Guidance for public health management of meningococcal disease in the UK

Health Protection Agency Meningococcus Forum

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Summary: Following changes in the epidemiology of meningococcal disease, the advent of new vaccines, and with new evidence on risk and control measures, the Public Health Laboratory Service Meningococcus Forum set up a Working Group to review the guidance for control measures in the UK. This guidance, published in 2002, has been updated by the HPA Meningococcus Forum. Recommendations are graded according to the level of evidence on which they are based. These guidelines cover pre-admission management, investigation of suspected cases, the role of public health, public health action after a single case, prophylaxis in healthcare settings, and management of clusters. Links to relevant websites are included.
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Review of guidelines

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1. Introduction
Epidemiology of meningococcal carriage and disease

*Neisseria meningitidis* is a normal inhabitant of the human nasopharynx and is transmitted from person to person by droplets or secretions from the upper respiratory tract. Saliva is inhibitory to meningococcal growth, and transmission by fomites is considered insignificant.

Meningococci are classified according to characteristics of the polysaccharide capsule into serogroup, of outer membrane proteins into serotype and serosubtype, and of chromosomal DNA into genotype. Carriage of meningococci (all strains included) is relatively common. A large community survey in England in 1987 found carriage rates varying from 2% in children under five years to a peak of 25% in 15 to 19 year olds. Conversely, carriage of *Neisseria lactamica*, a non-pathogenic organism believed to confer protection against meningococcal disease, is highest in young children. Increased rates of meningococcal carriage have been observed in smokers, overcrowded households, and military recruits. The mean duration of carriage in settings where prevalence is stable has been recently estimated as about 21 months.

Systemic immunity, as measured by serum bactericidal antibodies, usually develops within 14 days of acquisition of meningococci. Rarely, acquisition may progress to invasive disease before immunity develops. This incubation period is usually three to five days, based on data from studies of laboratory acquired infection, from occasional clusters where the date of exposure is known, and from carriage studies among military recruits. Not surprisingly, established meningococcal carriers do not usually develop invasive disease. The risk of invasive disease following acquisition is likely to vary with environmental and host factors but will also depend critically on the characteristics of the strain acquired. Only a small proportion of carried strains are responsible for most cases of invasive disease.

In the UK, annual rates of invasive disease usually vary between two and six per 100,000, with case-fatality rates of about 10%. Most cases are caused by serogroup B or C strains. Disease usually presents as septicemia, meningitis or both. Age-specific attack rates are highest in infancy, and decline during childhood with a secondary rise in teenagers and young adults. The highest incidence is seen in the winter months. Apart from age, risk factors include passive smoking, preceding influenza A infection and overcrowding.

Changing disease incidence
The reported incidence of meningococcal disease rose to historically high levels during 1998/99, particularly associated with serogroup C strains of the electrophoretic type 37 clonal complex. Following the introduction of the UK meningococcal C conjugate vaccination programme in November 1999, there was a marked fall in disease caused by serogroup C strains. Two national outbreaks of disease due to W135 strains, previously rare in the UK, followed the Hajj pilgrimages in 2000 and 2001.

Existing guidance
The Public Health Laboratory Service (PHLS) last published comprehensive guidance on the control of meningococcal disease in England and Wales in 1995. More detailed guidance followed on cluster management, prophylaxis in dispersal settings, cases and clusters in universities, use of ciprofloxacin pre-admission antibiotics and prophylaxis for healthcare workers. This series of guidance documents was adopted in Northern Ireland and modified slightly for use in Scotland.

Review of guidance
In the light of the changes since 1995 in both the epidemiology and guidance, and to incorporate new evidence on risk and control measures, the PHLS Meningococcus Forum set up a Working Group to review the guidance for control measures in the UK. Since 2003 the Forum has continued as the Health Protection Agency Meningococcus Forum. This review is based on available evidence, and the levels of evidence are graded according to published guidelines (Table 1).
Table 1

Levels of evidence

1++ High quality meta analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias

1+ Well conducted meta analyses, systematic reviews of RCTs, or RCTs with a low risk of bias

1 - Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias

2++ High quality systematic reviews of case-control or cohort or studies
High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal

2+ Well conducted case control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal

2 - Case control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal

3 Non-analytic studies, e.g. case reports, case series

4 Expert opinion

Grades of recommendation

A At least one meta analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or
A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B. A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or
Extrapolated evidence from studies rated as 1++ or 1+

C. A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or
Extrapolated evidence from studies rated as 2++

D. Evidence level 3 or 4; or;
Extrapolated evidence from studies rated as 2+

(www.sign.ac.uk/guidelines/fulltext/50/section6.html)
Where the Working Group considered that insufficient evidence was available on which to base guidance, agreement on recommendations was reached through consensus (expert opinion).

The Working Group comprised representatives of the PHLS Meningococcus Forum, the Public Health Medicine Environmental Group, the Scottish Centre for Infection and Environmental Health, HPA CfI, CDSC Wales, CDSC Northern Ireland, the Association of Medical Microbiologists, and the Community Infection Control Nurses Network.

Objective of guidelines
The objective of these guidelines is to present the rationale and recommendations for the control of meningococcal disease in the United Kingdom within one comprehensive document. Guidance is offered on pre-admission management to reduce mortality rate, investigation of suspected cases, case definitions, public health action after a single case, and management of clusters. These recommendations now form the definitive UK guidance on public health management of meningococcal disease.

2. Pre-admission management

(Recommendation 1)
Early treatment of suspected cases with benzylpenicillin is recommended in the UK to reduce case fatality22. The evidence for benefit from giving parenteral antibiotics before admission is inconsistent32,33, and has been obtained from retrospective observational studies in which it is difficult to control for important confounding factors such as speed of progression and stage of illness at the time of treatment33. In the absence of data from randomised controlled trials, the Meningococcus Forum continues to endorse the recommendation to start antibiotic treatment before admission to hospital. This opinion is based on the rapid clinical deterioration that can occur in meningococcal disease, on the established effectiveness of penicillin in hospital treatment and on the evidence for lack of harm34. Rapid transfer to hospital remains the highest priority whether or not penicillin is given. Minutes are precious.

Adverse effects from benzylpenicillin are unusual. Anaphylactic reactions are rare, occurring in one in 7,000 to one in 25,000 of treated patients35. Anaphylaxis is more likely if there is a history of immediate allergic reactions (such as difficulty in breathing, collapse, generalised itchy rash) after previous penicillin administration35,36, although most people with a history of ‘penicillin allergy’ do not have true hypersensitivity37. Cross-reactivity between penicillin and cephalosporin allergy occurs in between 2% and 10% of cases38.

Recommendation 1: Pre-admission management

Rapid admission to hospital is highest priority when meningococcal disease is suspected. Evidence grade C

All general practitioners should carry benzylpenicillin for injection and give it whilst arranging the transfer of the case to hospital, Evidence grade D

Unless there is a history of immediate allergic reactions after previous penicillin administration39. Evidence grade A

General practitioners do not need to carry an alternative antibiotic. However, if other antibiotics are available, a 3rd generation cephalosporin may be used. If there is a history of immediate allergic reactions to penicillin or cephalosporins, chloramphenicol may be used39.

Evidence grade D

Immediate dose of iv/im benzylpenicillin for suspected meningococcal infections

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults and children aged 10 years or over</td>
<td>1.2 g</td>
</tr>
<tr>
<td>Children aged 1 to 9 years</td>
<td>600 mg</td>
</tr>
<tr>
<td>Children aged under 1 year</td>
<td>300 mg</td>
</tr>
</tbody>
</table>
3. **Laboratory investigation of suspected cases**

Identification and characterisation of meningococci causing infection provides important information to assist the public health response. Whilst traditional microbiological techniques remain an important part of investigating suspected cases, molecular methods have been developed that assist diagnosis and further characterisation of strains from cases where isolates have not been obtained\textsuperscript{40,41,42}. Considerable advantages remain in having a cultured isolate available for testing, the most significant of which is a potentially infinite supply of the organism for further study.

Blood samples for culture and polymerase chain reaction (PCR) testing are essential. The chance of obtaining laboratory confirmation is increased by taking samples at the earliest available opportunity. If the possibility of meningococcal disease is not considered until some time after admission, it may still be possible to retrieve earlier specimens from haematology and chemistry departments.

When meningitis is present, cerebrospinal fluid (CSF) offers the best chance of yielding an organism for culture; meningococcal DNA can be found in the CSF up to 96 hours after commencing antibiotics\textsuperscript{43}. Lumbar puncture should not be performed until the patient’s condition has been stabilised and appropriate assessment has been made to rule out raised intracranial pressure. Material (preferably fluids) from any other normally sterile site, e.g. pericardial or synovial fluid can also be tested by culture and PCR.

Immunological abnormalities such as complement deficiency can predispose to meningococcal disease. This may present as recurrent meningococcal infection but should be suspected in teenagers or young children with infection due to rare serogroups (Hoare)\textsuperscript{44}.

**Investigations**

**Microscopy**

Visualising Gram-negative intracellular diplococci in the CSF provides a highly specific confirmatory test. In other sites, e.g. synovial fluid, there is a greater possibility of encountering gonococci and the clinical presentation of the illness should provide important clues to correctly identify the aetiological agent. Specimen collection, prior use of antibiotics and experience of the person performing microscopy are other factors that can affect the sensitivity and specificity.

**Cerebrospinal fluid (CSF)**

Classically the CSF from a case of meningococcal meningitis reveals a raised neutrophil count and high protein content along with lowered glucose concentration. Gram-negative diplococci (which are usually but not invariably intracellular) confirm meningococcal meningitis.

The typical picture will not always be present. Very occasionally, numerous organisms will be present in the absence of a raised neutrophil count, and in about 8% of culture positive cases meningococci may be cultured from CSF that is normal on initial analysis\textsuperscript{45}. Conversely, high white cell counts may be present in the CSF, but the number of organisms may be too low to be detectable by microscopy. Prior administration of antibiotics will decrease numbers and may alter the Gram staining characteristics of the organisms. CSF collected some time after presentation may contain a higher proportion of lymphocytes than typically is seen in more acute specimens.

