

# Salmonellosis (Non-typhoidal) rev Jan 2016

Note that typhoid infections (caused by *S. Typhi*) are reported in NEDSS as Typhoid Fever and will be covered in the Typhoid Fever section. Paratyphoid infections (caused by *S. Paratyphi* A, B, and C) are reported in NEDSS as Salmonellosis and will be covered in this section. See Table 1, at the end of this section.

## BASIC EPIDEMIOLOGY

### Infectious Agent

*Salmonella* species, a Gram-negative bacilli. There are two species of *Salmonella*, with the most common cause of human illness being *S. enterica*. The two species are further separated into subspecies and then serotypes based on defining antigens. Due to most human illness being attributed to the same species and subspecies, they are commonly referred to and distinguished by their defined serotype, such as *S. Heidelberg* (*Salmonella enterica* subsp. *enterica* subtype Heidelberg).

### Transmission

Transmission is fecal-oral and can occur through the ingestion of fecally contaminated food or water, or improperly cooked or prepared food. Transmission may also occur via direct contact with an infected person, fomite, animal or an animal's environment.

### Incubation Period

Usually 12-36 hours (ranges 6 to 72 hours). Longer incubations, up to 16 days, have been documented.

For *S. Paratyphi*, usually 1–10 days but may be as long as 2–3 weeks.

### Communicability

People are infectious as long as bacteria are shed in their stool. On average bacteria can be shed in stool through the course of infection, usually several days to several weeks, with a small percentage of cases excreting the organism for many months. Antibiotic use during the acute illness can prolong the carrier state.

### Clinical Illness

Non-typhoidal salmonellosis is characterized by diarrhea, nausea, headache, and sometimes vomiting. Fever is almost always present. Bloody diarrhea and invasive disease may occur, particularly with certain serotypes. Invasive infection may present as urinary tract infection, septicemia, abscess, arthritis, cholecystitis and rarely as endocarditis, pericarditis, meningitis, or pneumonia. A carrier state may develop.

*S. Paratyphi* can cause a milder systemic illness similar to typhoid fever including fever, anorexia, lethargy, and/or malaise.

## DEFINITIONS

### Clinical Case Definition

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

### Laboratory Confirmation

- Isolation of *Salmonella* (except *S. Typhi*)\* from a clinical specimen.
  - \**S. Typhi* is reportable as Typhoid Fever

### Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis. When available, O and H antigen serotype characterization should be reported.
- **Probable:** A clinically compatible case that is epidemiologically linked to a confirmed case, i.e., a close contact of a confirmed case or member of a risk group as defined by public health authorities during an outbreak.
- **Suspect:** A case with *Salmonella sp.* detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based).

Note: Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.

## SURVEILLANCE AND CASE INVESTIGATION

### Case Investigation

It is recommended that local and regional health departments investigate all reported cases of salmonellosis to identify potential sources of infection. Sporadic cases of salmonellosis do not require an investigation form be sent to DSHS EAIDB unless they are cases of *S. Paratyphi* infection or identified as part of a cluster or outbreak. Paratyphoid fever cases and any case associated with a cluster or outbreak should be interviewed.

### Case Investigation Checklist

- Confirm laboratory results meet the case definition.
- If an isolate has not been sent to the DSHS laboratory, encourage the laboratory to forward the isolate to the DSHS laboratory for serotyping and PFGE.
- Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- Paratyphoid Fever cases:** Interview paratyphoid fever cases, using the CDC Typhoid and Paratyphoid Fever Surveillance Report (available on the DSHS website: <http://www.dshs.state.tx.us/idcu/investigation/>) to record information from the interview.
- Salmonellosis cluster or outbreak cases:** Use the TXDSHS/CDC Hypothesis Generating Questionnaire or an outbreak specific form provided by DSHS EAIDB to interview salmonellosis cluster cases. See Managing Special Situations.
- Salmonellosis cases:** If time and resources allow, interview the case to identify potential sources of infection. Take a food history. Note brand and purchase or source information for high risk foods. Ask about potential exposures during at least the 5 days before onset including:

