GUIDELINES FOR THE MANAGEMENT, PREVENTION AND CONTROL OF

Meningococcal Disease

IN SOUTH AFRICA

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PREFACE

It is the role of the Department of Health to decrease morbidity and mortality due to emerging and re-emerging epidemic-prone infectious diseases. The Department has developed these guidelines, to strengthen health care response to meningococcal disease.

Meningococcal infection is an important disease in children and young adults worldwide. Health workers play a vital role in treatment, following up close contacts, and allaying of fears of families and low risk contacts. Although South Africa has not experienced large epidemics that occur periodically in the “meningitis belt” and occasionally in refugee camps in central Africa, occasional clusters/outbreaks do cause national alarm. It is vital that this commonly fatal disease is managed properly.

These guidelines emphasise the importance of a high index of suspicion, early detection and appropriate rapid management of the disease. The importance of both clinical and laboratory surveillance is outlined. Prompt reporting and management of disease prevents transmission of disease and mortality.

This document aims to

- Improve the understanding of the pathogenesis of meningococcal disease
- Encourage the early recognition of meningococcal disease
- Strengthen the management of cases and contacts
- Encourage appropriate responses to a case, a cluster or an outbreak of meningococcal disease

I trust these guidelines will assist health workers in their task of diagnosing and managing people affected by meningococcal disease and will also assist in their task of informing the public, and so help us build a healthier nation.

DR A MOTSOALEDI, MP
MINISTER OF HEALTH

ACKNOWLEDGEMENTS

The guideline for the management, prevention and control of meningococcal disease in South Africa was developed by the National Department of Health in collaboration with several stakeholders.

I would like to express my sincere gratitude to members of the Meningococcal Diseases Working Group who were responsible for drafting these guidelines. The Meningococcal Diseases Working Group was represented by members from the following organizations:

- National Department of Health
- World Health Organisation (WHO)
- Stellenbosch University
- National Institute for Communicable Diseases
- National Health Laboratory Services (Medunsa)
- Communicable Diseases, KwaZulu-Natal
- Federation of Infectious Disease Societies of Southern Africa

I would also like to thank a wide variety of people working in various health departments and the private sector, academic institutions, and researchers for their continued valuable contributions.

MS MP MATSOSO
DIRECTOR GENERAL: HEALTH

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GUIDELINES FOR THE MANAGEMENT, PREVENTION AND CONTROL OF MENINGOCOCCAL DISEASE IN SOUTH AFRICA

Key information to facilitate action:

1. Carriage of meningococcus in the throats of the public at large is common (5 -10%)
2. **Person to person transmission of disease is rare.** (More than 95% of cases have no clear contact) but close contacts have a higher risk, (see 8 below)
3. **Meningococcal disease can progress to death within hours**
4. **A high index of suspicion is vital:**
   - Some of the following signs and symptoms may or may not be present: fever; headache; stiff neck; and a reddish spotty or blotch rash which does not fade on pressure (look also on palms or soles of feet)
   - Disease occurs more often in winter and early spring in infants and young people in school, university, police colleges, army barracks, mines or prisons.
5. **Treatment: Antibiotics** (ceftriaxone/cefotaxime or penicillin iv if characteristic rash is present) and fluid resuscitation of shocked patient before transfer can be life saving
6. **Transfer** of any suspected case to hospital Immediately
7. **Report** suspected case(s) telephonically to district health team as soon as possible (see Section 13)
8. Give preventive treatment to close contacts at risk (such as household members or those having contact with the patient's oral secretions - See Section 13).
9. Consult this document for more detailed recommendations for those responsible for responding in one way or another to suspected and confirmed cases, contacts, clusters or outbreaks.
10. Note these guidelines and attachments are available at www.doh.gov.za

Meningococcal disease is a notifiable disease in South Africa. All cases of suspected and/or confirmed meningococcal disease should be notified immediately by telephone to the Local/District Health Department so that follow-up of close contacts is undertaken immediately. Written notification to the Local Health Department should follow.

Deaths from meningococcal disease tend to occur more often when there are fewer cases and there is a lower index of suspicion. Health workers are reminded in early winter from June/July onwards each year to be on the look out for early symptoms and signs of meningococcal disease.

1. INTRODUCTION

The aim of this document is to outline an approach to the management of a case of meningococcal disease, in order to strengthen the knowledge of the organism, the disease, the management of cases and contacts and encourage an appropriate public health response.

The key sources of information in this document were the following:

1. WHO Fact sheet No. 141 Meningococcal Meningitis, May 2003
2. Guidelines for the public health management of meningococcal disease in the UK PHLS September 2002.
3. Control of Communicable Diseases Manual, 18th edition ed: David Heymann, 2004 American Public Health Association
4. The Craigavon Infection Control Manual. N Damani/J Keyes
5. Morbidity and Mortality Weekly Report (MMWR)- Prevention and Control of Meningococcal Disease, May 27th 2005.

2. CAUSATIVE AGENT

Vieusseaux first described "cerebrospinal fever" in 1805 when an outbreak swept though Geneva, Switzerland. Reports throughout the 19th century confirmed the episodic, epidemic nature of the disease tending to affect young children and military recruits living in barracks. The causative agent, *Neisseria meningitidis* (the meningococcus), was identified in 1887 when Weichselbaum reported finding a new organism in the cerebrospinal fluid of six post-mortem cases during an epidemic. He called the organism "diplococcus intracellular meningitis", to distinguish it from the intracellular diplococcus gonorrhoea identified by Neisser in 1879.

Meningococci are classified according to the characteristics of their polysaccharide capsule. Thirteen serogroups of *N. meningitidis* have been identified and five (A, B, C, W135 and Y) are recognized to cause epidemics. The pathogenicity, immunogenicity, and epidemic capabilities differ according to the serogroup. The identification of the serogroup is important for surveillance purposes and decisions about public health responses.

3. RISK FACTORS

3.1 The Agent

Neisseria meningitidis (the meningococcus) commonly colonises the nasopharynx without causing disease. Strains associated with invasive disease have acquired certain virulence factors, which are, as yet, poorly understood.

3.2 The Host

Medical conditions that commonly predispose individuals to invasive disease include:

- Deficiencies of the terminal components of the complement system
- Functional or anatomical asplenia

3.3 The Environment

The risk of infection is related to the nature and duration of contact. Household contacts of a case of meningococcal disease have a 400 - 800 fold increased risk of infection compared to the general population. Household overcrowding, coexisting viral infection and especially exposure to tobacco smoke also increase the risk. However despite perceived risk, only 0.5% of cases are associated with a household contact. When fairly large numbers of first year university/ technikon students, military or police recruits live together in residences, hostels or barracks they also have a 3 times higher incidence of disease than in the general population.

4. PATHOGENESIS OF DISEASE

Humans are the only natural host of meningococcus. The transmission of *N. meningitidis* is directly from person to person by droplet spread or intimate contact with nasopharyngeal secretions. Nasopharyngeal carriage of meningococci is much more common than invasive meningococcal disease. Nasopharyngeal carriers rather than patients with meningococcal disease are generally the source of new infections.

Studies in the United States and the United Kingdom show that between 5-10% of the population carry *N. meningitidis* at any given time. Carriage rates increase from about 2% in children under five to 25% in the late teens. Carriage is increased in smokers, overcrowded households, new military recruits and in first year residents of university hostels. Asymptomatic carriage of meningococcus is an immunising event and systemic immunity (serum antibodies) develops about 14 days after acquisition of meningococci. Invasive disease develops in the minority of people who carry meningococcus and usually occurs in the first 3 to 5 days after acquisition of meningococci. In these

individuals the organisms in the nasopharynx evade the immune system and this result in blood stream invasion and dissemination especially to the brain.

The incubation period is 3 - 4 days (range 2 to10).