The sensitivity of the Gram stain in CSF to detecting meningococcal meningitis is estimated as 65%\textsuperscript{41}. This is affected by the stage of disease, number of organisms present and timing of the procedure in relation to antibiotic administration.

**Aspirates and biopsies from normally sterile sites**

In patients with a clinically compatible illness, Gram stains of aspirates and biopsy material from sterile sites have high specificity and serve to confirm invasive meningococcal disease. However, as for CSF, they are insufficiently sensitive to exclude invasive meningococcal disease on the basis of negative microscopy.

**Examination of material from skin lesions**

There has been no systematic study of the optimal way to sample from skin. Techniques employed have ranged from simply disrupting and swabbing a rash-affected area to performing punch biopsies. The reported sensitivity of Gram stains of skin lesion aspirates or biopsies ranges from 30% to 70%. It is highest in haemorrhagic lesions of patients with meningococcal septicaemia in whom Gram stains of skin biopsies may
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remain positive for up to 48 hours after antibiotic administration. False positive Gram stain results may occur.

While these investigations have been employed successfully in a few centres abroad46-48, they have not found popularity in the United Kingdom. Several units which have undertaken assessments report no improved ascertainment over that provided by culture and PCR of blood and CSF (personal communications – R Read, Sheffield; G Jones, Southampton; R Heyderman Bristol and M Cafferkey Dublin).

**Culture**

Culture of *N. meningitidis* from blood, CSF or another normally sterile site represents the optimal confirmation of invasive meningococcal disease. Isolates are amenable to relatively straightforward strain characterisation and additional investigations such as antibiotic susceptibility testing. Isolates submitted to UK reference units are characterised phenotypically by serogroup, serotype and serosubtype. Genotypic characterisation of some determinants can also be performed.

**Blood culture**

Blood for culture should be obtained from all suspected cases. However the sensitivity falls to 5% or less if antibiotics have been given more than one to two hours before collection49. Other factors that affect the sensitivity of blood cultures include the number of blood cultures collected, the volume of the samples, and their timing, but perhaps most critically, the bacterial load, which can vary enormously50.

**CSF culture**

The sensitivity of CSF culture is about 70% in cases of untreated meningococcal disease49. Nevertheless while antibiotics take somewhat longer to act in CSF than in blood, successful culture is unlikely unless specimens are collected within two to three hours of treatment commencing.

**Aspirate from a normally sterile site, skin rash aspirate or biopsy culture**

Culture of meningococci from these sites confirms invasive infection.

**Nasopharyngeal (throat) swabs**

Nasopharyngeal swabs are less affected by prior antibiotic therapy and have been found to yield meningococci in 40-50% of cases of invasive meningococcal disease49. They should be collected from all suspected cases and the request form should specify that meningococci are being sought. Nasopharyngeal swabs to detect meningococci are usually taken through the mouth (sweeping posterior pharynx behind uvula) but may be taken through the nose. A review of patients on the PHLS Meningococcus Reference Unit (MRU) database between 1994 and 1997, where both nasopharyngeal and systemic isolates were submitted, showed the organisms from both sites were identical in 97% (134/138) of cases. However, in 3% of cases they were different, and a nasopharyngeal isolate in the absence of a systemic isolate does not confirm invasive disease.

**Non-culture diagnostic tests**

**Polysaccharide antigen testing**

Demonstrating meningococcal polysaccharide antigen in CSF, blood or other normally sterile fluid using latex agglutination provides confirmatory evidence of invasive infection in patients with a clinically compatible presentation. The sensitivity of this test in its original format is poor and modified methodologies such as ultrasound enhancement have been used to improve performance characteristics51-53.

**PCR**

PCR-based assays for detecting specific DNA sequences of *N. meningitidis* have been developed and made widely available through reference laboratories in the United Kingdom. Experience has been based largely on experience with CSF and blood specimens. Other material from sterile sites, however, and indeed throat swabs and material from rashes can also be tested. The sensitivity of the ctrA (screening) assay currently used at the MRU has been estimated to be 89% for whole blood samples and 96% for CSF. Samples positive by this assay are submitted for further testing for serogroup determination, initially for serogroups B and C and, if negative for these, then for serogroups W135, Y and A41,42,54.

For blood specimens, whole blood (unclotted) specimens are preferred and current DNA extraction methods mean that heparinised specimens can now be handled along with EDTA and citrated samples.
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Serodiagnosis
Ideally, acute and convalescent specimens (collected two to six weeks after presentation) should be submitted together. A screening assay for antibodies to outer membrane proteins is performed and any reactive specimens are tested for serogroup specific antibodies. Results of these tests can occasionally provide helpful retrospective evidence in clusters of infection, particularly in being able to make judgements about the likelihood of recent serogroup C disease. In practice they are seldom available in time to influence decision making about individual cases and contacts. Carriage and invasive disease can result in equivalent antibody levels, thus the results of tests need to be interpreted in the light of clinical presentation and provide supportive evidence but are not definitively diagnostic55.

Strain differentiation of \textit{N. meningitidis}
Strain characterisation is generally performed at national reference laboratories. Attempts to more finely differentiate meningococcal strains from cases of invasive disease can be undertaken for public health reasons, e.g. to confirm or to exclude a suspected outbreak of cases. A true epidemiological link between cases can only be established by public health investigations. Laboratory typing results can categorically rule out true relatedness of apparently linked cases if they emerge as being distinct, but provide no more than supporting evidence when case isolates are indistinguishable.

The most widely applied differentiation techniques involve characterisation of surface structures in the capsule and outer cell membrane. Capsular polysaccharide antigens separate meningococci into serogroups among which A, B, C, W135 and Y account for the overwhelming majority of invasive infections worldwide.

Further differentiation can be made by identification of outer membrane proteins (OMPs). Of the five OMP classes present, three porin proteins have been used to produce reagents for an internationally recognised typing scheme. All meningococci have class 1 and also either class 2 or 3 OMPs – these last are mutually exclusive. Using monoclonal antibodies which detect the different antigens, the class 2/3 OMPs designate the serotype, while the class 1 porin OMPs define the serosubtype. The serogroup, serotype, and serosubtype together make up the most commonly used phenotypic designation of meningococci. Panels of monoclonal antibodies used in the UK, most European countries and Australasia have been lodged with the National Institute for Biological Standards and Controls, who prepare and distribute the reagents to national reference centres56,57.

Genotypic characterisation of strains (including non-culture-based applications)
Genotypic (molecular) procedures are now supplanting phenotypic (serology-based) typing methods. The best described and most widely available include pulsed field gel electrophoresis (PFGE), \textit{porA} sequencing and multi-locus sequence typing (MLST).

PFGE is a technique which looks at the entire bacterial genome divided into sections by low frequency cutting enzymes. Materials and methods however are not standardised between laboratories, resulting in variations which obviate the possibility of inter-laboratory comparisons. Nevertheless, when performed in a single centre, PFGE patterns can be usually useful in outbreak investigation.

The shortcomings of PFGE can be largely overcome by applying DNA sequencing. This gives results which are readily comparable between centres provided targets can be agreed. \textit{PorA} sequence typing is becoming increasingly available and can also be applied for outbreak investigation. The antigens defined by \textit{porA} stimulate production of bactericidal antibody and so represent potential vaccine candidates64. The MRU and the Scottish Meningococcus and Pneumococcus Reference Laboratory have now developed \textit{porA} sequencing as a non-culture-based method, which can be applied to the majority of ‘non-viable’ samples for which serogroup can be determined by PCR.

MLST can occasionally provide information useful for identifying outbreaks but is usually more appropriately applied to study long-term clonal relationships of meningococcal populations since it examines parts of the genome defining cell components which are not surface expressed and hence not under selection pressure. MLST is now also being developed as a non-culture-based method60,62.
Recommendation 2: Laboratory investigation

The following specimens should be collected on, or soon after, admission to hospital from all patients when meningococcal infection is included in the differential diagnosis.

- Blood for culture,
- Blood for PCR (EDTA or other unclotted blood specimen)
- Serum (on admission and 2-6 weeks later)
- * CSF for microscopy, culture, PCR
- Aspirate from other sterile sites suspected of being infected (e.g. joints) for microscopy, culture, PCR
- Nasopharyngeal (throat) swab normally taken through the mouth.

Evidence grade D

- Lumbar puncture should not be done until the patient’s condition has been stabilised and assessment made to rule out raised intracranial pressure.

NB. Where appropriate, specimens should be taken to check for alternative diagnoses, e.g. nasopharyngeal swabs and stool for viral culture.

Cases due to rare serogroups or recurrent infection.

In children and young adults with meningococcal disease caused by rare serogroups (i.e. not A, B, or C) or recurrent infection due to any serogroup, the CCDC/CPHM should discuss immunological investigation with the physician.

4. Role of public health

Recommendation 3

Public health departments have a major role in the management of meningococcal disease, ensuring that there are adequate disease prevention and surveillance programmes, and in the prevention of secondary spread through contact tracing. Usually the lead is through the consultant in communicable disease control (CCDC)/consultant in public health medicine (CPHM).

Surveillance local and national

CCDCs/CPHMs receive reports of cases from local clinicians in the course of managing the public health aspects of cases. In addition, meningococcal meningitis and septicaemia are statutorily notifiable diseases under the Public Health (Infectious Disease) Regulations 1988, and under Scottish legislation as meningococcal infection. Therefore clinicians are required to notify suspected cases to the proper officer, usually the CCDC/CPHM. An enhanced surveillance system records individual patient factors and links them to microbiological information from the national reference laboratories. This information is collected by the local CCDC/CPHM and sent to the regional and national epidemiology centres where it is further integrated with laboratory results.
**Recommendation 3: Role of public health**

The CCDC/CPHM* should ensure that policies are in place and implemented through a mechanism such as a service level agreement that recognises the corporate responsibility of the NHS. Policies should ensure that:

- cases are referred early to hospital
- cases are reported promptly to CCDC/CPHM
- cases in hospital are investigated appropriately
- contacts are traced and given appropriate chemoprophylaxis
- information is given to others including primary care, schools/universities, education authorities, National Health Service helplines, meningitis charities, employers
- communication with the media is appropriate and efficient.

