

## BOTULISM

(Foodborne, Infant, Wound)

### REPORTING INFORMATION

- **Class A (foodborne):** Report immediately via telephone the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located. Local health departments should report immediately via telephone the case or suspected case and/or a positive laboratory result to the Ohio Department of Health (ODH).
- **Class B (infant and wound):** Report by the end of the next business day after the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
  - Foodborne cases: Immediately via telephone. For local health departments, cases should also be entered into the Ohio Disease Reporting System (ODRS) within 24 hours of the initial telephone call to the ODH.
  - Infant and Wound cases: The Ohio Disease Reporting System (ODRS) should be used to report lab findings or suspected cases to the Ohio Department of Health (ODH). For healthcare providers without access to ODRS, you may use the [Ohio Confidential Reportable Disease form](#) (HEA 3334).
  - The Infant Botulism Interview questionnaire from the California Department of Health is useful during the investigation of a case.
- Key field for ODRS reporting includes: date of illness onset.

### AGENT

A potent neurotoxin produced from *Clostridium botulinum*, and rare strains of *C. butyricum* and *C. baratii*, which are anaerobic, spore-forming bacteria.

### CASE DEFINITION

#### Botulism, Foodborne

##### Clinical Description

Ingestion of botulinum toxin results in an illness of variable severity. Common symptoms are diplopia, blurred vision and bulbar weakness. Symmetric descending paralysis may progress rapidly.

##### Laboratory Criteria for Diagnosis

- Detection of botulinum toxin in serum, stool or patient's food or
- Isolation of *Clostridium botulinum* from stool

##### Case Classification

Suspect\*: A clinically compatible case that is not yet laboratory confirmed with no or a plausible epidemiologic link that has not been confirmed.

Probable: A clinically compatible illness with an epidemiologic link (e.g. ingestion of a home-canned food within the previous 48 hours).

Confirmed: A clinically compatible illness that is laboratory confirmed or that occurs among persons who ate the same food as persons who have laboratory confirmed botulism.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

\* This case classification can be used for initial reporting purposes to ODH as CDC has not developed a classification.

## **Botulism, Infant**

### **Clinical Description**

An illness of infants, characterized by constipation, poor feeding and "failure to thrive" that may be followed by progressive weakness, impaired respiration and death.

### **Laboratory Criteria for Diagnosis**

- Detection of botulinum toxin in stool or serum *or*
- Isolation of *Clostridium botulinum* from stool

### **Case Classification**

Suspect\*: A clinically compatible illness reported by a health care provider without laboratory results.

Confirmed: A clinically compatible illness that is laboratory confirmed, occurring in a child aged <1 year.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

\* This case classification can be used for initial reporting purposes to ODH as CDC has not developed a classification.

## **Botulism, Wound**

### **Clinical Description**

An illness resulting from toxin produced by *Clostridium botulinum* that has infected a wound. Common symptoms are diplopia, blurred vision and bulbar weakness. Symmetric paralysis may progress rapidly.

### **Laboratory Criteria for Diagnosis**

- Detection of botulinum toxin in serum *or*
- Isolation of *C. botulinum* from wound

### **Case Classification**

Probable: A clinically compatible case in a patient who has no suspected exposure to contaminated food and who has either a history of a fresh, contaminated wound during the 2 weeks before onset of symptoms, or a history of injection drug use within the 2 weeks before onset of symptoms

Confirmed: A clinically compatible illness that is laboratory confirmed in a patient who has no suspected exposure to contaminated food and who has a history of a fresh, contaminated wound during the two weeks before onset of symptoms, or a history of injection drug use within the 2 weeks before onset of symptoms.

Not a Case: This status will not generally be used when reporting a case but may be used to reclassify a report if investigation revealed that it was not a case.

## **Botulism, Other Intestinal Colonization**

### **Clinical description**

See Botulism, Foodborne.

### **Laboratory Criteria for Diagnosis**

- Detection of botulinum toxin in clinical specimen, or
- Isolation of *Clostridium botulinum* from clinical specimen

### **Case Classification**

Suspect\*: A clinically compatible illness reported by a health care provider without laboratory results.

Confirmed: A clinically compatible case that is laboratory-confirmed in a patient aged greater than or equal to 1 year who has no history of ingestion of suspect food and has no wounds.

\* This case classification can be used for initial reporting purposes to ODH as the Centers for Disease Control and Prevention (CDC) has not developed a classification.

## **SIGNS AND SYMPTOMS**

### **Foodborne, Wound and Other Botulism**

Initial complaints can include gastrointestinal symptoms (vomiting, diarrhea, abdominal pain), ptosis (droopy eyelids), visual difficulty (blurred or double vision), dry mouth, sore throat and dysphagia (difficulty swallowing). Descending paralysis can occur and continue for days or weeks. Fever is absent. Respiratory failure can also occur.