5. EPIDEMIOLOGY OF MENINGOCOCCAL DISEASE

5.1 Global picture

Meningococcal disease occurs sporadically in small clusters throughout the world. In temperate climates there is a seasonal pattern to disease with an increased incidence in winter and early spring. Changes in patterns of disease and serogroups are characteristic of meningococcus and highlight the importance of ongoing surveillance. Serogroups B and C account for a large majority of cases in Europe and the Americas. Serogroup C is also responsible for large outbreaks in Africa, South America and Asia. In the African meningitis belt serogroup A predominates with smaller epidemics caused by serogroup C and recently with serogroup W135. Serogroup A is usually the cause of meningococcal disease in Asia. In South Africa the pattern of meningococcal disease is characterised by sporadic cases throughout the year with occasional small clusters and a definite seasonal increase in winter and early spring.

5.2 The African Meningitis Belt

The highest burden of meningococcal disease occurs in the “Meningitis Belt”, an area stretching from Senegal in the west to Ethiopia in the east (Figure 1). This region has an estimated total population of 300 million people and is characterized by particular climatic and demographic conditions. During the dry season (December to June) dust storms increase the risk of upper respiratory tract viral infections. In addition, large numbers of people travel back and forth to the Hajj and to regional markets, so that crowding is exacerbated. Serogroup A diseases predominates and seasonal incidence rates vary between 1 and 20/ 100 000 annually. Every 8 to 12 years, with the waning of herd immunity, attack rates increase to 100 to 800 per 100 000 population with some communities reporting rates as high as 1000 per 100 000. The spread of a new epidemic-prone strain of serogroup W135 has been linked with the Hajj pilgrimage, causing high morbidity and mortality, particularly in West Africa. Following these Hajj-related outbreaks, since 2000, vaccination with a quadrivalent meningococcal vaccine has become mandatory for travellers to Saudi Arabia.

During endemic periods the highest attack rates are observed in young children, while during epidemics, older children, teenagers and young adults are also affected. In 1996,

the meningitis belt experienced the largest recorded outbreak of epidemic meningitis in history, with over 250 000 cases and 25 000 deaths reported. Between that crisis and 2004, over 223 000 new cases of meningococcal meningitis were reported to the World Health Organization. In 2002, the outbreaks occurring in Burkina Faso, Ethiopia and Niger accounted for about 65% of the total cases reported in the African continent.

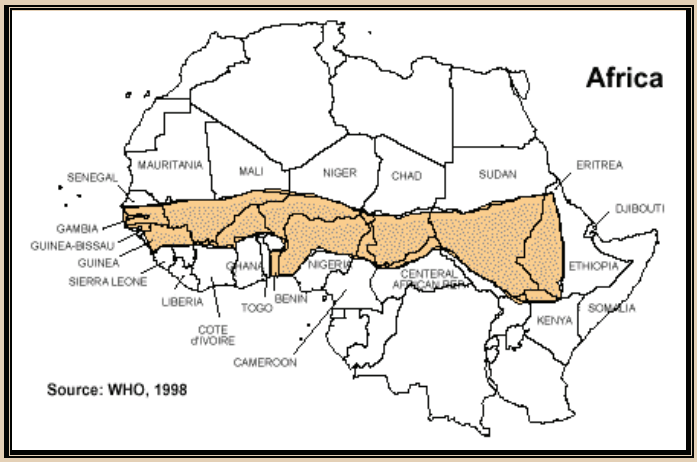

Figure 1: Map of the African meningitis belt

5.3 Meningococcal Disease in South Africa

It is important to recognise the difference between the epidemics that occur in the "meningitis belt" and the sporadic seasonal increase in cases seen in South Africa. Increases in sporadic cases and outbreaks of meningococcal disease tend to occur in late winter and early spring in South Africa and outbreaks may especially occur in mines, correctional and detention facilities, academic institutions, and displaced communities. The total number of cases notified in South Africa has decreased steadily from around 2000 cases in 1972 to less than 500 cases in 2005. Under-notification after laboratory confirmation is the key factor.

The National Institute for Communicable Diseases (NICD) data on laboratory-confirmed cases indicate high incidences in the Gauteng and the Western Cape provinces. The incidence rates as reported are highest in the less than five-year-old age group. In the Western Cape serogroup B tends to be the most common serogroup. Outbreaks have been linked to the mining areas of Gauteng and North West provinces with serogroup A, and to a lesser extent, serogroup C predominating. As identified by the Respiratory and Meningeal Pathogens Reference Unit (RMPRU) of the National Institute

for Communicable Diseases (NICD), since 2003, an increase in the number of cases of serogroup W135 has been reported in Gauteng province. This has been associated with a decrease in serogroup A disease.

5.4 Carriage of Meningococci

About 5 to 10% of people carry meningococci in their nasopharynx, very few will become ill due to the organism to some extent depending on risk factors mentioned above. Transmission of meningococci is higher in closed populations such educational institutions, prisons, army camps and is facilitated by climatic and living conditions such as winter, crowding and poor ventilation. In households and closed populations the carriage rate is significantly higher (20-70%). Carriage is more often in adolescents and young adults, lasts about 3 to 4 months and results in an immunological response and generates herd immunity.

6.CLINICAL FEATURES

Meningococcal disease presentation may be non-specific in the early stages and a high index of suspicion should be maintained. Disease presentation may also be acute and rapidly progressive. Key symptoms such as fever, headache and neck stiffness may be absent or slow to develop, particularly in young infants with meningococcal meningitis. Only 50% of patients present with meningococcaemia, and a rash is usually but not always present.

Summary of clinical presentations of meningococcal disease

Note: more than one clinical syndrome can occur simultaneously

- **Meningococcal meningitis (50%)**
- **Meningococcal septicaemia/Meningococcaemia:** progressive bleeding into the skin and circulatory collapse, Waterhouse-Friedrichsen syndrome (adrenal gland infarction accompanied by profound shock) and multi organ failure (10 - 20%)
- **Respiratory infection:** pneumonia **(5 - 15%)**
- **Focal infection:** conjunctivitis; septic arthritis; purulent pericarditis, endocarditis, myocarditis, (focal infections tend to occur in association with meningococcal septicaemia).
- **Chronic meningococcaemia:** intermittent fevers, rash, arthralgia and headaches (it is a rare syndrome)

6.1 Clinical features of meningococcal meningitis

Although sudden onset of illness with rapid progression to shock does occur, more commonly meningococcal disease is of a less dramatic nature and therapy is often effective. The disease may present initially as a flu-like illness with fever, malaise, headache, muscle pain, nausea or vomiting. Features of disease may include the following:

- Neck stiffness
- Photophobia
- Prostration
- Vomiting
- Impaired consciousness
- Hypotension
- Raised intracranial pressure

In infants particularly (less than 1 year old), the onset may be insidious and classical signs absent. The diagnosis should be suspected in young children in the presence of vomiting and fever, irritability, and, if still patent, raised anterior fontanel tension. With early diagnosis and appropriate management, the mortality rate of meningococcal meningitis is between 5% and 10%, however persistent neurological damage occurs in about 10 to 20% of survivors.

6.2 Clinical features of meningococcal septicaemia

The disease may present initially as a non-specific upper respiratory illness e.g. pharyngitis, followed by fever, headache, joint pain, vomiting, neck stiffness and photophobia. The haemorrhagic rash is a distinctive feature of meningococcal septicaemia and is indicative of severe disease, where the mortality rate may be as high as 50%. Although the rash is typically haemorrhagic or petechial in nature, it can also resemble the maculopapular rash of viral infections. In many cases the petechial rash will start on the buttocks, back of the legs and conjunctivae. The rash typically does not blanch on pressure and the petechiae may be difficult to see in the early stages, particularly in dark skin (checking the conjunctivae, soles and palms may in such cases reveal the petechiae). Remember the rash may be absent.