_Evidence grade D_

All cases where a diagnosis of meningococcal disease is suspected should be promptly notified to the communicable disease control team without waiting for microbiological confirmation.

**N.B. Notification is a legal requirement**

_Evidence grade D_

The CCDC/CPHM should ensure that comprehensive information on cases is gathered to contribute to local public health management and surveillance. Probable and confirmed cases, classified on the basis of information at discharge, should be reported into the national enhanced surveillance systems for meningococcal disease.

_Evidence grade D_

The data set should include epidemiological, laboratory and clinical information. The current minimum dataset for enhanced surveillance in the UK includes area of residence, patient identification, date of birth / age, gender, date of admission to hospital (or death if not admitted), source laboratory, laboratory confirmation, statutory notification, clinical features, whether part of cluster, and clinical outcome. Serogroup C cases are followed up for information on vaccination status both in the enhanced surveillance of meningococcal disease and through surveillance of potential vaccine failures.

Additional data for local management and audit programmes may include:

- **case** – name and address including post code, telephone number, details of general practitioner, dates and times of disease onset / hospital admission / reporting, ethnic group, occupation/workplace, school/college/nursery attended,
- antibiotics given prior to admission, name of hospital/ward, name of consultant, specimens and dates and types of specimens;
- **contacts** – addresses and telephone numbers, details of antibiotics/vaccine/information given and by whom; details of general practitioner;
- **notifier** – name, address and occupation.

*CCDC – Consultant in communicable disease control  
CPHM – Consultant in public health medicine*
5. Public health action after a case

Case definitions (Box 1)
Box 1 defines those cases that require public health action and those that do not.

<table>
<thead>
<tr>
<th>Box 1: Case definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case requiring public health action</strong></td>
</tr>
<tr>
<td><strong>Confirmed case</strong></td>
</tr>
<tr>
<td>Clinical diagnosis of meningitis, septicemia or other invasive disease (e.g. orbital cellulitis, septic arthritis)*</td>
</tr>
<tr>
<td>AND at least one of:</td>
</tr>
<tr>
<td>Neisseria meningitidis isolated from normally sterile site</td>
</tr>
<tr>
<td>Gram negative diplococci in normally sterile site</td>
</tr>
<tr>
<td>Meningococcal DNA in normally sterile site</td>
</tr>
<tr>
<td>Meningococcal antigen in blood, CSF or urine</td>
</tr>
<tr>
<td>* Although not meeting the definition of a confirmed case, meningococcal infection of the conjunctiva is considered an indication for public health action because of the high immediate risk of invasive disease.</td>
</tr>
</tbody>
</table>

| **Probable case** |
| Clinical diagnosis of meningitis or septicemia or other invasive disease where the public health physician, in consultation with the physician and microbiologist, considers that meningococcal infection is the most likely diagnosis. Some microbiological tests (e.g. rising antibody levels) that are not considered sufficient to confirm the diagnosis of meningococcal disease may change the case category from ‘possible’ to ‘probable’. |

| **Case not requiring public health action** |
| **Possible case** |
| Clinical diagnosis of meningitis or septicemia or other invasive disease where the public health physician, in consultation with the clinician and microbiologist, considers that diagnoses other than meningococcal disease are at least as likely. This category includes cases who may be treated with antibiotics but whose probable diagnosis is viral meningitis. |

In such cases, prophylaxis for contacts is not indicated but giving out information about meningococcal disease may be helpful (see recommendation 7).

| **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 nasopharyngeal swab may increase the index of suspicion that this is a probable case, especially if the isolate is a virulent strain. Meningococcal pneumonia is not an indication for public health action but may carry a low risk of transmission in healthcare settings especially to the immunocompromised (see section 6).

Chemoprophylaxis

Risk to household contacts
About 97% of cases are sporadic. Although the risk to contacts is low, the highest documented absolute and relative risk is to people who live in the same household as a case of meningococcal disease. The Office for National Statistics defines a household as one person living alone or a group of people who share common housekeeping or a living room. The risk is highest in the first seven days after a case and falls rapidly during the following weeks. If prophylaxis is not given, the absolute risk to an individual in the same household one to 30 days after an index case is about one in 300. Beyond this four week period the risk is probably close to background levels. The increased risk in household members may be due to a combination of genetic susceptibility in the family, increased exposure to virulent meningococci and environmental factors.
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The case is likely to have acquired the invasive strain from a close contact, typically in the same household, who is an asymptomatic carrier. The incubation period is usually three to five days and cases do not usually have detectable carriage until admission to hospital or shortly beforehand. As the highest risk of illness in untreated households is observed in the first 48 hours after onset of disease in the index case, the source of infection in these further cases is most likely to be from the same (or another) carrier and not from the case.

It follows that transient contact with the index case before acute illness is unlikely to be an important risk factor for disease, so that mere proximity to the case (e.g. during travel in a plane, bus or car) may not justify prophylaxis. Although guidance for the USA suggests that passengers seated next to the index case on a plane for more than eight hours should be offered prophylaxis, no published reports of cases in such contacts were found.

Low level salivary contact should not be considered as a risk factor.

No cases have been reported following post-mortem contact with a case of meningococcal disease.

Embalming is not considered a hazard for transmission.

Aim
Chemoprophylaxis aims to reduce the risk of invasive disease by eradicating carriage in the group of close contacts at highest risk. It may act in two ways: (i) by eradicating carriage from established carriers who pose a risk of infection to others and (ii) by eradicating carriage in those who have newly acquired the invasive strain and who may themselves be at risk. The short- and medium-term reduction in risk among household contacts who are given antibiotics suggest that both mechanisms may operate.

Risk reduction
Antibiotics such as rifampicin, ciprofloxacin, and ceftriaxone are highly effective in eliminating carriage. A review of retrospective observational studies found a significantly reduced risk of further cases in the household during the month after a case among household members given rifampicin prophylaxis. The approximate number needed to treat to prevent a case was estimated to be about 200 individuals. In cases caused by vaccine preventable strains, vaccination would be expected to reduce the long-term risk of disease in close contacts. The estimated number of unimmunised close contacts needed to vaccinate to prevent a case is approximately 1,000 in cases due to confirmed serogroup C infection (Hoek M, unpublished data).

Although benzylpenicillin suppresses meningococcal growth in the throat it does not reliably eradicate carriage. Around 5% of cases treated with benzylpenicillin still carry the invasive strain after completing treatment and before discharge from hospital. Convalescent cases may then pose a risk to household contacts unless given a course of antibiotic treatment to eradicate carriage.

Contacts outside the household
After a single case of meningococcal disease, the risk of linked cases outside the household is low; this is presumably related to lower intensity of exposure to virulent strains. In England and Wales from 1995 to 2001, after one case in either a pre-school group, a primary or a secondary school, the absolute risks to each child/pupil in the same institution of becoming a case within the next four weeks were approximately one in 1,500, one in 18,000 and one in 33,000 respectively. A retrospective study in European countries suggested that there may be some benefit from a policy of giving chemoprophylaxis to the whole nursery compared to treating only close contacts, but the data were inconsistent between countries and the difference between policies was not statistically significant.

The Meningococcus Forum considered the revised estimates of risk and benefit particularly with reference to the treatment of pre-school groups. The Forum recommends that UK policy not to give antibiotics to pre-school groups after a single case should be maintained. The reasons are that: the benefit of giving antibiotics in this setting is not known; clusters in pre-school groups are rare (about three per annum in England and Wales); the potential for risk reduction by intervention is reduced according to the time from identification of a case to administration of prophylaxis within the institution; and harm may arise from drug side effects, development of antibiotic resistance, and eradication of naturally immunising strains from the nasopharynx. The further one goes outside the case household, the lower the chance of finding a carrier of a pathogenic meningococcal strain and the greater the chance of treatment doing harm by eradicating carriage of non-pathogenic organisms that may generate cross-protective immunity. This particularly applies in young children who are more likely to be carrying Neisseria lactamica than Neisseria meningitidis.

Reports of clusters in other settings, e.g. the workplace, are rare and the level of risk is considered to be much lower than educational settings.

August 2006
Recommendation 4: chemoprophylaxis and choice of antibiotic

**Prophylaxis indicated**
Chemoprophylaxis should be offered to close contacts of cases, irrespective of vaccination status, that require public health action (see case definitions) in the following categories:

(a) those who have had prolonged close 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 (including extended household), pupils in the same dormitory, boy/girlfriends, or university students sharing a kitchen in a hall of residence.

Evidence grade C

(b) those who have had transient close contact with a case only if they have been directly exposed to large particle droplets/secrections from the respiratory tract of a case around the time of admission to hospital (see section 6).

Evidence grade D

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

- Staff and children attending same nursery or crèche
- Students/pupils in same school/class/tutor group
- Work or school colleagues
- Friends
- Residents of nursing/residential homes
- Kissing on cheek or mouth (intimate kissing would normally bring the contact into the close prolonged contact category)
- Food or drink sharing or similar low level of salivary contact
- Attending the same social function
- Travelling in next seat on same plane, train, bus, or car.

Evidence grade D

**Prophylaxis uncertain**
The Working Group recognised that the division between those who do and do not receive prophylaxis is arbitrary as evidence on risk and benefit is limited. CsCDC/CsPHM* will need to use their judgement in reaching a decision on whether or not to advise prophylaxis for those who do not clearly fall into the above categories. For example, when a case occurs in a group of children looked after by the same childminder or among a circle of close friends, an assessment should be made as to whether these exposures meet the definitions of a close contact.

