

# SALMONELLOSIS (Non-Typhoid)

**Potential Bioterrorism Agent: Category B**

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## **Responsibilities:**

**Hospital:** Report by IDSS, facsimile, mail or phone

**Lab:** Report by IDSS, facsimile, mail or phone

**Physician:** Report by facsimile, mail or phone

**Local Public Health Agency (LPHA): Report by IDSS, facsimile, mail or phone.**

**Follow-up required**

**Iowa Department of Public Health**

**Disease Reporting Hotline: (800) 362-2736**

**Secure Fax: (515) 281-5698**

## **1) THE DISEASE AND ITS EPIDEMIOLOGY**

### **A. Agent**

Salmonellosis is caused by Salmonella bacteria other than *Salmonella typhi*, (the *Salmonella* species that causes typhoid fever). There are approximately 2,000 known serotypes; only about 200 are detected in the U.S. in any given year. Infection may begin as acute diarrhea and develop into septicemia (blood infections) or focal infection. Infectious dose of Salmonella is usually over 10, 000 organisms.

### **B. Clinical Description**

Symptoms of Salmonellosis are diarrhea (sometimes bloody), headache, stomach cramps, fever, nausea, and sometimes vomiting. The infection may also appear as septicemia, an abscess, arthritis or cholecystitis.

Onset of illness may begin as acute enterocolitis and develop into septicemia or focal infection. Anorexia and diarrhea often persist for several days.

Complications include dehydration that may be severe, especially among infants and the elderly, and invasive disease may occur. Occasionally, the infectious agent may localize in any tissue of the body, produce abscesses and cause septic arthritis, cholecystitis, endocarditis, meningitis, pericarditis, pneumonia, pyoderma, or pyelonephritis. Deaths are uncommon, except in the very young, the very old, the debilitated and the immunosuppressed. It is estimated that 400 fatal cases occur each year; a few cases are complicated by chronic arthritis.

### **C. Reservoirs**

Common reservoirs: humans, livestock, pets, poultry and other birds, reptiles and amphibians. Most infected animals are chronic carriers and may be asymptomatic.

### **D. Modes of Transmission**

Spread via the fecal-oral route. By far the most common mode of transmission is ingestion of food or water that has been contaminated with animal feces. This includes raw or undercooked poultry, meats, and raw milk or milk products. Eggs can become infected "in utero," thus should be cooked until no longer runny, or pasteurized egg products used. In addition, reptiles such as iguanas, snakes and lizards are often chronic carriers of these bacteria and can be sources of infection.

Person-to-person spread can occur when an infected food handler contaminates food. A large dose of organisms is usually needed to cause infection, but the infectious dose may be lower for certain

susceptible groups such as children, the elderly and the immunocompromised. Most often, person-to-person spread occurs among household contacts, preschool children in child care, and the elderly and developmentally disabled living in residential facilities. Transmission can also occur person-to-person through certain types of sexual contact (e.g. fecal - oral contact).

### **E. Incubation period**

The incubation period can vary from 6 - 72 hours but is usually about 12 - 36 hours. Longer incubation periods of up to 16 days have been documented and may not be uncommon following low-dose ingestion. The higher the infectious dose of the organism, the shorter the incubation period.

### **F. Period of Communicability or Infectious Period**

The disease is communicable for as long as infected persons excrete *Salmonella* bacteria in their stool, but most likely while diarrhea exists. This can last from days to months, depending on the serotype, but rarely lasts more than one year. Treatment with antibiotics can prolong carriage. However, due to large infectious dose, transmission from carriers is very uncommon.

### **G. Epidemiology**

Salmonellosis has a worldwide distribution, with approximately 1.4 million cases occurring annually in the United States alone. An estimated 1.2 million cases occur annually in the United States; of these, approximately 42,000 are laboratory-confirmed cases reported to CDC. *Salmonella* serotypes Enteritidis, Typhimurium, and Newport account for about half of culture-confirmed *Salmonella* isolates reported by public health laboratories in the U.S.

About 60-80% of cases are sporadic, but large outbreaks have occurred in institutional settings and nationwide from common food sources. The largest common-vehicle outbreak of salmonellosis ever recognized in the United States was caused by ice cream made by a large national producer when the ice cream premix was transported in contaminated tanker trucks.

### **H. Bioterrorism Potential**

**Category B Agent:** Salmonella has been used as a bioterrorism agent. In one well-known example in 1984, a religious sect in Oregon deliberately contaminated salad bars at restaurants with Salmonella to disrupt an election process. Over 700 people became ill.

