

Virginia Department of Health
Botulism: Guidance for Health Care Providers
Key Medical and Public Health Interventions
after Identification of a Suspected Case

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1. Epidemiology

Botulism is a rare but serious paralytic illness caused by a nerve toxin produced by the anaerobic, spore-forming bacterium *Clostridium botulinum*. Sometimes strains of *Clostridium baratii*, *Clostridium butyricum*, and *Clostridium argentinense* produce botulinum toxin. Seven types of neurotoxins (A–G) and hybrid or mosaic toxins (e.g., C/D, D/C, and A/F that was originally reported as type H) have been recognized. Human disease is caused primarily by toxin types A, B, E, and, rarely, F.

There are six types of botulism based on the route of transmission: foodborne, infant, wound, adult intestinal toxemia (also known as adult intestinal colonization), iatrogenic, and inhalational botulism. Each of these forms is described below.

One case of botulism is considered a medical emergency because any form of botulism can be fatal. One case of foodborne botulism is also considered a potential public health emergency because of the possibility that other persons had food exposures in common.

- Foodborne botulism occurs because of consumption of preformed botulinum toxin, most commonly with homemade foods that are improperly canned, preserved or fermented. Foods most commonly contaminated are home-canned vegetables, cured pork and ham, and smoked or raw fish. Commercially canned foods rarely cause botulism. Consuming certain kinds of homemade alcohol (e.g., pruno wine also known as “pruno” or “hooch”) can also result in foodborne botulism.
- Infant botulism (i.e., intestinal botulism), the most common form of botulism, occurs with ingestion of *C. botulinum* spores that subsequently germinate in the intestine and produce toxin. Children under 12 months of age can be affected and most cases occur in those aged 6 weeks to 6 months.

- Wound botulism occurs, rarely, when spores get into an open wound and reproduce in an anaerobic environment and produce toxin. Wound botulism has been reported among people who inject certain drugs (e.g., black tar heroin) and people with .
- Adult intestinal toxemia (also known as adult intestinal colonization) botulism is a very rare kind of botulism that occurs in immunocompromised adults, those using antimicrobials, or those with an anatomical or functional bowel abnormality, by the same route as infant botulism.
- Iatrogenic botulism occurs from accidental overdose of injectable botulinum toxin used for cosmetic or medical procedures.
- Inhalational botulism is a form of botulism that does not occur naturally. It is caused by aerosolizing botulinum toxin and has been reported in the laboratory setting. Aerosolization of toxins could potentially be used for a bioterrorism attack. Clinically, inhalational botulism cannot be differentiated from the naturally-occurring forms.

Botulism occurs worldwide and all persons are susceptible. Botulism is rare in the United States, including Virginia. Approximately 100-200 cases of botulism are reported annually in the United States. Most reported cases (~70%) are infant botulism. In the eastern United States, botulism is primarily caused by botulinum toxin type B, while toxin type A predominates in the western part and toxin type E predominates in Alaska. About three cases are reported annually in Virginia.

Clostridium botulinum toxin is designated as a Category A bioterrorism agent (i.e., it is considered to be easily disseminated or transmitted and is associated with a higher rate of mortality than a Category B agent). *Botulinum* neurotoxin-producing species of *Clostridium* is also designated as a select agent, which means that it could be developed as a bioterrorism agent and that possession, use or transfer of these organisms requires registration with CDC or USDA. If botulism is suspected or confirmed, the local health department must be notified immediately so that a public health investigation can be initiated. To locate your local health department, see <http://www.vdh.virginia.gov/local-health-districts/>.