Evidence grade D

**Other situations:**

**Dispersal settings**
In settings where close contacts have been identified and where contact has now finished, e.g. those sleeping in the same room on holiday or at university, attempts should be made to arrange chemoprophylaxis within one week of dispersal if practicable.

Evidence grade D

**Post mortem contact with a case**
Prophylaxis is not indicated. Kissing the body is not considered to be a risk. Body bags are not necessary, and transport to other countries for burial or cremation does not pose a risk.

There is no restriction on embalming

Evidence grade D
### Contacts of possible cases
Contacts of possible cases do not need prophylaxis unless or until further evidence emerges that changes the diagnostic category to confirmed or probable.

*Evidence grade D*

### Timing
Antibiotic prophylaxis should be given as soon as possible (ideally within 24 hours) after diagnosis of the index case.

*Evidence grade C*

### Delayed diagnosis
If the public health physician receives a delayed report of a case, close contacts (as defined above) should be offered chemoprophylaxis, and vaccine if appropriate, up to four weeks after onset of illness *(low risk of further cases after this period).*

*Evidence grade D*

### Prophylaxis for the case
The case should receive chemoprophylaxis when able to take oral medication and before discharge from hospital, unless the disease has already been treated with ceftriaxone. Those treated with cefotaxime should still receive prophylaxis because it is not known whether cefotaxime eradicates carriage.

*Evidence grade C*

### Cases in contacts who have received prophylaxis
If further cases occur within a group of close contacts in the 4 weeks after receiving rifampicin prophylaxis, ciproflaxacin (or ceftriaxone) should be used for repeat prophylaxis.
Recommendations for choice of antibiotic

Rifampicin, ciprofloxacin, and ceftriaxone are all recommended for use in preventing secondary cases of meningococcal disease, but rifampicin is the only antibacterial agent that is licensed for this purpose\textsuperscript{39}. Ceftriaxone must be given by injection. Information given out with antibiotics should include an explanation that such treatment is not fully protective.

In a recently published Cochrane Review ceftriaxone, ciprofloxacin and rifampicin were all found to be effective at eradicating carriage for at least 2-3 weeks. Penicillin was less effective. It was noted that the use of rifampicin may lead to development of resistance\textsuperscript{87}.

**Rifampicin**

Recommended for use in all age groups. \textit{Evidence grade B}

Rifampicin is contraindicated in the presence of jaundice or known hypersensitivity to rifampicin. Interactions with other drugs, such as anticoagulants, phenytoin, and hormonal contraceptives should be considered. Side effects should be explained including staining of urine and contact lenses. Written information for patients should be supplied with the prescription (APPENDIX A). This is the responsibility of the prescriber.

Dosage twice daily for 2 days:

- Adults and children over 12 years of age: 600 mg
- Children 1-12 years: 10 mg/kg
- Infants (under 12 months of age): 5 mg/kg

Suitable doses in children based on average weight for age are:

- 0-2 months: 20 mg (1 ml*)
- 3-11 months: 40 mg (2 ml*)
- 1-2 years: 100 mg (5 ml*)
- 3-4 years: 150 mg (7.5 ml*)
- 5-6 years: 200 mg (10 ml*)
- 7-12 years: 300 mg (capsule or syrup)

* Rifampicin syrup contains 100 mg/5 ml

**Ciprofloxacin**

Recommended as an alternative agent to rifampicin for chemoprophylaxis in adults and children aged two years and above. \textit{Evidence grade C}

Ciprofloxacin is recommended when large numbers of contacts (aged 2 years or above) need prophylaxis. Ciprofloxacin has a number of advantages over rifampicin. It is given as a single dose (500 mg in adults and children over 12 years, 250 mg for children aged 5-12 years, 125 mg for children 2-4 yrs), it does not interact with oral contraceptives, and it is more readily available in community pharmacies.

It may, however, be followed by anaphylactic reactions\textsuperscript{88,89} (P Monk, M Evans, unpublished data). Healthcare staff should give out information sheets that include the risk of side effects (APPENDIX A), and be prepared to deal with allergic reactions. It can also interact with other drugs but a single dose is unlikely to have a significant effect. It has an unpredictable effect on epilepsy but may be preferable to rifampicin if on treatment with phenytoin.

The manufacturers do not recommend using ciprofloxacin in children or growing adolescents unless benefits of treatment are considered to outweigh risks. Concern has been raised about the possibility of joint/cartilage damage seen in immature animals given ciprofloxacin. Such effects have not been observed in children despite extensive use\textsuperscript{90,91}. Ciprofloxacin suspension is currently licensed for other indications in children above 2 years of age\textsuperscript{39}.

**Ceftriaxone**

As ceftriaxone can only be given by injection and is painful, its main indication is when preferred for specific reasons e.g. in pregnancy (see below). Potential side effects include diarrhoea, allergies, hepatic and blood disorders.
Pregnancy and breastfeeding

The Working Group considered on balance that chemoprophylaxis should now be recommended in pregnancy (with stronger evidence for benefit from prophylaxis to close contacts and expected benefit to the whole close contact group by treating all members of that group). Rifampicin and ceftriaxone can be used in pregnancy or in breastfeeding mothers, but ciprofloxacin is not recommended.

Evidence grade D

In pregnancy or when breastfeeding, mothers should be offered chemoprophylaxis with rifampicin (600 mg twice daily for two days) or ceftriaxone (250 mg single dose by intramuscular injection reconstituted with 2 ml 1% lignocaine).

Vaccines

Meningococcal serogroup C conjugate vaccines (MenC) were introduced into the UK childhood vaccination programme in late 1999 and scheduled for all under the age of 18 years. In 2002 these vaccines were also made available to those aged 20-24 years. These vaccines confer high levels of serum bactericidal antibody and induce immunological memory in individuals from the age of two months. Preliminary estimates of efficacy suggest that the vaccine is 88-96% effective against invasive meningococcal disease due to serogroup C infection. Protection declines over time especially when given under 1 year of age. Booster doses should offer added protection for those at high risk.

Previous serogroup C disease is not a contra-indication to MenC vaccination. The immune response to natural infection may be inferior to that observed after conjugate vaccines, particularly in young children.

Meningococcal polysaccharide vaccines offer protection against infection with serogroups A, C, W135 and Y. Protection against group A infection is highly effective from three months of age and lasts for around three years in older children and adults. Protection against serogroup C infection from these vaccines is of shorter duration than that conferred by the conjugate vaccine, and the level of protection is inferior in young children, particularly those under 18 months. The protection conferred by the quadrivalent vaccine against serogroups Y and W135 infection is inferred by evidence of immunogenicity in adults and so efficacy in younger children is unknown, but is expected to be similar to protection against serogroup C disease.
**Recommendation 5: Vaccines**

**Vaccination** should be according to current Department of Health recommendations [DH website](http://www.hpa.org.uk/infection/topics_az/meningo/advice/mensurvw99.pdf)

**Close contacts**

Close contacts of cases due to vaccine preventable strains of *N. meningitidis* who received chemoprophylaxis should be offered an appropriate vaccine once diagnosis has been confirmed and up to four weeks after illness onset.

For **confirmed serogroup C** infection, MenC vaccination should be offered to all close contacts previously unimmunised with MenC vaccine. The course can be started from the age of 2 months. Close contacts who are partially immunised should complete a course of MenC vaccination. Those who completed a course more than one year before should be offered a booster.

*Evidence grade B*

For **confirmed serogroup A** infection, vaccination with quadrivalent polysaccharide vaccine should be offered to all close contacts over 3 months of age (2 doses if aged under 2 years).

*Evidence grade B*

For **confirmed serogroup W135 or Y infections**, vaccination with quadrivalent polysaccharide vaccine should be offered to all close contacts over two years of age.

*Evidence grade B*

For **probable cases with serogroup A,C,Y, or W135 from nasopharyngeal swab**, quadrivalent vaccine should be offered to close contacts.

For **all cases** the opportunity should be taken to recommend MenC vaccination to unimmunised contacts under the age of 25 years.

*Evidence grade D*

**Vaccination of the index case**

MenC vaccine should also be offered to any unimmunised index cases (**whatever the serogroup**) under the age of 25 years. Although recurrent serogroup C disease is rare, this policy ensures that persons in this age group are given equivalent protection to their age-matched immunised peers.

*Evidence grade D*

Cases of confirmed serogroup C disease who have previously been immunised with MenC (or polysaccharide) vaccines should be offered MenC vaccine around the time of discharge from hospital. Vaccine failure implies an inadequate response to the vaccine and may reflect host factors or sub-optimal storage or administration of the vaccine. A sample of convalescent serum prior to re-immunisation should be taken and sent to the HPA Meningococcal Reference Unit. Immunological investigation of the case and review of vaccine storage and administration procedures should be considered. [http://www.hpa.org.uk/infection/topics_az/meningo/advice/mensurvw99.pdf](http://www.hpa.org.uk/infection/topics_az/meningo/advice/mensurvw99.pdf)

*Evidence grade D*

Convalescent immunisation with polysaccharide vaccines is not recommended for cases due to A, W135 or Y serogroups (**natural infection is likely to offer greater protection than immunisation with polysaccharide vaccines**).

*Evidence grade D*

**NB.** If / when conjugate quadrivalent vaccine is licensed in UK, it should be offered (i) to cases of serogroup A, W135, Y infection and their close contacts (ii) to cases of recurrent infection due to any serogroup (iii) in other situations in place of polysaccharide vaccine in line with DH recommendations.
Disseminating information

Following a case of meningococcal disease, it is important to give out information because early diagnosis and treatment should improve outcome. There is a small but real risk of further linked cases. Vigilance for signs and symptoms among contacts and their cases is important especially in the immediate high risk period (one week) after a case. Accurate and timely information should help to limit the spread of false rumours and anxiety.

