Salmonellosis (nontyphoid)

Summary

Salmonella infection most commonly causes acute gastroenteritis, although people with long term carriage can be asymptomatic. Most infections are acquired by ingestion of contaminated food or water (particularly raw eggs or milk), or by cross contamination during food handling (particularly raw poultry). Laboratory diagnosis is made by stool culture. Antimicrobial treatment of gastroenteritis is usually not indicated unless the patient is at risk for invasive disease. Symptomatic cases should be excluded from food handling, and from direct care of infants, elderly, immunocompromised, and hospitalized or institutionalized patients. Disease can be prevented by proper food preparation and by using good hand hygiene practices (i.e., proper hand washing after using the toilet, changing diapers, and before and after handling food).

Agent

There are more than 2,500 known serotypes of Salmonella, although in the United States the 100 most common serotypes account for about 98% of all reported cases. In 2022, the five most common serotypes of Salmonella reported in New Mexico were *Salmonella newport, Salmonella typhimurium, Salmonella enteritidis, Salmonella javiana, and Salmonella saintpaul*.

Transmission

Reservoir**:**

Salmonella have been found in symptomatic and asymptomatic domestic and wild animals, including poultry, swine, cattle, rodents, and pets such as snakes, iguanas, turtles, chicks, dogs, and cats. Humans may also serve as a reservoir for Salmonella infections.

Mode of transmission:

- Salmonellosis usually results from handling or eating undercooked or raw products of animal origin, such as eggs, milk, meat, and poultry. However, recent outbreaks have been associated with fresh produce (e.g., tomatoes, alfalfa sprouts and cantaloupe) and unpasteurized juices. Salmonella can also be spread from person to person or through direct contact with an infected animal, such as reptiles or baby poultry.

Period of communicability:

- The course of infection can range from days to several weeks. Some persons, particularly infants, may develop a temporary carrier state, which may continue for months. About 1% of adults and 5% of children under five years old may excrete the organism for more than one year. Antimicrobial therapy can prolong excretion.

Clinical Disease

Incubation period:

Usually 12-96 hours but can be ≥ 7 days.

Illness:

This gastrointestinal illness is characterized by an acute onset of fever, abdominal pain/stomach cramps, diarrhea, and sometimes vomiting, nausea, or headache. Dehydration,

especially among infants, may be severe. Fever is nearly always present. Anorexia and diarrhea often persist for several days. The diarrhea is self-limited and most patients recover within 10 days. Infection may begin as an acute enterocolitis and develop into septicemia or focal infection. Occasionally, the organism localizes in tissue to produce abscesses, septic arthritis, cholecystitis, endocarditis, meningitis, or pneumonia.

Laboratory Diagnosis

• The diagnosis of salmonellosis is usually established via a stool culture. Other clinical specimens (e.g., urine or blood) may also be used to confirm the diagnosis. Stool samples should be submitted in enteric pathogen transport media that contains preservative. Fresh stool specimens are preferred over rectal swabs.

• Salmonella bacteria may be excreted in the stool for several days or weeks after the acute phase of illness. Therefore, cultures taken after the acute phase of illness may be useful in establishing the diagnosis of salmonellosis or for detecting asymptomatic infections.

• Serologic tests are not useful in diagnosis as they are frequently unreliable.

• Culture Independent Diagnostic Testing (CIDT) is becoming a common method for diagnoses. CIDT is a PCR test with approximately 1-hour turn-around time, which makes it appealing. Although clinical laboratories frequently utilize CIDT to detect Salmonella infections, isolates are necessary for antimicrobial susceptibility testing and for characterization during public health investigations. Reflex bacterial culture is recommended, if possible, on the same specimen, for positive culture-independent specimens.

Treatment

• Antimicrobial therapy is usually not indicated for patients with uncomplicated (noninvasive) gastroenteritis caused by nontyphoidal Salmonella species, as therapy does not shorten the duration of disease and may prolong the excretion of organisms. Although of unproven benefit, antimicrobial therapy is generally recommended for Salmonella gastroenteritis in patients who are at risk for developing invasive disease, including infants younger than three months of age and persons with malignancies, sickle cell anemia, HIV, or other immunosuppressive illnesses.

• For invasive (extra-intestinal) Salmonella infections (such as bacteremia or osteomyelitis), appropriate antimicrobial therapy includes ampicillin, cefotaxime, chloramphenicol, trimethoprim-sulfamethoxazole (TMP-SMX), or a fluoroquinolone, depending on the susceptibility of the organism.

• Treatment decisions should be made in conjunction with the patient's health care provider.

Surveillance

Case Definition:

Confirmed – A case that meets the confirmed laboratory criteria for diagnosis

Probable – A case that is positive by CIDT methods without culture confirmation **or** a clinically compatible case that is epidemiologically linked to a confirmed case that meets the supportive or confirmatory laboratory criteria for diagnosis.

Laboratory criteria –

Confirmatory laboratory evidence: Isolation of Salmonella from a clinical specimen.

Supportive laboratory evidence: Detection of Salmonella spp. in a clinical specimen using a CIDT.

Clinical Criteria - An illness of variable severity commonly manifested by diarrhea, abdominal pain, nausea and sometimes vomiting. Asymptomatic infections may occur, and the organism may cause extra-intestinal infections.

Epidemiologic Linkage - A clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

Reporting: Report all probable or confirmed cases of Salmonella to the Epidemiology and Response Division (ERD) at 505-827-0006. Information needed includes: patient's name, age, sex, race, ethnicity, home address, home phone number, occupation, and health care provider.

Case Investigation: Use the Foodborne Surveillance Investigation to complete the investigation. Investigation information should also be entered into NM-EDSS per established procedures.