2. Clinical Manifestations

Foodborne Botulism

- **Incubation period:** typically 12–36 hours (range 6 hours–10 days)
- **Symptoms:** Early symptoms are often fatigue, weakness and vertigo, followed by double and blurred vision, dry mouth, and difficulty in swallowing and speaking as a result of toxin effects on the cranial nerves. Flaccid, symmetric, and descending paralysis is a typical symptom, developing from the shoulders to upper and lower arms, thighs, and calves. The paralysis can affect the muscles used for breathing. In severe cases, respiratory failure may occur. Gastrointestinal symptoms, including nausea, vomiting, constipation, abdominal swelling and less commonly, diarrhea, may occur. Loss of consciousness and fever typically do not occur, unless a complicating infection is also present.

Infant Botulism

- **Incubation period:** Unknown
- **Symptoms:** Early symptoms are often constipation, loss of appetite, weakness, lethargy, poor suck, ptosis, difficulty swallowing, altered cries, loss of head control, hypotonia. Infant botulism has a

wide spectrum of clinical severity, ranging from mild illness to sudden infant death. Progression is more severe in those aged less than two months.

Wound Botulism

- **Incubation period:** approximately 7 days (range 4 days–21 days)
- **Symptoms:** Similar to foodborne botulism

Adult intestinal toxemia botulism

- **Incubation period:** Unknown
- **Symptoms:** Similar to foodborne botulism. The onset is generally gradual and less dramatic. In some cases, diarrhea due to *Clostridium difficile* co-infection has been reported.

Iatrogenic Botulism

- **Incubation period:** Unknown
- **Symptoms:** Generalized weakness, dysphagia, and respiratory distress are the primary symptoms of iatrogenic botulism resulting from overdose of botulinum toxin.

Inhalational Botulism

- **Incubation period:** approximately 6–80 hours
- **Symptoms:** Mucus in throat, difficulty swallowing, dizziness, difficulty moving eyes, mild pupillary dilation and involuntary eye movement, indistinct speech, unsteady gait, and extreme weakness.
Note: Inhalational botulism does not occur naturally; therefore, intentional aerosolization of botulinum toxin should be suspected if a clustering of cases occurs.

3. Laboratory Testing and Diagnosis

Notification when Botulism is Suspected

If botulism is suspected, the healthcare provider should immediately report the case to the [local health department](#) per [Virginia's disease reporting regulations](#). The local health department will discuss options for public health testing. If VDH approves testing, specimens may be sent to the Division of Consolidated Laboratory Services (DCLS). VDH will facilitate notification and shipment to DCLS. Specimens potentially containing *C. botulinum* or botulinum toxin should **never** be shipped to DCLS without prior approval.

Laboratory Biosafety

Botulinum toxins are extremely poisonous and exposure to the toxin is the primary laboratory hazard. Laboratory personnel **must** be alerted if botulism is suspected so that they can take appropriate precautions. All laboratory work on specimens suspicious of containing toxin should be performed using standard precautions and biosafety level 2 (BSL-2) containment criteria. Additional containment and personnel precautions, such as those recommended for BSL-3, are recommended during activities with a high potential for aerosol or droplet precaution. To prevent the release of aerosols, laboratorians should use a class II biologic safety cabinet (BSC) when processing specimens.

Diagnostic Testing

Please note that treatment with antitoxin should be based on the clinical presentation and findings, and should **not** be delayed by waiting for confirmatory test results.

Confirmation of botulism relies on 1) detecting botulinum toxin in a clinical specimen (or food, if applicable), or 2) isolating *Clostridium botulinum* from a clinical specimen. Toxin testing is primarily performed using a mouse bioassay.

Because of the dangers in manipulating botulinum toxin, botulism testing is conducted at a Laboratory Response Network (LRN) laboratory, such as DCLS. Sentinel laboratories package and ship specimens to DCLS for testing. In some cases, additional testing at CDC might be performed.

Sample Collection

Table 1 lists recommended specimens for botulism testing and instructions for handling and shipping. Whenever possible, clinical specimens should be collected before treatment with antitoxin. For questions about specimen collection, the DCLS Emergency Officer can be reached 24 hours a day/7 days a week at 804-335-4617.

