Trust Guideline for the Diagnosis and Management of bacterial meningitis, including Meningococcal disease, in all patients aged 16 and over

For Use in:	All Adult Clinical areas within Norfolk and Norwich University Hospital
By:	All Personnel who work within the Trust
For:	Investigation and Management for patients aged 16 & over with suspected/confirmed Meningitis
Division responsible for document:	(Corporate / Medical / Surgical / Women / Children / Emergency Medicine) (delete as necessary)
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Supported by:	Director of Infection Prevention and Control (DIPC) and Neurologists.
Assessed and approved by the:	Hospital Infection Control Committee (HICC)
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To be reviewed by:	Director of Infection Prevention Control (DIPC**)**
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Compliance links: (is there any NICE related to guidance)	No
If Yes - does the strategy/policy deviate from the recommendations of NICE? If so why?	N/a

This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light

of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.

1. Contents page

Trust Guideline for the Diagnosis and Management of bacterial meningitis, including Meningococcal disease, in all patients aged 16 and over

Quick reference to Management of the individual case and Antibiotic Treatment

Early Management of Suspected Meningitis and Meningococcal Sepsis in Immunocompetent Adults

Early Recognition is crucial

Consider Meningitis or Meningococcal Sepsis if ANY of the following are present:

Headache, Fever, Altered Consciousness, Neck Stiffness, Rash, Seizures, Shock

Immediate Action

Admit patient in side room with appropriate droplet precautions and document in Patient Care Record Respiratory Isolation Poster

- Airway
- Breaching – Respiratory rate and O2 saturation
- Circulation – Pulse; capillary refill time, urine output; blood pressure (hypotension occurs late)
- Disability – Glasgow coma scale; focal neurological signs; seizures; papilloedema, capillary glucose
- Senior Review +/- Critical Care review if any Warning signs are present

Warning Signs

The following signs require urgent senior review +/- Critical care input

- Rapidly progressing rash
- Poor peripheral perfusion- capillary refill time >4 secs, oliguria or systolic BP <90mmHg
- Respiratory rate <8 or >30/min
- Pulse rate <40 or >140/min
- Acidosis pH<7.3 or Base excess worse than -5
- White blood cell count <4 x 10^9 /L
- Lactate >4 mmol/L
- Glasgow coma scale <12 or a drop of 2 points
- Poor response to initial fluid resuscitation

Delay LP

If any of the following are present

- Signs of severe sepsis or rapidly evolving rash
- Infection at the site of needle
- SEVERE respiratory/cardiac compromise
- Significant bleeding risk
- Signs suggesting shift of brain compartments (CT scan before LP is warranted as long as patient is stable)
  - Focal neurological signs
  - Presence of papilloedema
  - Continuous or uncontrolled seizures
  - GCS≤12

Suspected Meningitis

(meningitis without signs of shock, severe sepsis or signs suggesting brain shift)

- Blood cultures
- Lumbar puncture within 1 hour of arrival providing it is safe to do so
- Dexamethasone 10mg IV see table 7.1e
- Ceftriaxone or Cefotaxime 2g IV immediately following LP. See table 7.1c
- CT scan normally not indicated
- Careful fluid resuscitation (avoid fluid overload)
- If LP cannot be done in the first hour, antibiotics must be given immediately after blood cultures have been taken

Suspected Meningitis with signs suggestive of shift of brain compartments secondary to raised intracranial pressure

- Get Critical Care input
- Secure airway, high flow oxygen
- Take bloods including Blood Culture
- Dexamethasone 10mg IV see table 7.1e
- Give Ceftriaxone or Cefotaxime 2g IV immediately after blood cultures taken (see table 7.1c)
- Delay LP
- Arrange neurological imaging (once patient is stabilised)

Signs of severe sepsis or a rapidly evolving rash (with or without symptoms and signs of meningitis)

- Get Critical Care input
- Secure airway and give high flow oxygen
- Fluid resuscitation with an initial bolus of 500ml of crystalloid given over 5-10 minutes
- Blood cultures
- Give Ceftriaxone or Cefotaxime 2g IV immediately after blood cultures taken (see table 7.1c)
- Delay LP
- See Trust Guideline for Adult Non-Pregnant Patients Developing Sepsis in Inpatient Areas
- http://nnvmwebapps01/TrustDocs/ViewDoc.aspx?id=13146

Follow surviving sepsis guidelines at http://www.survivingsepsis.org/guidelines

Careful Monitoring and Repeated Review is essential

3. Quick reference

Links to Quick Reference Some of these documents can be printed and displayed for information
Respiratory Isolation Poster

4. Objectives

This guideline has been written to optimise the investigation and management of patients admitted with suspected bacterial meningitis, and prevent its spread. Evidence for this document is taken from current national recommendations, and complements guidance on the same subject issued by the Norfolk, Suffolk and Cambridgeshire Health Protection Unit (HPU) and the Paediatric Department Norfolk and Norwich University Hospital NHS Foundation Trust (NNUH).

