

PUBLIC HEALTH REFERENCE SHEET

Botulism



Name	<i>Clostridium botulinum</i> , some strains of <i>Clostridium butyricum</i> , <i>Clostridium baratii</i> , and <i>Clostridium argentinense</i>
Reservoir & Transmission	Ubiquitous in soil; found in intestinal tracts of animals, including fish Foodborne, intestinal (infant and adult), wound, iatrogenic, inhalational
Incubation Period	Foodborne: 12–72 hours of ingestion, range 2 hours to 8 days Intestinal: infant up to 30 days; adult is unclear Wound botulism: 4–14 days Iatrogenic: unclear Inhalational: similar to foodborne
Symptoms	Dysphagia (difficulty swallowing), dysarthria (slurred speech), blurred vision, diplopia (double vision), ptosis (drooping upper eyelid), and ophthalmoplegia (paralysis of internal eye muscles that control pupil size and focusing). Constipation is common, as well as GI symptoms such as nausea, vomiting, diarrhea can occur in foodborne botulism. Infants <1 year old: constipation, poor feeding, diminished suck and gag reflexes, weak and altered cry, ptosis, sluggish pupils, flattened facial expression, respiratory distress or failure
Gold Standard Diagnostic Test	Toxin detected in serum, stool, or gastric aspirate; culture of stool, gastric aspirate, or wound
Geographic Significance	Worldwide incidence is unknown, but cases were reported from the Americas, Africa, Asia, Australia, Europe, and the Middle East.

What is botulism?

Botulism is a rare but serious neuroparalytic illness caused by a toxin (a potent neurotoxin) produced by the bacterium *Clostridium botulinum* and some strains of *Clostridium butyricum*, *Clostridium baratii*, and *Clostridium argentinense*. These gram-positive bacteria are in the environment but can make spores which grow and produce toxin under specific conditions in food products, the intestines of infants and adults with structurally or functionally compromised intestinal tracts (e.g., surgery, antibiotic use), or contaminated wounds. All forms of botulism can be fatal and are medical emergencies. Botulism (*Clostridium botulinum* toxin) is a Centers for Disease Control and Prevention (CDC) Category A bioterrorism agent/disease. There are seven recognized serotypes: A, B, C, D, E, F, G. Serotypes A, B, E, and F are most commonly associated with naturally occurring human illness. The diagnosis categories for disease reporting are 1) foodborne, 2) infant (intestinal), 3) wound, and 4) other.

What is the occurrence of botulism?

In the United States, 145 cases of botulism are reported on average each year. Of these, approximately 15% are foodborne, 65% are infant botulism, and the rest are wound botulism. The number of cases of foodborne and infant botulism has changed little in recent years, but wound botulism has increased because of the use of black-tar heroin, especially in California.

How is botulism transmitted?

- Foodborne botulism: caused by eating foods that contain the botulism toxin. Foodborne botulism is a public health emergency because many people can be poisoned by eating a contaminated food. Common sources are homemade foods that have been improperly canned, preserved, or fermented. Foods with low acid content are the most common sources of home-canning related botulism cases (e.g., asparagus, green beans, beets, corn, potatoes). Food

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contamination can happen when made or stored improperly, or used by consumers (e.g., chopped garlic in oil, canned cheese sauce, canned tomatoes, carrot juice, baked potatoes wrapped in aluminum foil, fermented fish).

- Infant botulism: caused when infants consume the *C. botulinum* spores, found in raw honey.
- Wound botulism: caused by toxin produced from *Clostridium botulinum* and can occur in people who inject drugs, after a traumatic injury, or surgery. The presence of *Clostridium perfringens* in a wound can result in gas gangrene.
- Other:
 - Adult intestinal toxemia (adult intestinal colonization) botulism: very rare but can happen if the spores of the bacteria get into an adult's intestines and grow, which produces the toxin (similar to infant botulism).
 - Iatrogenic botulism: Botulism toxin is a neurotoxin that can be used for cosmetic purposes but also has several clinically beneficial indications (BOTOX®: onabotulinumtoxinA). Iatrogenic botulism can be caused by improper use or injection of high doses of an unapproved botulinum toxin for cosmetic or medical reasons.
 - Inhalational botulism: aerosolized botulinum neurotoxin could hypothetically be used for intentional exposure, bioterrorism.

Who is at risk for botulism?

Persons who eat improperly home-preserved foods; infants <1 year old that eat honey or dust; users of injection drug - particularly black-tar heroin, adults with altered intestinal flora due to antimicrobial use or anatomical or functional bowel abnormalities.

What are the signs and symptoms of botulism?

