, pericardial, pleural involvement

Signs and Symptoms of Invasive Meningococcal Disease

Meningococcal Meningitis

- Most Common pathologic presentation
- Result of hematogenous dissemination
- Clinical Findings:
  - Fever
  - Headache
  - Stiff neck

Meningococcemia

- Bloodstream infection
- May occur with or without meningitis
- Clinical Findings:
  - Fever
  - Petechial or purpuric rash
  - Hypotension
  - Multiorgan failure

Public Health Response

- Assess need for immediate intervention (may occur prior to confirmation)
- Confirm the case
  - Laboratory results, clinical presentation, health care provider evaluation and judgment
- Notify local health department
- Identify close contacts
- Ensure antibiotics are given to close contacts
- Set up surveillance for future cases
- Educate those exposed about prevention beyond antibiotics

Confirming a Case

- *Laboratory Testing*
  - Meningococcal disease is typically diagnosed by finding evidence of the bacteria in a sterile body fluid, such as spinal fluid, blood, or joint fluid by growing the bacteria in a **culture**, seeing the bacteria under the microscope or by doing certain antigen testing.
- Typically:
  - WBC counts >10 cells/mm^3 ,
  - decreased glucose(<45 mg/dl),
  - increased protein (>45 mg/dl).
- A presumptive diagnosis of bacterial meningitis can be made by Gram stain or antigen detection in CSF.

MENINGITIS INVESTIGATION SCENARIO

- **Preliminary Lab Results:**
  - **Protein (120 mg/dl) – HIGH**
  - **Glucose (15 mg/dl) – LOW**
  - **Gram Stain shows gram negative diplococci**

Viral vs. Bacterial

- No growth on culture or too soon to tell
- Laboratory tests are not definitive
- Maybe antibiotic therapy initiated before specimens obtained
- Public health uses the clinical judgment of health care providers to guide their actions (e.g., progression and severity of patient's illness)

Green for Go

- Sterile fluid growing the bacteria on culture
- The antigen test is positive for *Neisseria*
- The bacteria is seen under the microscope from the sterile fluid
- Signs/symptoms of meningitis or meningococcemia (blood infection)
- Physician says so

Yellow for Caution

- Nothing definitive from signs/symptoms or lab tests
- Treatment was started before lab tests obtained
- "bacterial meningitis is on differential"
- Physician MUST provide guidance in these cases
- Err on side of caution

STOP

- Meningitis or meningococcemia way down on list
- Physician is thinking "viral"
- Nothing growing, lab results not consistent
- *Neisseria meningitidis* from throat or sputum

Response Guidelines

- 70% of secondary cases occur within 7 days of disease onset in the first case.
- Incubation period is 1-10 days (avg. 2-4 days).
- Antibiotics:
  - ASAP for those having close contact to the case during case's infectious period.
  - **In fact, it is usually very important to move forward with identification and treatment of close contacts before lab confirmation is available**, based on clinical findings and lab results which point in the direction of IMD**.**

MENINGITIS INVESTIGATION SCENARIO

The patient is now inpatient at the hospital, and was intubated. He has developed a petechial rash, and is going in and out of consciousness.

Given the clinical picture and lab findings in this case, MDPH recommends post-exposure prophylaxis (PEP) for close contacts of the case.

- **What PEP options are available?**
- **How do we determine who to recommend PEP for?**

Prophylactic Antibiotics

Rifampin
- Multiple oral doses
- Safe for children
- Do not use during pregnancy

Ceftriaxone (efficacy confirmed for group A only)
- One IM dose
- Safe for children
- Safe during pregnancy

Ciprofloxacin
- One oral dose
- Do not use if < 18 yrs
- Do not use during pregnancy

Who Needs PEP?

- Since the incubation period of IMD is considered to be no longer than 10 days, chemoprophylaxis should be considered for anyone who was exposed to the case in the 10 days prior to the case's date of onset.
- Using this same logic, it would not be helpful to provide prophylaxis to anyone 10 days past their date of exposure.

Who could be a Close Contact?

Adults	Children
place of employment	school
car pool	daycare
sports teams	after-school programs
parties	sports teams
friends/relatives	baby sitters
visitors	friends/relatives
	visitors
	parties

N. meningitidis: Other considerations

- Keep in mind that these bacteria are transmitted through saliva.
- The bacteria are rather large, as organisms go. They don't travel very far and they die rather quickly.
- For comparison, the measles virus would stay in the air for two hours after the infected person left the room.
- Bacteria is susceptible to the appropriate antibiotics but carriage can be protective so the use of antibiotics needs to be prudent.

MENINGITIS INVESTIGATION SCENARIO

The patient is currently unconscious, so we work through the patient's roommate to try to identify close contacts:

- The roommate
- A girlfriend or boyfriend
- Several members of the case's lacrosse team who share water bottles
- Are there any other questions you would want to ask the case?

In addition, the case was intubated in the ER. The health care worker who performed this procedure would be considered a close contact.

MENINGITIS INVESTIGATION SCENARIO

The patient was treated with IV antibiotics, and eventually improved.