The guideline's objective is to present the rationale and recommendations for the diagnosis and management of cases of acute bacterial meningitis, following hospital admission, and to help in the control of meningococcal disease.

4.1 Staff groups

Chief Executive - has overall responsibility for ensuring there are effective procedures and resources in place to enable the implementation of this guideline

DIPC - has strategic responsibility within the Trust for the development and implementation of Infection Prevention and Control (IP&C) best practice and guidelines.

Divisional Managers/Matrons/Ward Managers - are responsible for ensuring they have a process in place to reassure the organisation that all staff is aware and receive appropriate training.

IP&C Team (IP&CT) - is responsible for reviewing the IP&C aspects of this guidance and amends as required on the review date, or prior to this, following new developments to reflect current best practice. The IP&CT has a responsibility to offer training, specialist advice and support to staff regarding the IP&C aspects of this guideline.

The Antimicrobial and Neurology team - are responsible for reviewing the treatment aspect of this guideline, advising on diagnosis and clinical management, processing specimens, reporting the results, sending the suspected specimens to the reference laboratory, informing the IP&CT, the patient's clinicians and the Consultant in Communicable Disease Control (CCDC).

All Staff - have a responsibility to ensure they follow the advice in this guideline and must ensure they attend appropriate training. Any deviations from these guidelines must be clearly documented in the patient's care notes, including risk assessments made.

It is the responsibility of each employee to be aware of the procedural documents which relate to their department/area of practice.

Workplace Health and Wellbeing (WH&W) – is responsible for giving advice to staff and for staff contact tracing.

Public Health England (PHE) – is responsible for giving advice to community contacts and for community contact tracing.

4.2 Exceptions/ contraindications

This document does not deal with the management and treatment of meningitis due to other organisms other than bacteria e.g. viral, fungal or parasitic meningitis.
This document excludes management of meningitis in pediatrics and neonatal cases.

5. Rationale

Meningitis refers to the inflammation of the protective membrane covering the brain and spinal cord.

5.1 Epidemiology/ Clinical features

Bacterial

Community acquired meningitis is primarily caused by Neisseria meningitidis (N. meningitidis) and Streptococcus pneumoniae in immunocompetent infants (>4 weeks), children and adults and comprises nearly 80% of all cases. Other less frequent causes include: Staphylococcus aureus (3%), Listeria monocytogenes (1%), Streptococcus dysgalactiae, Escherichia coli, Streptococcus pyogenes (1%), Mycobacterium tuberculosis (1%) and Haemophilus influenzae (H.Influenzae) (1%). Since the introduction of the Hib vaccination, meningitis caused by the capsular b strains of H. influenzae has become rare.

In **immunocompromised patients**, the most common agents are Streptococcus pneumoniae, Listeria monocytogenes, Cryptococcus neoformans and Gram-negative bacteria.

Viral

Aetiology is unidentified in most cases. Enteroviruses are currently the leading recognisable cause of aseptic meningitis and account for approximately 85% of all cases in which a pathogen is identified. Infants and children are the primary victims of enteroviral meningitis but adults and patients on immunosuppressive are also at risk of infection.

In an unimmunised population, mumps or measles should be considered as a possible cause of aseptic meningitis and encephalitis.

Herpes simplex viruses (HSV) accounts for 0.5-3% of all cases of aseptic meningitis. HSV meningitis is most commonly associated with primary genital infection (HSV type 2), developing in 36% of women and 13% of men with primary infection. Meningitis is less likely with recurrences of genital herpes.

Clinical Features

In adults at least two of the following symptoms are classically present-

- Headache
- Photophobia
- Fever
- Neck stiffness
- Altered mental status (may range from drowsiness, confusion, stupor to coma)

Skin rash (initially macular then petechial) occurs in patients with meningococcal septicaemia but can also occur in pneumococcal, haemophilus or streptococcal septicaemia.

