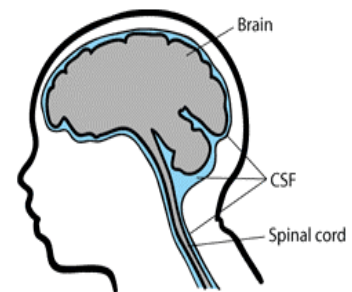


What is pneumococcal meningitis?

Meningitis is an inflammation of the lining around the brain and spinal cord. Most severe cases are caused by bacteria. Pneumococcal bacteria (*Streptococcus pneumoniae*) are the second biggest cause of bacterial meningitis in the UK and Ireland.

Pneumococcal meningitis occurs when the bacteria that have invaded the bloodstream move across to infect the 'meninges' (the membranes that surround and protect the brain and spinal cord). The meninges are filled with a liquid called cerebrospinal fluid (CSF), which is there to bathe the brain and cushion it against physical damage.



Bacteria can multiply freely in CSF, and there they release poisons, causing inflammation and swelling in the meninges and the brain tissue itself. This increases pressure on the brain, producing symptoms of meningitis such as headache, stiff neck and dislike of bright lights. Babies become irritable, may have a high-pitched or moaning cry, be stiff or floppy, and develop a bulging soft spot on their head. As the disease progresses the patient becomes drowsy, confused, and delirious. They may have seizures and eventually lose consciousness. If inflammation and damage to the brain cannot be successfully stopped with antibiotics and other treatments, the infection can be fatal.

Pneumococcal infection can less commonly cause full-blown septicaemia.

Septicaemia is blood poisoning caused by bacteria in the bloodstream. The bacteria give off poisons which attack the blood vessels so that they leak. As a result of these leaky vessels, there is a smaller volume of blood being transported around the body to the vital organs. Reduced blood supply means that oxygen carried by the blood is not reaching the tissues and organs of the body where it is needed. In order to maintain sufficient oxygen supply to the vital organs the circulatory system reduces blood supply to the hands, feet and skin surface. This is how symptoms of septicaemia such as cold hands and feet, pale skin

and rapid breathing develop. If treatment is not successful, septicaemia can ultimately lead to severe damage to vital organs, including heart failure, collapse, and death

For symptoms information see Meningitis Research Foundation's leaflets, including Race Against Time, Tot Watch, and Baby Watch. It is important to note that not everyone gets all the symptoms, and no two cases are exactly the same. People with pneumococcal disease **do not** often get the rash that is typical of the more common kind of meningitis and septicaemia, meningococcal disease.

How do you catch pneumococcal meningitis?

Many people, including approximately half of pre-school children^[1], carry pneumococcal bacteria in the back of their nose and throat, and constantly pass them around by coughing and sneezing and close contact.

Carriage of the bacteria is completely harmless most of the time. However, in a susceptible person, these bacteria can cause a wide range of diseases, from fairly minor bronchitis and ear and sinus infections to life-threatening pneumonia, meningitis, and less frequently septicaemia. Sometimes pneumococcal meningitis can develop from milder forms of the infection, such as earache.

How is pneumococcal meningitis treated?

Prompt recognition of the symptoms and rapid treatment offer the best chance of a good recovery. Anyone who gets pneumococcal meningitis needs to be treated in hospital.

Pneumococcal meningitis can be difficult to recognise in the early stages because there is usually no rash, and if the patient already has a milder pneumococcal infection, such as ear ache or bronchitis, this can confuse the diagnosis. Once in hospital, treatment may begin immediately if the doctor suspects meningitis. Alternatively, if the doctor suspects a possible bacterial infection, but the signs and symptoms of meningitis are not clear enough, the patient may be kept under observation to try to assess the problem further.

Observation of the patient will involve a physical examination and normally blood will be taken for tests. The quantity of certain cells and components of the blood can help to show that the patient has a bacterial infection.

The doctor may do a lumbar puncture (LP). This is when a sample of CSF is taken from the spinal canal (the passageway through the back bones which contains the spinal cord). The sample of CSF will be examined and then sent for further laboratory testing. An LP is important to confirm the diagnosis of meningitis, and to show which germ is causing the illness so that the most appropriate antibiotics (drugs used to treat infection caused by bacteria) can be chosen. If a patient with meningitis is very severely ill, it might not be safe to do an LP immediately, so this may be postponed. Having the diagnosis confirmed in this way can be helpful after recovery, for example when seeking long-term medical advice and follow-up care.

If the doctor suspects meningitis, antibiotics will be given even if it has not been possible to do an LP, or if the LP results are delayed. Antibiotics are given intravenously, through a needle inserted into a vein (usually in the back of the hand or on the arm). Steroids may also be given in this way to reduce inflammation around the brain. In addition the patient is often put on an intravenous drip to give fluids, which stops them getting dehydrated and ensures the correct balance of sugars and other components in the blood.

