CONDITION

Boric acid poisoning

Learn how boric acid poisoning happens, which symptoms to watch for, how exposure is treated, and when to contact Poison Control or seek emergency care.

WHAT IT IS
Poisoning from harmful boric acid exposure

BODY SYSTEM
Digestive system and multiple organs

MAIN SYMPTOMS
Nausea, repeated vomiting, abdominal pain, diarrhea

WHAT CAUSES IT
Boric acid exposure, usually swallowing

HOW IT IS DIAGNOSED
Exposure history, examination, blood and urine tests

MAIN TREATMENT
Decontamination and supportive care

CAN IT BE CURED?
Sometimes - limited exposures may fully resolve

IS IT AN EMERGENCY?
Sometimes - seizure or trouble breathing

LONG-TERM OUTLOOK
Many limited exposures cause no lasting harm

Overview

Boric acid poisoning happens when boric acid enters the body in an amount that causes harmful effects. This most often occurs after it is swallowed. Poisoning can also follow repeated or extensive exposure to damaged skin, although brief contact with healthy skin is less likely to cause serious effects.

Boric acid is a boron-containing chemical found in some insect killers, household products, laboratory materials, and industrial products. It is also used in certain vaginal products. Borax and other borate compounds are related chemicals, but they are not exactly the same. Product labels may use different names or contain other ingredients that affect risk.

The seriousness of an exposure depends on the amount, product concentration, route of exposure, and length of contact. Age, body size, symptoms, and kidney function also matter.

The kidneys remove much of the absorbed boric acid from the body. Infants and people with reduced kidney function may have more difficulty clearing it.

A small accidental taste may not cause severe illness, but the risk cannot be judged from symptoms alone. If someone has swallowed boric acid, contact a poison center promptly rather than waiting for symptoms. In the United States, call Poison Control at 1-800-222-1222. Outside the United States, contact the local poison information service.

Call emergency services immediately if the person collapses, has a seizure, has trouble breathing, cannot be awakened, or has severe confusion.

Symptoms

Symptoms may begin within hours after a significant exposure, but their timing varies. Early symptoms often involve the digestive system.

Possible symptoms include:

Repeated vomiting and diarrhea can lead to dehydration. Signs include a dry mouth, dizziness, reduced urination, unusual tiredness, and a fast heartbeat.

More serious poisoning can affect several organs. Possible findings include confusion, tremors, seizures, low blood pressure, abnormal heart rhythm, reduced urine output, or loss of consciousness. Severe cases may involve kidney injury and disturbances in the body's balance of acids and minerals.

A widespread red rash has been described in substantial poisoning. The skin may later peel, especially on the palms, soles, or other areas. This is sometimes called a "boiled lobster" rash in medical reports, but it is not present in every case and should not be used to judge the severity of an exposure.

Long-term or repeated exposure can cause less specific symptoms, such as ongoing digestive problems, skin irritation, weakness, or changes in kidney function. These symptoms have many possible causes and need medical evaluation rather than self-diagnosis.

- Nausea, repeated vomiting, abdominal pain, or diarrhea
- Headache, weakness, unusual sleepiness, or restlessness
- Redness, pain, or watering after eye exposure
- Coughing or irritation after breathing in dust
- Red, irritated skin after direct contact

Causes and risk factors

Accidental swallowing is a common reason for poison-center calls. It may happen when a child reaches an insecticide powder, when a product is transferred into an unlabeled container, or when boric acid is mistaken for a food ingredient or medicine.

Vaginal boric acid products are intended only for vaginal use. Swallowing a capsule or suppository is an exposure that should be discussed with a poison center. These products should be stored separately from oral medicines and kept out of the reach of children and pets.

Other possible exposures include inhaling airborne powder, splashing the eyes, or using boric acid repeatedly over a large area of skin. Absorption through healthy skin is usually limited. Risk may be greater when skin is burned, inflamed, broken, or covered for long periods.

Factors that can increase the chance of harmful effects include:

Workplace exposure may occur where borates are manufactured, packaged, or used. Following ventilation, hygiene, and personal protective equipment requirements can reduce contact. Workers should review the product's safety data sheet and report symptoms through their workplace health process.

- Swallowing a concentrated product or an uncertain amount
- Repeated exposure over days or longer
- Exposure in an infant or young child
- Reduced kidney function
- Significant vomiting or diarrhea
- Contact with burned, damaged, or diseased skin
- Exposure to a mixed product containing other toxic ingredients

Diagnosis

Boric acid poisoning is diagnosed by combining the exposure history with symptoms, examination findings, and laboratory results. Clinicians will ask for the product name, strength, amount involved, time of exposure, and route of contact. They may also ask about vomiting, first aid already given, medical conditions, and medicines.

Bring the container, label, or a clear photograph to the emergency department if it is safe to do so. Do not delay emergency care while looking for packaging.