6. Processes to be followed

Admitting hospital doctors should ask if antibiotic(s) have been given.
It is vital that antibiotics are administered as quickly as possible (e.g. within 30 minutes of presentation). If a Lumbar Puncture (LP) not contraindicated Cerebral Spinal Fluid (CSF) sample should be sent as soon as possible in order to avoid reduced cell count and culture sensitivity thus affecting the overall patient management. (See Quick Reference Guide "Early Management of suspected bacterial meningitis flowchart").

Suspected case
For paediatric patients see specific paediatric guidelines (Trust Guideline for management of: Bacterial Meningitis and Meningococcal Septicaemia in Children).

All patients with suspected acute bacterial meningitis should be hospitalised as soon as possible and empiric treatment commenced immediately. Once the organism has been identified after gram staining and culture of CSF, pathogen- specific treatment should be instituted.

Isolation
All cases of suspected and confirmed acute bacterial meningitis should be nursed in a **single room with respiratory precautions** (to be documented in the patient care record) until they have had 24 hours of appropriate antibiotics and there is clinical

improvement or the diagnosis of meningococcus or other infectious agent is ruled out. This reduces the risk of cross infection and allows nursing in a quieter environment. For further guidance, see Trust Guideline for the Management of Isolation Procedures

If the patient is coughing / vomiting, staff must add surgical face masks in addition to apron and gloves when attending to the patient i.e. Respiratory, when within 1 metre/3 feet of patient.

Filtering Face Piece 3 (FFP3) masks must be worn when performing Aerosol Generating Procedures (AGPs) such as resuscitation or airway management procedures in cases of probable or confirmed Meningococcal Disease.
Staff working in Critical Care Units and Admission Units (e.g. A&E and AMUs) may be at risk of frequent exposure. They should reduce such risks by minimising exposure to nasopharyngeal secretions and large droplets by taking precautions such as wearing surgical type masks. Closed suction should be used for all AGPs.
AGPs include:

- Non-invasive positive pressure ventilation (BIPAP, CPAP)
- Endotracheal intubation
- Respiratory/airway suctioning
- Tracheostomy care
- Chest physiotherapy
- Aerosolised or nebulised medication administration
- Diagnostic sputum induction
- Bronchoscopy procedure
- Extubation

Link to Mask poster

Isolation for suspected and confirmed cases of viral meningitis is depending on the causative organism and symptoms.

Antibiotics should be discontinued if the CSF culture is negative and clinical features are consistent with viral meningitis. A negative Gram stain does not exclude bacterial meningitis and interventions such as prior antibiotic use may influence culture results. Discuss with Microbiology if in doubt.

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6.1 Management of the individual case and Antibiotic Treatment

6.1a: Early Management of Suspected Meningitis and Meningococcal Sepsis in Immunocompetent Adults

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(meningitis without signs of shock, severe sepsis or signs suggesting brain shift)

- Blood cultures
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- Ceftriaxone or Cefotaxime 2g IV immediately following LP. See table 7.1c
- CT scan normally not indicated
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Suspected Meningitis with signs suggestive of shift of brain compartments secondary to raised intracranial pressure

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- Delay LP
- Arrange neurological imaging (once patient is stabilised)

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The following signs require urgent senior review +/- Critical care input

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- Poor peripheral perfusion- capillary refill time >4 secs, oliguria or systolic BP <90mmHg
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- Infection at the site of needle
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- Give Ceftriaxone or Cefotaxime 2g IV immediately after blood cultures taken (see table 7.1c)
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- See Trust Guideline for Adult Non-Pregnant Patients Developing Sepsis in Inpatient Areas
- http://nnvmwebapps01/TrustDocs/ViewDoc.aspx?id=13146

Follow surviving sepsis guidelines at http://www.survivingsepsis.org/guidelines

Table 6.1b: Additional Investigations

Blood

- Pneumococcal and meningococcal PCR (EDTA sample)
- FBC, Us and Es, LFTs, Glucose, Lactate, Clotting profile
- Blood gases

CSF (if LP performed)

- Glucose (with concurrent plasma glucose)
- CSF protein
- CSF lactate (if prior antibiotics have not been given)
- Microscopy, culture and sensitivities
- Meningococcal and Pneumococcal PCR
- Enteroviral, Herpes Simplex and Varicella Zoster PCR
- Consider investigations for TB meningitis

Other

- Nose and throat swab– for meningococcal culture
- HIV should be included in the differential diagnosis of all cases of meningitis.

