CONDITION

Hospital-acquired pneumonia

Hospital-acquired pneumonia is a lung infection that begins at least 48 hours after admission to hospital.

WHAT IT IS
New lung infection beginning during a hospital stay

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Cough, fever, breathlessness, new confusion

WHAT CAUSES IT
Usually bacterial infection

HOW IT IS DIAGNOSED
Chest imaging plus clinical evidence of infection

MAIN TREATMENT
Antibiotics and supportive hospital care

CAN IT BE CURED?
Yes - treatment often clears the infection

IS IT AN EMERGENCY?
Sometimes - severe breathlessness, blue lips, or new confusion

LONG-TERM OUTLOOK
Most recover, but severe infection can be life-threatening

Overview

Hospital-acquired pneumonia is a lung infection that develops at least 48 hours after admission to hospital. It was not present or already developing when the person arrived.

Pneumonia causes inflammation in the tiny air sacs of the lungs. These air sacs may fill with fluid and inflammatory material, making it harder for oxygen to enter the blood.

Hospital-acquired pneumonia is different from pneumonia that begins in the community. The bacteria found in hospitals may be more resistant to antibiotics like amoxicillin or doxycycline . People in hospital may also be recovering from surgery or another serious condition, which can make the infection harder to manage.

Pneumonia linked to a breathing machine is called ventilator-associated pneumonia. It is

usually considered a related but separate type of hospital-acquired infection.

This condition needs prompt medical assessment and treatment. Many people recover, but the risk of complications is higher in people who are frail, critically ill, or living with serious medical conditions.

Symptoms

Symptoms may begin suddenly or develop over several days. Common features include:

Older adults and people who are very unwell may not develop a clear fever. New confusion, unusual sleepiness, reduced alertness, or a sudden loss of independence may be the most noticeable signs.

Some symptoms can also come from the condition that led to hospital admission. For example, breathlessness may be caused by heart failure, a blood clot, or fluid around the lungs. Tests are needed to work out whether pneumonia is the likely cause.

- A new cough or a clear change in an existing cough
- Yellow, green, brown, or blood-streaked mucus
- Fever, chills, or sweating
- Shortness of breath or faster breathing
- Chest discomfort, especially when coughing or breathing deeply
- Low oxygen levels
- Unusual tiredness or weakness
- Reduced appetite

Causes and risk factors

Hospital-acquired pneumonia is usually caused by bacteria reaching the lower airways and lungs. These bacteria may come from the person's mouth, throat, digestive system, hospital environment, or medical equipment.

Viruses and fungi can also cause pneumonia, although they are less common causes in most hospital patients. The likely cause is influenced by the person's immune system, recent infections, treatments, and local patterns of infection.

Small amounts of saliva, food, drink, or stomach contents can sometimes enter the airway

instead of the food pipe. This is called aspiration. Aspiration is more likely when swallowing or consciousness is impaired.

Factors that can increase the risk include:

Having one or more risk factors does not mean that pneumonia will develop. It helps the hospital team choose suitable tests, monitoring, and initial treatment.

- Treatment in intensive care or use of a breathing machine
- Recent surgery, especially chest or abdominal surgery
- Difficulty coughing, swallowing, or clearing mucus
- Reduced consciousness, heavy sedation, or severe weakness
- A long hospital stay
- Recent antibiotic treatment
- Chronic lung conditions
- A weakened immune system
- Frailty or severe underlying illness
- Feeding tubes or other devices affecting the mouth and airway

Diagnosis

There is no single test that confirms every case. Diagnosis is based on symptoms, examination findings, chest imaging, and evidence of infection.

A chest X-ray may show a new area of inflammation or fluid in the lung. A CT scan gives more detailed images and may be used when the X-ray is unclear or a complication is suspected.

A pulse oximeter, usually placed on a finger, measures the oxygen level in the blood. An arterial blood gas test may be needed if breathing is severely affected. This blood test measures oxygen, carbon dioxide, and acidity.

Blood tests can look for inflammation and show how the kidneys, liver, and other organs are working. Blood cultures may identify bacteria that have entered the bloodstream.

A mucus sample may be sent to a laboratory. For someone using a breathing tube, secretions can be collected through the tube. Laboratory testing may identify the germ and show which antibiotics are likely to work against it.

Samples are often taken before antibiotics begin when this can be done without delaying treatment. A culture may still be negative even when pneumonia is present, especially after

antibiotics have already been given.

Doctors also consider other possible causes of the symptoms, including a collapsed area of lung, heart failure, a lung blood clot, medication effects, or inflammation without infection.

Treatment and management

Treatment usually starts promptly in hospital. The main treatment for bacterial hospital-acquired pneumonia is antibiotics.

Initial antibiotics are chosen before the exact germ is known. The choice is guided by how unwell the person is, previous test results, recent antibiotic use, allergies, kidney and liver function, and antibiotic resistance in that hospital.

Antibiotics may first be given into a vein. Some people can later change to tablets once they are improving and able to swallow and absorb medicine reliably.

When culture results become available, the treatment is reviewed. The hospital team may switch to an antibiotic that targets the identified germ more closely. Antibiotics may also be stopped if another diagnosis becomes more likely.

The length of treatment is based on clinical progress, the germ involved, complications, and the person's general health. Longer treatment is not automatically better because it may increase side effects and antibiotic resistance.