Case Definitions used by Public Health

The current CDC case definition for botulism is available at <https://wwwn.cdc.gov/nndss/conditions/botulism/>. Note that a case definition is set of uniform criteria used to define a disease for public health surveillance. Case definitions enable public health to classify and count cases consistently across reporting jurisdictions and they should not be used by healthcare providers to determine how to meet an individual patient's health needs.

Table 1. Sample collection for suspected botulism cases and testing at DCLS†**

Laboratory Test and Turnaround Time	Samples [†]	Amount	Instructions
Botulism laboratory confirmation (mouse bioassay) Estimated turnaround time: 4 business days upon specimen receipt; and 8 business days upon testing of stool enrichment cultures (if applicable).	Stool	10–50 grams	Place into sterile unbreakable container (do not use transport media). Store specimens at 4°C. Ship on cold packs as soon as possible.
	Enema	20 mL	If an enema is performed because of constipation, use a minimal amount of fluid (preferably sterile, nonbacteriostatic water) to obtain the specimen and prevent diluting the toxin unnecessarily. Place in a sterile unbreakable container. Store specimens at 4°C. Ship on cold packs as soon as possible. If an enema is given because of constipation, a minimal amount of fluid (preferably sterile, nonbacteriostatic water) should be used to obtain the specimen so that the toxin will not be unnecessarily diluted.
	Serum	10 mL sera (~20 mL whole blood)	Use red top or serum separator tubes to obtain serum (no anticoagulant). Store specimens at 4°C. Ship on cold packs as soon as possible. For infant cases, DCLS will accept 1mL of serum to perform limited testing if appropriate volume cannot be collected. Note: Serum volumes <5 mL will provide presumptive results and collection of additional serum might be required; whole blood should not be sent as it typically undergoes excessive hemolysis during transit.
	Gastric aspirate or vomitus	20 mL	Place in sterile unbreakable container. Store specimens at 4°C. Ship on cold packs as soon as possible.
	Tissue, exudate or wound swab	Small amount of tissue / 2 swabs	Place specimen into sterile unbreakable container with anaerobic transport media. Store and transport without refrigeration.
	Food samples	100–150 grams or as available in original container	Foods should be left in their original containers if possible. If transferring, place food into a sterile unbreakable, puncture resistant container and label carefully. Place containers individually in leak-proof containers (e.g., sealed plastic bags) to prevent cross-contamination during shipment. Store specimens at 4°C. Ship on cold packs as soon as possible. Note: Empty containers with remnants of suspected foods can be examined.

*Adapted from [American Society for Microbiology’s Sentinel Level Clinical Laboratory Guidelines for Suspected Agents of Bioterrorism and Emerging Infectious Diseases: Botulinum Toxin \(2013\)](#). If botulism is suspected, notify the [local health department](#) immediately to discuss the case and laboratory testing. If VDH approves testing, specimens may be sent to Division of Consolidated Laboratory Services (DCLS) with the [DCLS Clinical Microbiology/ Virology Request Form](#); include the name of the test on the form. For questions about collecting specimens or for notifying DCLS when submitting specimens, contact the DCLS Emergency Officer available 24/7 at 804-335-4617.

†Acceptable samples by form of botulism: Foodborne: stool/enema, serum, vomitus, gastric aspirate, and food. Wound: serum, debrided tissue, swab from wounds, and stool (if foodborne botulism is also suspected). Infant: stool/enema, rectal swab, serum, and potential sources. Adult intestinal toxemia: stool/enema and serum.

4. Treatment

The diagnosis and treatment of botulism should be made on the basis of the history, clinical presentation, and clinical findings. **Treatment should be initiated once botulism is clinically diagnosed and should not wait for laboratory confirmation.** In particular, botulinum antitoxin should be administered as soon as possible. Antitoxin does not reverse paralysis but arrests its progression.

For non-infant botulism cases, heptavalent (A–G) botulism antitoxin (HBAT) is available only at CDC. To obtain HBAT, the patient’s physician should consult with the local health department and also CDC (available 24/7 at 770-488-7100).