Table 6.1c: Empirical Treatment of Community Acquired Meningitis

Antibiotic of choice	**Penicillin Allergy** (Clear history of anaphylaxis or angioneurotic oedema with penicillins or cephalosporins)
Cefotaxime IV 2g 6-hourly **OR** **Ceftriaxone** IV 2g 12-hourly + **Dexamethasone** IV 10mg qds Start immediately prior to antibiotics or simultaneously. If antibiotics already started commence within 12 hours of starting antibiotics. If pneumococcal meningitis is confirmed, or thought probable based on clinical, epidemiological and CSF parameters continue for 4 days If another cause of meningitis is confirmed or thought probable stop dexamethasone	**Chloramphenicol** IV 25mg/kg 6-hourly + **Dexamethasone** IV 10mg qds Start immediately prior to antibiotics or simultaneously. If antibiotics already started commence within 12 hours of starting antibiotics. If pneumococcal meningitis is confirmed, or thought probable based on clinical, epidemiological and CSF parameters continue for 4 days. If another cause of meningitis is confirmed or thought probable stop dexamethasone
Pts ≥60 years OR Immunocompromised patients (including diabetics and alcohol misuse). Add in to above regimen **Amoxicillin** IV 2g 4 hourly	**Pts ≥60 years OR Immunocompromised patients (including diabetics and alcohol misuse).** Add in to above regimen **Co-trimoxazole** IV 10-20mg/kg of the trimethoprim component in 4 divided doses
If pt been to country where penicillin resistant pneumococcal are prevalent in the last 6 months (discuss with Microbiology if unsure) Add to the above regimen **Vancomycin IV** (see vancomycin policy for dose, aim for trough level 15-20 mg/L) **OR** **Rifampicin** PO/IV 600mg 12 hourly	**If pt been to country where penicillin resistant pneumococcal are prevalent in the last 6 months (discuss with Microbiology if unsure)** Add to the above regimen **Vancomycin IV** (see vancomycin policy for dose, aim for trough level 15-20 mg/L) **OR** **Rifampicin** PO/IV 600mg 12 hourly

Table 6.1d: Definite treatment for Community Acquired Meningitis

PATHOGEN		Suggested duration of treatment
No pathogen found		**10 days** if the patient has clinically recovered If Streptococcus pneumoniae is suspected continue dexamethasone for 4 days
Neisseria meningitidis		
Continue **Cefotaxime** IV 2g 6 hourly (give STAT Ciprofloxacin PO 500mg) Or Continue **Ceftriaxone** IV 2g bd (no STAT ciprofloxacin needed) Or change to **Benzylpenicillin** IV 2.4g 4 hourly (and give STAT Ciprofloxacin PO 500mg if Ceftriaxone not given as initial therapy) Rifamipicin PO 600mg bd for 2 days can be given if a stat Ciprofloxacin is contraindicated If clear history of anaphylaxis or angioneurotic oedema with beta-lactams: **Chloramphenicol** IV 25mg/kg 6-hourly (and give STAT Ciprofloxacin PO 500mg **STOP dexamethasone IV**		**5 days**
Streptococcus pneumoniae		
Sensitivities unknown or penicillin resistant, cephalosporin sensitive	Continue **Cefotaxime** IV 2g qds or **Ceftriaxone** IV 2g bd If clear history of anaphylaxis or angioneurotic oedema with beta-lactams: **Chloramphenicol** IV 25mg/kg 6-hourly	**Antibiotics: 10 days (**up to 14 days if taking longer to respond or if penicillin or cephalosporin resistant strain) **Dexamethasone IV : 4 days**
Penicillin sensitive MIC ≤0.06 mcg/ml	Continue **Cefotaxime** IV 2g qds or **Ceftriaxone** IV 2g bd (or **Benzylpenicillin** 2.4g IV 4-hourly is an alternative) If clear history of anaphylaxis or angioneurotic oedema with beta-lactams: **Chloramphenicol** IV 25mg/kg 6-hourly	
Penicillin and cephalosporin non susceptible Penicillin MIC >0.06 or cefotaxime/ceftriaxone MIC >0.5	Continue **Cefotaxime** IV 2g qds or **Ceftriaxone** IV 2g bd OR If clear history of anaphylaxis or angioneurotic oedema with beta-lactams: **Chloramphenicol** 25mg/kg IV 6-hourly **AND** **Vancomycin** (see Vancomycin policy for dose, aim for trough level 15-20mg/L) & if necessary add **Rifampicin** 300mg PO or IV (if oral route not available) 12-hourly	
Listeria monocytogenes		
Stop Cefotaxime/Ceftriaxone **Start Amoxicillin IV** 2g 4-hourly If clear history of anaphylaxis or angioneurotic oedema with beta-lactams: **Co-trimoxazole** IV 10-20mg /kg (of the trimethoprim component) 6-hourly OR **chloramphenicol** 25mg/kg IV 6-hourly **STOP dexamethasone IV**		**21 days**
Haemophilus influenzae		
Continue Cefotaxime IV 2g qds or Ceftriaxone IV 2g bd If clear history of anaphylaxis or angioneurotic oedema with beta-lactams: Moxifloxacin PO 400mg od **STOP dexamethasone IV**		**10 days**