Recommendation 6 Disseminating information

Leaflets or other printed information about meningococcal disease should be widely available and quickly distributed after reporting of a confirmed or probable case. This may also be helpful after a possible case depending on levels of concern, and is a matter for local judgement. 

Evidence grade D

The CCDC/CPHM* should ensure that information about a case of meningococcal disease is shared with other NHS colleagues and external agencies as necessary. It is important to inform the appropriate general practitioner(s) and out-of-hours services so that they know what public health action has been taken and to promote early recognition of any further cases. The CCDC/CPHM may also wish to inform NHS helplines and the meningitis charities.

Evidence grade D

Cases in educational institutions

Heads of pre school groups, schools, colleges and universities should be informed when there is a case of meningococcal disease in someone attending their institution. With the advice of the CCDC/CPHM, letters are usually sent to other parents/students to inform them of the situation (APPENDIX B). It is recommended to inform and seek support for this action from relatives of the case, as the letters may result in identification of the case. The purpose of the letter is to give information about meningococcal disease, assist parents and others in the early detection of the disease, allay anxiety and prevent uninformed rumours.

The information given should be sufficient to ensure that parents are aware of the situation whilst preserving the confidentiality of the patient. It is usually helpful to explain what public health action has been taken.

If a possible case attends an educational institution, it is still advisable to discuss the situation with the head of the institution at an early stage. The head will then be in a good position to respond immediately to parental concerns.

Dispersal

If a case is reported within one week of date of last attendance at the institution, distributing information should be considered where practical. This is consistent with chemoprophylaxis in dispersal settings.

Evidence grade D

August 2006
Meningitis charities and NHS Direct

The meningitis charities may be contacted when there is a case of meningococcal disease. They need to have sufficient information so that they can support callers with appropriate advice. The information given to these bodies should include anonymised details of the case and of public health action taken.

Leaflets available from

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<tbody>
<tr>
<td>Meningitis Trust</td>
<td>01453 768000</td>
</tr>
<tr>
<td>Meningitis Cymru (as Meningitis Trust)</td>
<td>01454 281811</td>
</tr>
<tr>
<td>Meningitis Research Foundation</td>
<td>0141 427 6698</td>
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<tr>
<td>Meningitis Association Scotland</td>
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24 hour helplines

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<tr>
<td>Meningitis Trust</td>
<td>0800 028 1828 (Freephone)</td>
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<tr>
<td>Meningitis Cymru (as Meningitis Trust)</td>
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<tr>
<td>Meningitis Research Foundation</td>
<td>0808 800 3344 (Freephone)</td>
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<td>0141 427 6698</td>
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<td>NHS Direct</td>
<td>0845 4647</td>
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<tr>
<td>NHS Scotland</td>
<td>0845 424 2424</td>
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<tr>
<td>International (Meningitis Trust)</td>
<td>+44 870 124 7000</td>
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Websites

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<td>Meningitis Research Foundation</td>
<td><a href="http://www.meningitis.org">http://www.meningitis.org</a></td>
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<td><a href="http://www.meningitis-trust.org.uk">http://www.meningitis-trust.org.uk</a></td>
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6. Prophylaxis in healthcare settings

Healthcare workers in contact with cases of meningococcal disease are at increased relative risk of disease in the 10-day period after exposure, although absolute risks are very low; in one study absolute risk was estimated as 0.8/10^5 and relative risk as 25^5. The data were consistent with a higher (but unquantifiable) risk in those more heavily exposed to nasopharyngeal secretions of cases around the time of admission to hospital.

After starting treatment with intravenous benzylpenicillin, carriage rates decrease rapidly so that meningococci are undetectable by nasopharyngeal swabbing after 24 hours on treatment^44. Third generation cephalosporin antibiotics would be expected to have a similar or more rapid effect on suppression of carriage. Both ceftriaxone and rifampicin are known to be effective in eradicating carriage^78,80, whereas penicillin is thought to suppress but not eradicate carriage^44.

Recently published UK guidelines for preventing hospital acquired infections recommend wearing face masks and eye protection when there is a risk of secretions splashing into face and eyes^96. In the USA, masks are recommended when working within 1 metre of patients known or suspected to be infected with micro-organisms transmitted by large-particle droplets (> 5 micrometres diameter) that can be generated during coughing, sneezing, talking or the performance of clinical procedures^97. Laboratory studies suggest that surgical masks can protect the wearer against droplet transmission^98,99.

Meningococcal pneumonia may carry a low risk of transmission in healthcare settings especially to the immunocompromised^64,65.
**Recommendation 7: prophylaxis in health care settings**

Healthcare workers should reduce the possibility of exposure to large particle droplets (e.g. by wearing surgical masks, using closed suction) especially when carrying out airway management procedures, so that chemoprophylaxis is not needed.

*Evidence grade D*

Chemoprophylaxis is recommended only for those whose mouth or nose is directly exposed to large particle droplets/secretions from the respiratory tract of a probable or confirmed case of meningococcal disease during acute illness until completed 24 hours of systemic antibiotics. This type of exposure will only occur among staff who are working close to the face of the case without wearing a mask or other mechanical protection. In practice this implies a clear perception of facial contact with droplets/secretions and is unlikely to occur unless using suction during airway management, inserting an airway, intubating, or if the patient coughs in your face. General medical or nursing care of cases is not an indication for prophylaxis.

Rifampicin 600 mg orally twice daily for 2 days or ciprofloxacin 500 mg as a single dose are recommended for prophylaxis.

*Evidence grade D*

Exposure of the eyes to respiratory droplets is not considered an indication for prophylaxis. Such exposure may however carry a low risk of meningococcal conjunctivitis and subsequent invasive disease. Staff should be counselled about this risk and advised to seek early treatment if conjunctivitis should develop within 10 days of exposure.

*Evidence grade D*

Routine vaccination of healthcare workers with meningococcal C conjugate vaccines is not recommended for two reasons. First, at the time of exposure, the serogroup of the infecting strain is not usually known, so previous vaccination would not obviate the need for chemoprophylaxis. Second, as the UK vaccination programme takes effect, the incidence of serogroup C disease and the proportion of cases caused by such strains should diminish, thus reducing risk of secondary cases that are vaccine preventable.

*Evidence grade D*

The above recommendations also apply to contacts of cases in healthcare workers (including dentists), and to contacts of cases on a hospital ward where the diagnosis is initially unsuspected and not treated with systemic antibiotics. Chemoprophylaxis is not usually indicated for patient or staff contacts of such cases. A hospital ward is not equivalent to a household setting. However the threshold for giving prophylaxis should be lower for immunocompromised contacts who may be at increased risk of invasive disease. Risk assessment is advised.

*Evidence grade D*

7. Management of clusters

Outbreaks of meningococcal disease often generate high levels of public alarm. Contributing to this alarm are the lack of predictability and speed of development of outbreaks that can frustrate the efforts of public health authorities. The speed of public health response is thus important both to implement preventive measures and reduce public anxiety.

In educational settings, once a second case has occurred, the risk of a third case may be as high as 30-50%. The risks are highest in the week after the second case. The risk to staff in such clusters is not known. However of six clusters that contained confirmed cases among both staff and children in educational settings in England and Wales 1995-2001, five involved pre-school groups or primary schools (N Syed, unpublished data), suggesting a greater risk to teachers of young children.

Relative risk of further cases in other settings hasn’t been formally assessed, but outbreaks in definable social groups, civilian communities and military recruits are well described.
Although one trial of mass chemoprophylaxis in a closed community (military barracks) showed a significant effect on disease reduction\textsuperscript{103} whether such interventions work in schools or civilian communities is not known\textsuperscript{104,105}. The aim of such interventions is to eradicate carriage of the outbreak strain from a population at high risk of invasive disease\textsuperscript{106}.

If an outbreak is caused by strains of a serogroup for which an effective vaccine exists, vaccination should be considered. Recent data from England and Wales showed that if the serogroup of one case had been identified and another case was diagnosed within four weeks in the same school, the second case was likely to be of the same strain as the first case\textsuperscript{85}. In the USA vaccination of whole communities in community serogroup C outbreaks is considered when a defined threshold is reached\textsuperscript{107}.

Assessment of benefits and costs of interventions must then lead to a decision on public health action. External factors such as availability of staff, antibiotics, vaccine and feasibility of action (such as holidays just started) may well influence the decisions made\textsuperscript{108}. More evidence is needed on the effectiveness of such interventions.

**Management of clusters in a single educational institution**

In this context, a cluster is defined as two or more cases of meningococcal disease occurring in the same preschool group, school, or college/university within a four-week period.

---

**Recommendation 8: Managing clusters in educational institutions**

**Assess the information**

When 2 or more cases are reported from an educational institution, careful and rapid assessment should be made. This should include a review of:

- clinical features of the cases
- microbiological data (serogroup/type/subtype)
- dates of onset of illness and of last attendance
- links between cases by age, school year, home address, social activities, and friends
- numbers of students in the school and in each school year.

**Consider the options**

The public health management options include:

- no further action (e.g. if two possible cases)
- giving out information only
- giving out information and offering wider prophylaxis in the institution.

The main decision to be taken by the CCDC/CPHM* is whether to offer wider prophylaxis, and, if so, when and to whom. The principle is to try to define a group at high risk of acquiring meningococcal infection and disease, and to target that group for prophylaxis in order to reduce risk. The target group should be a discrete group that contains the cases and makes sense to staff/parents/students, 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. The evidence on risk suggests a need to act promptly.

*Evidence grade D*
Make a decision

If two possible cases attend the same institution, whatever the interval between cases, prophylaxis to any contacts is not indicated.

Evidence grade D

If two confirmed cases caused by different strains attend the same institution, they should be regarded as two sporadic cases, whatever the interval between them. Only close contacts of each case should be offered prophylaxis.

