NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Guideline scope

Meningitis (bacterial) and meningococcal disease: recognition, diagnosis and management

June 2023: This scope has been amended. The population has been extended to include babies up to and including 28 days for some review questions where this population is not covered by relevant recommendations in other NICE guidelines.

This guideline will update the NICE guideline on meningitis (bacterial) and meningococcal septicaemia in under 16s (CG102). The guideline will be extended to cover people aged 16 and over, and babies up to and including 28 days where this population is not covered by recommendations in other NICE guidelines.

The guideline will be developed using the methods and processes outlined in developing NICE guidelines: the manual.

This guideline may also be used to update the NICE quality standard on meningitis (bacterial) and meningococcal septicaemia.

1 Why the guideline is needed

Key facts and figures

Meningitis can be caused by bacteria, viruses and fungi. For treatment and management, this guideline will cover bacterial meningitis only. In diagnosis of bacterial meningitis, other forms of meningitis such as viral and tuberculous need to be excluded. However the management of those other forms of meninigitis are not covered in this guideline.

Bacterial meningitis is an inflammation of the membranes that surround the brain and the spinal cord, caused by bacterial infection. The term meningococcal septicaemia has been widely employed to mean a bloodstream meningococcal infection. In this scope we use the term meningococcal disease meaning illness caused by an invasive meningococcal infection (this includes bloodstream infection and meningitis). The term meningococcal sepsis is also commonly used. Sepsis is a clinical syndrome caused by the body's immune and coagulation systems being switched on by the presence of an infection (usually bacterial), resulting in organ dysfunction or failure.

The main bacteria that cause meningitis in adults, children and babies over 3 months old are *Neisseria meningitidis* (meningococcus) and *Streptococcus pneumoniae* (pneumococcus). These two bacteria normally spread by person-to-person droplet transmission (for example sneezing). *Haemophilus influenzae* type b used to be another common cause, but since vaccination started it is now rare. In babies under 3 months old, Group B *Streptococcus*, *Escherichia coli* and other coliforms are common. *Listeria monocytogenes* is very rare, but occasionally causes meningitis in older people and in young children.

In 2018/2019 the overall incidence of invasive meningococcal disease (IMD) in England remained stable at 1 per 100,000. Meningococcal disease can affect anyone, but the highest rates of disease are in children under 5, with the peak incidence in children under 1. There is a second smaller peak in incidence in young people aged 15 to 19 years.

Compared to 2017/2018, the incidence in infants in 2018/2019 decreased from 16 per 100,000 to 9 per 100,000, and in children aged 1 to 4 years from 4 per 100,000 to 3 per 100,000. Young adults aged between 15 and 24 years accounted for 16% of all laboratory confirmed IMD in 2018/2019 and those aged 25 years or older comprised 49% of cases.

The epidemiology of bacterial meningitis in the UK has changed dramatically in the past 2 decades, following the introduction of vaccines to control

Haemophilus influenzae type b, serogroups B and C meningococcus and some types of pneumococcus. The MenACWY vaccination programme for teenagers and young adults is another notable development (introduced in response to an increased incidence of disease caused by serogroup W).

Current practice

There are variations in clinical practice, including in access to intensive care support for critically ill children and adults. There is also variation in follow-up and management for complications after acute bacterial meningitis and meningococcal disease.

Policy, legislation, regulation and commissioning

The guideline may also link to the following policies and programmes:

- Public Health England guidance on managing meningococcal disease
- The Surviving Sepsis Campaign and the NHS England Cross-system sepsis action plan.

2 Who the guideline is for

This guideline is for:

- healthcare professionals in primary, secondary and tertiary care (including accident and emergency departments, inpatient care and transitions between departments and services)
- commissioners of services
- people with suspected or confirmed meningitis or meningococcal disease, their families and carers and the public.

NICE guidelines cover health and care in England. Decisions on how they apply in other UK countries are made by ministers in the Welsh Government, Scottish Government, and Northern Ireland Executive.

Equality considerations

NICE has carried out an equality impact assessment during scoping. The assessment:

- lists equality issues identified, and how they have been addressed
- explains why any groups are excluded from the scope.

The guideline will look at inequalities relating to:

- older people, who may present with atypical features, or who may find it more difficult to access care because services are not designed with their particular needs in mind
- people with dark skin (for example, people of African, African–Caribbean, Middle Eastern and South Asian origin), because it can be harder to identify the typical rash associated with meningococcal disease on dark skin
- people from disadvantaged socioeconomic backgrounds, who are at increased risk of meningitis and who may find it more difficult to access follow-up care

3 What the guideline will cover

3.1 Who is the focus?

Groups that will be covered

- All adults, young people, children and babies (29 days old and over, using corrected age for preterm babies) with suspected or confirmed bacterial meningitis or meningococcal disease.
- Babies up to and including 28 days old (using corrected age for preterm babies) with suspected or confirmed bacterial meningitis or meningococcal disease will be included in some areas (see the section on babies up to and including 28 days old).
- Parents or carers of babies, children and young people who have suspected or confirmed bacterial meningitis or meningococcal disease.