Table 6.1e: Use of Steroids
Use of Dexamethasone (except in patients with septic shock) • Start 10mg IV Dexamethasone 6 hourly on admission either shortly before or simultaneously with antibiotics • If antibiotics already started, commence Dexamethasone if within 12 hours of starting antibiotics • If pneumococcal meningitis is confirmed, or thought probable based on clinical, epidemiological and CSF parameters continue for 4 days • If another cause of meningitis is confirmed or thought probable stop dexamethasone.

Table 6.1f: Outpatient therapy (OPAT) of meningitis and meningococcal disease
The decision to commence OPAT must be made by a physician familiar with OPAT and should be carried out by a specialist OPAT team and include regular review of cases by a physician. The patient should • Be afebrile and clinically improving • Have received 5 or more days of inpatient therapy and monitoring • Have reliable IV access • Be able to access medical advice/care from the OPAT team 24 hr a day • Have no other acute medical need other than the need for IV antibiotics • The patient and family must be willing to participate in OPAT **Regimens that could be used in the community** Ceftriaxone 2g bd IV (4g od IV can be used after the first 24 hours of therapy)

6.2 Measures undertaken to prevent secondary cases

Table 6.2a: Notification
It is the legal obligation of the clinician(s) looking after the patient to formally notify and contact the CCDC to let him/her know that a suspected case has been admitted under their care. Contact during office hours should be made through the Health Protection Team (HPT) (Norfolk, Suffolk and Cambridgeshire HPT telephone number **03003038537 (out of hours 01603 481221). PHE should oversee chemoprophylaxis/vaccination of close contacts of meningococcal/Hib meningitis.**

Table 6.2b: Control of Spread in the Hospital
Isolation: All patients with suspected meningitis or meningococcal sepsis should be isolated with Respiratory Precautions until meningococcal or sepsis is excluded or thought unlikely OR they have received 24 hours of Ceftriaxone OR a single dose of Ciprofloxacin This reduces the risk of cross infection and allows nursing in a quieter environment. See Trust Guideline for the Management of Isolation Procedures for guidance. If the patient is coughing / vomiting, staff must add surgical face masks in addition to apron and gloves when attending to the patient i.e. Respiratory, when within 1 metre/3 feet of patient. **Preventative measures** Filtering Face Piece 3 (FFP3) masks must be worn when performing Aerosol Generating Procedures (AGPs) such as resuscitation or airway management procedures in cases of probable or confirmed Meningococcal Disease. Staff working in Critical Care Units and Admission Units (e.g. A&E and AMUs) may be at risk of frequent exposure. They should reduce such risks by minimising exposure to nasopharyngeal secretions and large droplets by taking precautions such as wearing surgical type masks. Closed suction should be used for all AGPs. AGPs include: • Non-invasive positive pressure ventilation (BIPAP, CPAP) • Endotracheal intubation • Respiratory/airway suctioning • Tracheostomy care • Chest physiotherapy • Aerosolised or nebulised medication administration • Diagnostic sputum induction • Bronchoscopy procedure • Extubation

Table 6.2c: Vaccination of the Index Case for Meningococcal disease
• Any unimmunised index case under the age of 25 years (whatever the capsule serogroup) should be offered vaccination according to the national schedule • Cases of confirmed serogroup C disease that are eligible for vaccination and

have previously been immunised with Meningococcal C conjugate (or polysaccharide) vaccines should be offered a booster dose of Meningococcal C conjugate vaccinate around the time of discharge from hospital.