Evidence grade D

If two confirmed / probable cases who attend the same preschool group, school, college or university arise within a four-week period and are, or could be, caused by the same serogroup, public health action is indicated. It is not necessary to wait for microbiological results on probable cases (high immediate risk of further cases).

Evidence grade D

Information should be given out widely within the institution to parents and students as appropriate (see APPENDIX B).

Evidence grade D

For clusters in preschool groups, both staff and children would normally be offered prophylaxis.

For clusters in schools/colleges/universities, if a clear subgroup can be defined that contains the cases, prophylaxis should be offered to that group. If a subgroup cannot be defined, then a decision may be needed on offering prophylaxis to the whole institution. This will depend on factors such as the size of the population, the time interval and age difference between cases, whether they are confirmed or not.

If uncertain, seek expert advice from Centre for Infections (Tel: 020 8200 4400) or Health Protection Scotland (tel: 0141 300 1100).

For clusters among children at preschool groups and primary schools, staff should normally be included in the target group (some evidence of increased risk) but not in clusters among students at secondary schools, colleges, universities (no evidence of increased risk).

Evidence grade D

For a cluster involving one or more cases of confirmed group Y or W135 infections: quadrivalent polysaccharide vaccine should also be offered to all individuals over the age of two years who were offered antibiotics.

Evidence grade D

For a cluster involving one or more cases of confirmed group C infection: MenC conjugate vaccine should also be offered to all previously unimmunised individuals who were offered antibiotics. If the cluster involves MenC vaccine failures, further investigation may be required and discussion with CfI or HPS is recommended (see section 5, vaccines).

Implement the decision

If antibiotics +/- vaccine are to be offered, make urgent arrangements with:

- community medical/nursing staff to deliver medicines/vaccine/information
- head of the institution to inform parents/students and seek consent (APPENDIX B).
- pharmacists to supply antibiotics (in correct formulation, dosage and information sheets) and vaccines109.
Rifampicin or ciprofloxacin are the recommended antibiotics (see section 5, chemoprophylaxis). Patient group directions may be helpful (APPENDIX C).

NB Closing the school is not advised as no reduction in risk would be expected (levels of contact among social networks are unlikely to be reduced and may be increased; application and success of intervention will be assisted if school attendance is high).

Swabbing to measure carriage of outbreak strains is not usually recommended in acute outbreaks because decisions have to be taken before results are available and because carriage rates often bear no relationship to risk of further cases. NB. If 2 or more cases occur within a clearly defined social group outside an educational setting, the same principles as for a school cluster apply.

CCDC – Consultant in communicable disease control, CPHM – Consultant in public health medicine
CfI – Centre for Infections
HPS – Health Protection Scotland

Management of clusters in the wider community (Recommendation 10)
One of the major difficulties in targeting a wider community for intervention is deciding on the population boundaries, often defined by age group and geography. Such boundaries will of necessity be arbitrary. As far as possible, use existing administrative boundaries that make sense to the people who live within and without them. In any case, there are likely to be people living on the other side of the boundary who may feel unjustifiably excluded. The extent of public concern and press interest should not be underestimated.

Although school outbreaks must be handled quickly in order to control alarm and reduce immediate risk of further cases, wider community outbreaks usually build up more slowly and by their nature are more diffuse. The same principles and management steps apply (see above).
Recommendation 9: Managing clusters in wider community

Assess carefully all the epidemiological information at your disposal: confirmed and probable cases, serotyping and/or molecular typing data, dates of onset, links between cases, size of population containing the cases, and MenC vaccination uptake rates (where relevant).

Calculate age specific attack rates.

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 multiple cases in the same household or in the same institutional setting (if this setting is considered to be the focus of a separate outbreak) 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. The target age group within this population should contain all or most of the outbreak cases. If the outbreak is mainly in children, the denominator should be based on the age range of children at school or preschool and, where relevant, ages in whom vaccine should be effective (e.g. 2-11 year olds, 2-16 year olds).

Only consider intervention if the age-specific attack rate (number of confirmed outbreak strain cases [suggested minimum of four] divided by the number in target age group) in a three-month period is “high”. Although a precise threshold for intervention has not been set, age-specific attack rates among 2 to 16 year olds targeted for intervention in two community outbreaks during the winter of 1995/6 caused by serogroup C strains were over 40/100,000. This figure was about 20 times the annual incidence of confirmed serogroup C disease in one to 19 year olds in England and Wales during 1995-96.

Evidence grade D

Seek advice from national experts through Centre for Infections (tel: 020 8200 4400) or Health Protection Scotland** (tel: 0141 300 1100) if attack rates approach this level.

Decide whether or not to embark on a community immunisation and/or chemoprophylaxis programme at a full meeting of the outbreak control team.

Disseminating information

It is essential that clear, consistent and accurate information is provided to parents, students and staff, and the wider community. The target group should be clearly identified and information to this group should emphasise the importance of early recognition of symptoms and prompt access to medical services.

Local general practitioners and out-of-hours services should be advised to be on the alert for any new cases associated with the cluster. It may also be helpful to alert receiving Accident and Emergency Departments and admitting clinicians.

As far as possible, information that may need to be disseminated should be prepared in advance. In preschool and school settings the CCDC/CPHM should liaise closely with the manager or headteacher. In college/university settings liaison will be with a member of the senior management team. It is advisable for one person within the college/university to coordinate operations, and to receive and disseminate all information. Registry departments can aid in tracing students and getting information to them, and personnel or occupational health departments can help disseminate information to staff groups.

A public relations strategy will be required. If high levels of interest are anticipated or already evident, prepare to set up telephone helplines, to allow controlled media access to vaccination sites, to release regular coordinated press briefings and to hold press conferences101.

Evidence grade D

See section 5, box 2, for helpline contact details.

* CfI –Centre for Infections
Guidance for public health management of meningococcal disease in the UK

Membership of Working Group of PHLS Meningococcus Forum
Guidelines prepared by Working Group of the Public
Health Laboratory Service Meningococcus Forum:
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Brian Smyth, PHLS CDSC (Northern Ireland), Belfast
Mary Ramsay, Immunisation Division, PHLS CDSC, Colindale
Will Patterson, Lothian NHS Board
Philip Monk, Leicestershire Health Authority.
Rod Mackenzie, West Surrey Health Authority
Simon Kroll, St.Mary’s Hospital Campus
Ed Kaczmaroiski, Meningococcus Reference Unit, Manchester PHL
David Irwin, North Essex Health Authority
Meirion Evans, PHLS CDSC (Wales), Cardiff
Harsh Duggal, South Staffordshire Health Authority
Natasha Crowcroft, PHLS CDSC Colindale
Peter Christie, Scottish Centre for Infection and Environmental Health, Glasgow
Mike Barker, Southampton and South West Hampshire Health Authority

Review of guidelines
The guidelines will be reviewed by the HPA Meningococcus Forum every 3 years. Any modifications will be updated on the HPA website, www.hpa.org.uk

Acknowledgements
We are very grateful for comments from the Royal College of Physicians, the Royal College of General Practitioners, the Royal College of Pathologists, the Royal College of Paediatrics and Child Health, the British National Formulary, the Meningitis Research Foundation and many individual members of the PHMEG.

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References

August 2006


Guidance for public health management of meningococcal disease in the UK


78. Cartwright KA, Stuart JM, Robinson PM. Meningococcal carriage in close contacts of cases. Epidemiol Infect 1991; 106: 133-41.


82. Controlling the risk of infection at work from human remains – a guide for those involved in funeral services (including embalmers) and those involved in exhumation. Health & Safety Executive 2005.


Examples of drug information leaflets  Appendix A

**Rifampicin**

The antibiotic you will be given is called Rifampicin. It comes as either tablets or syrup and is suitable for people of all ages. The meningococcal germs that cause meningitis and septicaemia can be carried in the nose and throat, this antibiotic will kill them.

Rifampicin must be taken twice a day for 2 days (morning & evening), the instructions will be clearly written on the box or bottle. **It is important that you take a 2-day course. It is taken by mouth and should be taken one hour before a meal to obtain the best effect.** You may have extra medicine left, which should be disposed of safely.

Rifampicin is an antibiotic which is frequently used to treat lots of different conditions. It is recommended in national guidelines for close contacts of someone with meningococcal disease.

**The side effects of Rifampicin may include:**

- Orange/reddish staining of urine, saliva and tears. **This is normal – so do not be alarmed. Rifampicin may permanently stain some contact lenses so you should not wear contact lenses whilst on treatment or for the following week.**
- Tummy upset, diarrhoea and nausea
- Skin flushing and itching, with or without a rash
- Very rarely, jaundice (yellowing of the skin or whites of the eyes)

Rifampicin may reduce the effect of several medicines including
- blood thinning medication (anticoagulants)
- diabetic medication
- some types of epilepsy medication (anticonvulsants)

**Please tell the Public Health doctor or nurse if you**
- take any medication
- are allergic to rifampicin
**as you may need an alternative medicine**

**Rifampicin is recommended in national guidelines for contacts of meningococcal disease who are pregnant**

Rifampicin may interfere with the action of the **contraceptive pill** (the pill). If you are taking the contraceptive pill you should continue to take it as usual but use extra protection (e.g. condoms) whilst you are taking rifampicin and for 4 weeks afterwards. Also, you should ask the doctor who prescribed your contraceptive pills for advice as you may need to take extra contraceptive pills (as well as using other protection). Rifampicin does not affect other types of contraception.

If you are unclear or would like further information, please contact:
Ciprofloxacin

The antibiotic you will be given is called Ciprofloxacin. The meningococcal germs that cause meningitis and septicaemia can be carried in the nose and throat, this antibiotic will kill them.

It comes in tablet form. You will receive either one or two tablets of Ciprofloxacin. It is taken by mouth as a one off dose with a glass of water. It is important that you drink plenty of fluids for the rest of the day after having this antibiotic.