Supportive treatment may include:

Severe breathing problems may require high-flow oxygen, non-invasive breathing support through a mask, or a breathing machine. People with severe infection may need treatment in a high-dependency or intensive care unit.

- Oxygen for low blood oxygen levels
- Fluids if dehydration or low blood pressure is present
- Medicines for pain or fever
- Help to clear mucus and change position
- Nutrition and swallowing support
- Treatment for the condition that led to hospital admission

Complications

Hospital-acquired pneumonia can place strain on the lungs and other organs. Complications

are more likely when infection is severe or when the person already has major health problems.

Possible complications include:

Antibiotics can also cause side effects, including nausea, rash, or diarrhoea. Severe or persistent diarrhoea may be caused by Clostridioides difficile , often shortened to C. diff , which can grow after antibiotics disturb the normal bacteria in the bowel.

- Respiratory failure, when the lungs cannot supply enough oxygen
- Sepsis, an extreme body-wide response to infection that can injure organs
- Bacteria entering the bloodstream
- A lung abscess, which is a pocket of pus inside the lung
- Infected fluid around the lung, called an empyema
- Kidney injury or worsening heart problems
- Delirium, meaning a sudden and fluctuating state of confusion
- Loss of strength and mobility after a long illness

Prevention

Not every case of hospital-acquired pneumonia can be prevented. People may become infected despite appropriate hospital care, particularly when they are critically ill or unable to protect their airway.

Hospitals reduce risk through hand hygiene, cleaning equipment, safe management of breathing devices, and careful use of antibiotics. Staff may also check whether tubes and sedating medicines are still needed.

Other preventive measures may include:

You and your visitors can clean your hands regularly and follow any infection-control instructions. Tell hospital staff if you have trouble swallowing, cough while eating, or feel newly short of breath.

Vaccination against influenza, COVID-19, and pneumococcal infection can prevent some respiratory infections, but it does not prevent every type of hospital-acquired pneumonia.

- Regular mouth care
- Sitting upright when appropriate
- Early movement after surgery or illness

- Deep breathing and supported coughing
- Swallowing assessment when aspiration is a concern
- Keeping the head raised during tube feeding
- Reducing time on a breathing machine when safely possible

Living with it and what to expect

Recovery is influenced by the severity of the pneumonia, the germ involved, underlying health, and the reason for being in hospital.

The medical team usually looks for signs that treatment is working over the first few days. These include easier breathing, more stable oxygen levels, improving alertness, and a falling fever. A slow response may lead to repeat cultures, different imaging, or a review of the diagnosis and antibiotics.

Cough, tiredness, poor appetite, and reduced stamina can continue after the infection is controlled. People who were seriously ill may need several weeks or months to regain strength. Physiotherapy, nutritional support, or rehabilitation may help after a long hospital stay.

Some people return to their previous level of health. Others, particularly those who were frail or critically ill, may need more support with mobility and daily activities. Severe pneumonia can worsen an existing lung condition or contribute to lasting physical weakness.

A routine follow-up plan may include checking breathing, oxygen needs, mobility, and recovery from the original illness. Repeat chest imaging is not needed for everyone. It may be arranged when symptoms persist, the initial X-ray was unusual, or there is another reason to check that the lung changes have cleared.

When to get medical help

If you are in hospital, tell a nurse or another member of staff promptly about a new cough, fever, shaking chills, chest pain, breathlessness, confusion, or a sudden decline in how you feel. Do not wait for the next routine ward round.

After discharge, seek urgent medical assessment if breathing or fever worsens, symptoms return after initially improving, or you cannot keep down fluids or medicines.

Call emergency services for:

Arrange routine follow-up if your cough, fatigue, appetite, or exercise tolerance is not gradually

improving. Also seek advice for persistent or severe diarrhoea during or after antibiotic treatment.

- Severe difficulty breathing or an inability to speak normally
- Blue, grey, or unusually pale lips or skin
- New severe confusion, collapse, or difficulty waking
- Severe chest pain
- Coughing up more than small streaks of blood

Common questions

Is hospital-acquired pneumonia contagious?

Pneumonia itself is not always passed directly between people. However, some bacteria and viruses that cause it can spread through hands, droplets, or contaminated equipment. Hospital staff may use gloves, masks, gowns, or a private room when a transmissible infection is suspected.

How is it different from ordinary pneumonia?

Community-acquired pneumonia starts outside hospital or soon after admission. Hospital-acquired pneumonia begins at least 48 hours after admission. Hospital germs may have greater antibiotic resistance, so testing and the initial choice of treatment can differ.

How long does recovery take?

Some people improve within several days, but cough and tiredness may last for weeks. Recovery can take longer after intensive care, surgery, respiratory failure, or a long period in bed. The hospital team will judge progress using symptoms, oxygen levels, examination findings, and test results.

Will I need another chest X-ray?

Not everyone does. Repeat imaging may be useful if symptoms are not resolving, the first scan showed an unusual change, or there is concern about a complication or another lung condition.

Can hospital-acquired pneumonia come back?

It can recur, especially if swallowing problems, severe weakness, immune suppression, or breathing support continue. A new episode may involve a different germ, so returning symptoms need reassessment rather than simply restarting an old antibiotic.

Is ventilator-associated pneumonia the same thing?

It is a type of pneumonia that develops after a person has been using an invasive breathing

machine. It is closely related to hospital-acquired pneumonia, but it has specific risk factors, testing methods, and prevention measures.

Sources

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