Our case is confirmed by growth of *Neisseria meningitidis* in bacterial culture, and is found to be serotype B.

2 months later, at the same university, a second case of meningococcal disease is confirmed, and is also serotype B.

Interim Outbreak Recommendations for Investigational MenB Vaccine– 2014

Threshold for considering vaccination campaign with MenB (investigational) vaccine

- Population size <5,000: 2 or more case in 6 months
- Population size >5,000: 3 or more cases in 6 months

In addition

- Chemoprophylaxis of close contacts
- Testing of isolates: molecular genotyping
  - Determine if outbreak isolate covered by MenB vaccine(s)
  - Comparison of isolates from outbreak

Now that licensed MenB vaccines are available the CDC is updating these guidelines.

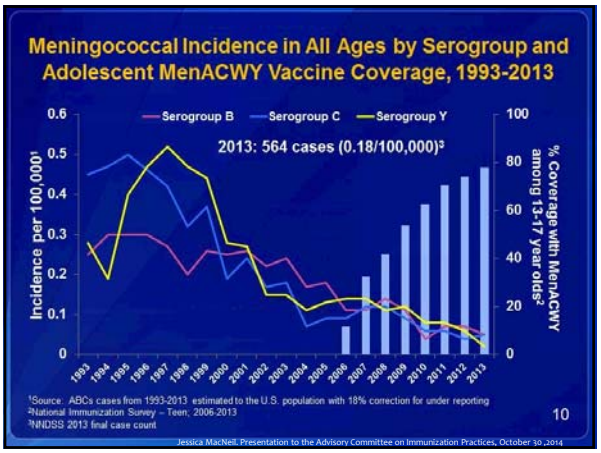
Interim guidance for Control of serogroup B meningococcal disease outbreaks in organization settings. 2014. www.cdc/gov/meningococcal/outbreaks/vaccine-serogroupb.html

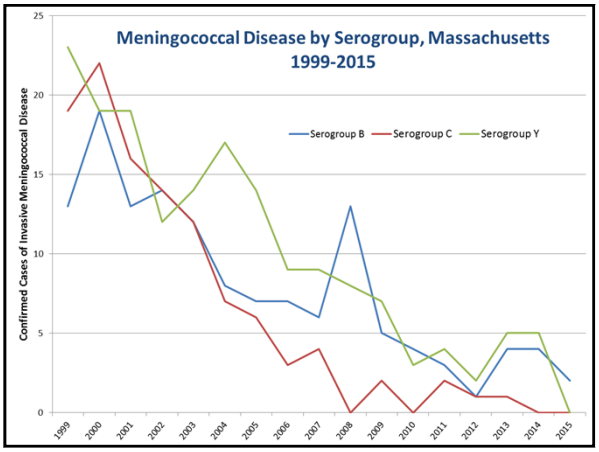
Meningococcal Vaccines: Menactra

- **Men ACWY-D (Menactra)**
  - **Licensed for 2-55 year olds as a single dose.**
  - **Recommended for all 11-13 year olds in 2005.**
  - **In 2011, licensed as two-dose series at 9 and 12 months.**
    - **Two-dose series recommended for infants at highest risk of meningococcal disease**
    - **Not recommended for children with asplenia.**

Meningococcal Vaccines: Menveo

- **Men ACWY-CRM (Menveo)**
  - **Licensed for 2-55 as single dose.**
  - **Four dose infants series (2, 4, 6, and 12 months) licensed by FDA in 2013.**
  - **First vaccine licensed for high risk infants (including asplenics) that includes serogroups A and W-135.**





Serogroup B Vaccine: Trumenba

New!

- MenB-FHbp (Trumenba)
- Licensed October 29, 2014
- Composed of two factor H binding proteins.
- 3 dose series (0, 2, 6 months)

Serogroup B Vaccine: Bexsero

New!

- MenB-4C (Bexsero)
- Licensed January 23, 2015
- Composed of *Neisseria meningitidis* adhesion molecule, factor H binding protein, heparin binding protein, and outer membrane vesicle containing a porin protein.
- 2 dose series (0, 1-6 months)

ACIP Approved Language – Feb 26, 2015 MenB Vaccine for Persons at Increased Risk

- A serogroup B meningococcal (MenB) vaccine series should be administered to persons aged ≥10 years at increased risk for meningococcal disease.* (Category A) This includes:
  - Persons with persistent complement component deficiencies.[1]
  - Persons with anatomic or functional asplenia.[2]
  - Microbiologists routinely exposed to isolates of *Neisseria meningitidis.*
  - Persons identified to be at increased risk because of a serogroup B meningococcal disease outbreak.
- Serogroup B vaccines are also recommended for outbreak control.

[1]Including inherited or chronic deficiencies in C3, C5-9 properdin factor D, factor H, or taking eculizumab (Soliris®).
[2]Including sickle cell disease.
*ACIP off-label recommendation.

Jessica MacNeil. Presentation to the Advisory Committee on Immunization Practices, February 26, 2015

Thank you!

Questions?

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