Microbe of the month

Breaking The Chain of Infection

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JULY 2022 NEWSLETTER

Compiled by
Helen Loudon IPC Consultant

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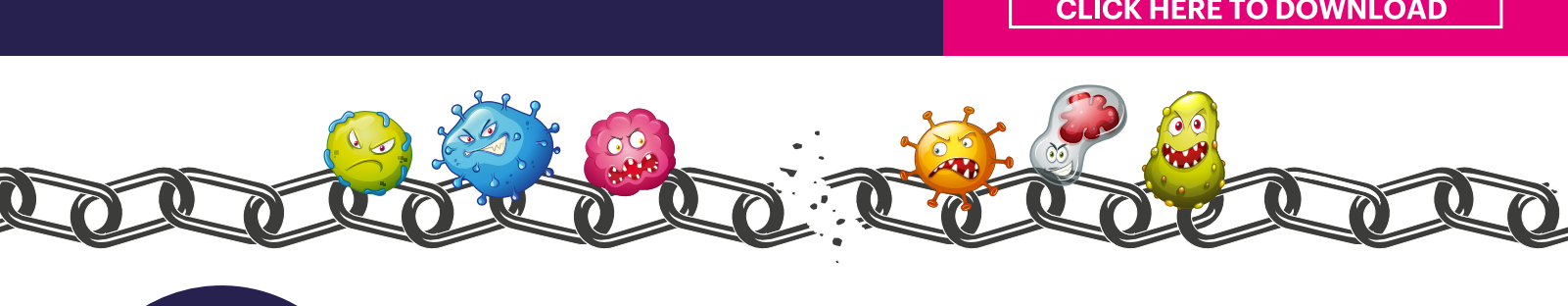

Featured this month:

Neisseria meningitidis

Meningococcal disease – devastating but preventable!

Hello readers!

The aim of the Microbe of the Month newsletter is to help create awareness about microorganisms of clinical importance, in an easy to read and understand format. Each newsletter provides insights into prevalent healthcare-related pathogens and those aspects which are relevant to Infection Prevention and Control (IPC), and Antimicrobial Stewardship (AMS) practice.

Please use this newsletter as a teaching tool in your workplace, share it widely with colleagues and start an 'infectious dialogue' about topical issues in infection control!

Background [1,2,3]

Meningococcal disease is caused by the small Gram-negative, encapsulated diplococcus *Neisseria meningitidis (N. meningitidis)*, commonly called the **'meningococcus'. It is important to note that humans are the sole natural host of this pathogen. Meningococcal disease is a category 1 notifiable medical condition – a widespread and devastating illness known for its epidemic potential and high rates of morbidity and mortality, despite appropriate therapy.**

The highest number of cases of the disease seem to occur in the semi-arid regions of sub-Saharan Africa (known as the 'African Meningitis Belt') – **especially during the winter months.**[2]

Disease onset is often rapid and can become life-threatening despite appropriate antibiotic therapy. **The consequences of infection range from hearing loss and severe scarring, to loss of limbs, and neurological damage, in at least 20% of survivors.** Over the last decade, approximately 17% of people with meningococcal disease in South Africa have died, with case fatality ratios increasing with age.[1,4]

Key words: *carriage, notifiable medical condition, meningococcal disease, long-term disability, chemoprophylaxis, meningococcal vaccine.*