The onset of illness can be very rapid and, in 5-10% of cases, the disease may be fulminant within a few hours of onset. Cases may present with hypotension, shock, confusion, coma and death. Disseminated intravascular coagulation (DIC) may also

occur. Such patients often respond poorly to antimicrobials, steroids, or vasopressor agents and usually require admission to an intensive care unit.

6.3 Clinical Differentiation

The clinical differential diagnosis of bleeding and fever with or without neurological signs includes:

- Viral haemorrhagic fevers (notably Crimean Congo Haemorrhagic Fever for South Africa)
- Severe tick bite fever
- Rift Valley fever
- Severe sepsis – caused by Gram-negative or Gram-positive bacteria
- Fulminant malaria
- Fulminant hepatitis
- Advanced HIV infection with AIDS related complications
- Leukaemia and other malignancies.

7. LABORATORY INVESTIGATIONS

7.1 Blood Culture

Blood must be collected in blood culture specimen bottles using strict aseptic technique (s) from all suspected cases and sent to the laboratory as quickly as possible. Specimens should reach the laboratory within 3-4 hours and not beyond 24 hours. Ideally two sets (taken from different sites and at different times) of blood cultures should be submitted prior to antibiotic therapy but treatment should not be delayed in order to obtain specimens. Even in cases of meningitis, blood for culture must be collected. About 1-5 ml of blood is needed in children and 5-10 ml in adults. Ideal volumes may vary depending on the blood culture system in use. Laboratories can be consulted for optimal blood volumes. Specimens must be kept at room temperature (not in a refrigerator) whilst awaiting transport to the laboratory.

If the clinical picture is compatible with meningococcal septicaemia, do not delay giving penicillin or ceftriaxone if laboratory confirmation cannot be immediately obtained. Early use of antibiotics in this setting can be lifesaving.

7.2 Cerebrospinal fluid (CSF)

Cerebrospinal Fluid (CSF) Examination and Culture

A lumbar puncture should be performed for suspected meningitis where no contraindications exist. In the primary care setting a lumbar puncture does not need

to be done. Emphasis should be placed on administration of lifesaving care and urgent transfer to a referral hospital.

In adults

Where lumbar puncture is not contraindicated and can be safely performed; this should be done, as it provides valuable diagnostic information on the specific cause of meningitis.

In Children

The clinical signs indicating the presence or absence of raised intracranial pressure in children are notoriously inaccurate and should never be relied upon. A lumbar puncture is not indicated in a child with clinical meningococcemia even if meningism is found. A lumbar puncture should never be done if there is any suggestion of impaired level of consciousness.

A blood culture and urgent treatment based on clinical assessment is more appropriate.

Contraindications to lumbar puncture in adults

Lumbar puncture is contraindicated in patients with raised intracranial pressure. Classical signs of RAISED INTRACRANIAL PRESSURE such as bradycardia, papilloedema or hypertension are often absent, especially in children. Neurological imaging, e.g. CT scanning should be considered before doing a lumbar puncture in all patients who have signs of:

- Raised intracranial pressure (impending cerebral herniation) with focal neurological signs or papilloedema.
- New onset seizures and an abnormal level of consciousness should prompt a careful examination to exclude raised intracranial pressure.
- Intracranial pathology with mass effect. Signs include:
  - Deep coma (Glasgow Coma Scale (GCS) less than 13),
  - Sudden deterioration of level of consciousness,
  - Decerebrate or decorticate posturing
  - Neurogenic hyperventilation
  - Unequal dilated or poorly reactive pupils and
  - Absent doll's eye reflex

Lumbar puncture should also be delayed in patients with haemodynamic instability (low blood pressure or uncorrected bleeding tendency).

Note: If no imaging is available or where a significant delay in performing a lumbar puncture is expected, empirical antimicrobial therapy should be started after taking samples for blood culture. If possible perform the lumbar puncture, if indicated, as soon as possible thereafter.

Transport and processing of CSF

The CSF should be kept as close to body temperature as possible whilst awaiting transport. The meningococcus is highly susceptible to heat, cold and direct sunlight. So the specimen should not be refrigerated, left on the window sill or transported in a hot car boot!

Tests to be requested on the cerebrospinal fluid (CSF) include:

- Protein and glucose determination (a blood glucose should also be done)
- Direct microscopy (cell count and Gram stain)
- Culture and antibiotic susceptibility testing

If HIV infection is suspected an Indian ink stain and cryptococcal latex antigen test for cryptococcal meningitis should also be requested.

Note: the isolation of *N. meningitidis* on culture from a normally sterile site confirms the diagnosis and allows for appropriate antimicrobial susceptibility testing and serogrouping to be performed in a reference laboratory. This information allows for detection of emerging antimicrobial resistance and monitoring of epidemic spread of infection.

The typical findings in CSF of adults may include the following:

- White blood cell count: often above 1000 cells/mm3 with 60% polymorphonuclear cells*
- Protein level: >0.80g/l (should be <0.45 g/l in normal CSF)
- CSF glucose concentration 2/3 lower than blood glucose
- Gram stain showing Gram-negative diplococci (intra and/or extracellular).

  ** may be low in immunocompromised patients*

7.3 Aspirates from other normally sterile sites specimens, skin rash aspirate or biopsy culture

These should be taken as clinically indicated, but if culture from these sites yield meningococci, this would confirm invasive disease.

7.4 Oropharyngeal swabs

Oropharyngeal swab specimens are less likely to be affected by prior antibiotic use, and may assist in making the diagnosis when used in conjunction with other laboratory test results and the clinical characteristics of presenting disease. In the absence of isolation of meningococci or positive PCR results from normally sterile sites, a positive culture from an oropharyngeal swab does not confirm disease, and may only reflect asymptomatic carriage.

Non-culture diagnostic tests

Polysaccharide antigen testing

Rapid detection tests for bacterial antigen using latex agglutination may give false positive and false negative results and should be interpreted with caution. They should not be routinely requested on all CSF specimens but reserved for certain circumstances e.g. patients in whom antibiotic therapy has been given prior to lumbar puncture, which may result in a negative culture.

PCR (polymerase chain reaction)

PCR-based assays for detecting specific DNA sequences of *N. meningitidis* are available at the meningococcal reference laboratory at the National Institute for Communicable Diseases, Johannesburg. The test has been validated and performs well for CSF and blood specimens; however, specimens from other normally sterile site can also be tested. Whole blood (EDTA or other unclotted specimen) and/or CSF specimens can be sent for PCR if cultures are negative, if the diagnosis is suspected and facilities for culture are not available, or if specimens are taken after commencing antibiotics. Direct communication with the laboratory in Johannesburg (011 555 0315/ 0327/ 0316) will assist in the urgent transportation of the specimen and expedited testing.

Skin scrapings/impression smears

The practice of performing skin scrapings and impression smears for Gram stain from the petechial/purpuric site is not recommended. A negative Gram stain does not exclude the diagnosis. In addition (*Neisseria)* species may form part of normal skin flora and will resemble meningococci on Gram stain thus yielding false positive results.

Post-mortem specimens

Post-mortem specimens can be taken to confirm an ante-mortem suspected diagnosis of meningococcal disease, or may be a way of establishing the cause of illness and death in cases with undiagnosed infection. These specimens may be especially useful

for sudden, unexplained deaths, especially in infants and young adults. Spleen and heart blood cultures can be submitted and processed similar to routine blood cultures, especially if performed as soon as possible after death (ideally within 15 hours). Post-mortem CSF can also be submitted to a microbiology laboratory for processing. Ideally specimens should be taken at the start of the post-mortem examination, and every effort should be made to avoid contamination. Non-culture diagnostic tests may be very important if meningococcal disease is suspected, and specimens should be submitted for PCR in addition to culture (see above for details).