Do not take the tablet if you have taken antacid/indigestion medicines or preparations containing iron or mineral supplements within the last 4 hours. Please see the doctor or nurse if this is the case. You should also avoid taking alcohol with this medication as it may make you drowsy affecting your ability to drive or operate machinery.

Ciprofloxacin is an antibiotic which is frequently used to treat lots of different conditions. It is recommended in national guidelines for close contacts of someone with meningococcal disease

The side effects of Ciprofloxacin may include:
- tummy ache, diarrhoea and nausea
- tiredness and headaches
- rash and itching
- facial swelling - very rarely breathing difficulties may occur with the facial swelling. You should seek medical attention urgently if this occurs.
- pain and inflammation around the joints

Please tell the Public Health doctor or nurse if you are
- allergic to ciprofloxacin
- pregnant or breastfeeding
so that they can arrange an alternative medicine

Please tell the Public Health doctor or nurse if you
- have a history of epilepsy or G6PD deficiency
as you may need alternative medication

If you are unclear or would like further information, please contact: -
Appendix B

Example of information letter to parents after a case
* delete/modify as appropriate

Dear Parent or Guardian,

I am writing to inform you that one *pupil/child from the *school/nursery has been admitted to hospital with *meningitis/septicaemia, probably/possibly caused by the meningococcal bacteria. The child is (*status – responding well to treatment etc.). No further action is necessary at the present time. There is no reason to make any change in the *school/nursery routine and no reason for children to be kept at home.

Meningococcal bacteria are carried in the back of the throat of about one in ten people at any one time but only very rarely cause illness. Most people who carry the bacteria become immune to them. The bacteria do not spread easily and those who have had prolonged, close contact with the person are at a slightly greater risk of getting ill. These people have been identified and given antibiotics to stop the bacteria spreading.

Although the risk of another case in the *school/nursery is very small, it is sensible to be aware of the signs and symptoms
*which are detailed in the attached leaflet / below

Meningitis
- Fever
- Vomiting
- Severe Headache
- Stiff Neck
- Dislike of bright light

Septicaemia
- Fever
- Vomiting
- Bruising Rash
- Rapid Breathing
- Cold Hands and Feet
- Joint/Muscle Pain

**NOT ALL OF THESE SIGNS AND SYMPTOMS MAY SHOW AT ONCE, but someone with this illness will become very ill. The illness may progress over one or two days **BUT IT CAN DEVELOP VERY RAPIDLY, sometimes in a matter of hours.**

Diagnosis in the early stages can be difficult. The early signs can be like bad ‘flu’ symptoms but be WATCHFUL and use your instincts. **IF SOMEONE BECOMES ILL WITH SOME OF THESE SIGNS OR SYMPTOMS, CONTACT THE DOCTOR URGENTLY** and ask for advice.

If you have individual worries about this case, you can speak to a member of the public health team on ........ during normal working hours.

Further information is available from:
The Meningitis Research Foundation www.meningitis.org 0808 800 3344 (24hr Helpline)
The National Meningitis Trust www.meningitis-trust.org 0845 6000 800 (24hr Support Line)
NHS Direct www.nhsdirect.nhs.uk 0845 46 47

Yours sincerely

*Head Teacher/Manager/ Public Health Physician
Example of parent letter if antibiotics and/or vaccine programme

Dear Parent or Guardian,

I am writing to inform you that *two/three pupils/children from the *school/nursery have been admitted to hospital with *meningitis/septicaemia, probably/definitely caused by the meningococcal bacteria. The children are *(status – responding well to treatment etc.).

In accordance with national expert guidance, we will be offering preventive antibiotics *and vaccination to all pupils in the *school/ school year. A special session for this will be held on ……. from …. to …. in ……..

Your child should attend this session and bring with them the enclosed consent form, signed by you. I also enclose an information sheet on *meningitis/ ciprofloxacin/ rifampicin/ vaccine for your information.

For further information, a telephone helpline is available on ……….

Yours sincerely

Public health physician

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Example of consent form

..................................*School/Nursery

Name of pupil/student .................................. Date of birth……/……/……
Address .................................................................
School year ...........

*I consent to /*my child/ receiving meningococcal vaccine
*I consent to /*my child/ receiving preventive antibiotic tablets
I have read the information leaflet attached

*Relationship to child: (Mother, Father, Legal Guardian) ..............................................

NAME (Capitals, please) .................................................................

Date: .................................. Signed: ..................................
## Administration of Rifampicin by Registered Nurses employed by ..............Trust/Agency for the prevention of secondary cases of meningococcal disease

1. This Patient Group Direction relates to the following drug:

<table>
<thead>
<tr>
<th>Name of medicine</th>
<th>Rifampicin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal Status</td>
<td>POM (Prescription only medicine)</td>
</tr>
</tbody>
</table>
| Storage          | Rifampicin capsules 300mg: store below 25° C  
                  Rifampicin syrup 100mg in 5ml: store below 30° C  
                  Protect from light and moisture  
                  Shake syrup before use and do not dilute |
| Dose             | Adults and Children over 12 years: 600mgs twice daily for 2 days  
                  Children aged 1 to 12 years: 10mg per kg twice daily for 2 days  
                  Infants under 12 months: 5 mg per kg twice daily for 2 days  
                  
                  **Children’s doses based on average weight for age:**  
                  | 0-2 months | 20mg (1ml syrup*) twice daily for 2 days  
                  | 3-11 months | 40mg (2ml syrup*) twice daily for 2 days  
                  | 1-2 years | 100mg (5ml syrup*) twice daily for 2 days  
                  | 3-4 years | 150mg (7.5ml syrup*) twice daily for 2 days  
                  | 5-6 years | 200mg (10ml syrup*) twice daily for 2 days  
                  | 7-12 years | 300mg (1 capsule) twice daily for 2 days  
                  
                  * Rifampicin syrup contains 100mg in 5ml |
| Route/method     | Oral  
                  The doses should be taken at least 30 minutes before a meal or 2 hours after a meal to ensure rapid and complete absorption |
| Frequency        | Twice daily |
| Duration         | Two days |
| Total dose number| Four doses |
| Advice to the patient or carer |  
|                  | Patients on oral contraceptives should be advised to use alternative, non-hormonal methods of birth control during the therapy and continued for at least 4 weeks after stopping the rifampicin.  
|                  | Pregnancy – use only if potential benefit outweighs the potential risk (see below for further detail)  
|                  | Stress the importance of completing the 2 day course  
|                  | Soft contact lenses should not be worn for 1 week following completion of the course or they may be permanently stained.  
|                  | Treatment is not fully protective and close contacts must be alert to symptoms and signs of meningococcal disease.  
|                  | **Provide written patient information sheet on rifampicin and meningococcal disease** |
### Side effects

See BNF for full details

- Nausea, diarrhoea, urticaria and rash, fatigue, headache or drowsiness
- Orange/reddish staining of urine, sputum and tears, may stain contact lenses and nappies
- Respiratory symptoms, including shortness of breath
- Collapse and shock
- Haemolytic anaemia
- Acute renal failure
- Thrombocytopenic purpura
- Alterations to liver function, jaundice
- Also, oedema, muscular weakness and myopathy, exfoliative dermatitis, toxic epidermal necrolysis, pemphigoid reactions, leucopenia, oesinophilia

### Overdose

Gastric lavage should be performed as soon as possible. Intensive support measures should be instituted and individual symptoms treated as they arise.

### 2. Clinical condition

#### Clinical condition to be treated

Prophylaxis following close contact with a case of meningococcal disease to eliminate meningococci in the nasopharynx of asymptomatic carriers

#### Criteria for inclusion

- All children and adults at risk of meningococcal disease, including:
  - People who have had close, prolonged contact with the confirmed or probable case during the 7 days before the case became ill
  - During local outbreaks of the disease
  Ideally, prophylaxis should be given within 24 hours of the index case being diagnosed

#### Criteria for exclusion

- Refusal of treatment or parental decline to give consent
- Jaundice
- Hypersensitivity to rifampicin or any of the ingredients
- Hepatic impairment (may require reduced dose)
- Anticoagulants or phenytoin
- Transplant patients receiving ciclosporin, tacrolimus or sirolimus
- HIV positive patients receiving antiretroviral therapy

#### Action if excluded

- Explain clinical reasons for exclusion
- Consider alternative prophylaxis and if necessary refer to relevant GP or Consultant in Communicable Disease Control
- Advise on risks of infection, the need for vigilance for symptoms of meningococcal disease and the need to seek urgent medical attention should symptoms occur
- Document all actions

#### Action if refused

- Advise on risks of infection, the need for vigilance for symptoms of meningococcal disease and the need to seek urgent medical attention should symptoms occur
- Inform GP
- Respect wishes
- Document actions in patient’s records
Drug interactions
(Further interactions are outlined in the BNF)

Rifampicin has been shown to have liver enzyme inducing properties and may reduce the effectiveness of:
- Anticoagulants
- Corticosteroids
- Ciclosporin
- Digitalis preparations
- Oral contraceptives
- Oral hypoglycaemics
- Dapsone
- Phenytoin
- Quinidine
- Narcotics
- Analgesics

It may be necessary to adjust the dosage of these drugs if they are given concurrently with rifampicin, especially when it is initiated or withdrawn. Patients may need advice or referral to a doctor.

Cautions

Hepatic impairment – consider risks and benefits

Pregnancy and lactation

Pregnancy – use only if the potential benefit outweighs the potential risks. If used within the last few weeks of pregnancy it may cause post-natal haemorrhages in the mother and infant, for which treatment with vitamin K1 may be indicated. Rifampicin or ceftriaxone recommended by HPA for prophylaxis in pregnancy

Rifampicin is excreted in breast milk – only use if the potential benefit outweighs the potential risks

3. Records

3.1 The following paper or computer-based records should be kept:
- Verbal consent agreeing to the administration of the drug is required from an appropriate person
- Patient name and contact details
- Name and brand of the drug
- Batch number and expiratory date (if available)
- Dose given
- Route of administration
- Signature & date
- Adverse effects reported

Note: The nurse administering the drug must ensure that the patient’s name and date of administration is written on the box/bottle. The patient must also be provided with written advice on the effects of rifampicin.

