

Meningitis

Introduction

Meningitis is an infection of the meninges (protective membranes) that surround the brain and spinal cord.

The infection causes the meninges to become inflamed (swollen), which in some cases can damage the nerves and brain.

Signs and symptoms in children

Although anyone of any age can get meningitis, babies and young children are often affected. The signs and symptoms to look out for in your child are:

a very high fever with cold hands and feet

they may feel agitated but not want to be touched

they may cry continuously

some children can become very sleepy and it may be difficult to wake them up

they may appear confused and unresponsive

they may develop a blotchy red rash that does not fade when you roll a glass over it

In older children and adults, the symptoms of meningitis can include:

severe headache

vomiting

high temperature (fever) of 38°C (100.4°F) or over

stiff neck

sensitivity to light

rapid breathing

a general feeling of being unwell

a distinctive skin rash (although not everyone will have this)

It is important to note that not everyone will get all of the above symptoms.

If you notice any of the symptoms of meningitis, particularly in young children, seek medical help immediately.

Types of meningitis

There are two types of meningitis. They are:

bacterial meningitis, which is caused by bacteria such as *Neisseria meningitidis* or *Streptococcus pneumoniae* and spread through close contact

viral meningitis, which is caused by viruses that can be spread through coughing, sneezing and poor hygiene

The two types of meningitis are described in more detail below.

Bacterial meningitis

Bacterial meningitis is very serious and should be treated as a medical emergency. If the bacterial infection is left untreated, it can cause severe brain damage and infect the blood (septicaemia).

Around 1,265 cases of meningitis were caused by the *Neisseria meningitidis* bacteria in England and Wales in 2009 and 2010. The number of cases has decreased in recent years because of a successful vaccination programme that protects against many of the bacteria that can cause meningitis.

However, there is currently no vaccine to prevent meningococcal group B disease. It is essential to know the signs and symptoms to look for and get medical help if you are worried.

Bacterial meningitis is most common in children under five years old, and in particular in babies under the age of one. It is also common among teenagers aged 15 to 19 years.

Viral meningitis

Viral meningitis is the most common and less serious type of meningitis. It is difficult to estimate the number of cases of viral meningitis because symptoms are often so mild they are mistaken for flu.

Viral meningitis is most common in children and more widespread during the summer months.

Read more about the causes of meningitis.

Diagnosing meningitis

Meningitis can be difficult to diagnose because it often comes on suddenly and can be easily confused with flu as many of the symptoms are the same.

However, it is very important that you seek immediate medical help if you notice any of the symptoms of meningitis, particularly in a young child.

This may mean going to the accident and emergency (A&E) department of your local hospital in the middle of the night. Do not wait for the purple rash to appear, because not everyone gets a rash.

Where meningitis is suspected, treatment will usually begin before the diagnosis has been confirmed. This is because some of the tests can take several hours to complete and it could be dangerous to delay treatment for that amount of time.

The doctors will carry out a physical examination to look for signs of meningitis or septicaemia (blood poisoning), such as a rash. They will also carry out a number of other tests to confirm the diagnosis.

Read more information about how meningitis is diagnosed.

Treating meningitis

Viral meningitis usually gets better within a couple of weeks, with plenty of rest and painkillers for the headache.

Bacterial meningitis is treated with antibiotics (medication that treats infections caused by bacteria). Treatment will require admission to hospital, with severe cases treated in an intensive care unit so the body's vital functions can be supported.

Read more information about how meningitis is treated.

Several decades ago, almost everyone who had bacterial meningitis would die. Nowadays, deaths are mainly caused by septicaemia (blood poisoning) rather than meningitis. Meningococcal disease (the combination of meningitis and septicaemia) causes death in around one in 10 cases.

Up to a quarter of people may experience complications of meningitis, such as hearing loss, after having bacterial meningitis.

Vaccination

The best way to prevent meningitis is by ensuring vaccinations are up-to-date. Children in the UK should receive the available vaccines as part of the childhood vaccination programme.

It is also important to check your travel vaccinations are up-to-date before travelling in certain parts of the world.

Read more information about meningitis vaccination.

Symptoms of meningitis

Meningitis is a very serious illness, but most children make a full recovery if they are treated quickly.

Our symptom alert helps you recognise the signs and includes a printable checklist.

Bacterial or viral meningitis?

It is only possible to distinguish between bacterial and viral meningitis by carrying out clinical tests. It is not possible to tell the difference from the symptoms alone.

Therefore, every case of suspected meningitis should be treated as a medical emergency.

Meningitis should be treated as a medical emergency because bacterial meningitis can lead to septicaemia (blood poisoning), which can be fatal.