8 INFECTION CONTROL

Infection control measures for cases of meningococcal disease include:

- Isolation of patients in a side ward with standard precautions AND respiratory droplet precautions. These patients may be transferred when necessary to a general ward 24-48 hours after receiving adequate treatment with a drug that will reliably eliminate nasopharyngeal carriage (ceftriaxone/cefotaxime). Patients on penicillin alone can only be moved from isolation after being given chemoprophylaxis to eradicate nasopharyngeal carriage.

- Standard (universal) precautions must always be observed:
  - Gloves should be worn for all contacts with blood, body fluids, secretions and excretions (except sweat); non-intact skin and mucous membranes.
  - Hand washing with medicated soap before and after any patient contact. Hand washing before and after donning gloves.
  - If procedures are likely to generate splashes, eye protection, a mask and impermeable gowns/aprons should be worn.
  - Needles and other sharps should not be re-capped and must be disposed of in designated puncture-resistant sharps containers.

- Respiratory droplet precautions (used in addition to standard precautions as above):
  - Isolate the patient in their own room
  - Use standard surgical masks when working within one meter of the patient.
  - Use eye protection if exposed to oral or respiratory secretions.
  - Use a closed suction system.

Note: isolation of patients is recommended for at least 24-48 hours after adequate antibiotic treatment (for elimination of carriage) and patients should not be admitted into an overcrowded ward.

If a side ward Is not at all possible, decrease the risk of spread by ensuring Standard (universal) precautions, drawing the curtains around the bed and keeping the distance between the bed of this patient and the others more than I meter.

9. TREATMENT OF PATIENTS WITH MENINGOCOCCAL DISEASE

MENINGOCOCCAL DISEASE IS A MEDICAL EMERGENCY AND TREATMENT SHOULD NOT BE DELAYED.

Pre-hospital treatment consists of antibiotics (ceftriaxone/cefotaxime) and fluid resuscitation of shocked patient before moving them from the primary care facility. Treatment should not be delayed due to difficulties in performing lumbar punctures, delays in neuro-imaging or unavailability of results. The choice of antibiotics is determined by their ability to adequately penetrate the cerebrospinal space and the susceptibility of the organism. The recommended first line drug of choice for proven meningococcal septicaemia or meningitis is IV benzyl penicillin for 5-7 days. However, wherever possible, ceftriaxone or cefotaxime should always be used for empiric therapy for suspected bacterial meningitis (Table 2). Patients with proven meningococcal meningitis and established significant beta-lactam allergy should receive chloramphenicol.

Table 2 Empiric antibiotic therapy for bacterial meningitis in South Africa

Age group	Recommended empiric antibiotic therapy
<1m – neonatal	Ampicillin and Cefotaxime
1 months – 23 months	Ceftriaxone or Cefotaxime*
2 years – 50 years	Ceftriaxone/cefotaxime PLUS Ampicillin (if suspecting Listeria spp.)**
Over 50 years	Ceftriaxone or Cefotaxime (add ampicillin if Listeria considered) **
Immunocompromised state	Ceftriaxone or Cefotaxime (add ampicillin if Listeria considered) **
Basilar skull fracture	Cefotaxime or Ceftriaxone *
Nosocomial neurosurgical infections and/or infected CSF shunts	Vancomycin PLUS ceftazidime or cefepime

* Vancomycin should be added where high level penicillin resistance is anticipated (MIC≥2).

** *Listeria monocytogenes* is a relatively uncommon cause of bacterial meningitis in SA but should be considered. This organism is inherently resistant to cephalosporins and requires ampicillin ± gentamicin for effective treatment.

10. PUBLIC HEALTH RESPONSE

Every suspected case of meningococcal disease should prompt an urgent response to include:

- Immediate telephonic notification to local health authority by health care worker in the facility (nurse or clinician); followed by written notification
- Rapid investigation of the case
- Classification of the case according to case definitions (see below)
- Identification of close contacts for all confirmed and probable cases
- Provision of required post exposure prophylaxis to close contacts
- Identification of other cases in same institution or community that may suggest a cluster

10.1 Case definitions

Classification of cases using the following case definitions will determine the need for public health action. Confirmed and probable cases all require a public health response as outlined below.

10.1.2 Cases requiring public health action

Confirmed case

Clinical diagnosis of meningitis, septicaemia or other invasive disease (e.g. orbital cellulitis, septic **arthritis**)*

AND at least one of the following:

- *Neisseria meningitidis* isolated from a normally sterile site
- Gram-negative diplococci in a normally sterile site
- Meningococcal antigen in blood, CSF
- Meningococcal DNA in normally sterile site

***Meningococcal conjunctivitis should also be managed as per invasive meningococcal disease**

Probable case

Clinical diagnosis of meningitis and/or septicaemia where the public health physician, in consultation with the physician and microbiologist, considers that meningococcal infection is the most likely diagnosis.

NOTE: These definitions should be used by public health personnel in assessing requirements for further public health action. Health care workers are not required to classify cases as above but should rather notify ALL patients in whom a diagnosis of meningococcal disease is being considered. DO NOT WAIT for laboratory confirmation before notifying.

10.2 Cases not requiring public health action

Possible case

Clinical diagnosis of meningitis or septicaemia or other invasive disease where the doctor or nurse concerned, in consultation with the clinician and microbiologist, considers that diagnoses other than meningococcal disease are at least as likely. This category includes cases that may have been treated with antibiotics but whose probable diagnosis is viral meningitis.

In such cases, prophylaxis for contacts is not indicated.

Infection in non-sterile sites

Isolation of meningococci from sputum or from swabs taken from nasopharynx or genital tract is not by itself an indication for public health action as asymptomatic carriage in the respiratory and genital tract is common. However, when assessed together with other clinical and microbiological parameters, a positive throat swab may increase the index of suspicion of a probable case, especially if the isolate is a virulent strain. Meningococcal pneumonia alone is not an indication for public health action but may carry a low risk of transmission in healthcare settings especially to the immunocompromised. In SA, the majority of cases of meningococcal pneumonia reported to the RMPRU have been accompanied by evidence of invasion in blood or CSF and these would always require public health action. The response to a single case can usually be managed between the hospital staff and the local health department concerned based on the guidelines/ policy available. Consultation with a medical microbiologist and infectious disease specialist is recommended.

Management of contacts of a case requiring public health action

About 97% of cases are sporadic and have no identifiable contact. Meningococcal disease rarely spreads directly from person to person. The disease is the result of a complex interaction of the bacteria, the environment and the host. While the risk even for close contacts of cases is low, it is 400-800 times higher in people who live in the same household as the index case. This is mostly likely to be due to infection spreading in the household from an asymptomatic carrier to another family member rather than from the index case.

The increased risk in household members compared to the general population is thought to be likely due to genetic susceptibility in the family, increased exposure to virulent bacteria and environmental factors such as exposure to tobacco smoke. The risk is highest in the 48 hours after the index case presents. Close surveillance for household and intimate contacts is important so that early signs of possible disease, such as fever, are recognised and treated.

Indications for chemoprophylaxis (Defining close contacts)

The *following information is based on published studies of disease incidence and risk.* It must be remembered that taking drugs carries a risk of side effects which, although small, can be serious and may be greater than the risk of disease.

Chemoprophylaxis should be offered to **close contacts** of confirmed/probable cases, irrespective of vaccination status (see case definitions above).

Close contacts requiring prophylaxis include:

- Those who have had prolonged close contact with respiratory secretions of the case in a household type setting during the seven days before onset of illness. Examples of such contacts would be those living and/or sleeping in the same household, those such as pupils, students, members of the military or police sleeping in the same dormitory or, sharing a kitchen where they prepare food together or sharing the same bathroom in a hostel, barracks or residence.
- Those who have had transient close contact with a case require prophylaxis only if they have been directly exposed to large droplets or secretions from the respiratory tract within 10 days of a case becoming ill or admitted to hospital. This also applies to health care staff and ambulance or emergency personnel.