- If 2 or more cases of probable/confirmed IMD due to the same vaccinate preventable strain in the same educational or residential setting within a few week period occur than wider vaccination may be offered in line with national guidance.

Table 6.2d: Antibiotic Chemoprophylaxis and Vaccination in Staff contacts

Chemoprophylaxis recommended if

- Staffs have had exposure to direct nasopharyngeal secretions (i.e. WITHOUT a mask) from a known or highly probable case of meningococcal disease (i.e. mouth to mouth resuscitation, airway management (suction / intubation) or prolonged close care (within 1 metre/ 3 feet) where the patient has been coughing / sneezing droplet secretions.

Workplace Health & Wellbeing will administer prophylaxis to staff. Out of hours cases suspected or confirmed meningitis must be notified to the Site Manager (Bleep 1228) by the clinical area where patient has been. Refer to Workplace Health and Wellbeing out of Hours policy for details.

Out of hours

The list of staff with potential exposure will be collated by the Operations Manager. A risk assessment for staff will be conducted by the Consultant Microbiologist on call with input from CCDC if required. Following this risk assessment, staff deemed to have had significant exposure will be directed to A&E by the operations Manager for chemoprophylaxis. The on call pharmacist may be consulted for any antibiotic supply queries.

Meningococcal Infection:

Ciprofloxacin 500mg PO STAT In those unable to take Ciprofloxacin, **Rifampicin** (counsel patients on side effects) can be given as an alternative (PO 600mg bd for 2 days for those ages 12 and over).

Pregnancy: Ciprofloxacin PO 500mg STAT OR Ceftriaxone injection OR Azithromycin PO STAT

Vaccination
Antibiotic chemoprophylaxis should be given first and the decision to offer vaccination should be made once meningococcal serogrouping is available**.**
Workplace Health & Wellbeing will arrange to obtain and administer staff vaccinations where indicated.

- Eligible at-risk close contacts (e.g. asplenia, complement-deficiency) who are unimmunised or partially immunised should be appropriately immunised for their age.

- For confirmed serogroup A, C, W or Y infections, fully immunised at-risk close contacts should be offered the MenACWY conjugate vaccine, unless they have received a MenACWY vaccine in the previous 12 months.

Workplace Health & Wellbeing Contact details:

- Weekdays - 0830 to 1700 Telephone 01603 287035 (Internal 3035)
- Out of hours cases suspected or confirmed meningitis must be notified to the Site Manager (Bleep 1228) by the clinical area where patient has been. Refer to Workplace Health and Wellbeing out of Hours policy for details.

Table 6.2e: The community, family and close contacts

The rationale for giving antibiotic chemoprophylaxis to close contacts of IMD cases is to eliminate established carriage from the close contact group and, thereby, to reduce onward transmission. Antibiotic chemoprophylaxis also eradicates carriage in those who have newly acquired the invasive strain and may they be at risk. Close contact is defined as prolonged close contact with the case in a household type setting during the seven days before the onset of illness. Examples of such contacts would be those living and/or sleeping in the same household, pupils in the same dormitory, boy/girlfriends, or university students sharing a kitchen in a hall of residence.

It is the responsibility of the clinician(s) looking after the patient to formally notify and contact the CCDC to let him/her know that a suspected case has been admitted under their care.

It is the responsibility of the proper officer CCDC to recommend and organise prophylaxis, where appropriate for community contacts of meningococcal and Hib disease.

Contact during office hours should be made through the Health Protection Team (HPT) (Norfolk, Suffolk and Cambridgeshire HPT telephone **03003038537**).

The CCDC is responsible for ensuring that appropriate prophylaxis is given and **will**

discuss the arrangements for the immediate family with the clinical team looking after the patient

When dealing with close relatives who are unable to leave the bedside or unable to contact their General Practitioner (GP) and it has been agreed that prophylaxis for confirmed meningococcal disease is required, the NNUH clinician looking after the index case may occasionally offer prophylaxis following discussion with the CCDC.

6.3 Confirming the diagnosis

Identification of the causative organism is important for the appropriate management of cases and contacts. The "gold standard" is to culture the causative agent of meningitis from blood, CSF, or other normally sterile site. When parenteral penicillin has been given before admission, the yield from blood culture is low, but the organism can still be recovered from throat swab.