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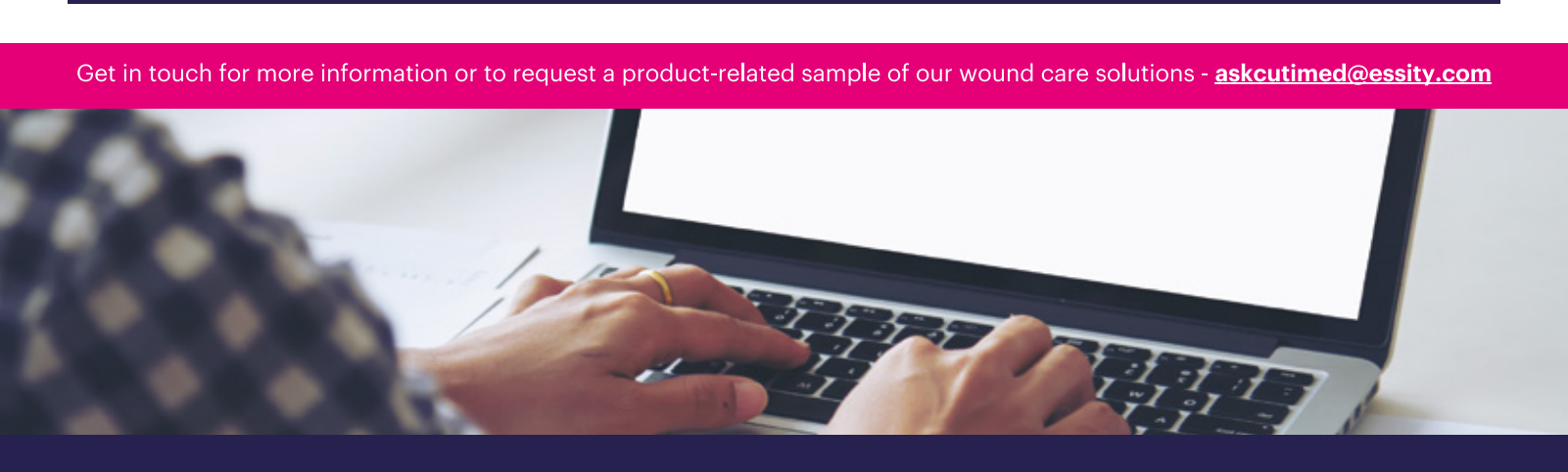

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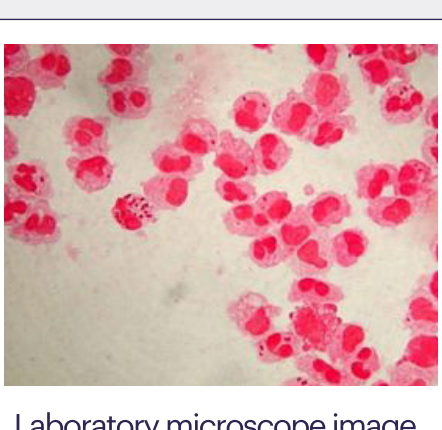
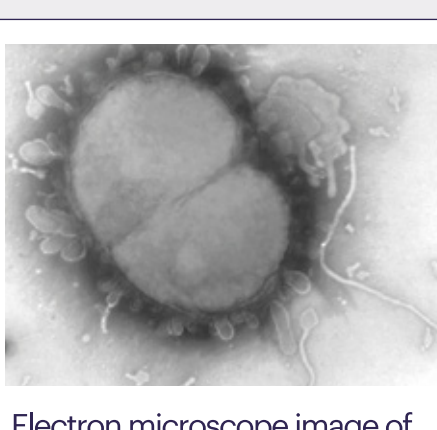
THE MICROBIOLOGY OF NEISSERIA MENINGITIDIS [1,3,4,5]

N. meningitidis has a characteristic bean-shaped appearance, always appearing in pairs commonly known as '**diplococci**'. Importantly, the organism is surrounded by a protective polysaccharide capsule, which is used to classify the organism into **12 serogroups**. Six of these 12 serogroups have been found to cause disease in South Africa, with A, B, C, W, X and Y causing most cases of meningitis.[3,4]

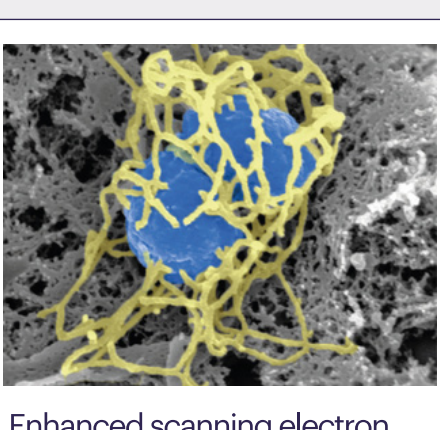
The **polysaccharide capsule** surrounding *N. meningitidis* not only stimulates a powerful antibody response, but is also a strategic **virulence structure** which makes it antiphagocytic (i.e., preventing phagocytosis and destruction by polymorphonuclear leukocytes). Other virulence characteristics include the release of potent **endotoxins**, which cause blood vessel destruction, haemorrhage, toxic shock, organ failure and fatal sepsis. *N. meningitidis* also possesses **pili** that allow attachment to human nasopharyngeal cells, where **they undergo antigenic changes to avoid detection by the immune system** – blending in and becoming part of the normal flora of the nasopharynx.[1,5]



Laboratory microscope image clearly depicting the pairing of bean-shaped '**diplococci**' of *Neisseria meningitidis*.