Specific consideration will be given to babies between 29 days and 1 year old.

Groups that will not be covered

- People with:

- known immunodeficiency.
- brain tumours, pre-existing hydrocephalus, intracranial shunts, previous neurosurgical procedures, or known cranial or spinal anomalies that increase the risk of bacterial meningitis.
- confirmed viral meningitis or viral encephalitis.
- confirmed tuberculous meningitis.
- confirmed fungal meningitis.

Babies up to and including 28 days old

Recommendations for babies up to and including 28 days old (using corrected age for preterm babies) are included in the NICE guideline on neonatal infection: antibiotics for prevention and treatment (NG195). This guideline update will only make recommendtions for this population when the population is not already covered by other NICE guidelines.

3.2 Settings

Settings that will be covered

Primary, secondary and tertiary healthcare settings (including the ambulance service, accident and emergency departments, inpatient care and transitions between departments and services). This includes remote contact (for example NHS 111) and face-to-face contact. Community facing services such as community child health will be included where relevant.

3.3 Activities, services or aspects of care

Key areas that will be covered

We will look at evidence in the areas below when developing the guideline, but it may not be possible to make recommendations in all the areas.

1 Recognising suspected bacterial meningitis and meningococcal disease, including ‘safety netting’
2 Investigations used in cases of suspected bacterial meningitis and meningococcal disease to support diagnosis
3 Antibiotics for bacterial meningitis and meningococcal disease

4 Non-antibiotic management of bacterial meningitis
5 Non-antibiotic management of meningococcal disease
6 Long-term complications and follow-up for bacterial meningitis and meningococcal disease
7 Further investigation
8 Information and support

Note that guideline recommendations for medicines will normally fall within licensed indications; exceptionally, and only if clearly supported by evidence, use outside a licensed indication may be recommended. The guideline will assume that prescribers will use a medicine's summary of product characteristics to inform decisions made with individual patients and their family or carers.

Areas that will not be covered

- Vaccinations and vaccination programmes. The guideline will cross-refer to other guidance on vaccinations and vaccination programmes where necessary.
- Public health management of meningococcal disease. The guideline will cross refer to Public Health England guidance where necessary.

Related NICE guidance

Published

- Vaccine uptake in the general population (2022) NICE guideline NG218
- Epilepsies in children, young people and adults (2022) NICE guideline NG217
- Neonatal infection: antibiotics for prevention and treatment (2021) NICE guideline NG195
- Fever in under 5s: assessment and initial management (2019) NICE guideline NG143
- Tuberculosis (2019) NICE guideline NG33
- Suspected neurological conditions: recognition and referral (2019) NICE guideline NG127

- Sepsis: recognition, diagnosis and early management (2017) NICE guideline NG51
- Headaches in over 12s: diagnosis and management (2015) NICE guideline CG150
- Acutely ill adults in hospital: recognising and responding to deterioration (2007) NICE guideline CG50

In development

NICE guidance that will or may be updated by this guideline

- Meningitis (bacterial) and meningococcal septicaemia in under 16s: recognition, diagnosis and management (2010) NICE guideline CG102
- Fever in under 5s: assessment and initial management (2019) NICE guideline NG143. Recommendations on meningitis may be updated as necessary, to address overlap between the 2 guidelines.
- Gastro-oesophageal reflux disease in children and young people: diagmosis and management (2015) NICE guideline NG1.

NICE guidance about the experience of people using NHS services

NICE has produced the following guidance on the experience of people using the NHS. This guideline will not include additional recommendations on these topics unless there are specific issues related to the recognition, diagnosis and management of meningitis (bacterial) and meningococcal disease:

- Medicines optimisation (2015) NICE guideline NG5
- Patient experience in adult NHS services (2012) NICE guideline CG138
- Medicines adherence (2009) NICE guideline CG76

3.4 Economic aspects

We will take economic aspects into account when making recommendations. We will develop an economic plan that states for each review question (or key area in the scope) whether economic considerations are relevant, and if so whether this is an area that should be prioritised for economic modelling and analysis. We will review the economic evidence and carry out economic

analyses, using an NHS and personal social services (PSS) perspective, as appropriate.