Prophylaxis is NOT routinely indicated following a single case for (unless already identified as close contacts as above):

- All staff and children attending same nursery school or crèche
- All pupils or students in same school or classroom or tutorial group
- All work or school colleagues
- All friends
- All residents of nursing/residential homes
- Dry kissing on cheek or mouth (*Intimate kissing would normally bring the contact into the respiratory contact category*).
- All individuals attending the same social function
- All passengers travelling in same plane, train, bus, or car

Household contacts and overnight visitors

Those who live in the same household or are intimate contacts of the index case should all receive chemoprophylaxis. Chemoprophylaxis should be given as early as possible, preferably within 24 hours of identification of a case. It may still be effective if given up to 10 days after the presentation of the index case if delays are unavoidable. Overnight visitors to the home of the index case within 7 days before the onset of illness should also be given prophylaxis.

Educational settings

Following a single case, chemoprophylaxis is recommended for close contacts only (see definitions above). This will usually include close friends who may share eating utensils or meet the other criteria for a close contact. Usually this does not mean the whole class, but only selected individuals within the class. It may be more difficult to define a close contact amongst younger children in preschools/crèches but where possible post exposure prophylaxis should be limited to those who meet these criteria. Clusters, even in preschools are rare. The naturally immunizing strains in the nasopharynx which provide protection and may be eradicated by indiscriminate use of chemoprophylaxis.

Workplace

The risk in the workplace is generally even less than in educational settings. Chemoprophylaxis is not recommended except in exceptional circumstances i.e.: individuals meeting the criteria for “close contacts” of the case.

Passengers on public transport

Transient contact such as sitting next to a case before an acute illness occurred, on a

bus, train, taxi or aeroplane does not usually pose a special risk and does not justify routine prophylaxis. These situations should be discussed with experts and managed accordingly. Prophylaxis on aeroplanes and other public transport is sometimes given to passengers immediately adjacent, in front and behind the index case, especially if travelling times are prolonged. Passengers should also receive an information leaflet with information regarding signs and symptoms and informed to seek immediate medical attention if they become symptomatic. The degree of contact with the index case will guide decision-making in these cases.

Health care settings

Health care workers should reduce exposure to large particle droplets by wearing surgical masks and using closed suction systems, especially when carrying out mouth and airway procedures, so that chemoprophylaxis is not needed. Health care workers who have had contact with large particle droplets/secretions of patients during procedures such as mouth-to-mouth resuscitation or endotracheal intubation, at the time of hospital admission, should receive chemoprophylaxis.

Health care workers in contact with a patient but not exposed to droplets/secretions do not usually qualify for chemoprophylaxis. A hospital ward is not equivalent to a household setting. Balanced risk assessment should be done in a case of immunocompromised contacts that may be at increased risk for invasive disease such as those who have anatomical or functional asplenia. Such individuals should receive pre-exposure prophylaxis with quadrivalent meningococcal vaccine as well as post exposure chemoprophylaxis when indicated.

It is useful to remind anxious staff, especially those that do not qualify for post exposure prophylaxis, that all drugs carry side effects; and that this risk is likely to be greater than the risk of disease; and that overuse of antibiotics leads to the development of resistance.

Drugs used for chemoprophylaxis

Any of the three possible chemo-prophylactic treatments may be given (Table 3).

Table 3 Antibiotics for chemoprophylaxis of meningococcal disease

Generic Name	Dose in Adults*	Dose in Children	Route	Duration (Days)
Ciprofloxacin	500mg	10mg/kg	PO	Single Dose
Ceftriaxone	250mg	(<12 years) 125mg	IM	Single Dose
Rifampicin		10mg/kg bd.	PO	2 days

***Close contacts who are pregnant should receive Ceftriaxone 250mg IM.**

11. MENINGOCOCCAL VACCINES

Polysaccharide quadrivalent vaccines against *N. meningitidis* serogroups A, C, W135 and Y are used in South Africa. A bivalent vaccine comprising serogroups A and C only, is also available. The main recipients of the quadrivalent vaccine are Hajj pilgrims to Mecca.

The serogroup A component of polysaccharide vaccines is effective from 3 months of age and protection persists for about 3 years. Protection afforded by the serogroup C, W-135 and Y is of shorter duration and offers poor protection in children less than 18 months. Vaccines only provide adequate protection 10 to 14 days following vaccination. Protein conjugate vaccines are more effective than polysaccharide vaccines in children under 2 years of age and have activity against nasal carriage of meningococci.

The development of vaccines against serogroup B has faced many challenges. Serogroup B polysaccharide is poorly immunogenic, even when conjugated to a protein carrier. Although outer membrane vaccines show some promise, strain-specific differences in outer-membrane proteins suggest that these vaccines may still not provide protection against all serogroup B meningococci.

Recent W-135 epidemics in West Africa have led to the use of a trivalent A C W135 vaccine.

Following several serogroup C meningococcal outbreaks in the United Kingdom, a

conjugate C vaccine has been introduced into the routine childhood immunization programme, resulting in a dramatic drop in meningococcal disease incidence, Serogroup C conjugates have also been used to control serogroup C epidemics, notably in Canada.

11.1 Recommendations for use of meningococcal vaccine in South Africa

11.1.1 Pre-exposure vaccination

This can be used to protect individuals at risk (e.g. travellers to areas in Africa where there are epidemics, the military, and pilgrims to the Meningitis belt and to Saudi Arabia). Travellers to areas affected by meningococcal outbreaks are advised to be vaccinated. Pilgrims to the Hajj and Ramadan Omra, and visitors to Saudi Arabia must obtain a quadrivalent vaccine (against A, C, Y, W135) at least ten days prior to their arrival in the country.

Individuals who are at risk of severe disease or may be at increased risk of occupational exposure should also be offered quadrivalent vaccine. This includes:

- persons with functional or anatomical asplenia
- individuals with terminal complement deficiencies
- laboratory staff in reference laboratories who routinely work with *N. meningitidis*

11.1.2 Pre-exposure vaccination for university students and boarding schools

Vaccination is not currently routinely recommended for 1st year students moving into university residences in SA. However, students and their parents should be informed of the existing very small risk, which could be decreased through vaccination. The disease incidence rate for incoming students into residences compared to the general population in the US in 1999 was 4.6/100 000 compared to 1.7/100 000 person years. Currently there are no local SA data to quantify this risk.

11.1.3 Post exposure vaccination

Close contacts of cases that have been given chemoprophylaxis can later be offered appropriate vaccine once the serogroup has been confirmed. This will extend the period of protection. Vaccine can be given up to 4 weeks after exposure as a preventive measure for close contacts; it does not have to be given as an urgent procedure. Use of vaccine does **NOT** replace the immediate need for chemoprophylaxis in close contacts as the serogroup will be unknown and vaccine does not offer immediate protection.

12. DETECTION OF AN OUTBREAK

Outbreaks tend to generate high levels of public alarm, especially as these are unpredictable and can develop quickly. Recognition of an outbreak of meningococcal disease particularly in the community can be challenging. Careful but rapid epidemiological investigation and calculation of attack rates is essential in determining whether an outbreak exists and its extent.

Look out for:

- An increased rate of disease in defined populations and/or an absolute increase in cases
- A cluster of patients in a particular age group
- A shift in the age distribution of cases

12.1 Classification of cases for determining incidence/attack rates

Reported cases should be classified as follows, to allow accurate determination of rates of disease within the population concerned:

Sporadic case

A single case with no known history of close contact with another case

Primary case

A case with no known close contact with another case

Co-primary case

A close contact in whom disease develops within 24 hours of onset of illness in the primary case

Secondary case

A close contact of a primary case who becomes ill more than 24 hours after onset of illness in primary case.

12.2 Definition of an outbreak

12.2.1 Organisation/institutional outbreak

- Two or more probable or confirmed cases during a 4 week interval in a group which makes sense epidemiologically (if cases are laboratory confirmed – serogrouping should be the same).