### **Infant Botulism**

Infant botulism is a novel form of human botulism in which ingested spores of *Clostridium botulinum* colonize and grow in the infant's large intestine and produce botulinum neurotoxin in it. The action of the toxin in the body produces constipation, weakness (notably of gag, cry, suck and swallow), loss of muscle tone, and ultimately, flaccid ("limp") paralysis. Affected infants have difficulty feeding and often, breathing. However, in the absence of complications, patients recover completely from the disease.

## **DIAGNOSIS**

Botulism is frequently misdiagnosed, most often as a polyradiculoneuropathy (Guillain-Barré or Miller-Fisher syndrome), myasthenia gravis, or other diseases of the central nervous system. In the United States, botulism is more likely than Guillain-Barré syndrome, chemical poisoning, or poliomyelitis to cause a cluster of cases of acute flaccid paralysis. Botulism differs from other flaccid paralyzes in that it always manifests initially with prominent cranial paralysis and its invariable descending progression, in its symmetry, and in its absence of sensory nerve damage. The initial diagnosis is based on clinical symptoms. Treatment should not wait for laboratory confirmation.

Electromyography (EMG) may be helpful in diagnosis. A normal Tensilon test helps to differentiate botulism from myasthenia gravis; borderline positive tests can occur in botulism. Normal CTs and MRIs help to rule out a cardio vascular accident (CVA).

Laboratory confirmation is done by demonstrating the presence of toxin in serum, stool, vomit, gastric contents, or food, or by culturing *C. botulinum* from stool, a wound or food. Contact the ODH Bureau of Infectious Diseases (BID) Outbreak Response and Bioterrorism Investigation Team (ORBIT) at 614-995-5599 (Monday – Friday; 8 AM – 5 PM) to arrange for specimen testing. The ODH Laboratory performs testing for botulinum. Contact the ODH Laboratory at 888-ODH-LABS (888-634-5227) (Monday – Friday; 8 AM – 5 PM) for specimen

submission criteria. After-hours, weekends or holidays contact the infectious disease on-call duty officer.

Specimen quantities needed:

Serum	15 ml (minimum of 5 ml, when necessary and without anticoagulant)
Stool*	10-20 g or 20 ml for toxin testing; 1 g for culture
Food	25 g

\* If an enema must be given because of constipation, a minimal amount of fluid (preferably sterile, non-bacteriostatic water) should be used to obtain the specimen so that the toxin will not be unnecessarily diluted.

*Campylobacter* is the most common identified infection preceding Guillain-Barré Syndrome (GBS). If a suspect botulism patient had diarrhea concurrent with or prior to onset of neurologic symptoms, consider culturing a stool sample for *Campylobacter*. Ideally, this should be done at the hospital, but stool in Cary Blair transport media can be submitted to the ODH Laboratory; call BID ORBIT (614-995-5599) to make arrangements for testing at the ODH Laboratory. For further information about Guillain-Barré Syndrome, see: [http://www.ninds.nih.gov/disorders/gbs/detail\\_gbs.htm](http://www.ninds.nih.gov/disorders/gbs/detail_gbs.htm)

## **EPIDEMIOLOGY**

### **Source**

*Clostridium botulinum* is ubiquitous and has been found in soil, sea sediment and the intestinal tracts of animals, including fish.

Foodborne botulism is an intoxication that results from the ingestion of preformed toxin in inadequately preserved, stored or prepared food. The most common food sources in the United States are low-acid home-canned fruits and vegetables. Meats and meat products are more commonly implicated in Europe, as are fish in Japan.

The sources of spores for infants include dust and honey. Light and dark corn syrups may also contain botulinum spores, but at much lower frequencies.

### **Occurrence**

Worldwide. Sporadic cases, family and general foodborne outbreaks occur where food products are prepared or preserved by methods, which do not destroy botulinum spores and permit toxin formation. The actual incidence and distribution of infant botulism is unknown.

### **Mode of Transmission**

Foodborne: ingestion of food containing pre-formed toxin.

Wound: contamination of a wound in which anaerobic conditions develop.

Infant: ingestion of spores which colonize the intestines and produce toxin (adults with special bowel problems are susceptible to "infant type" botulism). Honey may be implicated as the source of the spores.

Botulism is not transmitted person-to-person.

### **Period of Communicability**

Botulinum toxin and organisms can be excreted in the feces for weeks to months after the onset of illness; however, secondary person-to person transmission has not been documented.

## **Incubation Period**

The incubation period for foodborne botulism ranges from 6 hours to 14 days, although it is usually 12-36 hours. For wound botulism, it is 4-14 days between the time of injury and the onset of symptoms. The incubation period for infant botulism is unknown (since it cannot be determined precisely when the infant ingested the causal botulinum spores).

