



PREVENTION OPPORTUNITIES UNDER THE BIG SKY

FOODBORNE BOTULISM: KEY CONCEPTS FOR HEALTH CARE PROFESSIONALS

Botulism is caused by a toxin produced by the bacteria *Clostridium botulinum*.¹ While the toxin can be used in carefully controlled doses for therapeutic or aesthetic purposes, ingestion of the toxin in inadequately prepared foods causes a life-threatening emergency. The fact that this toxin is listed as one of the most likely bioterrorist agents is a reflection of the danger it poses.² This issue of *Montana Public Health* describes key concepts for recognition and control of foodborne botulism. [NOTE: A subsequent issue will describe two other circumstances in which the bacteria produce toxin and cause illness: wound botulism and infant botulism.]

THE TOXIN The botulism toxin is a potent neurotoxin produced by the anaerobic, gram-positive bacillus *C. botulinum*. There are seven toxin types, A-G; types A, B, E, and occasionally F are associated with human disease. Toxin type is significant for clinical and epidemiologic reasons. The toxin causes a profound paralysis by irreversibly binding to receptors on nerve endings, entering the nerve, and interfering with the release of acetylcholine.

FOODBORNE BOTULISM In the United States, about 25 cases of foodborne botulism are reported each year. Only two cases were identified in Montana from 1996 to 2005 (Table).

TABLE. Foodborne botulism reported in Montana and United States, 1996-2005

	<u>1996-2000</u>	<u>2001-2005</u>
Montana	1	1
U.S.	124	122

Foodborne botulism results from consuming pre-formed toxin in contaminated food. Home-prepared foods are more frequently implicated than those commercially prepared; however, both are potential sources of foodborne botulism. Hardy *C. botulinum* spores can survive a less-than-meticulous canning process. In the resulting low-oxygen environment, these spores can germinate, reproduce and synthesize toxin.

SIGNS AND SYMPTOMS The clinical presentation of botulism is characterized by the "5 Ds": symmetric, **d**escending flaccid paralysis of motor and autonomic nerves (always beginning with the cranial nerves), **d**iplopia (double vision) or blurred vision, **d**rooping eyelids, **d**ysphonia (slurred speech), **d**ysphagia (difficulty swallowing). Patients may also experience dry mouth and muscle weakness. If untreated, illness may progress to cause descending paralysis of respiratory muscles, arms and legs. These signs 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 after ingestion of the toxin. The foodborne botulism case-fatality rate in the U.S. is currently 5 to 10%.

DIAGNOSIS AND TREATMENT Prompt diagnosis and early treatment of botulism are essential to minimize the risk of death. The diagnosis must be based on clinical findings since testing for toxin takes days and is not done at hospital laboratories in Montana. Other potential causes that should be considered include Guillain-Barré syndrome, myasthenia gravis, stroke, tick paralysis, medication reactions, polio, and West Nile virus infection. Laboratory testing may be needed to exclude these conditions. Early treatment of foodborne botulism requires prompt notification of public health officials.

Because botulinum antitoxin works on unbound toxin only, it must be administered as soon as possible after symptom onset. The severity and duration of illness can be reduced if the antitoxin is given early, although established paralysis is not reversed. Antitoxin is accessible by calling Montana Department of Public Health and Human Services (DPHHS). Consultation related to botulism is available any time day or night. DPHHS will coordinate the release of antitoxin from CDC, which is the sole source for it. Antitoxin will be shipped at no charge from the nearest available CDC quarantine station, and delivered from there to the site necessary to treat the patient(s).

LABORATORY TESTING FOR BOTULINUM TOXIN

Laboratory testing is done with a mouse bioassay. This requires waiting for mice to die; it takes several days. The Montana Public Health Laboratory facilitates testing and should be consulted for advice on specimen submission. Treatment for botulism should NOT be delayed to await laboratory test results.

Importance of Reporting Prompt epidemiologic investigation is essential to prevent additional cases from occurring if a hazardous food is still available for consumption. Botulism is preventable.

Public education about botulism prevention is an ongoing activity. Information about safe canning is widely available for consumers from local extension services and from U.S. Department of Agriculture (USDA).³ Although botulism spores are heat stable, botulinum toxin is heat labile. Botulinum toxin can be inactivated by heating to 176°F (80°C). Therefore,

thorough heating of home-canned foods before consumption can reduce the risk of botulism intoxication.

C. botulinum activity may cause container lids to bulge and the contents to have “off-odors.” Commercial cans or home-canned products with bulging lids should not be opened, and foods with off-odors should not be eaten or “taste tested.” When commercially canned food is recalled, consumers as well as commercial sales sites must participate to prevent cases of foodborne botulism.⁴

Recommendations for health care providers caring for suspected cases of botulism

- Report **immediately** by calling the Montana Department of Public Health and Human Services for consultation and, if necessary, delivery of antitoxin.
- Coordinate clinical specimen submission with the Montana Public Health Laboratory, 800-821-7284.

Prevention of botulism

- Persons who do home canning should follow strict hygienic procedures to reduce contamination of foods. Instructions on safe home canning can be obtained from county extension services or from the USDA.
- Botulism toxin is destroyed by high temperatures, so persons who eat home-canned foods should consider boiling that food for 10 minutes before eating it to ensure safety.
- Participate in all recalls of commercially canned food.

For more information or 24/7 consultation, contact the Communicable Disease Epidemiology Section at 406-444-0273.

References:

1. Botulism in the United States, 1899-1996. Handbook for epidemiologists, clinicians, and laboratory workers. Centers for Disease Control and Prevention. 1998. <http://www.cdc.gov/ncidod/dbmd/diseaseinfo/files/botulism.pdf>.
2. Arnon S, et al. Botulinum toxin as a biological weapon: medical and public health management. JAMA. 2001;285:1059-1070.
3. http://www.uga.edu/nchfp/publications/publications_usda.htm
4. Botulism associated with canned chili sauce, 2007. http://www.castleberrys.com/news_productrecall.asp.

2,600 copies of this public document were published at an estimated cost of \$0.45 per copy, for a total cost of \$1,170.00, which includes \$403.00 for printing and \$767.00 for distribution.



1400 Broadway
Helena, MT 59620-2951
Joan Miles, MS, JD, Director, DPHHS
Steven Helgerson, MD, MPH, State Med. Officer
Jane Smilie, MPH, Administrator, PHSD
Mail Stop: 69078