Bacterial meningitis

Bacterial meningitis is the more serious form of the condition. The symptoms usually begin suddenly and rapidly get worse. If you suspect a case of bacterial meningitis, you should phone 999 immediately to request an ambulance.

There are some early warning signs you may notice before the other symptoms appear.

Early warning signs

Bacterial meningitis has a number of early warning signs that usually occur before the other symptoms. These are:

pain in the muscles, joints or limbs, such as in the legs or hands

unusually cold hands and feet, or shivering

pale or blotchy skin and blue lips

The presence of a high temperature (fever) with any of the above symptoms should be taken very seriously. Phone immediately to request an ambulance.

Early symptoms

The early symptoms of bacterial meningitis are similar to those of many other conditions, and include:

a severe headache

fever

nausea (feeling sick)

vomiting (being sick)

feeling generally unwell

A fever is where you have a body temperature that is higher than usual. In general, in both adults and children this is taken to be a temperature of 38°C (100.4°F) or above.

Other signs of fever include:

your face is hot to the touch

you look red or flushed

Later symptoms

As the condition gets worse it may cause:

drowsiness

confusion

seizures or fits

being unable to tolerate bright lights (photophobia) – this is less common in young children

a stiff neck – also less common in young children

a rapid breathing rate

a blotchy red rash that does not fade or change colour when you place a glass against it (a rash is not always present)

Babies and young children

The symptoms of bacterial meningitis are different in babies and young children.

Possible symptoms include:

becoming floppy and unresponsive, or stiff with jerky movements

becoming irritable and not wanting to be held

unusual crying

vomiting and refusing feeds

pale and blotchy skin

loss of appetite

a staring expression

very sleepy and reluctant to wake up

Some babies will develop a swelling in the soft part of their head (fontanelle).

Viral meningitis

Most people with viral meningitis will have mild flu-like symptoms, such as:

headaches

fever (see above)

generally not feeling very well

In more severe cases of viral meningitis, symptoms may include:

neck stiffness

muscle or joint pain

nausea (feeling sick)

vomiting (being sick)

diarrhoea (passing loose, watery stools)

photophobia (sensitivity to light)

Unlike bacterial meningitis, viral meningitis does not usually lead to septicaemia (blood poisoning).

Causes of meningitis

Meningitis can be caused by bacteria or a virus.

Bacterial meningitis

Vaccination programmes have helped reduce the number of different types of bacteria that can cause meningitis. However, there are currently a number of bacteria that do not have effective vaccines yet. Some bacterial causes are described below.

Neisseria meningitidis bacteria

Neisseria meningitidis bacteria are often referred to as meningococcal bacteria. There are several different types of meningococcal bacteria called groups A, B, C, W, X, Y and Z.

There is a vaccination that provides protection against group C meningococcal bacteria. Read more information about the Men C vaccination. There is also a quadruple vaccine that provides protection against group A, C, W and Y meningococcal bacteria.

In the UK, most cases of meningococcal meningitis are caused by the group B bacteria. A vaccine for group B disease is being tested in clinical trials but is not yet available for general use.

Streptococcus pneumoniae bacteria

Streptococcus pneumoniae bacteria are often referred to as pneumococcal bacteria. Pneumococcal bacteria tend to affect babies and young children because their immune systems (the body's defence system) have not built up immunity (protection) to these bacteria.

Spreading the bacteria

The meningococcal bacteria that cause meningitis do not live long outside the body, so are usually only spread through prolonged, close contact. Possible ways to spread the bacteria include:

sneezing

coughing

kissing

sharing utensils, such as cutlery

sharing personal possessions, such as a toothbrush or cigarette

As most people – particularly adults above 25 – have a natural immunity to the meningococcal bacteria, most cases of bacterial meningitis are isolated (single cases). However, there is a chance of a small outbreak of cases occurring in environments where a lot of young people live close together. For example:

a boarding school

a university campus

a military base

student housing

Pneumococcal bacteria are much easier to catch than meningococcal bacteria, and are spread through coughing and sneezing. However, in most cases they only cause mild infection, such as a middle ear infection (otitis media).

Read about pneumococcal infections for more information about the type of infections these bacteria can cause.

Viral meningitis

As in the case of bacterial meningitis, vaccination programmes have successfully eliminated the threat from many viruses that used to cause viral meningitis.

For example, the measles, mumps and rubella (MMR) vaccine provides children with immunity against mumps, once a leading cause of viral meningitis in children.

Read more information about the MMR vaccination.

