CONDITION

Acute respiratory distress syndrome

Learn how acute respiratory distress syndrome affects the lungs, what causes it, how it is treated in intensive care, and what recovery may involve.

WHAT IT IS
Life-threatening form of lung failure

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Severe shortness of breath, labored breathing, low oxygen, confusion

WHAT CAUSES IT
Inflammation from severe illness or injury

HOW IT IS DIAGNOSED
Oxygen measurements, chest imaging, exclusion of other causes

MAIN TREATMENT
Intensive care breathing support and treatment of the cause

CAN IT BE CURED?
Sometimes - lungs may recover with support

IS IT AN EMERGENCY?
Yes, severe breathing trouble needs emergency care

LONG-TERM OUTLOOK
Recovery varies, with possible lasting breathing and cognitive problems

Overview

Acute respiratory distress syndrome, or ARDS, is a life-threatening form of lung failure. It develops when inflammation damages the tiny air sacs in the lungs and nearby blood vessels. Fluid then leaks into the air sacs, making it difficult for oxygen to pass from the lungs into the blood.

ARDS is not a single disease. It is a reaction to another serious illness or injury, such as pneumonia, sepsis, or major trauma. It usually develops quickly, often within several days of the triggering problem.

A person with ARDS has dangerously low blood oxygen. Most people need care in an intensive care unit, or ICU. Treatment supports breathing while the medical team treats the underlying cause and gives the lungs time to recover.

ARDS can affect adults and children. Its severity varies. Some people improve within days, while others need breathing support for weeks. Recovery may continue for months after leaving the hospital.

Symptoms

ARDS usually develops while a person is already seriously ill, although the illness that triggers it may begin outside the hospital. Symptoms can worsen quickly.

Common signs and symptoms include:

Other symptoms depend on the cause. Pneumonia may cause fever and cough. Sepsis may cause fever or low body temperature, low blood pressure, confusion, and reduced urination. A major injury may cause bleeding or shock.

ARDS is a medical emergency. Call emergency services for severe trouble breathing, blue or gray discoloration, new confusion, fainting, or an inability to stay awake. Do not drive yourself if you are severely short of breath or confused.

Less severe breathlessness that is new or getting worse still needs prompt medical assessment, especially after a recent infection, hospitalization, injury, surgery, or exposure to smoke or chemicals.

- Severe shortness of breath
- Fast, difficult, or labored breathing
- Low oxygen levels
- A rapid heartbeat
- Confusion, unusual sleepiness, or restlessness
- Bluish, gray, or pale lips, skin, or nail beds
- Extreme tiredness

Causes and risk factors

ARDS occurs when a severe illness or injury triggers widespread inflammation in the lungs. The trigger may directly injure the lungs or cause inflammation throughout the body that later affects them.

Common causes include pneumonia, sepsis, aspiration, and major trauma. Sepsis is a dangerous response to infection that can injure organs. Aspiration means that vomit, food,

liquid, or another substance enters the lungs instead of the stomach.

Other possible causes include:

Not everyone with these conditions develops ARDS. Risk depends on the severity of the underlying illness, the number of organs affected, and a person's overall health.

Factors associated with a greater risk include older age, cigarette smoking, heavy alcohol use, chronic liver disease, and frailty. Some people develop ARDS without having any of these factors. Having a risk factor does not mean that ARDS will occur.

The inflammation in ARDS is different from fluid buildup caused mainly by heart failure. However, heart problems and ARDS can occur together, which may make diagnosis and treatment more complex.

- Severe viral, bacterial, or fungal lung infections
- Inhaling smoke, toxic gases, or irritating chemicals
- Near drowning
- Severe inflammation of the pancreas, called acute pancreatitis
- Major burns
- Multiple blood transfusions
- Shock or extensive blood loss
- Certain drug overdoses or harmful substance exposures

Diagnosis

There is no single blood test that confirms ARDS. Doctors diagnose it by combining the person's history, oxygen measurements, imaging results, physical examination, and tests for other possible explanations.

A pulse oximeter measures oxygen saturation through a sensor placed on a finger or another part of the body. An arterial blood gas test measures oxygen, carbon dioxide, and acidity in a blood sample taken from an artery. These results help the team judge how severely the lungs are affected.

A chest X-ray or computed tomography, commonly called a CT scan, may show cloudy areas in both lungs. These areas represent fluid or inflammation. In some settings, lung ultrasound can provide additional information.

Clinicians also look for features used in accepted ARDS definitions. The breathing problem begins or worsens soon after a known illness or injury. Imaging shows changes affecting both

lungs. Oxygen levels remain low despite oxygen support. The lung findings are not fully explained by heart failure, excess body fluid, or lung collapse.

Tests used to identify the cause may include blood cultures, respiratory samples, viral testing, and other laboratory studies. An echocardiogram, which is an ultrasound of the heart, may help determine whether heart failure is contributing to fluid in the lungs. Bronchoscopy may occasionally be used to examine the airways or collect lung samples.

The medical team also watches for infection, blood clots, kidney or liver injury, and problems involving other organs.

