

## SALMONELLOSIS (NONTYPHOIDAL)

### I. DESCRIPTION AND EPIDEMIOLOGY

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#### A. Overview

Salmonellosis refers to illness caused by *Salmonella* bacteria, which are gram-negative bacilli belonging to the *Enterobacteriaceae* family. Nearly all *Salmonella* species causing human illness are serotypes of *S. enterica* subspecies *enterica*. Of the approximately 2,000 *S. enterica* serotypes that cause human illness, the most common in the United States are Typhimurium, Enteritidis, and Newport. For surveillance and public health response, *Salmonella* infections are divided into two main categories: 1) nontyphoidal salmonellosis and 2) *Salmonella* Typhi and Paratyphi infections (also known as typhoid fever and paratyphoid fever). This chapter focuses on nontyphoidal salmonellosis which most commonly causes acute gastroenteritis. The reservoirs for nontyphoidal *Salmonella* bacteria are domestic and wild animals, mainly poultry, livestock, reptiles, and pets. Humans can also be sources of infection.

#### B. Salmonellosis in California

Approximately 5,000 laboratory-confirmed cases of salmonellosis are reported per year in California. Most salmonellosis cases are sporadic rather than outbreak-associated. In recent years, California patients have been involved in *Salmonella* outbreaks due to contaminated eggs, poultry, peanut butter, ground beef, and a variety of fresh produce, including onions, cucumbers, coconut, papayas, and mangoes. Non-food vehicles, such as turtles, live poultry, bearded dragon lizards, and pig ear dog treats, have also caused widespread illness outbreaks.

#### C. Symptoms

The most common illness associated with nontyphoidal *Salmonella* infection is acute gastroenteritis with diarrhea, abdominal pain, fever, and vomiting. Gastroenteritis symptoms usually last 3 to 5 days, and most people recover without treatment. Asymptomatic infections may also occur. Although rare, *Salmonella* can spread to the blood (bacteremia) leading to sepsis or other extraintestinal infections (such as meningitis or osteomyelitis). Reactive arthritis may also occur as a rare complication.

#### D. Transmission

Salmonellosis is most often transmitted through the ingestion of food derived from infected animals or food contaminated by feces of an infected animal or person. This largely occurs through raw and improperly handled or cooked food of animal origin such as meat, poultry, and eggs. Transmission may also occur through the consumption of contaminated produce and ready-to-eat foods such as peanut butter and bakery products. Exposure to infected animals, including reptiles (e.g., snakes, lizards, and turtles), amphibians (e.g., frogs), and petting zoo animals, has also resulted in

salmonellosis. Person-to-person fecal-oral transmission may occur, especially when diarrhea is present and hands are not washed adequately.

The risk of transmission exists for the duration of fecal excretion of organisms and can last from days to weeks. A temporary carrier state can continue for several months, especially in children younger than 5 years of age. Approximately one percent of patients continue to excrete *Salmonella* for over a year and are considered chronic carriers.

### E. Incubation Period

The incubation period is generally 12 to 36 hours though it can be as short as 6 hours or longer than 2 weeks.

### F. Clinical Management

Clinical management decisions, including attempts to treat chronic carriers, should generally be made by the patient's primary care physician or infectious disease specialist.

## II. COUNCIL OF STATE AND TERRITORIAL EPIDEMIOLOGISTS (CSTE) SURVEILLANCE CASE DEFINITION (2017)

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The CSTE case definition can be found on the [CDC Surveillance Case Definitions website](https://ndc.services.cdc.gov/case-definitions/salmonellosis-2017/) (<https://ndc.services.cdc.gov/case-definitions/salmonellosis-2017/>).

### CSTE Position Statement

[16-ID-03](https://cdn.ymaws.com/www.cste.org/resource/resmgr/2016PS/16_ID_03.pdf) ([https://cdn.ymaws.com/www.cste.org/resource/resmgr/2016PS/16\\_ID\\_03.pdf](https://cdn.ymaws.com/www.cste.org/resource/resmgr/2016PS/16_ID_03.pdf))

### 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.

### Laboratory Criteria for Diagnosis

*Supportive laboratory evidence:* Detection of *Salmonella* spp. in a clinical specimen using a culture-independent diagnostic test (CIDT).