Interpretation of CSF findings of meningitis in adults				
	Acute bacterial meningitis	**Viral meningitis**	**Tuberculous meningitis**	**Normal CSF**
Characteristics	Turbid, cloudy, purulent	Clean	Clear, cloudy	Clear
Opening pressure (mmH_2O)	>180	>180	>180	180 (upper limit)
WBC count (cells/mm^3)	1000-10000	5-1000	25-100	0-5
Neutrophils (cells/mm^3)	100-10000 (may be normal)	Usually <100	Usually <100	0
Lymphocytes (cells/mm^3)	Usually <100	10-1000 (may be normal)	50-1000 (may be normal)	<5
Protein (g/l)	>0.45	<1	>0.45	015-0.45
Glucose (m/L)	<2.5	2.5-4.5	<2.5	2.5-4.5
CSF/blood glucose ratio	<0.3	>0.5	<0.5	0.6

7. Monitoring compliance

All patients should receive antibiotic treatment as indicated.

Prompt administration of antibiotics (within 30 minutes of presentation, unless already given before admission).

Please refer to Monitoring Compliance / Effectiveness Table

8. Summary of development and consultation process undertaken before registration and dissemination

During its development it was circulated to the Departments represented by the authors, (Critical Care Complex, AMU, Neurology, Paediatrics-for information-, A&E and Microbiology) in addition to Pharmacy, CCGs, the Norfolk, Suffolk and Cambridgeshire HPU, the Infection Control Committee and the Drugs & Therapeutics Committee.

Comments received were addressed and, where appropriate, the document modified to reflect these.

Distribution list/ dissemination method

Accident and Emergency
Acute Medical Unit
Intensive Care Unit
Paediatric Admissions Unit
Infection Control Manual copyholders
Norfolk & Norwich Trust Intranet
Neurology ward(s)
Workplace Health & Wellbeing - Occupational Health
Intranet
OPED
EAUS

9. References

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10. Associated Documentation

British National Formulary (BNF) 66
http://nnvmbnf01:8080/bnf/view/page/local_bnfc/PHP12633
http://nnvmbnf01:8080/bnf/view/page/local_bnf/PHP3262

Early management of suspected bacterial meningitis and meningococcal septicaemia in immunocompetent adults. Meningitis Research Foundation. British Infection Society

http://www.meningitis.org/assets/x/51738

Haemophilus influenza type b (Hib): the Green Book, chapter 16
https://www.gov.uk/government/publications/haemophilus-influenzae-type-hib-the-green-book-chapter-16

Meningococcal: the Green Book, chapter 21
https://www.gov.uk/government/publications/meningococcal-the-green-book-chapter-22
Prevention and Control of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP), CCDC, March 2013

PHE (2018) Guidance for the public health management of meningococcal disease in the UK. PHE publications.

The sources Caroline Hallam used are:

- ESCMID guideline- diagnosis and treatment of acute bacterial meningitis 2016
- The UK joint specialist society's guideline on the diagnosis and management of acute meningitis and meningococcal sepsis in immunocompetent adults, British infection association, 2016
- Guidance for the public health management of meningococcal disease in the uk feb 2018.
- British infection society
- Early management of suspected meningitis and meningococcal sepsis in immunocompetent adults – 1 page table
- https://www.britishinfection.org/files/5414/5674/3289/algorithm.pdf

11. Equality Impact Assessment (EIA)

This policy has been screened to determine equality relevance for the following equality groups: race, gender, age, sexual orientation and religious groups. This policy is considered to have little or no equality relevance.

Trust Guideline for the Diagnosis and Management of bacterial meningitis, including Meningococcal disease, in all patients aged 16 and over

Monitoring Compliance / Effectiveness Table
Document Name: Trust Guideline for the Diagnosis and Management of bacterial meningitis, including Meningococcal disease, in all patients aged 16 and over.
Document owner: Infection Prevention and Control Team

Element to be monitored	Lead Responsible for monitoring	Monitoring Tool / Method of monitoring	Frequency of monitoring	Lead Responsible for developing action plan & acting on recommendations	Reporting arrangements	Sharing and disseminating lessons learned & recommended changes in practice as a result of monitoring compliance with this document
Compliance with isolation guidance	IP&CT	Electronic Audit tools Business object	Every 2 years	IP&CT DIPC	IP&C Monthly report Clinical Governance HICC	IP&CT Escalated to: HICC Clinical Safety board
Compliance with appropriate antibiotic treatment	Antibiotics pharmacist, Microbiology SpR	Electronic Audit tools Business object	Every 2 years	DIPC	IP&C Monthly report Clinical Governance HICC	