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

Botulism is a public health emergency. Prompt diagnosis and early treatment of botulism are essential to minimize the otherwise great risk of death. Prompt epidemiologic investigation is critical to prevent further cases from occurring if a hazardous food is still available for consumption. Contact the local health department and ODH BID immediately by telephone (24/7). ODH will notify CDC and facilitate consultation. If antitoxin is indicated, CDC will arrange for shipment directly to the attending physician. The local health department should investigate to determine the source of toxin and public health impact.

#### Treatment

Clinical diagnosis of botulism is confirmed by specialized laboratory testing that often requires days to complete. Routine laboratory test results are usually unremarkable. Therefore, clinical diagnosis is the foundation for early recognition of and response to a suspected cases of botulism. All treatment and management decisions should be made based on clinical diagnosis.

#### Foodborne, Wound, Other (Intestinal Colonization of Adults)

If diagnosed early, foodborne and wound botulism can be treated with an antitoxin which blocks the action of the botulinum toxin circulating in the blood. Intravenous botulinum antitoxin, available from the Centers for Disease Control and Prevention (CDC), is administered after testing for hypersensitivity to equine sera. Antitoxin can prevent the disease from worsening, but recovery still is gradual over many weeks. Purgation and high enemas are recommended if the patient's gastrointestinal tract is not atonic. For wound botulism, debridement and drainage are performed and appropriate antibiotics administered.

#### Infant

Infant botulism may be treated with Botulism Immune Globulin Intravenous (Human) (BIG-IV), which was licensed by the United States Food and Drug Administration on October 23, 2003 under the proprietary name of BabyBIG<sup>®</sup>. The California Department of Health Services (CDHS) is the sponsor and national distributor of BabyBIG<sup>®</sup>, which may be obtained through the California Infant Botulism Treatment and Prevention Program (IBTPP) by contacting 510-231-7600. (Botulinum antitoxin (an equine product) has rarely been used for treating infant botulism, because of the risk of sensitization or anaphylaxis.)

The respiratory failure and paralysis that occur with severe botulism might require intensive medical and nursing care with the patient on a ventilator for weeks. After several weeks, the paralysis slowly improves.

#### Isolation

Botulism is not transmitted person-to-person. Medical personnel caring for patients with suspected botulism should use standard precautions (hand washing, eye protection, and gown). Patients with suspected botulism do not need to be isolated, but those with flaccid paralysis from suspected meningitis require droplet precautions.

**Contacts**

Induced vomiting, gastric lavage, rapid purgation and high enemas facilitate elimination of toxin in persons known to have eaten incriminated food. With infant botulism, searching for other causes to rule out foodborne botulism is important. Exposed persons should be kept under close medical observation.

**Follow-up Specimens**

After investigation of the food histories of ill persons, suspected foods should be recovered for appropriate testing and subsequent disposal.

**Public Health Significance**

Suspicion of a single case of botulism should raise the question of a group outbreak involving a family or others who have shared a common food. Home-preserved foods or time-temperature abused commercial products should be the prime suspects until ruled out, although widely distributed commercially preserved foods are occasionally implicated and pose a far greater threat to the public health.

**Prevention and Control**

Education to improve home canning methods should be promoted. The exact time, temperature and pressure required to destroy spores varies with the food being processed. Bulging containers should not be opened and foods with strange odors should not be consumed or taste-tested. Commercial cans with bulging lids should be returned unopened to the vendor. Foods (e.g. soups) intended to be refrigerated, then heated should not be stored at room temperature before heating.

Since honey and possibly corn syrup appear to be risk factors for infant botulism, honey and corn syrup should not be fed to infants, especially those <6 months old. Handling diapers containing feces should be followed by careful hand washing at all times.

**What is botulism?**

Botulism is a rare but serious paralytic illness caused by a nerve toxin that is produced by the bacterium *Clostridium botulinum* and sometimes by strains of *Clostridium butyricum* and *Clostridium baratii*. There are five main kinds of botulism. Foodborne botulism is caused by eating foods that contain the botulinum toxin. Wound botulism is caused by toxin produced from a wound infected with *Clostridium botulinum*. Infant botulism is caused by consuming the spores of the botulinum bacteria, which then grow in the intestines and release toxin. Adult intestinal toxemia (adult intestinal colonization) botulism is a very rare kind of botulism that occurs among adults by the same route as infant botulism. Lastly, iatrogenic botulism can occur from accidental overdose of botulinum toxin. All forms of botulism can be fatal and are considered medical emergencies. Foodborne botulism is a public health emergency because many people can be poisoned by eating a contaminated food.

**What kind of germ is *Clostridium botulinum*?**

*Clostridium botulinum* is the name of a group of bacteria commonly found in soil. These rod-shaped organisms grow best in low oxygen conditions. The bacteria form spores, which allow them to survive in a dormant state until exposed to conditions that can support their growth. There are seven types of botulism toxin designated by the letters A through G; only types A, B, E and F cause illness in humans.