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

### Epidemiologic Linkage

*Probable:* A clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

## Case Classification

*Confirmed:* A case that meets the confirmed laboratory criteria for diagnosis.

*Probable:*

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

Please refer to [Appendix A: \*Salmonella\* \(Nontyphoidal\) Infections Diagram](#) for CDPH Case Classification and Reporting.

## Criteria to Distinguish a New Case from an Existing Case

A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual.

When two or more different serotypes are identified from one or more specimens from the same individual, each should be reported as a separate case.

## Comment

The use of CIDTs as stand-alone tests for the direct detection of *Salmonella* in stool is increasing. Specific performance characteristics such as sensitivity, specificity, and positive predictive value of these assays likely depend on the manufacturer and are currently unknown. It is therefore useful to collect information on the type(s) of testing performed for reported salmonellosis cases. When a specimen is positive using a CIDT it is also helpful to collect information on all culture results for the specimen, even if those results are negative. Culture confirmation of CIDT-positive specimens is ideal, although it might not be practical in all instances. State and local public health agencies should make efforts to encourage reflexive culturing by clinical laboratories that adopt culture-independent methods, should facilitate submission of isolates/clinical material to public health laboratories, and should be prepared to perform reflexive culture when not performed at the clinical laboratory as isolates are currently necessary for molecular typing (whole genome sequencing) that are essential for outbreak detection.

## III. CASE SURVEILLANCE, INVESTIGATION, AND REPORTING

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### A. Purpose of Reporting and Surveillance

- To identify *Salmonella* outbreaks, recognize food vehicles, and interrupt potential sources of ongoing transmission.
- To detect new and emerging *Salmonella* serotypes and genetic patterns, and monitor epidemiologic trends.

- To better understand the epidemiology of salmonellosis in California, and to develop targeted interventions to decrease rates of illness.
- To educate people about how to reduce their risk of *Salmonella* infection.

## B. Local Health Department (LHD) General Investigation Guidelines

- Clinical laboratories and healthcare providers are required to report *Salmonella* infections by electronic transmission, fax, telephone, or mail within one working day of identification. This includes infections that are detected through a CIDT. Begin investigation as soon as *Salmonella* is reported from a clinical laboratory or healthcare provider.
- The sooner a patient is interviewed, the better the recall of food and other exposures. While most *Salmonella* infections are sporadic, approximately 20 percent of cases in California that have undergone strain typing will be part of a recognized cluster. Most multi-jurisdictional clusters are identified through whole genome sequencing (WGS), a molecular subtyping technique. Unfortunately, because of inherent delays in the current system, an isolate is often identified as part of the cluster several weeks after the presumed exposure has occurred. In order to improve the likelihood of determining the vehicle of an outbreak, it is helpful to try to get as much information as possible in the initial interview, and to document any activities which may help prompt recall later (such as a party or other significant event, or daily food diary in the week prior to illness onset).
- Patients may be interviewed using the CDPH Salmonellosis Case Report Form (see [III. C. LHD Reporting](#)), or a protocol developed by your local health department. Please ask about exposures during the 7 days prior to illness onset. Note that this is most appropriate when patients present with gastroenteritis or a systemic infection, such as bacteremia. If a patient has a urinary tract infection or asymptomatic shedding, for example, the date of exposure may not necessarily be a week prior to diagnosis. In those situations, use your judgment to determine if an exposure history is necessary (for example, in the setting of a point-source outbreak).
- Inform the patient about the possibility of follow up calls for additional information, especially if the patient is later identified to be part of a cluster or outbreak.
- Determine if the patient is in a sensitive occupation, such as food handling or direct care of persons in healthcare facilities (see [IV. A. Management of Cases](#) and [CACDC Enteric Disease Matrix](#) for guidance). Administer appropriate infection control recommendations.
- If the patient appears to be part of a point-source outbreak, follow your protocol for foodborne outbreak investigations. This should include notifying CDPH about the outbreak (see below).
- All patients should be educated about disease transmission and appropriate risk reduction measures.

- If you require assistance with your investigation, call the CDPH Infectious Diseases Branch (IDB) Disease Investigations Section (DIS) at 510-620-3434. Please also see the [CDPH Salmonellosis Information for Local Health Departments webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/SalmonellosisLHDs.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/SalmonellosisLHDs.aspx>)
- Ensure that the *Salmonella* isolate is forwarded to the CDPH Microbial Diseases Laboratory (MDL) for serotyping and possible molecular subtyping (see [III. D. CDPH MDL Resources](#)). Molecular subtyping is also done at select local public health laboratories throughout the state.

