Meningitis (bacterial) and meningococcal septicaemia in children and young people: recognition, diagnosis and management

Guideline scope

This guideline will update the NICE guideline on meningitis (bacterial) and meningococcal septicaemia in under 16s (CG102). The guideline will be extended to cover young people up to age 18.

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

This guideline will also be used to update the NICE quality standard for meningitis (bacterial) and meningococcal septicaemia in children and young people.

1 Why the guideline is needed

Key facts and figures

Meningitis is an infection of the surface of the brain (meninges). Sepsis is an immune system response that can be caused by meningococcal infection, and results in organ dysfunction and failure.

Meningitis can be caused by bacteria, viruses and fungi. However, for treatment and management this guideline will only cover bacterial meningitis (excluding tuberculous meningitis).

The main bacteria that cause meningitis in adults, children and babies aged over 3 months 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 the age of 3 months, 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 2017/2018 the overall incidence of invasive meningococcal disease in the UK was 1 per 100,000. Meningococcal disease can affect anyone, but the highest rates of disease are in children under 5 years, with the peak incidence in children under 1 year. There is a second smaller peak in incidence in young people aged 15 to 19 years. In 2017/2018, 16% of cases occurred in people aged 15-24 years, and 46% of cases occurred in people over 24.

The epidemiology of bacterial meningitis in the UK has changed dramatically in the past 2 decades following the introduction of vaccines to control Hib, serogroups B and C meningococcus and some types of pneumococcus. Other notable developments include the MenACWY vaccination programme for teenagers and young adults (introduced in response to an increased incidence of disease caused by meningitis W strains).

Current practice

There are variations 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
- babies, children and young people with suspected or confirmed meningitis or meningococcal septicaemia, 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 babies, children and young people:

- with dark skin (for example people of African, African–Caribbean, Middle Eastern and South Asian origin), as it can be harder to identify the typical rash associated with meningococcal disease on dark skin
- from disadvantaged socioeconomic backgrounds, who are at increased risk of meningitis
- who have recently come from countries or events (such as the Hajj) where there is an increased risk of developing meningococcal disease.

3 What the guideline will cover

3.1 Who is the focus?

Groups that will be covered

- Young people, children and babies (aged 28 days and over) with suspected or confirmed bacterial meningitis or meningococcal sepsis.

- Parents or carers of babies, children and young people who have suspected or confirmed bacterial meningitis or meningococcal sepsis.

Specific consideration will be given to babies under 1 year.

Groups that will not be covered

Babies, children and young people:

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

Newborn babies under 28 days who are receiving care in neonatal units. The NICE guideline on neonatal infection includes recommendations on meningitis for newborn babies who are in neonatal units. This guideline is also being updated. We will look at how best to cover newborn babies with meningitis in these 2 updates, and we may change the scope of the meningitis guideline to cover this population

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 face-to-face and remote contact.

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 sepsis
2 Investigating and diagnosing suspected bacterial meningitis and meningococcal sepsis
3 Antibiotics for bacterial meningitis and meningococcal sepsis
4 Non-antibiotic management of bacterial meningitis
5 Non-antibiotic management of meningococcal sepsis
6 Long-term complications and follow-up for bacterial meningitis and meningococcal sepsis
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.

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

Related NICE guidance

Published

- Fever in under 5s: assessment and initial management (2019) NICE guideline NG143
- Epilepsies: diagnosis and management (2019) NICE guideline CG137
- Tuberculosis (2019) NICE guideline NG33
- Suspected neurological conditions: recognition and referral (2019) NICE guideline NG127
- Learning disabilities and behaviour that challenges: service design and delivery (2018) NICE guideline NG93

- Sepsis: recognition, diagnosis and early management (2017) NICE guideline NG51
- Intrapartum care for healthy women and babies (2017) NICE guideline CG190
- Mental health problems in people with learning disabilities: prevention, assessment and management (2016) NICE guideline NG54
- Headaches in over 12s: diagnosis and management (2015) NICE guideline CG150

In development

- Suspected neurological conditions NICE quality standard. Publication expected July 2020
- Neonatal infection: antibiotics for prevention and treatment NICE guideline. Publication expected March 2021
- Epilepsies in children: diagnosis and management NICE guideline. Publication expected June 2021
- Vaccine uptake in the general population NICE guideline. Publication expected October 2021

NICE guidance that will 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.

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 septicaemia:

- Medicines optimisation (2015) NICE guideline NG5
- 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 sepsis

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

2 Investigating and diagnosing suspected bacterial meningitis and meningococcal sepsis

- 2.1 What is the accuracy of blood investigations in identifying babies, children and young people likely to have 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 identifying babies, children and young people likely to have meningococcal sepsis, 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 the diagnosis of 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 babies, children and young people with suspected bacterial meningitis?

2.5 What is the effectiveness of neuro-imaging in reducing the occurrence of brain herniation following lumbar puncture?

3 Antibiotics for bacterial meningitis and meningococcal sepsis

3.1 Is immediate antibiotic administration effective in improving outcomes for babies, children and young people with suspected bacterial meningitis?

3.2 Is immediate antibiotic administration effective in improving outcomes in babies, children and young people with suspected meningococcal sepsis?

3.3 What antibiotic treatment regimens (including choice of antimicrobial agent, dosage, route and duration of administration) are effective in the treatment of suspected bacterial meningitis prior to or in the absence of identification of the causative infecting organism?

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

- Neisseria meningitidis
- Streptococcus pneumoniae
- Haemophilus influenzae type b
- group B streptococcus
- Gram-negative bacilli
- Listeria monocytogenes.

3.5 What antibiotic treatment regimens are effective in the treatment of suspected or confirmed meningococcal sepsis?

4 Non-antibiotic management of bacterial meningitis

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

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

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

4.4 What is the effectiveness of lumbar or ventricular cerebrospinal fluid drainage in bacterial meningitis?

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

5 Non-antibiotic management of meningococcal sepsis

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

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

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

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 sepsis?

7 Further investigation

7.1 What additional investigations should be performed in babies, children and young people with recurrent bacterial meningitis?

8 Information and support

8.1 What information is valued by patients, and by the parents or carers of babies, children and young people with suspected or confirmed bacterial meningitis or meningococcal sepsis?

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

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 and NICE Pathways

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

4.2 NICE Pathways

When this guideline is published, we will update the existing NICE Pathway on bacterial meningitis and meningococcal septicaemia in under 16s to cover up to age 18. NICE Pathways bring together everything we have said on a topic in an interactive flowchart.

5 Further information

This is the draft scope for consultation with registered stakeholders. The consultation dates are 26 November 2019 to 24 December 2019.

The guideline is expected to be published in February 2022.

You can follow progress of the guideline.

Our website has information about how NICE guidelines are developed.