Electron microscope image of *Neisseria meningitidis* showing the protective **polysaccharide capsule** and surface 'blebbing' (release of endotoxins).



Enhanced scanning electron micrograph of a single Neisseria *meningitidis bacterium* (blue) with its **adhesive pili** (yellow).

EPIDEMIOLOGY AND MODE OF TRANSMISSION [1,3,4]

Approximately 5-10% of the population are **carriers** of *N. meningitidis* and are fortunate, as this asymptomatic nasopharyngeal infection allows them to develop anti-meningococcal antibodies to that strain (this is called 'natural immunisation'). **Carriers spread the organism from person to person via respiratory droplets during close personal contact.** Meningococcal disease occurs when an invasive strain of the organism invades the oropharyngeal mucosa and enters the bloodstream, causing **septicaemia** and/or **meningitis**. Meningococcal disease usually occurs 3-7 days after exposure to an invasive organism. **Infants under 12 months of age have the highest incidence of meningococcal infection. Disease onset is rapid and severe, and all cases require urgent medical attention.**

Risk factors for acquisition of carriage (a prerequisite for disease) include passive smoking, intimate personal contact (kissing), pub or club attendance, overcrowding, and **mass gatherings**. Because these are all largely behaviour-related, this may explain the **high rates of carriage seen in teenagers and young adults**. Other risk factors for disease include HIV infection, auto-immune deficiencies and asplenia. (Meningococcal disease rarely spreads from person to person; rather, it is obtained through contact with an asymptomatic carrier.) Meningococcal caseloads are known to wax and wane over periods of 5 to 10 years; therefore, it is possible that South Africa may see another increase in meningococcal disease soon.[1]

SIGNS AND SYMPTOMS [4]

Most meningococcal disease patients present with prodromal symptoms the week prior to hospital admission. These symptoms generally arise after an incubation period of 2-10 days (average 3-4 days) and are suggestive of an upper respiratory tract infection – including sore throat, nasal discharge, cough and earache. The presence of fever during this phase is not always reported and may have been masked by the use of antipyretics.

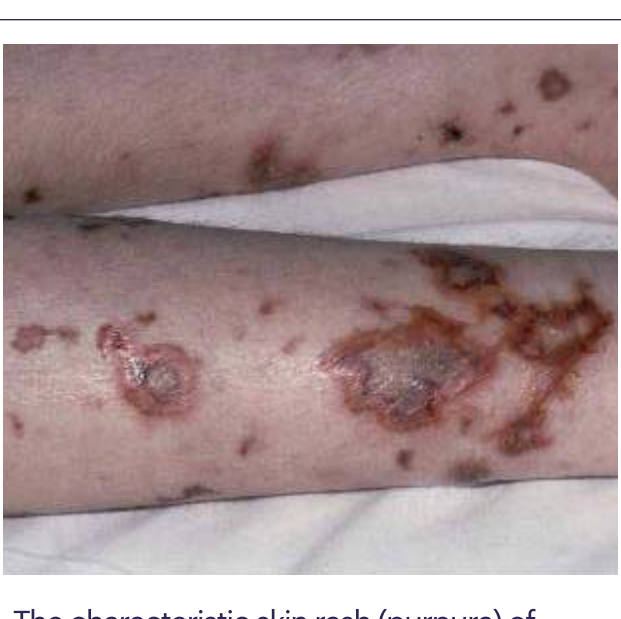
Healthcare workers should consider meningococcal disease when persons present with a non-specific illness that is rapidly deteriorating.