Clinical features of botulism are characterized by symmetric, descending flaccid paralysis of motor and autonomic nerves, beginning with the cranial nerves. If untreated, illness from any type of botulism can progress to descending paralysis of respiratory muscles, arms, and legs.

Signs and symptoms usually start with weakness of the muscles that control the eyes, face, mouth, and throat, and spread to the neck, arms, torso, and legs. Symptoms may include difficulty swallowing (dysphagia), muscle weakness, blurred or double vision (diplopia), drooping upper eyelid (ptosis), ocular palsy, slurred speech, and respiratory distress or failure.

- Foodborne botulism: symptoms generally begin 18 to 36 hours after eating contaminated food but can occur as early as 6 hours or as late as 10 days; these symptoms may include vomiting, nausea, abdominal pain, and diarrhea.
- Infant botulism: symptoms include constipation, poor feeding, ptosis, sluggish pupils, flattened facial expression, diminished suck and gag reflexes, weak and altered cry, respiratory distress or failure.

What are potential complications of botulism?

All forms of botulism can be fatal due to respiratory failure or the consequences of extended paralysis. Recovery follows the regeneration of new neuromuscular connections and may

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require weeks or months of care. With antitoxin and medical care, fewer than 5% of people with botulism die.

How is botulism diagnosed?

Initial diagnosis is based on clinical symptoms, then laboratory confirmed. If botulism is suspected, immediately call:

* CDC: phone **770-488-7100**; available 24/7

* Infant Botulism Treatment and Prevention Program (IBTPP) at the California Department of Public Health: phone: **510-231-7600**; available 24/7; www.infantbotulism.org
Botulism differs from other flaccid paralyzes in that it typically manifests initially with prominent cranial nerve palsies. It also differs in its invariable descending progression, in its symmetry, and in its absence of sensory nerve dysfunction.

Botulism is frequently misdiagnosed, most often as polyradiculoneuropathy (Guillain-Barré or Miller-Fisher syndrome), myasthenia gravis, or other diseases of the central nervous system. A normal Tensilon test helps to differentiate botulism from myasthenia gravis; borderline positive tests can occur in botulism. A normal CT or MRI scan helps to rule out cerebrovascular accident.

Laboratory confirmation is done by demonstrating the presence of botulinum toxin in serum, stool, food, or by culturing botulinum neurotoxin-producing species of *Clostridium* (*C. botulinum*, *C. butyricum*, or *C. baratii*) from stool or a wound.

Do not wait for laboratory confirmation to begin treatment. Diagnostic testing is done through the state public health department's laboratory, and this specialized testing often takes days to complete.

How is botulism treated?

Antitoxin can prevent progression and shorten the duration of illness if administered early in the course of illness.

Botulism Antitoxin Heptavalent (A, B, C, D, E, F, G) - (Equine) is for the treatment of symptomatic botulism following documented or suspected exposure to botulinum neurotoxin serotypes A, B, C, D, E, F, or G in adults and pediatric patients.

- Infant botulism: BabyBIG[®], Botulism Immune Globulin Intravenous (Human) (BIG-IV), is an orphan drug that consists of human-derived anti-botulism-toxin antibodies that is approved by the U.S. Food and Drug Administration for the treatment of infant botulism types A and B. To obtain BabyBIG for a patient with suspected infant botulism, the treating physician must first contact the Infant Botulism Treatment and Prevention Program on-call physicians for a clinical consultation.

- Wound botulism: treatment may include wound debridement or drainage to remove the source of toxin-producing bacteria, and antibiotic therapy can be considered.

If the toxin paralyzes the respiratory muscles, ventilator support may be needed.

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Clinical Guidelines for Diagnosis and Treatment of Botulism, 2021 | MMWR (cdc.gov)
<https://www.cdc.gov/mmwr/volumes/70/rr/rr7002a1.htm>

How can botulism be prevented?

There is currently no approved vaccine for botulism in the U.S.

- Foodborne botulism: Follow safe home canning instructions from the U.S. Department of Agriculture. Because high temperatures destroy the botulism toxin, persons who eat at-home canned foods should consider boiling the food for 10 minutes before eating it.
- Infant botulism: Raw honey is an identified and avoidable cause of infant botulism (under 1 year old). Do not allow children younger than 12 months old to eat raw honey or ingest dirt if laying on the ground.
- Wound botulism: Patients should seek treatment from a licensed medical provider for medical or cosmetic injections.

What are some public health considerations?

- Specify the clinical form of the disease.
- Document the source of infection if known.

References:

“Botulism,” Centers for Disease Control and Prevention, last reviewed June 8, 2022.

<https://www.cdc.gov/botulism/>

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