### C. LHD Reporting

#### LHD Reporting Overview

Nontyphoidal salmonellosis has been a nationally notifiable disease condition since 1944. Confirmed and probable salmonellosis cases must be reported to CDPH. See Table on page 8 for the summary of reporting guidelines for salmonellosis. Provisional counts of confirmed and probable salmonellosis cases are transmitted weekly to the CDC National Notifiable Disease Surveillance System (NNDSS), regardless of the CalREDIE process status. However, a confirmed or probable case is included in the [CDC Annual Tables of Nationally Notifiable Infectious Diseases and Conditions](https://wonder.cdc.gov/nndss/nndss_annual_tables_menu.asp) ([https://wonder.cdc.gov/nndss/nndss\\_annual\\_tables\\_menu.asp](https://wonder.cdc.gov/nndss/nndss_annual_tables_menu.asp)) only after it is closed at the local level.

Please refer to [Appendix A: \*Salmonella\* \(Nontyphoidal\) Infections Diagram for CDPH Case Classification and Reporting](#).

Salmonellosis is not a case report form (CRF)-required condition. However, the use of the state Salmonellosis CRF (either CalREDIE tabs or corresponding PDF form CDPH 8640) is encouraged, as this would allow for the standardized collection of risk exposures and rapid comparison between jurisdictions if needed. CDPH 8640 is available in the CalREDIE Document Repository under the CDPH tab of the ribbon in the CalREDIE application.

#### Instructions for CalREDIE-Participating LHDs

- Enter the patient information into CalREDIE upon notification of the case by the clinical laboratory or health care provider. Select “**Salmonellosis (Nontyphoidal)**” as “Disease Being Reported”. Please enter isolate and serotype information on the Laboratory Info tab when available. Although electronic lab report (ELR) results are available in the ‘Laboratory Information w/Provider & Facility (system)’ sections, it can be helpful to enter results in the ‘Laboratory Testing Results’ section as it will help with interpretation of results, downloading of data from the CalREDIE Data Distribution Portal (DDP), and future analyses.
- When two or more different *Salmonella* serotypes are identified from one or more specimens from the same individual, each should be counted as a separate

case. This is true regardless of the timing of the specimen collection. If the incubation (exposure) period is the same for each serotype identified, multiple CalREDIE incidents do not need to be created. Please enter in information for each serotype by clicking on the “Add” button at the bottom of the section. Then enter collection date, specimen type, culture and CIDT results, and serotype information.

Instructions for LHDs not participating in CalREDIE (referred to as extended data exchange jurisdictions, or EDEJ)

- For EDEJs, confidential morbidity report (CMR) and case report data must still be provided.
- Reporting case data using the Salmonellosis CRF (CDPH 8640) is encouraged.
- The EDEJ may contact IDB (510-620-3434) for the CDPH 8640 if needed.
- When two or more different *Salmonella* serotypes are identified from one or more specimens from the same individual, each should be reported as a separate case. This is true regardless of the timing of the specimen collection. If the incubation (exposure) period is the same for each serotype identified, risk factors need to be collected and entered into CDPH 8640 only once.

Reporting *Salmonella* Outbreaks and Clusters

- Suspected *Salmonella* outbreaks, including point-source outbreaks and WGS clusters within your jurisdiction, should be reported immediately to CDPH.
  - *CalREDIE-participating LHDs*: Create a new outbreak in CalREDIE. From the dropdown list for “Disease”, select the appropriate disease category such as “GI, Foodborne”, “GI, Waterborne”, “GI, Other/Unknown”, etc.
  - *EDEJs*: Notify IDB DIS by telephone (510-620-3434). For foodborne outbreaks, complete the Foodborne Disease Outbreak Report Form (CDPH 8567) and send to the IDB Surveillance and Statistics Section (address on form).