Most patients are treated on a regular hospital ward, but the most severely ill patients will need intensive care treatment. Even patients who respond quickly to treatment and are well enough to stay on a regular hospital ward will need a two-week course of intravenous antibiotics to cure pneumococcal meningitis.

What happens after pneumococcal meningitis?

Most people who catch pneumococcal meningitis recover, but it is among the most life-threatening major forms of meningitis^[2]. Approximately half of survivors are left with some type of after effect. These after effects may be mild or temporary and improve with time although around 22% of survivors end up with a moderate or severe disability^[3]. Most serious problems can be identified whilst the patient is still in hospital.

Sometimes after effects are not identified until months or even years after the illness. When the patient is a baby not long out of hospital, it can be difficult to tell whether problems may appear at a later stage because learning difficulties and coordination problems may not be noticed until the child reaches school age. The picture becomes clearer as the baby grows and develops, but it can be distressing for parents not to know the extent of after effects in the first weeks and months after taking their child home from hospital.

What after effects can pneumococcal meningitis cause?

Behavioural and emotional effects are quite common: children can be clingy and have temper tantrums, adults can feel despondent and irritable. Although these feelings usually resolve themselves, lasting psychological problems can be serious enough to need referral to mental health services or to a counsellor^[4].

Hearing loss is probably the most common serious physical after effect. Approximately 21% of children who survive pneumococcal meningitis have some degree of hearing impairment^[5]. Damage to the brain and other parts of the nervous system can also cause severe learning difficulties, problems with movement and coordination that can be as severe as cerebral palsy and paralysis, speech and language problems^[6], epilepsy and visual impairment. Although pneumococcal meningitis is a very serious illness, most people do survive without any permanent damage.

For more detailed information on after effects, see the Meningitis Research Foundation's booklet *Meningitis and Septicaemia, What Happens Next?*

Is there any follow up care?

Once discharged, patients should be followed up and carefully assessed for signs of damage. All patients who have had bacterial meningitis should be offered a hearing test.

A hearing test will ideally be arranged by the hospital as soon as the patient is well enough, usually before discharge from hospital and certainly within 4 weeks of recovery. If the test results show severe or profound hearing loss in both ears, the patient will be offered an assessment for cochlear implantation. Cochlear implantation involves surgery to insert a bionic ear. Approximately 5% of pneumococcal meningitis survivors require cochlear implants^[3].

The meningitis guideline from NICE³ (the National Institute for Health and Clinical Excellence) specifies that for children recovering from meningitis, doctors should consider their needs for after care, and discuss potential problems with parents before discharge from hospital. Four to six weeks after discharge, the child should be assessed by a paediatrician and referred for follow up care if after effects are identified. Follow up care often involves physiotherapy, occupational therapy, and speech and language therapy, depending on the problem, and different specialists may be involved. NICE guidelines are applicable In

England, Wales and Northern Ireland and are widely influential in other countries.

The hospital will inform the child's GP, health visitor or school nurse so that they can watch out for any problems that might arise later on. Teachers should be informed when a child has had meningitis so that educational support can be arranged if necessary.

Many people find that it helps to talk to someone who has been through a similar experience. The Foundation's helpline team and befriending network are always available to listen and talk things over.

Am I at risk of spreading or contracting the disease if I have been in contact with a patient with pneumococcal meningitis?

Contact with someone with pneumococcal meningitis presents no particular risk. Many people carry pneumococcal bacteria in the back of their nose and throat and although the bacteria are easy to pass on, it is extremely rare for a healthy person to catch severe pneumococcal disease from someone in their household who has the illness.

Outbreaks of invasive pneumococcal disease in a nursery or nursing home or other 'closed' setting need prompt investigation. Certain control measures may be appropriate such as vaccination of close contacts or treating close contacts with antibiotics^[7-8].

Can pneumococcal meningitis be prevented?

Yes, some types of pneumococcal meningitis are preventable. Routine infant immunisation now includes a vaccine against the thirteen most common strains in the UK and Ireland^[9-10]. A separate vaccine is also available for people over the age of 65 and older people with health conditions which increase their risk from pneumococcal infection.

Detailed information about current vaccines is available from Meningitis Research Foundation's "Pneumococcal Meningitis Vaccine" factsheet.

Where can I go for further information and support?

Freephone helpline UK 080 88 00 33 44 Ireland 1800 41 33 444

email helpline@meningitis.org

Visit our website www.meningitis.org

If using any information from this document in external communications, please credit Meningitis Research Foundation and quote our URL www.meningitis.org.

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