Treatment and management

ARDS treatment takes place in a hospital, usually in an ICU. The immediate goals are to keep enough oxygen in the blood, reduce additional lung injury, support other organs, and treat the condition that triggered ARDS.

Supplemental oxygen may be delivered through nasal tubing, a face mask, or high-flow nasal oxygen. High-flow treatment provides warmed, humidified oxygen at a higher flow rate. Some carefully selected patients may receive noninvasive ventilation through a tight-fitting mask.

If these methods do not provide enough support, a breathing tube may be placed through the mouth into the windpipe. A mechanical ventilator then moves air into and out of the lungs. Medicines for comfort and sedation are often needed while the tube is in place.

Ventilator settings are chosen to protect the lungs. Clinicians generally use smaller breaths based on a person's predicted body size rather than actual weight. They also limit pressure inside the lungs. This approach lowers the risk of stretching and further damaging fragile lung tissue.

Positive end-expiratory pressure, or PEEP, keeps some pressure in the lungs after each breath. This can prevent air sacs from repeatedly collapsing. The amount is adjusted according to oxygen needs, blood pressure, lung mechanics, and the risk of overinflation.

For moderate or severe ARDS, the team may place an intubated patient face down for long periods. This is called prone positioning. It can improve oxygen flow by allowing air and blood to reach the lungs more evenly. Trained staff regularly protect the breathing tube, skin, eyes, and pressure points while the person is prone.

Short-term medicines that temporarily relax the muscles may be considered in selected people with severe ARDS. These medicines can help the ventilator work more effectively but require close monitoring. Corticosteroids like prednisone or hydrocortisone may also be considered in some cases. Their possible benefits, timing, and risks depend on the clinical

situation.

Fluid management requires balance. Fluids may be necessary when blood pressure is dangerously low. Once shock is controlled, avoiding unnecessary fluid can reduce lung swelling. Diuretics like furosemide or hydrochlorothiazide , sometimes called water pills, may be used when appropriate to remove excess fluid.

Treatment of the cause is essential. This may include antibiotics like amoxicillin or doxycycline for a suspected bacterial infection, drainage of an infected area, treatment for sepsis, or care for trauma, burns, or pancreatitis. Antibiotics do not treat ARDS itself and are not useful for infections caused only by viruses.

Nutrition is commonly given through a feeding tube if a person cannot eat safely. The team also works to prevent blood clots, pressure injuries, stomach bleeding, and hospital-acquired infections. Physical and occupational therapy may begin in the ICU when the person is stable enough.

In the most severe cases, extracorporeal membrane oxygenation, or ECMO, may be considered at an experienced center. ECMO circulates blood through a machine that adds oxygen and removes carbon dioxide. It can provide temporary support while the lungs recover, but it has important risks and is not appropriate for everyone.

Complications

ARDS and the illness that caused it can affect the whole body. Some complications happen during intensive care, while others become more noticeable during recovery.

Possible complications include:

Mechanical ventilation can save a person's life, but pressure and oxygen exposure can also injure vulnerable lungs. Lung-protective ventilation is used to reduce this risk.

Some survivors develop lung scarring, known as fibrosis. Others have continuing symptoms even when later imaging and lung tests improve. Weakness may result from the critical illness, long periods in bed, inflammation, or medicines used during ICU care.

Recovery differs greatly from person to person. The severity of ARDS, length of ICU care, other organ injuries, previous health, and underlying cause all affect the course.

- Blood clots in the legs or lungs
- Pneumonia or other hospital-acquired infections
- Air leaking from an injured lung

- Kidney, heart, liver, or brain injury
- Muscle weakness and loss of physical endurance
- Swallowing or voice problems after a breathing tube
- Delirium, meaning sudden confusion during a serious illness
- Anxiety, depression, sleep problems, or post-traumatic stress symptoms
- Memory, attention, or problem-solving difficulties
- Persistent shortness of breath or reduced exercise capacity

Follow up

Follow-up usually begins soon after discharge from the hospital or rehabilitation facility. Visits may include a review of breathing, oxygen needs, medicines, nutrition, sleep, mood, memory, and the ability to manage daily activities.

A clinician may arrange lung function testing, oxygen measurement during activity, or repeat chest imaging. These tests are based on symptoms and the hospital course; not every survivor needs the same testing.

Rehabilitation can be an important part of recovery. Physical therapy may rebuild strength and balance. Occupational therapy can help with everyday tasks. Pulmonary rehabilitation may combine supervised exercise, breathing education, and symptom management. Speech therapy may help with swallowing, communication, or voice changes.

Return to work, driving, exercise, and other activities should be gradual and discussed with the care team. Family members may also need support after a prolonged ICU stay.

Contact the regular healthcare team promptly for increasing breathlessness, a new fever, worsening cough, new leg swelling, reduced ability to complete usual activities, or problems with oxygen equipment.

Seek emergency care for severe or sudden breathing difficulty, chest pain, coughing up blood, blue or gray discoloration, fainting, or new confusion. These symptoms are not part of routine recovery and should not wait for a scheduled appointment.

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