CONDITION

Pneumonia - weakened immune system

Pneumonia in someone whose immune system has reduced ability to fight infection.

WHAT IT IS
Lung infection with reduced immune defences

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Cough, breathlessness, fever, chest pain

WHAT CAUSES IT
Infection by bacteria, viruses, fungi, or parasites

HOW IT IS DIAGNOSED
Chest imaging plus blood, sputum, or airway samples

MAIN TREATMENT
Targeted antimicrobials and supportive care

CAN IT BE CURED?
Sometimes - infection often clears; immune weakness may continue

IS IT AN EMERGENCY?
Sometimes - severe breathlessness or confusion needs emergency care

LONG-TERM OUTLOOK
Often recovery, but recurrence risk follows immune weakness

Overview

Pneumonia is an infection that inflames the tiny air sacs in one or both lungs. These air sacs may fill with fluid or pus, making it harder for oxygen to pass into the blood.

A weakened immune system cannot respond to infection as strongly as usual. This is also called being immunocompromised . It can change which germs cause pneumonia, how quickly the infection progresses, and which tests and treatments are needed.

Some people have common forms of bacterial or viral pneumonia. Others develop an opportunistic infection . This is an infection caused by a germ that rarely causes serious illness in a person with healthy immune defences. Examples include Pneumocystis jirovecii , certain moulds, and cytomegalovirus.

Symptoms may be less obvious than expected. For example, some people do not develop a

high fever even when the infection is serious. New breathing symptoms therefore need prompt medical assessment.

Many cases can be treated successfully. The outlook is influenced by the germ involved, the severity of the pneumonia, the reason the immune system is weakened, and how quickly effective treatment begins.

Symptoms

Symptoms can begin suddenly over hours or days, or develop gradually over several weeks. They may include:

Pneumocystis pneumonia, often called PCP or PJP, commonly causes a dry cough, fever, and gradually increasing breathlessness. Fungal pneumonia may develop slowly, although it can also become severe quickly.

Older adults and people with a very weak immune response may have mild or unusual symptoms. Confusion, unusual sleepiness, falls, or a sudden decline in everyday function may be the first signs.

Symptoms alone cannot identify the germ. Different infections can look similar, while non-infectious problems such as a blood clot, medication reaction, cancer, or inflammation can also cause cough and breathlessness.

- A new or worsening cough
- Shortness of breath, including during ordinary activity
- Fever, chills, or feeling unusually cold
- Chest pain that worsens with coughing or deep breathing
- Tiredness, weakness, or reduced ability to exercise
- Coughing up mucus, which may be clear, yellow, green, or blood-streaked
- Fast breathing or a racing heartbeat
- Poor appetite, nausea, or vomiting

Causes and risk factors

Pneumonia happens when germs reach the lungs and the immune system cannot clear them effectively. Possible causes include bacteria, respiratory viruses, fungi, and, less often, parasites.

Common pneumonia germs still matter in people with weakened immunity. However, the range of possible causes is broader. It can include tuberculosis, Pneumocystis jirovecii , Aspergillus moulds, cytomegalovirus, and other organisms found in the environment or already present in the body.

The type of immune weakness helps indicate which germs are more likely. Risk can be increased by:

Recent hospital care, antibiotic use, travel, contact with tuberculosis, exposure to mould or disturbed soil, and previous infections may also affect which causes are considered.

Having one of these risk factors does not mean that every cough is pneumonia. It does mean that new respiratory symptoms may need earlier investigation.

- Chemotherapy or some treatments for blood cancers
- An organ or stem cell transplant
- Medicines that suppress immune activity, including corticosteroids and some biologic medicines
- HIV with significant loss of infection-fighting CD4 cells
- Certain inherited immune conditions
- Low numbers or poor function of white blood cells
- Advanced cancer or severe malnutrition
- Loss of spleen function

Diagnosis

Assessment usually begins with questions about your symptoms, medicines, immune condition, recent treatments, travel, exposures, and previous infections. Your temperature, breathing rate, heart rate, blood pressure, and oxygen level may be checked.