3.5 Key issues and draft questions

While writing this scope, we have identified the following key issues and draft questions related to them:

1 Recognising suspected bacterial meningitis and meningococcal disease, including 'safety netting'

1.1 What symptoms and signs, individually or in combination (including clinical scores), and risk factors, are associated with an increased risk of bacterial meningitis?

1.2 What symptoms and signs, individually or in combination (including clinical scores), and risk factors, are associated with an increased risk of meningococcal disease?

2 Investigations used in cases of suspected bacterial meningitis and meningococcal disease to support diagnosis

2.1 What is the accuracy of blood investigations in diagnosing bacterial meningitis, including:

- white cell count
- neutrophil count
- C-reactive protein (CRP)
- procalcitonin
- polymerase chain reaction (PCR) for bacterial pathogens
- blood culture.

2.2 What is the accuracy of blood investigations in diagnosing meningococcal disease, including:

- white cell count
- neutrophil count
- CRP
- lactate

- procalcitonin
- PCR for *Neisseria meningitidis*
- blood culture.

2.3 What is the accuracy of cerebrospinal fluid parameters in diagnosing bacterial meningitis, including:

- white cell count
- neutrophil count
- microscopy for bacteria
- glucose concentration (absolute or relative to simultaneously estimated blood glucose)
- protein concentration
- lactate
- cerebrospinal fluid culture
- PCR for bacteria, including *Neisseria meningitidis* and *Streptococcus pneumoniae*, Group B Streptococcus, and 16S rRNA gene PCR for bacterial DNA
- procalcitonin.

2.4 What symptoms or signs (individually or in combination) are risk factors for brain herniation following lumbar puncture in people with suspected bacterial meningitis?

2.5 What is the effectiveness of neuroimaging in reducing the occurrence of brain herniation following lumbar puncture?

3 Antibiotics for bacterial meningitis and meningococcal disease

3.1 Is immediate antibiotic administration effective in improving outcomes for people with suspected bacterial meningitis?

3.2 Is immediate antibiotic administration effective in improving outcomes in people with suspected meningococcal disease?

3.3 What antibiotic treatment regimens (including choice of antimicrobial agent, dosage, route and duration of administration)

are effective in treating suspected bacterial meningitis before or in the absence of identifying the causative infecting organism?

3.4 What antibiotic treatment regimens are effective in treating bacterial meningitis caused by specific infecting organisms? For example:

- *Neisseria meningitidis*
- *Streptococcus pneumoniae*
- *Haemophilus influenzae*
- group B Streptococcus
- Gram-negative bacilli
- *Listeria monocytogenes*

3.5 What antibiotic treatment regimens are effective in treating suspected or confirmed meningococcal disease?

4 Non-antibiotic management of bacterial meningitis

4.1 What is the effectiveness of fluid restriction in bacterial meningitis?

4.2 What is the effectiveness of osmotic agents in bacterial meningitis?

4.3 What is the effectiveness of intracranial pressure monitoring in bacterial meningitis?

4.4 What is the effectiveness of corticosteroid treatment in bacterial meningitis?

5 Non-antibiotic management of meningococcal disease

5.1 What is the effectiveness of supplemental corticosteroids in meningococcal disease?

5.2 What is the effectiveness of fluid management in meningococcal disease?

6 Long-term complications and follow-up for bacterial meningitis and meningococcal disease

6.1 What is the risk of long-term complications in bacterial meningitis?

6.2 What is the risk of long-term complications in meningococcal disease?

7 Further investigation

7.1 What additional investigations should be performed in people with recurrent bacterial meningitis?

8 Information and support

8.1 What information and support is valued by patients, and by the parents or carers of babies, children and young people, when concerns arise about the possibility of bacterial meningitis or meningococcal disease?

8.2 What information and support is valued by patients, and by the parents or carers of babies, children and young people with confirmed bacterial meningitis or meningococcal disease?

3.6 Main outcomes

The main outcomes that may be considered when searching for and assessing the evidence are:

- mortality
- long-term neurological impairments
- developmental, psychological and cognitive impairments
- hearing impairment
- epilepsy
- amputation, skin, soft tissue and orthopaedic complications
- quality of life
- treatment-related adverse events.

4 NICE quality standards

4.1 NICE quality standards

NICE quality standards that may need to be revised or updated when this guideline is published

- Meningitis (bacterial) and meningococcal septicaemia in children and young people (2012) NICE quality standard QS19
- Gastro-oesophageal reflux in children and young people (2016) NICE quality standard QS112

5 Further information

This is the final scope, which takes into account comments from registered stakeholders during consultation.

The guideline is expected to be published in January 2024.

You can follow progress of the guideline.

Our website has information about how NICE guidelines are developed.