There are still a number of viruses that can cause viral meningitis. These include: enteroviruses - a group of viruses that usually only cause a mild stomach infection, and can be spread through coughing, sneezing or not washing your hands after touching a contaminated surface

the herpes simplex virus - which can cause genital herpes and cold sores

During a meningitis infection

In most meningitis infections, bacteria or viruses spread through the blood. An infection can begin in one part of the body, such as your throat or lungs, before moving through the tissue and into the blood.

The brain is usually protected from infection by the blood-brain barrier, which is a thick membrane that filters out impurities from the blood before allowing it into the brain.

However, for reasons that are not entirely clear, in some people the infection is able to pass through the blood-brain barrier and infect the meninges (brain membrane). The immune system responds to the infection by causing the meninges to swell in an attempt to stop the spread of infection. The swollen meninges may then damage the brain and the rest of the nervous system (nerves and spinal cord).

Bacteria or viruses can also infect the cerebrospinal fluid (CSF), which is the fluid that surrounds and supports the brain and spinal cord. An infection of the CSF can cause further swelling of the meninges, leading to increased pressure in the skull and pressing on the brain. This is known as intracranial pressure.

Diagnosing meningitis

Meningitis is difficult to diagnose. It usually comes on suddenly and can be easily confused with flu, as many of the symptoms are the same.

Seek medical attention

If you notice any of the symptoms of meningitis, particularly in a young child, seek medical help immediately.

This may mean going to the accident and emergency (A&E) department of your local hospital in the middle of the night. Do not wait for the purple rash to appear as not everyone gets a rash. Always treat a suspected case of meningitis seriously until doctors have confirmed the diagnosis.

If you are not sure it is meningitis, you can get more information by:

contacting your DOCTOR, practice nurse or health visitor

Confirming the diagnosis

In cases of suspected meningitis, treatment will usually begin before the diagnosis has been confirmed. This is because some of the tests can take several hours to complete and it could be dangerous to delay treatment for that amount of time.

The doctors will carry out a physical examination to look for signs of meningitis or septicaemia (blood poisoning), such as a rash. They will also carry out tests to confirm the diagnosis.

Diagnostic tests for meningitis may include:

a blood test – to check for the presence of bacteria or viruses that can cause meningitis

a lumbar puncture – where a sample of cerebrospinal fluid (CSF) is taken from the base of the spine and checked for the presence of bacteria or viruses

a computerised tomography (CT) scan – if there are any other suspected problems, such as damage to the brain

a chest X-ray to look for signs of infection

A lumbar puncture will need to be delayed if there are signs of increased pressure on the brain. This is because removing some of the CSF could increase in pressure even more.

Treating meningitis

People with suspected meningitis or septicaemia (blood poisoning) need to be admitted to hospital immediately, wherever they are.

Bacterial meningitis

Someone with bacterial meningitis will require urgent treatment in hospital. If they have severe meningitis, they may need to be treated in an intensive care unit (ICU).

Read about ICUs for more information on the type of treatment these units provide.

Antibiotics (medication for infections caused by bacteria) will be used to treat the underlying infection. These will be given intravenously (through a vein in your arm).

At the same time you may also be given:

oxygen

intravenous fluids (through a vein)

steroids or other medication to help reduce the inflammation (swelling) around your brain

If the antibiotics work well, you should spend about a week in hospital, or maybe less. But if you are severely ill, you may need to stay in hospital for weeks or even months.

Meningococcal disease (the combination of meningitis and septicaemia) can cause some long-term complications.

Read more about the complications of meningitis.

Viral meningitis

Viral meningitis can either be:

severe

mild

The treatment for both severe and mild meningitis is described below.

Severe viral meningitis

If the symptoms of viral meningitis are severe enough to require admission to hospital, the condition will be treated in the same way as bacterial meningitis, with antibiotics.

Once a diagnosis of viral meningitis has been confirmed, the antibiotics will be withdrawn. However, intravenous fluids will be continued to support the body as it recovers.

In very severe cases where someone is in hospital with viral meningitis, anti-viral medicines may be given.

Mild viral meningitis

Most people with viral meningitis will not require hospital treatment. Viral meningitis is usually mild and can be treated at home with:

plenty of rest

painkillers for the headache

anti-emetics (anti-sickness) medicine for the vomiting

Most people recover within five to 14 days.

Infection control

Most cases of meningitis are isolated and there is a low risk of the infection spreading.

However, if someone is thought to be particularly at risk of infection, they can be given a dose of antibiotics as a precautionary measure. This could be, for example, a young child who has spent a large amount of time in close contact with another child who has developed bacterial meningitis.

Complications of meningitis

Bacterial meningitis can place tremendous strain on the body and the brain. It is estimated that a quarter of people with meningococcal disease (the combination of meningitis and blood poisoning) will have complications.