  OR

- Three cases of confirmed or probable meningococcal disease in ≤ 3 months of the same serogroup (if available) with a history of a common affiliation but no close contact giving a primary disease attack rate of ≥ 10 cases/100 000 persons.

(Reference: Guidelines for the public health management of meningococcal disease in the UK PHLS September 2002, Vol. 5 No 3 reprint 187 - 204 plus appendices)

12.2.2 Community based outbreak

- Three cases of confirmed or probable meningococcal disease within a three month interval of the same serogroup (if available) in persons who live in the same area **AND** who have not had close contact with each other and do not share a common affiliation. Giving a **primary** disease attack rate of ≥ 10 cases/100 000 total community population. The population should include recognised political boundaries most closely related to the residences of these cases.
- The numerator is the number of confirmed cases in the population at risk caused by strains of the same serogroup and that are not distinguishable. **Count primary cases together with related co-primary and secondary cases as a single case.**
- The denominator is the population at risk. This population should be clearly defined and make sense to the people who live within and without the selected boundaries. It may not be easy to define such a population. Examples are a rural town/village or a secondary school with its feeder schools.

13. MANAGEMENT OF OUTBREAKS

13.1 Managing outbreaks in an institution/ organisation

13.1.1 First steps in investigation

In educational settings, where a second case has occurred, the risk of a third case may be as high as 30-50%. A prompt investigation of all suspected clusters/outbreaks is essential. When two or more cases are reported from the same institution within a four week period, careful and rapid assessment should be made:

A site visit is recommended by the response team to:

- Confirm the information available on cases
- Ensure that all close contacts of cases have already received prophylaxis where indicated
- Obtain copies of laboratory results and/or clinical notes and review these.
- Obtain details on serogroup results if available from the RMPRU of the NICD (see contact numbers). If cases are different serogroups they should be managed as sporadic cases.
- Make a line listing of suspected cases and classify them according to case definitions:
  - Confirmed
  - Probable
  - Possible
- List the characteristics of the cases in terms of person, time and place.
- A review of the epidemiological information on each case should be obtained and analysed. (See annexure A)
- Cases should be classified according to definitions (see above) as:
  - Primary
  - Co-primary and
  - Secondary
- The number of primary cases should be used to determine the attack rate within the institution. This requires information about the population at risk for use in the denominator. This is not always easily determined in an institution/organisation.

The population at risk should make sense epidemiologically and have meaning for the people involved and this is used as the denominator

- The case fatality rate (number of deaths over the total number of cases) should also be determined

* **A primary case with its related co-primary and/or secondary cases is counted as only 1 case in calculating rates of meningococcal disease.**

13.1.2 Options for control of institutional clusters/ outbreaks

The public health management options for an institutional outbreak may include:

- No further action e.g.; if after thorough investigation only two possible cases are identified
- Giving out information only
- Giving out information and offering wider prophylaxis in the institution.

13.1.2.1 Role of chemoprophylaxis

The main decision to be taken is whether to offer wider prophylaxis, and, if so, when and to whom. The evidence on risk suggests a need to act promptly. The target group for chemoprophylaxis should be a discrete group, for example, children and staff of the same preschool group, children of the same school year, children or students who share a common social activity, or a group of friends.

Some considerations in decision-making

- If **two possible cases** attend the same institution, whatever the interval between cases, prophylaxis – for any contacts – is not indicated.
- If **two confirmed cases exist** but are caused by different serogroups of meningococcus, they should be regarded as two sporadic cases, whatever the interval between them. Only close contacts of each respective case should be offered chemoprophylaxis.
- If a cluster/outbreak is confirmed in an institution (based on the criteria discussed above) and cases are from an identified subgroup e.g.; the same class, prophylaxis should be offered to that group.
- If a cluster/outbreak is confirmed but is not confined to a well define subgroup, advice should be sought from the National Directorate: Communicable Disease Control (012 395 8096) or the NICD (011 386 6000/082 883 9920 - 24 hour Outbreak Hotline) regarding options for control.

- During outbreaks, information should be given out widely within the institution as appropriate
- For confirmed clusters/outbreaks among children at preschool groups and primary schools, staff should normally be included in the target group (there is some evidence of increased risk) but not usually in outbreaks among students at secondary schools, colleges, universities (here there is no evidence of increased risk amongst staff).
- If unsure of the appropriate response always seek expert advice from National Directorate: Communicable Disease Control (012 395 8096) or the NICD (011 386 6000/082 883 9920 - 24 hour Outbreak Hotline).

13.1.2.2 Role of meningococcal vaccine in institutional outbreaks

For a cluster involving two or more cases of confirmed serogroup group A, C, Y or W135 infections in an institution, quadrivalent polysaccharide vaccine may also be considered for all individuals over the age of two years who were given chemoprophylaxis in order to extend protection. For an outbreak involving a broader institutional community, vaccine is usually preferable, as mass chemoprophylaxis has not been shown to be effective in this setting.

13.1.2.3 Use of nasopharyngeal swabs during outbreaks

Obtaining nasopharyngeal swabs for detection of carriage of outbreak strains is not recommended in acute outbreaks because decisions have to be taken before results are available and because carriage rates often bear no relationship to the risk of further cases. In addition a single negative swab does not exclude carriage.

NB: Closing an institution or school is not advised as no reduction in risks would be expected (levels of contact among social networks are unlikely to be reduced and may in fact be increased by closing an institution). Also the success of any intervention will be improved if school/institution attendance is high.

13.2 Managing outbreaks in the community

Identification of these outbreaks can be difficult and must be differentiated from an increase in sporadic disease. In order to do this, detailed epidemiological investigation of cases and calculation of attack rates is essential. In smaller populations, absolute numbers of cases rather than rates of disease may be more accurate. The calculation of age specific attack rates is useful to assess a potential target group for vaccination and the feasibility of such interventions.

Active case finding in the community should be commenced. An alert should be communicated to local general practitioners (GPs), paediatricians, out-of-hours services, clinics and hospitals with a clinical case definition in order to ensure all cases are identified, treated and reported promptly.

If it is established that an outbreak exists, decisions regarding appropriate intervention should be taken by the response team. Seek advice from national experts at the National Directorate: Communicable Disease Control (012 395 8042/8096) or the National Institute for Communicable Diseases (NICD): 011 386 6000/082 883 9920 (24 hour outbreak hotline).

One of the major challenges of interventions in community outbreaks is the difficulty in defining and reaching the target population. It is useful to try to define this group by population boundaries and age group. Such boundaries are often arbitrary but attempts should be made to use existing administrative boundaries e.g.: district, sub-district and/or region that will make sense to the people who live in the area.

13.2.1 Role of chemoprophylaxis

Community wide chemoprophylaxis is not recommended as it has not been shown to be of value. All close contacts of individual cases should be given prophylaxis as per the standard protocol.

13.2.2 Role of meningococcal vaccine

This should be considered in community outbreaks due to serogroup A, C, Y or W135 depending on the serogroup, age group of affected population, geographic boundaries and feasibility. Such decisions should be made after careful assessment of all information by the full outbreak response team and in consultation with relevant experts.

13.2.3 Communications during outbreak

An agreed public relations strategy is usually required, especially if high levels of interest are anticipated or already evident. This may include:

- Telephone help-lines
- Controlled media access to intervention sites
- Regular coordinated press briefings and press conferences

13.3 Major meningococcal epidemics

Such a population wide epidemic has not occurred in southern Africa and seems unlikely in the foreseeable future. For an overview of recommendations of how major meningococcal epidemics should be managed see the Weekly Epidemiological Record 22 September 2000, No. 38, 2000, 75, 305–312. Available at http://www.who.int/wer and the Control of Communicable Disease Manual 18th ed. 2004. American Public Health Association.