A chest X-ray can show areas of inflammation. A computed tomography, or CT, scan gives more detailed images and may find changes that are difficult to see on an X-ray. Imaging supports the diagnosis but often cannot identify the exact germ.

Tests may include blood samples, a mucus or sputum sample, nasal or throat swabs, and urine tests for certain organisms. Laboratories can use cultures, antigen tests, or molecular tests such as PCR to look for genetic material from a germ.

If ordinary samples do not explain the illness, a bronchoscopy may be needed. During this procedure, a thin flexible camera is passed into the airways. Fluid or small tissue samples can

then be collected from the lungs. Sedation and local anaesthetic are usually used.

Blood tests can also show inflammation, white blood cell levels, kidney and liver function, and the effect of the illness on the body. An arterial blood gas may be used to measure oxygen and carbon dioxide directly from an artery.

Because several germs can be present at once, testing may continue even after initial treatment has started. Doctors may also investigate non-infectious causes if the test results do not fit pneumonia.

Treatment and management

Treatment is based on how unwell you are, the type of immune weakness, likely exposures, imaging results, and test findings. Care may take place at home, in hospital, or in an intensive care unit.

Antimicrobial medicines target the suspected cause. These include antibiotics like amoxicillin or doxycycline for bacteria, antiviral medicines for certain viruses, antifungal medicines for fungi, and medicines active against Pneumocystis or parasites. Treatment may begin before the exact germ is confirmed because laboratory results can take time.

Initial treatment sometimes covers several possible germs. It can then be narrowed or changed when results become available. The choice and length of treatment are often different from those used for pneumonia in someone with a healthy immune system.

Supportive care helps the body while the infection is treated. It may include oxygen, fluids, fever or pain relief, and help with nutrition. Severe breathing failure may require high-flow oxygen or mechanical ventilation.

Do not stop, reduce, or restart an immune-suppressing medicine on your own. In some situations, changing it could help control infection. In others, a sudden change could cause rejection, inflammation, adrenal problems, or a flare of the underlying condition. The team managing that medicine should be involved.

Follow-up may include repeat blood tests, oxygen checks, or chest imaging. This is especially important when symptoms persist, the cause was uncertain, or the infection was fungal or otherwise difficult to treat.

Complications

Pneumonia can reduce oxygen levels and place strain on the lungs, heart, kidneys, and other

organs. A weakened immune response can allow infection to spread before strong symptoms appear.

Possible complications include:

Some infections can leave lung scarring or reduced exercise tolerance. Others may return if the immune system remains severely weakened. Prompt diagnosis and treatment reduce risk but cannot prevent every complication.

- Respiratory failure, when the lungs cannot supply enough oxygen
- Sepsis, a harmful whole-body response to infection
- A lung abscess, which is a pocket of infected material
- Fluid around the lung, called a pleural effusion
- Infected fluid around the lung, called an empyema
- Spread of infection to the blood, brain, or other organs
- Worsening of an existing lung, heart, or kidney condition

Prevention

Not every case can be prevented. The condition causing immune weakness may also be unavoidable. However, some steps can lower the chance of infection or severe illness.

Vaccines can protect against several causes of pneumonia, including influenza, COVID-19, and pneumococcal infection. The appropriate vaccines and timing are affected by age, previous vaccines, treatment, transplant history, and the degree of immune suppression. Some live vaccines are not suitable during significant immune suppression, so vaccination plans need individual review.

Certain people at high risk are prescribed preventive antimicrobial medicine. This is sometimes used to prevent Pneumocystis pneumonia or specific infections after a transplant. It is not needed by everyone and should not be shared or started without medical advice.

Other practical measures include regular handwashing, avoiding smoking and second-hand smoke, and limiting close contact with people who have a known contagious respiratory infection. A well-fitting mask may add protection in crowded indoor settings or during periods of high respiratory infection activity.