For infant botulism cases, human-derived botulism antitoxin (also known as BabyBIG®) is available only through California Department of Public Health’s Infant Botulism Treatment and Prevention Program (www.infantbotulism.org). To obtain BabyBIG®, the patient's physician should contact the on-call physician of the Infant Botulism Treatment and Prevention Program at 510-231-7600 to review the indications for such treatment. Note that in a bioterrorism attack, BabyBIG® should not be administered.

There is no indication that treatment of children, pregnant women, or immunocompromised persons with botulism should differ from standard therapy. Meticulous supportive care, including artificial ventilation and nutritional support, should be provided when indicated.

5. Post-exposure Prophylaxis

Antitoxins are not useful for preventive purposes. Asymptomatic persons with exposures to botulism toxins or *Clostridium botulinum* spores should be monitored closely for signs and symptoms and should be treated promptly with antitoxin at the first signs of illness. Those known to have eaten incriminated food should be purged with cathartics, given gastric lavage and high enemas, and kept under close medical observation.

6. Vaccination

Currently, there is no licensed vaccine for commercial use.

7. Infection Control

Person-to-person transmission of botulinum neurotoxin does not occur. Standard Precautions are adequate for the care of patients with botulism. Patients do not need to be isolated.

Infants with botulism can shed *C. botulinum* and toxin in the stool for weeks to months after onset. Hand hygiene among care givers is critical. Diapers should be disposed of so that other people or animals cannot come into contact with them. People with open cuts or wounds on their hands should wear gloves when handling soiled diapers. Close contact with other infants (e.g., sharing crib and toys) should be avoided while excretion might be continuing.

Foods suspected of contamination should be promptly removed from potential consumers and submitted to public health for testing. Those known to have eaten incriminated food should be kept under close medical observation.

8. Decontamination

If exposure to the botulism toxin via aerosol inhalation is suspected, the clothing of those who are exposed must be removed and stored in labeled double plastic bags until it can be washed thoroughly with soap and water. The exposed persons must shower thoroughly with soap and water. Contaminated objects or surfaces should be cleaned with a 0.1% hypochlorite bleach solution to inactivate the botulism toxin.

9. Postmortem Practices

Standard precautions should be used for postmortem practices. These include using a surgical scrub suit, surgical cap, impervious gown or apron with full sleeve coverage, a form of eye protection (e.g., goggles or face shield), shoe covers, and double surgical gloves with an interposed layer of cut-proof synthetic mesh. Autopsy personnel should wear N-95 respirators during autopsies. Powered air-purifying respirators (PAPRs) equipped with N-95 or high-efficiency particulate air (HEPA) filters should be considered for postmortem practices. Bodies infected with biological terrorism agents including *Clostridium botulinum* should not be embalmed.

10. Public Health Measures

- Suspected or confirmed botulism cases should be reported immediately to the local health department. See <http://www.vdh.virginia.gov/local-health-districts/>.
- Laboratory specimens should be sent to DCLS for confirmation of agent and other studies after consultation and approval by VDH. For questions about specimen collection, the DCLS Emergency Officer can be reached 24 hours a day/7 days a week at 804-335-4617.
- Designated public health authority should begin an epidemiologic investigation. The activities include:
 - Collect detailed information from the patient and close contacts if necessary about the source of the exposure, in particular food history.
 - Investigate contacts of the patient for compatible illness to identify a potential common exposure. Persons who may have consumed any contaminated food items should be monitored closely.
 - Suspected food items (e.g., home-canned foods) should be collected for possible testing. VDH's Office of Epidemiology will work with the U.S. Food and Drug Administration if commercially prepared food is implicated.
 - Implement control measures to prevent disease and additional exposures. For laboratorians or others potentially exposed who might have worked with the agent before identification as *Clostridium botulinum*, post-exposure monitoring might be recommended based on a risk assessment.

11. References and Resources

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