CONDITION

Paraquat poisoning

Paraquat poisoning is severe toxic injury caused by exposure to the paraquat weedkiller.

WHAT IT IS
Toxic injury from exposure to paraquat weedkiller

BODY SYSTEM
Lungs, kidneys, liver, and digestive system

MAIN SYMPTOMS
Mouth burns, vomiting, reduced urine, worsening breathlessness

WHAT CAUSES IT
Paraquat exposure, especially swallowing

HOW IT IS DIAGNOSED
Exposure history, urine dithionite test, blood paraquat level

MAIN TREATMENT
Rapid decontamination and intensive supportive hospital care

CAN IT BE CURED?
Sometimes - limited exposure with rapid treatment

IS IT AN EMERGENCY?
Yes - any suspected swallowing or significant exposure

LONG-TERM OUTLOOK
Often poor after swallowing; limited exposure may fully recover

Overview

Paraquat is a powerful weedkiller. Paraquat poisoning happens when the chemical enters the body, most often by being swallowed. It can also cause harm through the eyes, damaged skin, or heavy exposure to spray droplets.

This is a medical emergency because even a small swallowed amount of a concentrated product can cause severe injury. Paraquat damages cells through a process called oxidative stress. This means harmful oxygen-related chemicals build up inside tissues.

The mouth, throat, stomach, kidneys, liver, and lungs are especially vulnerable. Early symptoms may look like chemical burns or stomach illness. Serious kidney, liver, and lung damage can then develop over hours or days. Lung scarring may continue to worsen over several weeks.

There is no specific antidote that switches off paraquat's effects. Treatment focuses on

stopping further absorption, supporting the body, and managing complications. The outcome is strongly influenced by the amount and concentration involved, the route of exposure, and how quickly treatment begins.

Symptoms

Symptoms can begin within minutes or hours after swallowing paraquat. However, some serious effects are delayed. Feeling fairly well shortly after exposure does not mean the danger has passed.

Early symptoms after swallowing may include:

Over the next several hours or days, poisoning may affect other organs. Possible symptoms include reduced urine, yellowing of the eyes or skin, confusion, weakness, fast heartbeat, or low blood pressure.

Lung injury may cause cough, chest discomfort, rapid breathing, or shortness of breath. These symptoms may develop after a delay and can worsen as lung tissue becomes inflamed and scarred. This scarring is called pulmonary fibrosis.

A splash in the eyes can cause pain, redness, watering, and damage to the eye surface. Skin contact may cause redness, irritation, blistering, or chemical burns. Absorption is more likely through broken, diseased, or repeatedly soaked skin.

Paraquat does not readily turn into a gas. However, inhaling concentrated spray droplets or mist can irritate the nose, throat, and airways.

- Burning or pain in the mouth and throat
- Swelling, ulcers, or peeling inside the mouth
- Nausea, vomiting, stomach pain, or diarrhoea
- Difficulty or pain when swallowing

Causes and risk factors

Paraquat poisoning is caused by contact with a paraquat-containing herbicide. Swallowing is the route most likely to cause life-threatening poisoning.

Exposure may happen through an agricultural accident, unsafe storage, transfer into an unlabelled bottle, a leaking container, or intentional self-harm. A product stored in a drink bottle can be mistaken for water or another beverage.

Factors linked with greater harm include:

Children may be exposed if paraquat is left unlocked or placed in an ordinary household container. Workers may be exposed while mixing, loading, spraying, or cleaning equipment.

Paraquat poisoning is not contagious or inherited. Casual contact with someone who has been properly decontaminated does not cause poisoning. Clothing or skin that still carries the product can expose other people, so contaminated items should be handled by trained responders.

- Swallowing a concentrated product
- A larger or prolonged exposure
- Delay before emergency treatment
- Contact with broken or inflamed skin
- Clothing soaked with the chemical
- Exposure without suitable protective equipment

Diagnosis

Doctors usually begin with the exposure history: the product name, concentration if known, route of contact, estimated amount, and time of exposure. A product container, label, or clear photograph can help identify the chemical, but you should not risk further contact to collect it.