## **2) DISEASE REPORTING AND CASE INVESTIGATION**

### **A. Purpose of Surveillance and Reporting**

- To identify whether the case may be a source of infection for others (e.g., a diapered child, child care attendee or food handler) and, if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g. a restaurant or a commercially distributed food product) and to stop transmission from such sources.

### **B. Laboratory and Healthcare Provider Reporting Requirements**

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing the Iowa Disease Surveillance System (IDSS). However, if IDSS is not available to your facility, the reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698, mailing address:

IDPH, CADE  
Lucas State Office Building, 5th Floor  
321 E. 12<sup>th</sup> Street  
Des Moines, IA 50319-0075

Postage-paid disease reporting forms are available free of charge from the IDPH clearinghouse. Call (319) 398-5133 or visit the website [healthclearinghouse.drugfreeinfo.org/cart.php?target=category&category\\_id=295](http://healthclearinghouse.drugfreeinfo.org/cart.php?target=category&category_id=295) to request a supply.

### C. Local Public Health Agency (LPHA) Follow-up Responsibilities

#### Case Investigation

- a. It is the LPHA responsibility to complete a Salmonella case investigation by interviewing the case and others who may be able to provide pertinent information. Much of the information can be obtained from the case's healthcare provider or the medical record. Please use the Iowa Disease Surveillance System (IDSS) when possible for data collection.
- b. Use the following guidelines in completing the form:
  1. Record the demographic information, date of symptom onset, symptoms, and medical information.
  2. When asking about exposure history (food, travel, activities, etc.), use the incubation-period range for salmonellosis (6 – 72 hours). Specifically, focus on the period beginning a minimum of 6 hours prior to the case's onset back to no more than 72 hours before onset.
  3. If possible, record any restaurants at which the case ate, including food items(s) and date consumed.
  4. Ask questions about travel history and outdoor activities to help identify where the case became infected.
  5. Ask questions about water supply because salmonellosis may be acquired through water consumption.
  6. Household/close contact, pet or other animal contact, child care, and food handler questions are designed to examine the case's risk of having acquired the illness from, or potential for transmitting it to, these contacts. Ask specifically about exposure to reptiles. Determine whether the case attends or works at a child care or healthcare facility and/or is a food handler.
  7. Ask if the patient knows others who have similar illness about the same time. If several attempts have been made to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please enter as much information as can be gathered into IDSS. Please note in IDSS any reason why information could not be gathered completely. If using IDSS, select the appropriate reason under the Event tab in the Event Exception field.
- c. After completing the IDSS case investigation, transmit to IDPH by entering the completion date in the investigation complete field under the event tab. If necessary, information can be mailed to CADE:

Iowa Department of Public Health  
Attn: CADE  
Lucas State Office Building  
321 E. 12<sup>th</sup> Street  
Des Moines, IA 50309-0075

Or FAX to (515) 281-5698

### 3) CONTROLLING FURTHER SPREAD

For uncomplicated cases, no antibiotic treatment is recommended. Antibiotics may encourage the development of the carrier state and may lead to resistant strains or more severe infections. However, infants under 2 months of age, the elderly, the debilitated, those with sickle disease, persons infected with HIV, or patients with continued or high fever or manifestations of extra intestinal infection, should be given antibiotic therapy.

## **A. Isolation and Quarantine Requirements**

Exclude persons with salmonellosis from food preparation and direct child and patient care until diarrhea is resolved. Children in child care should be excluded until diarrhea ceases. Consult with the staff at CADE if any clarification is needed.

## **B. Protection of Contacts of a Case**

None

## **C. Managing Special Situations**

### **Child care**

Since salmonellosis can be transmitted person-to-person through fecal-oral transmission, it is important to carefully follow up on cases of salmonellosis in a child care. General recommendations include:

- Children or staff with *Salmonella* infection who have diarrhea should be excluded until their diarrhea is gone.
- Good hand hygiene must be practiced at all times.

### **School**

Since salmonellosis may be transmitted person-to-person through fecal-oral transmission, it is important to follow up carefully on cases of salmonellosis in a school. General recommendations include:

- Students or staff with *Salmonella* infection who have diarrhea should be excluded until their diarrhea is gone.
- Good hand hygiene must be practiced at all times.

### **Community Residential Programs**

Actions taken in response to a case of salmonellosis in a community residential program will depend on the type of program and the level of functioning of the residents. Exclude persons with salmonellosis from food preparation and patient care until diarrhea is resolved.