If your work, hobbies, travel, or home environment involves birds, construction dust, mould, caves, or disturbed soil, ask whether special precautions apply to your type of immune weakness.

Living with it and what to expect

Recovery may take weeks, even after the infection is under control. Cough, tiredness, poor appetite, and breathlessness during activity often improve more slowly than fever. Build activity up gradually rather than trying to return to your previous routine at once.

Some people recover fully from a single episode. Others need longer treatment, especially for fungal, mycobacterial, or opportunistic infections. Follow-up can continue for months to check that symptoms and lung changes are resolving.

The chance of another infection is linked to whether immune function recovers. Immunity may improve after chemotherapy ends or white blood cell levels rise. It may remain reduced when long-term immune-suppressing treatment is necessary.

Preventive medicines, vaccines, and monitoring may form part of longer-term care. Attend planned blood tests and imaging even if you feel better, because symptoms do not always show whether an infection has fully cleared.

Seek routine follow-up if recovery stalls, your cough or breathlessness remains limiting, treatment side effects are difficult to manage, or symptoms return after improving.

When to get medical help

If you have a weakened immune system, contact your medical team promptly for a new cough, fever, increasing breathlessness, chest pain, or an unexplained decline in energy. Do not wait for symptoms to become severe. A normal temperature does not rule out a significant infection.

Get same-day medical advice for worsening symptoms, repeated vomiting, difficulty taking prescribed medicines, blood in your mucus, reduced urination, or an oxygen reading below the action level given in your care plan.

Call emergency services if you have:

These signs can indicate low oxygen, sepsis, or another serious problem. Do not drive yourself if you are severely unwell.

- Severe difficulty breathing or cannot speak normally because of breathlessness
- Blue, grey, or unusually pale lips or skin
- New confusion, collapse, or difficulty waking
- Severe or rapidly worsening chest pain

- Signs of shock, such as cold clammy skin with marked weakness
- A dangerously low oxygen reading based on your emergency plan

Common questions

Is pneumonia more dangerous if my immune system is weak?

It can be. The infection may progress faster, involve unusual germs, or produce fewer early warning signs. Early assessment and treatment improve the chance of controlling it.

Can I have pneumonia without a fever?

Yes. Immune-suppressing medicines and low white blood cell levels can limit fever. New breathlessness, cough, confusion, or unusual weakness still needs attention.

Is pneumonia contagious?

Pneumonia itself is inflammation inside the lungs. Some germs that cause it, such as influenza, COVID-19, and certain bacteria, can spread between people. Opportunistic fungi and Pneumocystis have different patterns of exposure and transmission. The precautions needed depend on the identified or suspected germ.

How long does recovery take?

Some symptoms improve within days of effective treatment, but tiredness, cough, and reduced stamina may last for weeks. Opportunistic or fungal infections can require treatment and monitoring for months. Recovery is also affected by the underlying immune condition.

Will I need to stop my immune-suppressing medicine?

Not necessarily. The risks of continuing, reducing, or stopping treatment must be balanced carefully. Changes should be coordinated with the team managing your transplant, cancer, inflammatory condition, or other immune treatment.

Can pneumonia come back?

Yes. Recurrence is more likely if immune weakness continues, the original infection was not fully cleared, or preventive treatment is needed but cannot be used. A returning cough, fever, or breathlessness should be reassessed rather than assumed to be part of recovery.

Sources

- American Thoracic Society: Immunocompromised Host Pneumonia-Definitions and Diagnostic Criteria , Annals of the American Thoracic Society , 2023
- Centers for Disease Control and Prevention: About Pneumonia , patient and public health information
- Centers for Disease Control and Prevention: Clinical Overview of Pneumocystis Pneumonia , clinical overview
- National Institutes of Health: Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents With HIV-Pneumocystis Pneumonia , federal clinical guidance
- Ramirez JA and colleagues: Treatment of Community-Acquired Pneumonia in Immunocompromised Adults-A Consensus Statement Regarding Initial Strategies 31664-5/fulltext), Chest , 2020;158(5):1896-1911