A urine sodium dithionite test may be used. This test changes colour when paraquat is present, although it is not available in every hospital. A measured paraquat level in blood can confirm exposure and help specialists estimate the likely severity when interpreted alongside the time since exposure.

Treatment should not be delayed while waiting for a test result.

Blood tests are used to check kidney and liver function, blood cells, salts, acid levels, and oxygen balance. Urine output is closely monitored. Heart tracing, chest imaging, and repeated breathing assessments may also be needed.

No single test can predict the outcome with certainty. Concentration, timing, organ function, and changes over the following days all matter.

Treatment and management

Anyone who may have swallowed paraquat needs immediate assessment in an emergency

department. Care may involve a poison centre, clinical toxicologist, intensive care team, kidney specialist, and lung specialist.

The first step is to stop further exposure. Contaminated clothing is removed and isolated. Exposed skin is washed thoroughly with soap and water. The eyes are rinsed with plenty of clean water or saline. Staff use protective equipment to avoid secondary exposure.

Do not make someone vomit after paraquat has been swallowed. Vomiting can cause further chemical injury and may allow the product to enter the lungs. Do not give food, drinks, charcoal, or home remedies unless an emergency service or poison centre specifically directs you to do so.

In hospital, activated charcoal or Fuller's earth may be used soon after swallowing. These materials bind paraquat in the digestive system and may reduce absorption. They are not antidotes and cannot remove paraquat that has already entered tissues.

Supportive treatment may include careful fluid management, medicines for pain or vomiting, nutrition, wound care for mouth injuries, and treatment for low blood pressure. Kidney replacement treatment, often called dialysis, may be needed if the kidneys fail or blood chemistry becomes unsafe.

Hemoperfusion passes blood through a filter designed to bind toxins. It may remove some paraquat from the bloodstream if started very early, but paraquat moves into tissues quickly and evidence that this improves survival is uncertain.

Some specialist teams use medicines that suppress inflammation, such as corticosteroids and other immune-suppressing medicines. Research has not established one treatment plan that reliably prevents lung damage.

Oxygen is given when it is needed to treat dangerously low blood oxygen. Higher oxygen exposure can increase paraquat-related oxidative injury, so clinicians generally use oxygen carefully rather than routinely. You should never avoid prescribed emergency oxygen on your own.

Complications

Paraquat can cause deep chemical burns in the mouth, throat, food pipe, and stomach. Swelling or tissue damage can make swallowing difficult and may interfere with nutrition.

Acute kidney injury can reduce the body's ability to remove paraquat and control fluid, salts, and acid levels. Liver inflammation or liver failure can also occur. These organ injuries may improve in survivors, but severe damage can be life-threatening.

The most characteristic later complication is lung inflammation followed by pulmonary fibrosis. Fibrosis means normal flexible lung tissue is replaced by stiff scar tissue. This makes it harder for oxygen to move into the blood. Severe scarring can lead to respiratory failure.

Other possible complications include shock, abnormal heart rhythms, damage to the heart muscle, seizures, confusion, and failure of several organs at once. The pattern differs according to the dose and route of exposure.

Eye exposure may lead to persistent surface injury if it is not rinsed and assessed promptly. Deep skin burns can heal slowly and may increase absorption while paraquat remains on the skin.

Prevention

Paraquat poisoning is preventable. The chemical should be used only where permitted and only by people legally authorised to handle it. In some countries, including the United States, paraquat products are restricted-use pesticides.

Keep paraquat in its original, clearly labelled container. Never pour it into a bottle, cup, food container, or container normally used for drinks. Store it locked away from children, food, animal feed, and household products.

Follow the product label and local safety rules when mixing, applying, cleaning equipment, or disposing of containers. Use the protective clothing, gloves, eye protection, and respiratory protection required for that specific product and task. Replace damaged protective equipment.