In long-term care facilities, residents with salmonellosis should be placed on Standard and Contact Precautions until their symptoms subside. Staff members who give direct patient care (*e.g.* feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions. Exclude persons with salmonellosis from food preparation, direct child and patient care until diarrhea is resolved. In addition, staff members with *Salmonella* infection who are not food handlers should not work until their diarrhea is gone.

In residential facilities for the developmentally disabled, staff and clients with salmonellosis must refrain from handling or preparing food for other residents until their diarrhea has subsided. In addition, staff members with *Salmonella* infection who are not food handlers should not work until their diarrhea is gone.

### **Reported Incidence Is Higher than Usual/Outbreak Suspected**

If the number of reported cases of *Salmonella* in any city or town is higher than usual, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle (such as food or association with a child care center) should be sought and applicable preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal cleanliness and sanitary disposal of feces. Consult with the regional epidemiologist or CADE if assistance is needed. CADE can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross jurisdictional lines.

## D. Preventive Measures

### Environmental Measures

Implicated food items must be removed from the environment. A decision about testing them can be made in consultation with CADE and the State Hygienic Laboratory (SHL). CADE can help coordinate pickup and testing of food samples. If a commercial product is suspected, the Department of Inspections and Appeals (DIA), or their contracted agency, will coordinate follow-up with relevant agencies.

*Note:* The role of the DIA is to provide policy and technical assistance with the environmental investigation. This includes interpreting the Iowa Code, conducting a HACCP risk assessment, initiating enforcement actions and collecting food samples.

The general policy of the University of Iowa State Hygienic Laboratory (SHL) is to only test food samples implicated in suspected outbreaks, not in single cases, except when botulism is suspected. The LPHA may suggest that the holders of food implicated in single case incidents locate a private laboratory that will test food or store the food in their freezer for a period in case additional reports are received. However, a single, confirmed case with leftover food consumed within the incubation period most likely will not be considered for testing.

Since Salmonella is sometimes implicated in foods that have wide, sometimes national, distribution, it is critical that all Salmonella isolates be sent to SHL for PFGE testing (DNA fingerprinting). This allows investigators to connect Iowa illnesses and those in other parts of the country.

### Preventive Measures/Education

To avoid future exposures, recommend that people:

- Make sure to thoroughly cook all food products from animals, especially poultry and eggs, and avoid consuming raw eggs, unpasteurized milk, or other unpasteurized dairy products. When preparing dishes where eggs may not be cooked (such as eggnog or sauces) use pasteurized egg products. Eggs can be contaminated with Salmonella from the chicken before the shell is formed. About 1 in 200 eggs from an infected flock may be contaminated. The risk is lower for all eggs. Only 1 in 10,000 eggs on the supermarket shelves are likely to be contaminated with *Salmonella enteritidis*.
- Always wash hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, and after touching their pets or other animals (especially reptiles).
- Wash the child's hands as well as their own after changing diapers.
- Dispose of feces in a sanitary manner in all settings.
- Keep food that will be eaten raw, such as vegetables, from becoming contaminated by animal-derived food products. Wash all foods that will be eaten rare before eating.
- Avoid letting infants or young children touch reptiles, such as turtles, snakes or iguanas, or their cages.
- Avoid reptiles when choosing pets if there are infants, elderly or immunocompromised people in the home.
- Do not use reptiles as classroom pets in a child care or schools with children younger than 5 years old.
- Avoid sexual practices that may permit fecal-oral transmission. Latex-barrier protection should be emphasized as a way to prevent the spread of salmonellosis to sexual partners as well as to prevent the exposure to, and transmission of, other pathogens.

## 4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Salmonella can be found at: [www.cdc.gov/osels/ph\\_surveillance/ndss/phs/infdis.htm#top](http://www.cdc.gov/osels/ph_surveillance/ndss/phs/infdis.htm#top)

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

## References

American Academy of Pediatrics. *2015 Red Book: Report of the Committee on Infectious Diseases, 30<sup>th</sup> Edition*. Illinois, American Academy of Pediatrics, 2015.

CDC web site, Salmonellosis; [www.cdc.gov/salmonella/](http://www.cdc.gov/salmonella/)

Heymann, D.L., ed. *Control of Communicable Diseases Manual, 20<sup>th</sup> Edition*. Washington, DC, American Public Health Association, 2015.

## Additional Resources

USDA web site providing latest information on salmonellosis in animals

[www.aphis.usda.gov/](http://www.aphis.usda.gov/)

FDA web site providing the latest food recalls:

[www.fda.gov/opacom/7alerts.html](http://www.fda.gov/opacom/7alerts.html)