Control Measures

Control measures for CIDT cases that tested positive for more than one condition should be prioritized as follows: Vibrio> STEC> Cryptosporidium> Salmonella> Shigella> Campylobacter> Cyclospora> Giardia. For a summary of work and daycare exclusion criteria for all enteric pathogens see Appendix 8.

1. Case management
   1.1. Isolation: Exclude symptomatic persons from food handling and from direct care of infants, elderly, immunocompromised, and hospitalized or institutionalized patients. The person may be allowed to resume his/her usual duties when: diarrhea has resolved, and proper hygiene measures can be maintained (as assessed by a food sanitarian, trained environmentalist, or infection control practitioner), and They have two negative stool tests (either culture or molecular methods, ie, PCR) at least 24 hours apart, with the first taken at least 48 hours after completion of antibiotic therapy, if given. If a stool test is positive, then it should be repeated until negative. Exclusion of asymptomatic infected persons (i.e., carriers) from food handling, and from direct care of infants, elderly, immunocompromised, and hospitalized or institutionalized patients can be assessed on a case by case basis by the New Mexico Department of Health based on an individual's ability to maintain hand hygiene and further prevent transmission of enteric infection to patrons or patients. They need not be excluded from work if proper hygiene measures are maintained. For hospitalized patients, contact precautions should be used for handling feces and contaminated clothing and bed linen.
   1.2. Prophylaxis: Not applicable.
2. Contact management
   2.1. Isolation: Stool cultures should be obtained from household contacts who are involved in food handling or direct care of infants, elderly, immunocompromised, and hospitalized

or institutionalized patients. Persons with positive cultures should be managed as above (section 1.1).

2.2. Prophylaxis: Not applicable.

3. Prevention:
   3.1. Emphasize good hand hygiene practices (i.e., proper hand washing after using the toilet, changing diapers, and before and after handling food).
   3.2. General guidelines for preventing foodborne illness include:
   3.3. Thoroughly cook raw food from animal sources.
   3.4. Wash raw vegetables. Manual for Investigation and Control of Selected Communicable Diseases December 2018 New Mexico Department of Health, Epidemiology and Response Division, Infectious Disease Epidemiology Bureau Page 4 of 5
   3.5. Avoid unpasteurized dairy products.
   3.6. Wash hands, knives, and cutting boards after handling uncooked foods.
   3.7. Immunization: Not applicable.

Managing Salmonella in Child Care Centers

Outbreaks of Salmonella infection in childcare centers are uncommon.

Management of sporadic cases

When a case of Salmonella occurs among a childcare center attendee, that child should be excluded until she/he is asymptomatic and the stools are formed. Individuals who use diapers can return to care when stools are contained in the diaper or when toilet trained individuals no longer experience fecal incontinence **and** if the frequency of bowel movements becomes no more than two (2) stools above their normal frequency, even if stools remain loose. Since children (and adults) may shed Salmonella for weeks to months after an acute infection, and because outbreaks of Salmonella in childcare settings are rare, it is reasonable to allow asymptomatic children to return to the childcare center without follow-up stool cultures. Per childcare licensing regulations, a center should notify parents or guardians in writing of a case of Salmonella in the facility (Subsection D of 8.16.2.20 NMAC). See Appendix 7 for a notification letter template. When a case of Salmonella occurs among a childcare center staff member, that person should be excluded from their work duties until they are asymptomatic as defined above. A case of salmonellosis in a childcare facility should prompt the search for other cases among children and staff members of the facility, as well as household members or other close contacts of the index case. Stool cultures should be obtained on other symptomatic persons. The childcare center should review its infection control protocols with staff and emphasize the following: Strict hand washing routines for staff and children and routines for handling fecally contaminated materials (diapers, soiled clothing etc.,). Frequently mouthed objects should be cleaned and sanitized daily. Items should be washed with dishwashing detergent and water, then rinsed in freshly prepared (daily) household bleach solution (dilute 1 cup bleach in 9 cups of water). Food handling and diaper changing areas should be physically separated and cleaned daily. Diaper changing surfaces should be nonporous and cleaned with a freshly prepared (daily) household bleach solution (dilute one cup bleach in nine cups of water). Cleaning of diaper changing surfaces after each use is required; diapers should be disposed of properly. If available, nonporous gloves should be worn when changing diapers, with careful attention paid that soiled gloves don't contaminate clean objects.

• Institute and maintain a system of stool monitoring (i.e., diaper logs) for all infants and children who are not toilet trained. Diaper logs are not required by regulation but are recommended whenever a day care attendee is diagnosed with an enteric pathogen. At a minimum, diaper logs should document the quality (e.g., formed, loose, watery, blood present, mucus present) and time of each diaper change. The log should be reviewed each day with the center director, or their designated personnel, and personnel from NMDOH who are being consulted and/or investigating individual cases, clusters, or outbreaks at the center. The purpose of the log is to assist in the identification of potential new cases, to prioritize testing recommendations, and assist in determining if exclusion of the infant or child is necessary until infection can be ruled out.

Animals in the childcare center with diarrhea should be isolated from children and taken to a veterinarian for diagnosis and treatment. If an outbreak of salmonellosis (i.e., two or more cases) is suspected in a childcare facility, ERD should be notified immediately. Outbreaks of Salmonella in this situation would ordinarily be controlled by exclusion of symptomatic children and staff.

References

American Academy of Pediatrics. In: Kimberlin, DW, et al eds. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. Itasca, IL: American Academy of Pediatrics; 2018.

Heymann, DL, ed. Control of Communicable Diseases Manual. 19th edition. Washington, DC: American Public Health Association; 2008.