Special Considerations

The use of CIDT, which identifies pathogens through laboratory methods other than culture, is increasingly common. CIDTs include PCR-amplified, antigen-based and/or multi-analyte panel tests that are often ordered based on a clinical syndrome rather than a specific suspected pathogen. The accuracy of CIDT varies depending on the organism and the test used, but is generally considered highly sensitive and specific. Since January 2017, CSTE has defined *Salmonella* detected through CIDT as a probable case, which will be counted towards the year-end case count for *Salmonella* by CDC and CDPH. Note that a positive CIDT result will be considered probable, even if subsequent culture of the specimen is negative. CIDT-positive patients should be investigated by the local health jurisdiction as any other probable or confirmed

salmonellosis case. Please refer to [Appendix A: Salmonella \(Nontyphoidal\) Infections Diagram](#) for CDPH Case Classification and Reporting.

Although many reptiles are reservoirs for *Salmonella* bacteria, small turtles are especially risky and have been linked to many salmonellosis outbreaks. Since 1975, the U.S. Food and Drug Administration has banned the sale of turtles with shell lengths less than four inches. However, small turtles are still illegally sold by street vendors, flea markets, pet stores, and souvenir shops. California also has regulations that limit the sale of turtles, regulate how they are sold, establish authority to test and destroy infected turtles, and limit the places where turtles may be kept (see [V. B. California Code of Regulations, Title 17, Public Health, Section 2612.1](#)).

*Salmonella* Typhi and *Salmonella* Paratyphi infection (also known as typhoid fever and paratyphoid fever) are similar systemic diseases caused by *Salmonella* Typhi and Paratyphi respectively; however, they have different reporting requirements from nontyphoidal salmonellosis. Please see the table on page 8 for reporting details.

- S. Typhi Infections: Only illness caused by S. Typhi is nationally reportable as S. Typhi infection. EDEJs should complete the CDPH S. Typhi and S. Paratyphi Infection CRF (CDPH 8586, contact IDB DIS for the form if needed).
- S. Paratyphi Infections: Illnesses caused by S. Paratyphi A, S. Paratyphi B tartrate **negative**, and S. Paratyphi C should be reported in CalREDIE as S. Paratyphi Infection. EDEJs should complete the CDPH S. Typhi and S. Paratyphi Infection CRF (CDPH 8586, contact IDB DIS for the form if needed). S. Paratyphi infection (paratyphoid fever) is not covered under the same statute as S. Typhi infection (typhoid fever) and may be managed as nontyphoidal salmonellosis in terms of the management of case and contacts.
  - Of note, S. Paratyphi B tartrate **positive** does not cause paratyphoid fever and should be reported and managed as nontyphoidal *Salmonella*.

**Table: Reporting S. Typhi, S. Paratyphi, Nontyphoidal Salmonellosis, and Salmonellosis Outbreaks to CDPH.**

Disease ( <i>Salmonella</i> Serotype)	CalREDIE Jurisdictions	Extended Data Exchange Jurisdictions
<b>S. Typhi Infections</b> <ul style="list-style-type: none"> <li>• S. Typhi</li> </ul>	Create CalREDIE incident, selecting “ <b>S. Typhi infection</b> ” as “Disease Being Reported”	Submit and complete the Confidential Morbidity Report and S. Typhi and S. Paratyphi Infection Case Report (required)
<b>S. Paratyphi Infections</b> <ul style="list-style-type: none"> <li>• S. Paratyphi A</li> <li>• S. Paratyphi B tartrate <b>negative</b></li> <li>• S. Paratyphi C</li> </ul>	Create CalREDIE incident, selecting “ <b>S. Paratyphi infection</b> ” as “Disease Being Reported”	Submit and complete the Confidential Morbidity Report and S. Typhi and S. Paratyphi Infection Case Report (required)
<b>Nontyphoidal Salmonellosis</b> <ul style="list-style-type: none"> <li>• S. Paratyphi B tartrate <b>positive</b></li> <li>• All other <i>Salmonella</i> serotypes NOT listed for S. Typhi and S. Paratyphi infections.</li> </ul>	Create CalREDIE incident, selecting “ <b>Salmonellosis (Nontyphoidal)</b> ” as “Disease Being Reported”	Complete and submit the Confidential Morbidity Report (required) and complete the Salmonellosis Case Report form (recommended)
<b>Salmonellosis Outbreaks</b> <ul style="list-style-type: none"> <li>• All <i>Salmonella</i> serotypes</li> </ul>	Create an outbreak in CalREDIE. Select the appropriate disease category such as “GI, Foodborne”, “GI, Waterborne”, etc.	Notify IDB DIS; complete the appropriate CDPH outbreak report form when investigation is completed (required)