Common symptoms may include:

- **sudden onset of a high fever**
- **severe headache**
- **neck stiffness**
- **dislike of bright lights (photophobia)**
- **vomiting and/or severe diarrhoea or abdominal pain**
- **painful joints**
- **pale and blotchy skin**
- **very cold hands and feet**
- **seizures, or drowsiness that can rapidly deteriorate into a coma**

Symptoms in infants are harder to detect and could include a fever with cold peripheries, high-pitched moaning or whimpering, blank staring, inactivity, drowsiness, poor feeding, opisthotonus (neck retraction with arching of the back), and/or a pale and blotchy complexion.

A late and serious symptom of meningococcal septicaemia is the characteristic purpuric rash. It begins as a cluster of pinprick blood spots under the skin, spreading to form bruises. The rash can appear anywhere on the body and does not fade under pressure. **Development of this rash is a medical emergency.**



The characteristic skin rash (purpura) of **meningococcal septicaemia** caused by *Neisseria meningitidis*.

LABORATORY DIAGNOSIS [4]

Confirmation of the disease requires either:

- Isolation of *N. meningitidis* from a normally sterile body site (i.e., cerebrospinal fluid [CSF] or blood culture)
- Detection by PCR assay (from CSF, EDTA-coagulated whole blood, serum, plasma, or joint fluids)

Note: Lumbar puncture should only be performed where NO contraindications exist (i.e., hypotension, bleeding tendency, focal neurological impairment and severe brain swelling on imaging). **If meningococcal disease is suspected in a primary care setting, lumbar puncture should be delayed until arrival in hospital.**

- CSF should be sent for protein, glucose, direct microscopy (i.e., cell count and Gram stain), culture and antibiotic susceptibility.
- **Note:** Rapid bacterial antigen detection tests should not be used routinely as they may be unreliable.

TREATMENT OF MENINGOCOCCAL DISEASE [4]

Suspected meningococcal disease is a medical emergency and treatment should not be delayed (even whilst awaiting transfer, lumbar puncture, imaging, or laboratory confirmation).

- Intravenous ceftriaxone (adults: 2g 12-hourly, or infants/children: 50mg/kg/dose 12-hourly) or cefotaxime (adults: 2g 6-hourly, or infants/children: 50mg/kg/dose 6-hourly) should always be used for empiric therapy for suspected bacterial meningitis.
- **Once confirmed as meningococcal septicaemia/meningitis, the recommended drug of choice is high-dose IV benzyl penicillin** (adults: 5 MU 6-hourly, or infants/children: 100,000 U/kg/dose 6-hourly) for 5-7 days.

Patients with known or suspected meningitis should be isolated at the time of admission with respiratory droplet precautions (i.e., surgical facemask) and can be transferred to a general ward after receiving at least 24 hours of treatment with an antibiotic which will eliminate nasopharyngeal carriage (ceftriaxone / cefotaxime).

Patients on penicillin alone should also receive chemoprophylaxis with ceftriaxone to eradicate nasopharyngeal carriage.

Chemoprophylaxis should be offered to close contacts of confirmed or probable cases [4]

- Close contacts include those who have had prolonged close contact with the case in the 7 days preceding the illness.
- Examples would include those living and sleeping in the same household / army barracks / hostel / dormitory.
- Transient close contacts only require prophylaxis if they have been exposed to large droplets or secretions from the respiratory tract; for example, intimate kissing / sexual partners and **ambulance / emergency personnel.**
  - A single dose of oral ciprofloxacin or intramuscular ceftriaxone should adequately clear carriage.
  - Alternatively, a 2-day course of oral rifampicin may be given.

Prophylaxis is **NOT** routinely indicated following a single case for all work / school contacts (unless a crèche setting where close respiratory contact may have occurred); all passengers on a plane / train / bus; all healthcare personnel; or all persons attending the same social function – unless they have already been identified as a close contact above.

PREVENTION OF MENINGOCOCCAL DISEASE AND OUTBREAKS [1,3,4]

Certain strains of meningococcal disease can be prevented through vaccination. South Africa currently has two quadrivalent formulations (which target serogroups A, C, W and Y) of vaccine registered:

- a polysaccharide vaccine (suitable only for those >2 years of age)
- a conjugate vaccine (suitable for use from 9 months old)

Where possible, in **persons who remain at high risk of meningococcal disease, the conjugate vaccine is preferred, as hypo-immunity has been associated with repeated doses of the plain polysaccharide vaccine.**

Currently there are no vaccines targeting meningococcus serogroup B registered in South Africa. Although vaccination is recommended for certain high-risk groups, meningococcal vaccine is not part of the national immunisation programme in South Africa.