Complications can vary in severity from person to person, and can be temporary or permanent.

Usually, the more severe a meningitis infection is, the greater the likelihood of complications. Complications are more common after bacterial meningitis and rare after viral meningitis.

Possible complications include:

hearing loss, which may be partial or total

problems with memory and concentration

problems with co-ordination and balance

learning difficulties, which may be temporary or permanent

epilepsy – a condition that causes someone to have repeated fits

cerebral palsy – a general term for a set of conditions that affect movement and co-ordination

speech problems

vision loss, which may be partial or total

Hearing loss

As hearing loss is the most common complication of meningitis, people recovering from the condition are usually given a hearing test to assess their hearing. The test should be carried out before you are discharged or within four weeks of being well enough to have the test.

Children and young people should discuss the results of their hearing test with a paediatrician (a doctor who specialises in treating children). This should take place four to six weeks after you are discharged from hospital. If your hearing is severely affected, you may need cochlear implants (small devices inserted into your ear to improve your hearing).

Read more information about hearing impairment.

Gangrene

If bacteria have also entered the blood, they can produce toxins (poisons) that kill healthy tissue. If the tissue damage is severe, it will die and become gangrenous.

Gangrenous tissue will need to be surgically removed in a procedure called debridement. In the most severe cases, it may be necessary to amputate a whole body part such as a:

finger

toe

limb

Read more information about gangrene.

Intensive care

Being treated in intensive care for several weeks can also sometimes cause complications. Some of the common problems people have reported after leaving an intensive care unit include:

feeling weak and tired

having a weak voice

feeling depressed

Read about recovering from intensive care for more information about problems you may experience, and the help that is available.

Psychological effects

Having meningitis can be a traumatic experience, particularly for young children. Many people's psychological and emotional behaviour may change.

Possible psychological effects include:

becoming 'clingy' and needing to be near a loved one – for example, a child feels anxiety when not with a parent

bedwetting

disturbed sleep

nightmares

moodiness

aggression or irritability

feeling dejected or hopeless

temper tantrums

developing a fear of doctors and hospitals

These effects should improve with time as you or your child recover, but some people may need additional therapy to cope.

Talk to your DOCTOR if you are anxious about your child's behaviour, or if you are having psychological complications.

Your DOCTOR may be able to refer you to the mental health services for treatment such as counselling (a talking therapy), or they may refer your child to a childhood psychologist (a healthcare professional who specialises in the assessment and treatment of mental health conditions in children).

Meningitis vaccination

There are a number of vaccines that can prevent many cases of viral and bacterial meningitis.

The vaccines available include:

the measles, mumps and rubella (MMR) vaccination

the meningitis C vaccination

the DTaP/IPV/Hib vaccination, which provides protection against Hib bacteria, diphtheria, whooping cough, tetanus and the polio virus

the pneumococcal conjugate vaccine (PCV)

Children should receive these vaccines as part of their childhood vaccination programme. Speak to your DOCTOR if you are not sure whether your vaccinations are up-to-date.

Vaccine for meningitis B

Meningitis vaccines for travellers

Groups A, Y and W135 are more common elsewhere in the world. If you are travelling abroad, you can be vaccinated against groups A, C, W and Y of the meningococcal bacteria.

High-risk areas

High-risk areas for meningococcal meningitis include:

parts of Africa

Saudi Arabia

Vaccination against groups A, C, Y and W135 meningitis is recommended if you are travelling to a high-risk area and you will be:

staying for longer than one month backpacking

living with locals in rural areas attending the Hajj or Umrah pilgrimages (religious journeys to Mecca, the centre of the Islamic world) in Saudi Arabia

doing seasonal work in the Hajj area of Saudi Arabia

Visitors arriving in Saudi Arabia for the Hajj and Umrah pilgrimages, and seasonal workers in the Hajj area, require proof of vaccination against groups A, C, Y and W135 meningitis.

The vaccine

The conjugate ACYW135 meningococcal vaccination will protect you against groups A, C, Y and W135 meningitis. This should be given two to three weeks before you travel.

For adults and children over five years of age, a single dose provides protection for about five years. For children who were under five years of age when they were first vaccinated, the vaccine gives protection for two to three years.

For infants aged between two months and two years, the initial dose of the vaccine must be followed by a second dose three months later.

The meningitis vaccine is not suitable for babies younger than two months old.

Side effects

About 10% of people experience soreness and redness at the injection site after having the ACWY vaccine to protect against groups A, C, W135 and Y meningitis. This usually lasts around 24-48 hours. Mild fever can also occur (this is usually more common in young children than in adults). Severe reactions are very rare.