14. ANNEXURE A FORM 1: LINE LISTING FOR MENINGOCOCCAL DISEASE CASES

No.	Name	Age	Sex	Address	Date of Onset	Signs / Symptoms	Reporting Date	Vaccination Status	Laboratory Results	Treatment	Outcome/ Remarks

15. ANNEXURE B: FORM 2: CONTACT TRACING FORM FOR MENINGOCOCCAL DISEASE

No.	Name	Age	Sex	Address	Date of Contact	Clinical Diagnosis		Reporting Date	Vaccination Status	Outcome/ Remarks
						Signs / Symptoms	If Present, Onset Date			

16. ANNEXURE C: FACTSHEET FOR SCHOOLS/ INSTITUTIONS

What is meningococcal infection?

Meningococcal disease is a serious illness caused by a bacterium known as *Neisseria meningitidis* (meningococcus).

Meningococci are bacteria, which, if looked for, can be found at the back of the throat or nose in about 5 to 20% of healthy adults and children. Only rarely do meningococci overcome the body's defences and cause serious illness. Such carriage may actually prevent the spread of meningococci and subsequent disease.

When disease does occur, the bacteria usually cause inflammation of the lining of the brain (meningitis) or spread throughout the body via the blood (septicaemia or blood poisoning).

There are five different serogroups of meningococci that cause most disease (A, B, C, W135 and Y). Most cases occur in Gauteng and in Western Cape Province (WCP). In Gauteng serogroups A and W135 cause about 70% of the meningococcal disease, while in WCP the vast majority are due to serogroup B.

Who catches meningococcal infection?

Crowding, passive smoking, low socio-economic status and a preceding viral throat infection, being a new military recruit or first year student in a residence are risk factors. It is not known why some people become ill while others remain symptomless 'carriers' of the bacteria.

Most cases occur in children under four years of age. The next highest incidence is recorded for teenagers between 15 and 19 years of age.

95% of cases occur without any connection to other cases (sporadic cases), sometimes two or more cases are connected by those affected having close contact (outbreaks). In some areas, such as west and north Africa there are large periodic epidemics.

How can you suspect someone has meningococcal infection?

A person can become very ill very quickly.

Warning signs in children or adults include:

- Sudden onset of a high fever,
- Severe headache,
- Dislike of bright lights (photophobia), Vomiting,
- Painful joints,
- Fits or Drowsiness leading to coma

Not all the symptoms may be present

In babies illness may be less obvious eg:

- Fever while the hands and feet are cold,
- High pitched moaning or whimpering,
- Blank starring, inactivity, hard to wake up, Suddenly doesn't want to eat,
- Neck retraction with arching of the back
- Pale and blotchy complexion

Septicaemia occurs if the bacteria enter the bloodstream. A characteristic rash develops and may start as a cluster of pinprick blood spots under the skin, spreading to form bruises under the skin. The rash can appear anywhere on the body. It can be distinguished from other rashes by the fact that it does not fade when pressed under the bottom of a glass (the drinking glass test). Many people with meningococcal infection may not have the rash.

How do you catch meningococcal infection?

Meningococcus is not highly infectious.

The bacteria are passed by close and fairly prolonged contact, so family members of a case and others who have close contacts with a case may be spreading the same germs. This usually means household or intimate kissing contacts.

Close contact in residential accommodation, such as student halls of residence, and schools can also give the opportunity for the spread of infection.

As the meningococci bacteria cannot survive for long outside the human body, infection cannot be caught from water supplies, swimming pools, or buildings.

How serious is meningococcal infection?

The bacteria only rarely give rise to meningococcal disease. But when they do, infection spreads rapidly and is fatal in about 10% of cases (can be up to 50% with septicaemia). If infection is diagnosed early and treated promptly most people make a full recovery. However, about 1 in 8 people who recover experience some long term effects. These can include headaches, stiffness in the joints, epileptic fits, deafness and learning difficulties.

Can you prevent meningococcal infection?

Meningococcal disease rarely spreads directly from person to person. Over 95% of cases are sporadic and have no identifiable contact. While even in close contacts the risk is low, it is highest in people who live in the same household as the person who became ill, but this is most likely to be due to infection spreading in the household from an asymptomatic carrier to another family member rather than from the person who became ill.

The risk is highest in the 48 hours after the index case presents. Watching household and intimate contacts is important so that early signs of possible meningococcal disease, such as fever, are recognised and treated urgently.

Who should take preventive drugs?

Antibiotics are recommended only for close respiratory contacts of a case

(a) Those who have had prolonged close respiratory type contact (possibly breathing in a fair amount of respiratory droplets) with the case in a household type setting during the seven days before onset of illness. Examples of such contacts would be those living and/or sleeping in the same household, those such as pupils, students, members of the military or police sleeping in the same dormitory, sharing a kitchen where they prepare food together, sharing eating utensils or sharing the same bathroom in a hostel, barracks or residence.

(b) Those who have had transient close contact with a case – *but only* if they have been directly exposed to close coughing or intimate kissing contact with large droplets or secretions from the respiratory tract within 10 days of a case becoming ill or

admitted to hospital. This could include those close enough to have shared items like food and eating utensils, such as close friends at school (but not the whole class). This rule should also apply to children and teachers in crèches.

Prophylaxis NOT usually indicated for: ***(unless already identified as close contacts as above)***

- All staff and children attending same nursery school or crèche
- All pupils or students in same school or classroom or tutorial group
- All work or school colleagues
- All friends
- All residents of nursing/residential homes
- Dry kissing on cheek or mouth. (Intimate kissing would normally bring the contact into the close contact category.)
- Attending the same social function
- All those travelling on the same plane, train, bus, or car

The advice above is based on local and international assessment of risk in contacts of actual cases. It must be remembered that taking drugs carries a risk of side effects – which although small can be serious and greater than the risk of disease!

How soon can a child be back at school after meningococcal infection?

All cases of meningococcal meningitis and septicaemia must be notified to the local health authority. Once a child has recovered from meningococcal infection and has been treated to clear the infection, they can return to school. There is no reason to exclude any healthy siblings or other close contacts of the case from school.

Adapted from the Health Protection Agency website: www.hpa.org.uk/infections/topics

17. ANNEXURE D: FACT SHEET FOR HEALTH CARE WORKERS – for general distribution
Meningococcal Disease

A rapid review of primary care and public health measures

Introduction

Neisseria meningitidis (the meningococcus) is an important cause of meningitis and septicaemia in children and young adults around the world. Meningococcal disease generally occurs sporadically in small clusters around the world with major epidemics limited to certain geographical areas. Meningococcal disease is caused by *Neisseria meningitidis* (meningococcus). Serogroups A, B, C, Y and W135 are recognised to cause epidemics. In South Africa cases occur year round with definite seasonal increases in late winter/early spring.

Humans are the only natural host of meningococcus. The transmission of *N. meningitidis* is directly from person to person by droplet spread. Asymptomatic carriage of meningococcus occurs at a rate of 10% in the general population and up to 25% in young adults. Nasopharyngeal carriage of meningococci is much more common than invasive meningococcal disease. The meningococcus does not survive for any significant period in the environment.

The response to a case or cases should be based on a clear understanding of how the organism spreads, produces disease, the clinical picture it presents, what health care is available and what the appropriate public health response is.

Over 95% of meningococcal cases are sporadic and have no identifiable contact. Nasopharyngeal carriers rather than patients with meningococcal disease are generally the source of new infections. The disease is the result of a complex interaction of the bacteria, the environment and the host. While the risk even for close contacts of cases is low, it is highest in people who live in the same household as a case of meningococcal disease. This is mostly likely to be due to infection spreading in the household from an asymptomatic carrier rather than from the index case. The incubation period is 3-4 days (range 2-10).