While the incidence of meningococcal disease is currently low in South Africa, the consequences of acquiring the disease can be devastating despite adequate treatment; and ideally, all South Africans should be protected against this disease. Certain individuals are at higher risk for acquiring the disease, and vaccination is recommended in the following circumstances:

- Persons with primary autoimmune conditions (particularly complement deficiency)
- Those on immunosuppressive therapy following solid organ transplant or haemopoietic stem cell transplant
- HIV infection
- Those with functional or anatomic asplenia are considered at high risk and should be offered routine vaccination
- Other groups at increased risk include those with **occupational exposure** to meningococci (e.g., a microbiology laboratory), persons living in crowded living conditions (e.g., school / university students in hostels, army recruits and miners) and those travelling to hyperendemic areas should be offered routine vaccination.[1]

THE BOTTOM LINE...[4]

- **Mandatory notification to the local or district health authority of all clinically suspected cases within the first 24 hours is required to facilitate urgent contact tracing.**
- Notification may be done electronically by using the NMC (Notifiable Medical Conditions) App, available at https://www.nicd.ac.za/nmc-overview/notification-process/ or https://mstrmobile.nicd.ac.za/nmc/
- Notification can also be done by completing the Notifiable Medical Conditions (NMC) Case Notification Form – https://www.idealhealthfacility.org.za/App/Document/Download/62; which should be emailed to NMCsurveillanceReport@nicd.ac.za or faxed to **086 639 1638** (also send a copy to the NMC focal person at your local / District Authority).
- **Notifiable Medical Conditions Hotline: 072 621 3805**
- **Healthcare workers can also call the NICD Hotline for afterhours and emergency medical advice and assistance: 082 883 9920**
- Patient isolation with standard and respiratory droplet precautions (surgical face mask required) is crucial, and should be maintained for a period of at least 24 hours following the first dose of antibiotic.
- STAT chemoprophylaxis should be offered to close contacts of probable / confirmed cases.
- Although the need for routine vaccine against meningococcal disease in South Africa is controversial given the currently low burden of disease - due to its high potential for morbidity / mortality, it is recommended that clinicians consider vaccination of healthy infants and children; HIV-infected persons with a CD4 count >25%; students at boarding schools / university residences / military barracks (i.e., shared living facilities); and miners.
- The meningococcal meningitis vaccine is recommended for use from 9 months of age; and all healthy infants should have received 2 doses (given 12 weeks apart) before the age of 2 years.
- Note: Protein-conjugated meningococcal vaccine is preferable to the polysaccharide vaccine given the ability of the protein-conjugated meningococcal vaccine to induce immune memory, allow for booster responses and eliminate carriage of the organism in the person vaccinated.

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REFERENCES

1. Meiring, S, Hussey G, Jeena P, Parker S, von Gottberg, A. Recommendations for the use of meningococcal vaccines in South Africa. Southern African Journal of Infectious Diseases, 2017;32:3, 82-86. https://doi.org/10.1080/23120053.2017.1359939
2. Batista RS, Gomes AP, Dutra Gazineo JL, Balbino Miguel PS, Santana LA, Oliveira L, Geller M. Meningococcal disease, a clinical and epidemiological review. Asian Pac J Trop Med. 2017 Nov;10(11):1019-1029. doi: 10.1016/j.apjtm.2017.10.004.
3. World Health Organisation (WHO). Factsheet Meningitis 28th September 2021. https://www.who.int/news-room/fact-sheets/detail/meningitis
4. National Institute for Communicable Diseases (NICD). Meningococcal Disease. An Update for Healthcare Workers April 2019. https://www.nicd.ac.za/wp-content/uploads/2019/04/Meningococcal-disease-for-HCW_NICD-04042019.pdf
5. Gladwin M, Trattler W, Mahan CS. Medical Microbiology Made Ridiculously Simple. 6th Edition. Miami, FL: MedMaster, Inc; 2014