

Meningococcal Meningitis

Facilitator:

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Specific Learning Objectives

- At the end of session, the learner shall be able to describe:
 - Epidemiology of meningococcal meningitis
 - Diagnosis and treatment
 - Prevention and control

Introduction

- **Meningococcal meningitis**

- Bacterial form of meningitis

- Several different bacteria

- *Neisseria meningitidis*

- Six out of twelve serogroups (A, B, C, W135, X and Y) can cause epidemics.

- It can cause severe brain damage

- Fatal in 50% of cases if untreated.

- Even when the disease is diagnosed early and adequate treatment is started, 5% to 10% of patients die, typically within 24 to 48 hours after the onset of symptoms.

Epidemiology

- Epidemic rates of meningococcal disease varies:
 - $<1 - 3/100,000$ in many developed nations
 - $10 - 25/100,000$ in some developing countries.
- Occurs in small clusters throughout the world
- Seasonal variation

Outbreak trends

- **The meningitis belt**

- The largest burden of meningococcal disease occurs in an area of sub-Saharan Africa which stretches from Senegal in the west to Ethiopia in the east.
- During the dry season between December to June
 - ✓ dust winds, cold nights and upper respiratory tract infections combine to damage the nasopharyngeal mucosa
 - ✓ facilitated by overcrowded housing and by large population displacements.

India

- Isolated cases of meningococcal meningitis have been reported from many Indian states
 - including Haryana, Uttar Pradesh, Rajasthan, Sikkim, Gujarat, Jammu & Kashmir, West Bengal, Chandigarh, Kerala and Orissa.
- Serogroup A has been associated with all the repeated outbreaks of meningitis,
- Serogroup B and C have been detected in a few sporadic cases.

Transmission

- Person-to-person
- Droplets of respiratory or throat secretions from carriers.
- Close and prolonged contact with a carrier facilitates the spread of the disease
 - such as kissing, sneezing or coughing on someone, or living in close quarters (such as a dormitory)
- The average incubation period is **four days**
 - can range between two and 10 days.

- *Neisseria meningitidis*
 - only infects humans
 - no animal reservoir
 - The bacteria can be carried in the throat and sometimes, can overwhelm the body's defenses allowing infection to spread through the bloodstream to the brain.

Symptoms

- Most common:
 - stiff neck, high fever, sensitivity to light, confusion, headaches and vomiting.
- Less common but even more severe (often fatal):
 - meningococcal septicaemia, which is characterized by a haemorrhagic rash and rapid circulatory collapse.
- Bacterial meningitis may result in brain damage, hearing loss or a learning disability in 10% to 20% of survivors.

Diagnosis

- History & clinical examination
- Lumbar puncture
 - purulent spinal fluid
 - microscopic examinations of the spinal fluid
- Supported or confirmed by growing the bacteria from specimens of spinal fluid or blood, by agglutination tests or by PCR.
- The identification of the serogroups and susceptibility testing to antibiotics are important to define control measures.

Treatment

- A medical emergency.
- Admission to a health institution is necessary
 - isolation of the patient is not necessary.
- Appropriate antibiotic treatment
 - ideally after the lumbar puncture has been carried out if such a puncture can be performed immediately.
 - if treatment is started prior to the lumbar puncture it may be difficult to grow the bacteria from the spinal fluid and confirm the diagnosis.

- A range of antibiotics
 - Penicillin,
 - Ampicillin,
 - Chloramphenicol,
 - Ceftriaxone.
- Under epidemic conditions in areas with limited health infrastructure and resources, **Chloramphenicol or Ceftriaxone** are the drugs of choice because a single dose has been shown to be effective in meningococcal meningitis.

Prevention

- Types of vaccines:
- Polysaccharide vaccines
 - bivalent (groups A and C)
 - trivalent (groups A, C and W)
 - tetravalent (groups A, C, Y and W135)
- Group B ???
 - Antigenic mimicry
 - Outer membrane proteins (OMP) and strain-specific to control specific epidemics
 - particular in Cuba, New Zealand and Norway.
 - Additional universal group B protein vaccines are in late stages of development.

- Meningococcal conjugate vaccines:
 - Against group C have been available and widely used since 1999.
 - Tetravalent A, C, Y and W135 conjugate vaccines have been licensed since 2005
 - in Canada, the United States of America, and Europe.
 - In December 2010, a new meningococcal A conjugate vaccine
 - in Burkina Faso, and in selected regions of Mali and Niger.

- The **conjugate vaccine has several advantages** over existing polysaccharide vaccines:
 - it induces a **higher and more sustainable immune response** against group A meningococcus;
 - it **reduces the carriage** of the bacteria in the throat and thus **its transmission**;
 - it is available at a **lower price**;
 - it is expected to be particularly effective in protecting **children under two years of age**, who do not respond to conventional polysaccharide vaccines.
 - it is expected to confer **long-term protection**.

Global public health response

- With the introduction of the new meningococcal A conjugate vaccine, WHO promotes a strategy comprising:
 - **Epidemic preparedness:** surveillance, from case detection to investigation and laboratory confirmation.
 - **Prevention:** vaccinating all 1-29 year-olds in the meningitis belt with this vaccine.
 - **Epidemic response:** prompt and appropriate case management with oily chloramphenicol or ceftriaxone and reactive mass vaccination of populations not already protected through vaccination.