3.2 Drug audit trail data collection:

Reconciliation: Stock balances should be reconciled with receipts, administration and records on a patient-by-patient basis.

Storage: Standards must be consistent with the Summary of Product Characteristics.
4. **Professional responsibility of nurses**

4.1 The nurse will ensure that she/he has the relevant training and is competent in administering POM, including contra-indications and anaphylaxis. She/he will attend training updates as appropriate.

4.2 The nurse will have due regard to the Nursing and Midwifery Council Code of Professional Conduct, the Scope of Professional Practice and Guidelines for the Administering of Medicines.

5. **Administration of rifampicin:**

All nurses involved in the administration of rifampicin must read and sign the appropriate Patient Group Direction.

6. **This Patient Group Direction has been peer reviewed by:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Date</th>
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**Sources:**


**Patient Group Direction**
Supply and administration of RIFAMPICIN by nurses employed by ….Trust/Agency in the ….Unit

---

**This Patient Group Direction for use in ….Trust/….Agency is authorised by:**

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Name</th>
<th>Signed</th>
<th>Date</th>
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<tbody>
<tr>
<td>Senior PCT Doctor</td>
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<tr>
<td>Senior PCT Pharmacist</td>
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<tr>
<td>Senior PCT Nurse</td>
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</table>

The nurses named below, being employees of ….Trust/….Agency, are authorised to supply and administer RIFAMPICIN as specified in this Patient Group Direction.

---

**We agree to supply and administer the above drug in accordance with this Patient Group Direction**

<table>
<thead>
<tr>
<th>Name</th>
<th>Job Title</th>
<th>Signed</th>
<th>Date</th>
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</table>

This Patient Group Direction comes into effect: Date
Review date (every two years): Date
### Administration of Ciprofloxacin by Registered Nurses

employed by …………….Trust/Agency

1. This Patient Group Direction relates to the following drug:

<table>
<thead>
<tr>
<th>Name of medicine</th>
<th>Ciprofloxacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal Status</td>
<td>POM (Prescription only medicine)</td>
</tr>
</tbody>
</table>

**NB The use of Ciprofloxacin for prophylaxis of meningococcal disease is an unlicensed indication.**

The Health Service Circular HSC2000/026 states that medicines used outside the terms of the Summary of Product Characteristics may be included in PGDs provided such use is exceptional, justified by current best clinical practices and that a direction clearly describes the status of the product.

The use of ciprofloxacin for prophylaxis of meningococcal meningitis is described in the British National Formulary and XXXX local Policy. Please refer to these documents.

<table>
<thead>
<tr>
<th>Storage</th>
<th>No special storage precautions are necessary. Protect from contamination, sunlight, atmospheric moisture and adverse temperatures.</th>
</tr>
</thead>
</table>
| Dose    | Adults and children over 12 years: 500mg  
|         | Children 5-12 years: 250mg*  
|         | Children 2-4 years 125mg  
|         | * Following a risk assessment only  
|         | Not recommended for children under 2 years |
| Route/method | Oral |
| Frequency | Single dose |
| Total dose number | 1 dose |

**Advice to the patient or carer**

- Swallow tablets whole with an adequate amount of liquid. Do not take with dairy products or with mineral fortified drinks alone, (e.g. milk, yoghurt, calcium fortified orange juice).
- Drink plenty of fluids for rest of the day to avoid excessive alkalinity of urine.
- Treatment is not fully protective and close contacts must be alert to symptoms and signs of meningococcal disease.
- May impair driving and skilled tasks, effects are enhanced by alcohol
- Provide patient information leaflet on ciprofloxacin.

### Cautions and Side effects

See BNF for full details

- History of epilepsy or conditions predisposing to seizures
- History of glucose-6-phosphate dehydrogenase (G6PD) deficiency
- Renal impairment: avoid excessive alkalinity of urine and ensure adequate fluid intake (risk of crystalluria).  
- Myasthenia gravis
- Pregnancy and breast-feeding
- Children and young adolescents (Ciprofloxacin has been shown to cause arthropathy in weight-bearing joints of immature animals). The benefit of its use in children for the prophylaxis of meningococcal disease must be considered against the risks. Recommend for prophylaxis.
- Side effects may include nausea, diarrhoea, rash, fatigue or facial swelling, and tendon damage. Rarely, breathing difficulties – urgently refer to doctor.
### 2. Clinical condition

<table>
<thead>
<tr>
<th>Clinical condition to be treated</th>
<th>Ciprofloxacin may be used as an alternative agent to rifampicin for chemoprophylaxis of meningococcal meningitis in adults and children aged 2 years and above.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria for inclusion</strong></td>
<td>All children and adults at risk of meningococcal disease, including:</td>
</tr>
<tr>
<td></td>
<td>• People who have had close, prolonged contact with the confirmed or probable case during the 7 days before the case became ill</td>
</tr>
<tr>
<td></td>
<td>• During local outbreaks of the disease</td>
</tr>
<tr>
<td></td>
<td>Ideally, prophylaxis should be given within 24 hours of the index case being diagnosed</td>
</tr>
<tr>
<td><strong>Criteria for exclusion</strong></td>
<td>• Hypersensitivity to any of the ingredients.</td>
</tr>
<tr>
<td></td>
<td>• Pregnancy and lactation.</td>
</tr>
<tr>
<td></td>
<td>• History of epilepsy or conditions that predispose to seizures, unless on treatment with phenytoin (benefit outweighs risk)</td>
</tr>
<tr>
<td></td>
<td>• Patients with myasthenia gravis</td>
</tr>
<tr>
<td></td>
<td>Child under 2 years of age (for children up to age 17 years, see statement in cautions section).</td>
</tr>
<tr>
<td><strong>Action if excluded</strong></td>
<td>• Advise of reasons for exclusion</td>
</tr>
<tr>
<td></td>
<td>• Consider alternative prophylaxis and if necessary refer to relevant GP or Consultant in Communicable Disease Control</td>
</tr>
<tr>
<td></td>
<td>• Advise of risks of infection and recognising symptoms</td>
</tr>
<tr>
<td></td>
<td>• Document all actions</td>
</tr>
<tr>
<td><strong>Action if refused</strong></td>
<td>• Advise on risks of infection, the need for vigilance for symptoms of meningococcal disease and the need to seek urgent medical attention should symptoms occur</td>
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<tr>
<td></td>
<td>• Inform GP</td>
</tr>
<tr>
<td></td>
<td>• Respect wishes</td>
</tr>
<tr>
<td></td>
<td>• Document actions in patient’s records</td>
</tr>
<tr>
<td><strong>Drug interactions</strong></td>
<td>Significant drug interactions that may require advice or referral to a doctor. These include:</td>
</tr>
<tr>
<td></td>
<td>• Anticoagulants</td>
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<td>• Ciclosporin</td>
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<td></td>
<td>• Theophylline</td>
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<td></td>
<td>• Interacts with phenytoin but considered preferable to rifampicin</td>
</tr>
<tr>
<td></td>
<td>Others include: antacids, iron, zinc, calcium salts, coumarins, methotrexate, didanosine, duloxetine, oral nutritional solutions, dairy products, NSAIDs, glibenclamide, probenecid, metoclopramide, ropinirole, sucralfate.</td>
</tr>
<tr>
<td></td>
<td>Should not be administered within 4 hours of medications that contain magnesium, or iron salts</td>
</tr>
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<td></td>
<td>Avoid if taking Theophylline.</td>
</tr>
<tr>
<td></td>
<td>Patients should be monitored for 30 minutes after administering the dose in case of anaphylaxis.</td>
</tr>
<tr>
<td><strong>Pregnancy and lactation</strong></td>
<td>Not recommended during pregnancy or lactation.</td>
</tr>
</tbody>
</table>

### 3. Records

#### 3.1 The following paper or computer-based records should be kept:
• Verbal consent agreeing to the administration of the drug is required from an appropriate person
• Patient name and contact details
• Name and brand of the drug
• Batch number and expiratory date (if available)
• Dose given
• Route of administration
• Signature & date

• Adverse effects reported

Note: The nurse administering the drug must ensure that the patient’s name and date of administration is written on the box/bottle. The patient must also be provided with written advice on the effects of Ciprofloxacin.

3.2 Drug audit trail data collection:
Reconciliation: Stock balances should be reconciled with receipts, administration and records on a patient by patient basis.
Storage: Standards must be consistent with the Summary of Product Characteristics.

4. Professional responsibility (all nurses)

4.1 The nurse will ensure that she/he has the relevant training and is competent in administering POM, including contra-indications and anaphylaxis. She/he will attend training updates as appropriate.

4.2 The nurse will have due regard to the Nursing and Midwifery Council Code of Professional Conduct, the Scope of Professional Practice and Guidelines for the Administering of Medicines.

5. Administration of Ciprofloxacin:

All nurses involved in the administration of Ciprofloxacin must read and sign the appropriate Patient Group Direction.

6. This Patient Group Direction has been peer reviewed by:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Date</th>
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Sources:


**Patient Group Direction**

**Supply and administration of CIPROFLOXACIN by nurses**
employed by ….Trust/Agency in the ….Unit

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Name</th>
<th>Signed</th>
<th>Date</th>
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<tbody>
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</table>

The nurses named below, being employees of ……………….Trust/Agency
are authorised to supply and administer CIPROFLOXACIN
as specified in this Patient Group Direction

We agree to supply and administer the above drug in accordance with this
Patient Group Direction

<table>
<thead>
<tr>
<th>Name</th>
<th>Job Title</th>
<th>Signed</th>
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</thead>
</table>

This Patient Group Direction comes into effect: Date

Review date (every two years): Date