Do not eat, drink, or smoke while handling paraquat. Wash exposed hands and skin before touching your face or other objects. Remove contaminated clothing promptly rather than continuing to wear it.

If paraquat is being considered during a period of emotional crisis or thoughts of self-harm, create distance from the product and seek immediate support. Secure storage and limiting access can save lives.

Living with it and what to expect

Paraquat poisoning usually unfolds over days to weeks rather than as a single brief event. People with significant exposure often need repeated blood tests and close monitoring, even if early symptoms are mild.

During the first few days, attention focuses on burns, fluid balance, kidney and liver function, and signs of circulatory problems. Kidney or liver injury may recover if the exposure is survived.

Lung problems can appear or worsen later. Inflammation and scarring may progress over several weeks. People who develop lung injury may need breathing tests, imaging, rehabilitation, or oxygen support after leaving hospital. Severe pulmonary fibrosis can cause lasting limits on activity and breathing.

People with small, promptly treated skin or eye exposures may recover without lasting effects. Some survivors of limited swallowed exposure also recover, but no clinician can promise a particular course early on.

Follow-up after discharge is planned around the organs affected. It may include kidney and liver blood tests, oxygen measurements, breathing tests, nutrition support, wound care, and mental health care. Routine appointments remain important, but new shortness of breath, reduced urine, or worsening swallowing problems should not wait for the next scheduled visit.

A poisoning event can also have a lasting emotional effect on you and those close to you. Psychological support may be useful whether the exposure was accidental or intentional.

When to get medical help

Treat suspected paraquat swallowing as an emergency. Call your local emergency number and poison centre immediately. Do not wait for symptoms.

Emergency assessment is also needed after a significant eye splash, soaked clothing, contact with broken skin, or inhalation of concentrated spray. Move away from the source without exposing other people. If it is safe, remove contaminated clothing and begin rinsing exposed skin or eyes while help is arranged.

Do not drive yourself if you are unwell. Do not handle a leaking container to bring it with you. Give responders the product name or a photograph of the label if this can be done safely.

After hospital discharge, seek urgent medical care for:

Blue or grey lips, severe breathing difficulty, collapse, or reduced responsiveness require emergency services. Routine follow-up is appropriate for planned blood tests, breathing checks, wound review, and rehabilitation when no new warning symptoms are present.

- New or worsening shortness of breath
- Blue or grey lips, severe drowsiness, collapse, or confusion
- Very little or no urine

- Repeated vomiting or inability to swallow fluids
- Increasing mouth, throat, chest, or abdominal pain
- Yellow skin or eyes

Common questions

Can you survive paraquat poisoning?

Survival is possible, especially after limited exposure and rapid treatment. Significant swallowed exposure often has a poor outlook. The amount, concentration, treatment timing, blood level, and development of organ damage all influence the course.

How quickly do paraquat poisoning symptoms start?

Mouth burning, vomiting, and stomach pain may begin within minutes or hours. Kidney, liver, and lung injury may appear later. Breathing problems can develop or worsen over several days or weeks.

Is there an antidote for paraquat?

No specific antidote has been proven to reverse paraquat poisoning. Treatment aims to limit absorption, support affected organs, and manage inflammation and other complications.

Can paraquat poison you through the skin?

Yes, although intact skin absorbs less paraquat than the digestive system. Risk increases with broken or inflamed skin, concentrated products, prolonged contact, or soaked clothing. Skin exposure should be washed promptly and assessed when substantial.

Why are doctors careful with oxygen in paraquat poisoning?

Paraquat causes injury through oxygen-related chemical reactions. Unnecessarily high oxygen levels may add to that damage. Oxygen is still used when blood oxygen is dangerously low, with the level carefully adjusted by the clinical team.

Can someone seem well and still become seriously ill?

Yes. Early symptoms do not always show how severe the poisoning will become. Kidney, liver, and lung damage can be delayed, which is why suspected swallowing requires emergency assessment even when the person initially feels well.

Sources

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