**How common is botulism?**

In the United States, an average of 180 cases a year have been reported over the past 5 years. Of these, approximately 14% are foodborne botulism, 74% are infant botulism, and 12% are wound or unspecified botulism. Adult intestinal colonization and iatrogenic botulism also occur, but rarely. Outbreaks of foodborne botulism involving two or more persons occur most years and are usually caused by home-canned foods. Most wound botulism cases are associated with black-tar heroin injection, especially in California.

**What are the symptoms of botulism?**

The classic symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. Infants with botulism appear lethargic, feed poorly, are constipated, and have a weak cry and poor muscle tone. These are all symptoms of the muscle paralysis caused by the bacterial toxin. If untreated, these symptoms may progress to cause paralysis of the arms, legs, trunk and respiratory muscles. In foodborne botulism, symptoms generally begin 18 to 36 hours after eating a contaminated food, but they can occur as early as 6 hours or as late as 10 days.

**How is botulism diagnosed?**

Physicians may consider the diagnosis if the patient's history and physical examination suggest botulism. However, these clues are usually not enough to allow a diagnosis of botulism. Other diseases such as Guillain-Barré syndrome, stroke and myasthenia gravis can appear similar to botulism, and special tests may be needed to exclude these other conditions. These tests may include a brain scan, spinal fluid examination, nerve conduction test (electromyography or EMG) and a Tensilon test for myasthenia gravis. The most direct way to confirm the diagnosis is to demonstrate the botulinum toxin in the patient's serum or stool by injecting serum or stool into mice and looking for signs of botulism. The bacteria can also be isolated from the stool of persons with foodborne and infant botulism. These tests can be performed at some state health department laboratories and at CDC.

### **How can botulism be treated?**

The respiratory failure and paralysis that occur with severe botulism may require a patient to be on a breathing machine (ventilator) for weeks, plus intensive medical and nursing care. After several weeks, the paralysis slowly improves. If diagnosed early, foodborne and wound botulism can be treated with an antitoxin which blocks the action of toxin circulating in the blood. This can prevent patients from worsening, but recovery still takes many weeks. Physicians may try to remove contaminated food still in the gut by inducing vomiting or by using enemas. Wounds should be treated, usually surgically, to remove the source of the toxin-producing bacteria. Good supportive care in a hospital is the mainstay of therapy for all forms of botulism.

Currently, antitoxin is not routinely given for treatment of infant botulism. Infant botulism may be treated with Botulism Immune Globulin Intravenous (Human) (BIG-IV), also known as BabyBIG®.

### **Are there complications from botulism?**

Botulism can result in death due to respiratory failure. However, in the past 50 years the proportion of patients with botulism who die has fallen from about 50% to 3-5%. A patient with severe botulism may require a breathing machine, as well as intensive medical and nursing care for several months. Patients who survive an episode of botulism poisoning may have fatigue and shortness of breath for years and long-term therapy may be needed to aid recovery.

### **How can botulism be prevented?**

Botulism can be prevented. Foodborne botulism has often been from home-canned foods with low acid content, such as asparagus, green beans, beets and corn. However, outbreaks of botulism have been linked to more unusual sources such as chopped garlic in oil, chile peppers, tomatoes, improperly handled baked potatoes wrapped in aluminum foil, and home-canned or fermented fish. Persons who do home canning should follow strict hygienic procedures to reduce contamination of foods. Oils infused with garlic or herbs should be refrigerated. Potatoes which have been baked while wrapped in aluminum foil should be kept hot until served or refrigerated. Because the botulism toxin is destroyed by high temperatures, persons who eat home-canned foods should consider boiling the food for 10 minutes before eating it to ensure safety. Instructions on safe home canning can be obtained from county extension services or from the US Department of Agriculture. Because honey can contain spores of *Clostridium botulinum* and this has been a source of infection for infants, children less than 12 months old should not be fed honey. Honey is safe for persons 1 year of age and older. Wound botulism can be prevented by promptly seeking medical care for infected wounds and by not using injectable street drugs.

### **What are public health agencies doing to prevent or control botulism?**

Public education about botulism prevention is an ongoing activity. Information about safe canning is widely available for consumers. State health departments and CDC have persons knowledgeable about botulism available to consult with physicians 24 hours a day. If antitoxin is needed to treat a patient, it can be quickly delivered to a physician anywhere in the country. Suspected outbreaks of botulism are quickly investigated, and if they involve a commercial product, the appropriate control measures are coordinated among public health and regulatory agencies. Physicians should report suspected cases of botulism to the local health department and local health departments should report suspected cases to the Ohio Department of Health.