- Any contacts or household members with a similar illness. Obtain the name, phone number or address and clinical information of the ill person.
- Restaurant meals. Obtain the name of the restaurant, date and location of the meal, and food/drinks consumed.
- Public gathering where food was consumed. Obtain the date, location, sponsor of the event, and food/drinks consumed.
- Consumption of raw or undercooked meat, poultry, or eggs.
- Consumption of raw milk or other unpasteurized dairy products.
- Travel within and outside Texas or outside the United States, or contact with others who have traveled outside the United States. Determine dates of travel.
- Contact with reptiles or amphibians (snakes, lizards, turtles, frogs, etc.).
- Contact with pets, livestock, or other animals (including farms and petting zoos).
- Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and animal contact/handling precautions. See Prevention and Control Measures.
- Identify whether there is a public health concern: persons should not work as food handlers, child-care or health care workers, or attend child-care as long as they have diarrhea. See Exclusions.
- Fax completed forms for paratyphoid fever or cluster related cases to DSHS EAIDB at **512-776-7616** or email securely to an EAIDB foodborne epidemiologist.
  - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDB noting case is LTF.
- If case is part of an outbreak or cluster, see Managing Special Situations section.
- All confirmed, probable, and suspect case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

### Prevention and Control Measures

- Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After handling raw food, especially poultry and other raw meat products.
  - After any contact with an animal, their living area, or their food.
- Avoid consuming raw milk, unpasteurized dairy products, and undercooked eggs.
- Follow food safety principles in the kitchen, especially:
  - Cook meat thoroughly. Poultry should be cooked to an internal temperature of 165°F.
  - Prevent cross-contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after they touch raw meat.
  - Separate uncooked meats, hot dogs and other meat packaging from vegetables, uncooked food and ready to eat foods.
  - Keep the refrigerator at 40°F or lower and the freezer at 0°F or lower.

- Clean up all spills in your refrigerator right away—especially juices from raw meat, raw poultry, and hot dog and lunch meat packages.

## Exclusions

School/child-care: No exclusion specified for salmonellosis but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employees: Symptomatic food employees infected with non-typhoidal *Salmonella* are to be excluded from work. Asymptomatic food employees diagnosed with an infection from non-typhoidal *Salmonella* are to be restricted from work.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from non-typhoidal *Salmonella* based on test results showing two consecutive, negative stool specimen cultures. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics, if antibiotics were given.
- More than 30 days have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or
- The food employee did not develop symptoms and more than 30 days have passed since being diagnosed.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

## MANAGING SPECIAL SITUATIONS

### Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDB at **(800) 252-8239** or **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethn.	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/16	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/16	V, D, F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional salmonellosis cases.
- If isolates have not already been submitted to the DSHS laboratory for serotyping and PFGE, request hospital/clinical labs submit isolates for serotyping and PFGE testing. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
  - Policies on, and adherence to, hand hygiene
  - Storage and preparation of food
  - Procedures for changing diapers and toilet training
  - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

#### PFGE clusters:

- For clusters of cases with indistinguishable PFGE patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDB foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- Local/regional health departments with cases in their jurisdiction should:
  - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
    - Fax the completed questionnaire promptly within timeframe designated in the cluster notification to DSHS EAIDB at **512-776-7616** or e-mail securely to an EAIDB foodborne epidemiologist.
  - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDB to discuss further.
  - If an interview is unattainable or the case is lost to follow-up, fax the completed cover sheet and any case information to DSHS EAIDB.
- Local/regional health department with cases will be notified by the EAIDB foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:

- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDB foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

## REPORTING AND DATA ENTRY REQUIREMENTS

### Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and suspect cases are required to be reported **within 1 week** to the local or regional health department or the DSHS EAIDB at **(800) 252-8239 or (512) 776-7676**.

### Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed, probable, and suspect** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A person with non-typhoidal *Salmonella* sp. isolated 2 or more times should only be counted once as a case within a 365 day timeframe (regardless of calendar year) unless additional information is available indicating a separate infection, e.g., different serotype, different PFGE pattern, etc.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- If investigation forms are requested, they may be faxed to 512-776-7616 or emailed securely to an EAIDB foodborne epidemiologist.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDB at **512-776-7676**.
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Outbreaks as indicated above with patients in the same household.
  - Enter outbreaks into NORS online reporting system at <https://wwwn.cdc.gov/nors/login.aspx>
  - Forms, training materials, and other resources are available at <http://www.cdc.gov/nors/>
- To request a NORS account, please email [FoodborneTexas@dshs.state.tx.us](mailto:FoodborneTexas@dshs.state.tx.us)
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

## LABORATORY PROCEDURES

### CLINICAL SPECIMENS:

Submission of *Salmonella* isolates for serotyping and pulse-field gel electrophoresis (PFGE) is available through the DSHS Laboratory and is highly encouraged but not required.

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Salmonella* species. Contact an EAIDB foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

### Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8°C (*ice pack*) as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool ( <i>not preferred specimen</i> )	Accepted up to 30 days ( <i>ASAP for optimal recovery of bacterial pathogens</i> )	2-8°C ( <i>ice pack</i> )
Stool in transport solution/medium ( <i>preferred specimen</i> )	≤24 hours	Room Temp or 2-8°C ( <i>ice pack</i> )
Stool in transport solution/medium ( <i>preferred specimen</i> )	>24 hours but ≤3 days	2-8°C ( <i>ice pack</i> )
Stool in transport solution/medium ( <i>preferred specimen</i> )	>3 days	Freeze immediately at ≤-70°C. Ship on dry ice.

### Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check “Outbreak association” and write in name of outbreak.
- Payor source:
  - Check “IDEAS” to avoid bill for submitter

### Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday unless special arrangements have been pre-arranged with DSHS Laboratory.

- Ship specimens to:

Laboratory Services Section, MC-1947  
Texas Department of State Health Services  
Attn. Walter Douglass (512) 776-7569  
1100 West 49th Street  
Austin, TX 78756-3199

**Causes for Rejection:**

- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Specimen not in correct transport medium

**FOOD SAMPLES AND ENVIRONMENTAL SWABS:**

Testing of food and environmental swabs for *Salmonella* spp. is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDB foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian**

For further questions, please contact an EAIDB foodborne epidemiologist to discuss further.

## Salmonellosis, TABLE 1:

Guide to Salmonellosis, Paratyphoid Fever, Typhoid Fever Reporting and Surveillance Forms

<b><i>Salmonella</i> serotype</b>	<b>Reported in NEDSS as</b>	<b>Surveillance Form</b>
<i>Salmonella</i> Typhi	Typhoid Fever	CDC Typhoid and Paratyphoid Fever Surveillance Report requested
<i>Salmonella</i> Paratyphi A, B*, or C	Salmonellosis	CDC Typhoid and Paratyphoid Fever Surveillance Report requested
all other <i>Salmonella</i> serotypes	Salmonellosis	no CDC or DSHS form requested unless part of outbreak investigation

\**Salmonella* Paratyphi B var L(+) tartrate + (formerly var. Java) is associated with routine GI illness and is reported as Salmonellosis and no CDC or DSHS form is requested unless part of an outbreak investigation.

### UPDATES

- Updated the food employee Exclusion section to reflect the New Texas Food Establishment Rules (TFER) which went into effect on October 11, 2015 and now include non-typhoidal *Salmonella* with exclusion/restriction criteria.
- Added statement regarding only counting a case once per 365 days in the Reporting and Data Entry Requirements section.
- Expanded the NORS sub-section in the Reporting and Data Entry Requirements section to include the NORS outbreak definition and the types of outbreaks that should be reported in NORS.
- Expanded the Laboratory Procedures section to include additional information regarding the submission of raw stool and stool in transport medium for *Salmonella* spp. testing and to include the General Policy of testing food samples and environmental swabs for *Salmonella* spp.