A physical examination may include checking heart rate, blood pressure, breathing, alertness,

hydration, skin, and urine output. Depending on the exposure, testing may include:

Specialized tests can measure boron or boric acid in blood or urine, but they are not routinely available and may not return quickly enough to guide early treatment. Clinical symptoms and organ function are usually more important for immediate decisions.

Other illnesses can cause similar vomiting, diarrhea, rash, confusion, or kidney problems. Clinicians may therefore consider infection, medication effects, other poisons, and unrelated medical conditions.

- Blood electrolytes and kidney function
- Blood glucose and tests of the body's acid-base balance
- Liver tests or a complete blood count
- Urine testing and measurement of urine output
- An electrocardiogram to examine heart rhythm

Treatment and management

There is no specific antidote that reverses boric acid poisoning. Treatment focuses on limiting further exposure, relieving symptoms, maintaining hydration, and supporting affected organs.

After swallowing boric acid, rinse the mouth gently and contact a poison center. Do not make the person vomit. Do not give home remedies or try to neutralize the chemical. A poison specialist can advise whether home observation is appropriate or medical assessment is needed.

For eye exposure, remove contact lenses if they come out easily and rinse the eye with clean, lukewarm running water for 15 to 20 minutes. For skin exposure, remove contaminated clothing and wash the skin thoroughly with soap and water. Move away from airborne powder after inhalation exposure. Persistent eye pain, breathing symptoms, or skin injury needs medical evaluation.

In a healthcare setting, treatment may include intravenous fluids, medicine for nausea or seizures, correction of electrolyte or acid-base problems, and close monitoring of kidney function and urine output. People with significant symptoms may need hospital observation.

Activated charcoal does not bind boric acid well and is not routinely useful. Procedures that empty the stomach also have risks and are not standard home or routine treatment. Any decontamination procedure should be decided by clinicians or a medical toxicologist.

Hemodialysis filters the blood through a machine. It can remove boric acid and may be

considered in severe poisoning, especially when kidney function is poor or serious symptoms are present. This is a specialist decision based on the full clinical situation rather than the exposure history alone.

Complications

Many limited exposures do not lead to lasting harm, particularly when prompt poison-center guidance is followed. Significant poisoning, however, can cause complications from both the chemical and the resulting fluid loss.

Repeated vomiting and diarrhea may cause severe dehydration, low blood pressure, and abnormal levels of sodium, potassium, or other electrolytes. These changes can affect the heart, muscles, brain, and kidneys.

Acute kidney injury means the kidneys suddenly stop working as well as they should. This can reduce the body's ability to remove boric acid and may allow toxicity to worsen. Kidney function often requires continued monitoring during a significant exposure.

Severe nervous system effects can include confusion, seizures, or coma. Circulatory shock, in which organs do not receive enough blood and oxygen, is possible in critical poisoning. These outcomes are uncommon after minor accidental contact but require emergency treatment when they occur.

Skin irritation may continue after direct exposure. In substantial systemic poisoning, a widespread rash and later skin peeling can occur. Infection or delayed healing may complicate exposure involving already damaged skin.

Follow up

Follow the instructions given by Poison Control or the treating clinician. After a minor exposure without symptoms, home observation may be all that is needed. Do not repeat the exposure, and store or dispose of the product according to its label.

Arrange routine medical follow-up if vomiting, diarrhea, rash, reduced appetite, weakness, or irritation continues. People treated for a significant exposure may need repeat blood tests to confirm that kidney function, electrolytes, and hydration have returned to normal. Follow-up is particularly important after hospitalization or if kidney injury occurred.

Seek urgent medical advice if symptoms are worsening, vomiting prevents fluids from staying down, urination becomes noticeably reduced, or unusual drowsiness or confusion develops.

Call emergency services immediately for:

To prevent another exposure, keep boric acid in its original labeled container. Store insecticides away from food and medicines. Keep vaginal products separate from oral capsules, and never transfer boric acid powder into cups, jars, or food containers.

- Trouble breathing
- A seizure
- Collapse or inability to wake the person
- Severe confusion or agitation
- Signs of shock, such as fainting, very pale or clammy skin, or profound weakness

Sources

- Agency for Toxic Substances and Disease Registry. Toxicological Profile for Boron . U.S. Department of Health and Human Services; 2010.
- National Library of Medicine. Boric acid poisoning . MedlinePlus Medical Encyclopedia.
- National Capital Poison Center. Boric acid: Uses, toxicity, and more . Poison Control.
- U.S. Environmental Protection Agency. Reregistration Eligibility Decision: Boric Acid and Its Sodium Salts . Office of Prevention, Pesticides and Toxic Substances; 1993.
- Litovitz TL, Klein-Schwartz W, Oderda GM, Schmitz BF. Clinical manifestations of toxicity in a series of 784 boric acid ingestions. American Journal of Emergency Medicine . 1988;6(3):209-213.