Clinical Clues

Early symptoms and signs include malaise, fever and vomiting. Headache, photophobia, drowsiness or confusion, joint pains and a typical haemorrhagic rash of meningococcal septicaemia may develop. A high index of suspicion should always be maintained. Fever and a low blood pressure or slow pulse should heighten the index of suspicion. Early on, the rash may look like rubella or measles. The classic rash is petechial or purpuric in nature and does not fade if you push a drinking glass against it. The rash may be absent.

Patients may present in a comatose state and disease can be very rapidly progressive. In some patients symptoms may be non-specific. Presentation in young infants may include vomiting, pyrexia, irritability and, if still patent, raised anterior fontanelle tension.

The most common serious clinical presentations of meningococcal disease include meningococcal meningitis and meningococcal septicaemia/ meningococcaemia.

Clinical Management

SUSPECTED MENINGOCOCCAL DISEASE IS A MEDICAL EMERGENCY AND TREATMENT SHOULD NOT BE DELAYED.

Wherever possible ceftriaxone or cefotaxime should always be used for empiric therapy for suspected bacterial meningitis. The recommended drug of choice for **proven** meningococcal septicaemia or meningitis is IV benzyl penicillin for 5-7 days.

Patients with known or suspected meningitis should be isolated at the time of admission in a single bedded ward with standard AND respiratory droplet precautions. These patients may be transferred to a general ward 24-48 hours after receiving adequate treatment with a drug that will reliably eliminate nasopharyngeal carriage [ceftriaxone/ cefotaxime]. Patients on penicillin alone can only be moved from isolation after being given chemoprophylaxis to eradicate nasopharyngeal carriage

Laboratory investigations

Do not delay treatment if a blood culture or CSF specimen cannot be immediately obtained.

Specimens should be kept at room or body temperature and away from direct sunlight. Do not refrigerate specimens

Blood culture:

Blood should be collected, using strict aseptic technique, from all suspected cases in blood culture specimen bottles and sent to the laboratory as quickly as possible. Specimens should if at all possible reach the laboratory within 3-4 hours, but not beyond 24 hours. Ideally two sets of blood cultures should be submitted prior to antibiotic therapy. Even in cases of meningitis, blood cultures are useful for diagnosis. About 1–3 ml of blood is needed in children and 5–10 ml in adults.

Cerebrospinal Fluid CSF:

If meningococcal disease is suspected a lumbar puncture is not indicated in the primary care setting and should be considered on arrival at a hospital.

Lumbar puncture should only be performed where no contraindications exist.

The classical clinical signs (bradycardia, papilloedema or hypertension indicating the presence or absence of raised intracranial pressure in children are notoriously inaccurate and should never be relied upon. A lumbar puncture should never be done in a child if there is any suggestion of an impaired level of consciousness. Adult patients with raised intracranial pressure, suspected focal intracranial pathology or who are immune compromised, should have a brain imaging before lumbar puncture. Contraindications for lumbar puncture include focal intracranial pathology or severe brain swelling on imaging, uncorrected bleeding tendency or a low blood pressure.

Cerebrospinal fluid should be sent for protein, glucose, direct microscopy (cell count and Gram stain) culture and antibiotic susceptibility. Rapid bacterial antigen detection tests should not be used routinely as they are not always reliable. They can be used for specific indications.

Skin scrapings

Skin scrapings/impression smears

Skin scrapings and impression smears for Gram stain from the petechial/purpuric site are not recommended as the test tends to give false positive and false negative results.

Notification

The name and household contact details of a case of the meningococcal disease should be reported immediately by telephone to the Local or District Health Department - for urgent contact follow up. The notification form (GW17/5) should also be completed.

Chemoprophylaxis

Non-pregnant adults: Ciprofloxacin, rifampicin and ceftriaxone are all effective in reducing the nasopharyngeal carriage rate and are therefore recommended for chemoprophylaxis. Ciprofloxacin offers a major advantage in terms of compliance. Ciprofloxacin is an effective drug for prophylaxis and is the drug of choice for non-pregnant adult contacts.

Children: Rifampicin is the drug of choice where it is available and four doses can be supervised. Ciprofloxacin and ceftriaxone are acceptable alternatives. Ceftriaxone is a painful injection (especially in children), which is often given with lignocain to children.

Pregnancy: Ceftriaxone is the first choice in pregnancy.

Management of contacts

Over 95% of cases of meningococcal disease occur in those without any contact with a case. This means the risk of disease even in close contacts is low, however it is slightly higher than the general population.

Chemoprophylaxis should be offered to all close respiratory contacts (defined as people who have had close, prolonged contact with the case), as soon as possible, i.e. preferably within 24 hours after the diagnosis of the index case, but can be effective up to 10 days. It is recommended in the following situations:

(a) Those who have had prolonged close respiratory type contact with the case in a household type setting during the seven days before onset of illness. Examples of such contacts would be those living and/or sleeping in the same household, those such as pupils, students, members of the military or police sleeping the same dormitory, sharing a kitchen where they prepare food together or sharing the same bathroom in a hostel, barracks or residence.

(b) Those who have had transient close contact with a case – only if they have been directly exposed to close coughing or intimate kissing contact with large droplets or secretions from the respiratory tract within 10 days of a case becoming ill or admitted to hospital. This also applies to health care staff and ambulance or emergency personnel.

(c) Index case should also receive prophylaxis to eliminate nasopharyngeal carriage (unless they have already been treated with ceftriaxone/cefotaxime) as soon as they are able to take oral medication.

Prophylaxis is NOT generally indicated for: *(unless already identified as close contacts as above)*

- All staff and children attending same nursery school or crèche
- All pupils or students in same school or classroom or tutorial group
- All work or school colleagues
- All friends
- All residents of nursing/residential homes
- Dry kissing on cheek or mouth. (Intimate kissing would normally bring the contact into the respiratory contact category.)
- Food or drink sharing or similar low level of salivary contact
- All those attending the same social function
- All travellers on the same plane, train, bus, or car

Healthcare workers

Health care workers (HCWs) should avoid exposure to droplets by wearing surgical masks and using a suction which does not ventilate into the room, when carrying out airway procedures (i.e. endotracheal intubations/airway management, or examination of the oropharynx), on all patients with suspected meningococcal septicaemia or meningitis.

Chemoprophylaxis is recommended only for those HCWs who have been in direct contact with droplets of respiratory secretions (i.e. mouth or nose is directly exposed to large particle droplets/ secretions) and who have not used appropriate barrier precautions.
General medical or nursing care of cases is not usually an indication for prophylaxis

Chemoprophylaxis: Antibiotic options

One of the following:

Non-pregnant Adults

1. Ciprofloxacin 500mg Single Dose/os.
2. Rifampicin 600mg 12 hourly/os x 4 doses
3. Ceftriaxone 250mg Single Dose Im

Pregnant adults

Ceftriaxone 250mg Single Dose Im

Children

1. Ciprofloxacin 10mg/kg single dose/os
2. Rifampicin 10mg/kg 12 hourly/os x 4 doses
3. < 12 years, 125mg Ceftriaxone single dose Im.

Immunization of contacts

If serogroup A, C W135 or Y has been isolated from a case, polysaccharide quadrivalent vaccine may extend the period of protection for close contacts ≥2 years of age that have already received chemoprophylaxis. The cost of such vaccination is at the person's own expense.

Chemoprophylaxis must always be given regardless of vaccination status.

Surveillance

All contacts should be advised on the early symptoms and signs and advised to report these promptly.

Managing a cluster of cases

When two or more cases of meningococcal disease occur in any institution, such as a school or military barracks etc. within a 4-week period, and these are due to the same serogroup this should be considered an outbreak and managed accordingly. (See section 13 Management of Outbreaks in the main document).

Adapted with permission from: The Craigavon Infection Control Manual edited by N Damani/J Keyes.

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19. COMMUNICABLE DISEASE CONTROL COORDINATORS OFFICES

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