**D. Laboratory Considerations/ Microbial Diseases Laboratory (MDL) and Food and Drug Laboratory Branch (FDLB) Resources**

CDPH MDL Resources

The diagnosis of salmonellosis is made by the identification of *Salmonella* in a clinical specimen, most commonly stool, but can include extraintestinal sites such as blood, urine, wound, and cerebrospinal fluid. By California Title 17 regulations (see [V. Applicable State Statutes](#)), clinical laboratories are required to send *Salmonella*

isolates to a public health laboratory. In addition, in June 2016, CDPH revised the isolate and submission section of Title 17, 2505 to require clinical laboratories to attempt to obtain a bacterial culture isolate for certain diseases. This includes specimens that are CIDT-positive for *Salmonella*. The local public health laboratories, with a few exceptions, forward isolates to MDL for serotyping. Note that MDL will provide results to the local public health laboratory or clinical laboratory that submitted the specimen. It is the local laboratory's responsibility to ensure that the results are then communicated to the communicable disease control office of the patient's jurisdiction of residence. Questions on MDL *Salmonella* testing services can be emailed to [MDL.Submissions@cdph.ca.gov](mailto:MDL.Submissions@cdph.ca.gov).

- Serotyping: By California state statute, all local public health laboratories must submit *Salmonella* isolates to MDL for serotyping, with Department-approved exceptions. MDL performs both traditional agglutination-based serotyping and genome-based serotyping which uses WGS to determine the serotype. While WGS-based serotyping is performed on isolates from all sources, traditional serotyping is primarily performed on isolates from blood sources only. A *Salmonella* serotyping testing and reporting summary for MDL is included in [Appendix B](#).
- WGS: MDL will conduct WGS testing on all *Salmonella* isolate submissions that meet test criteria (e.g., pure isolates; non-duplicate isolates (see [Appendix B](#)). The sequences are entered into a national database, called [PulseNet](#), and compared to other isolates in the database using core-genome Multilocus Sequence Typing (cgMLST). If a cluster of isolates with closely related sequences are detected, MDL will notify IDB DIS epidemiologists who will notify the communicable disease control staff of the patient's jurisdiction of residence. Pulsed-field gel electrophoresis was discontinued as of July 2019.
- Antimicrobial Susceptibility Testing (AST): MDL does not conduct AST on *Salmonella*. Representative *Salmonella* isolates that are part of clusters are sent to the CDC National Antimicrobial Resistance Monitoring System (NARMS) for AST. CDC NARMS also monitors predicted antimicrobial resistance based on genomic sequences uploaded to PulseNet.

### CDPH FDLB Resources

FDLB will conduct culture and WGS testing on select *Salmonella* isolates from food, animal, and environmental samples submitted to FDLB and upon request from local, state, and/or federal partners. FDLB testing is generally reserved for cluster investigations, and not for sporadic cases. However, consideration will be given on a case-by-case basis. Questions should be directed to a IDB DIS foodborne epidemiologist at 510-620-3434.

## IV. MANAGEMENT AND CONTROL MEASURES

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### A. Management of Cases

All patients with salmonellosis should be educated regarding disease transmission and appropriate infection control measures. Patient educational materials, including guidelines for safe food handling, as well as decreasing risk of salmonellosis from chicks, ducklings, turtles, reptiles, and other animals are available on the [CDPH Salmonellosis webpage](https://www.cdph.ca.gov/Programs/CID/CDC/Pages/Salmonellosis.aspx) (<https://www.cdph.ca.gov/Programs/CID/CDC/Pages/Salmonellosis.aspx>).

The California Code of Regulations, Title 17 (2612) specifies exclusion criteria for foodhandlers, childcare or eldercare workers, and healthcare workers with nontyphoidal salmonellosis, either symptomatic or asymptomatic: "... no patient shall be released from supervision to engage in any occupation involving the preparation, serving or handling of food, including milk, to be consumed by individuals other than his immediate family, nor to engage in any occupation involving the direct care of children or of the elderly or of patients in hospitals or other institutional settings until two successive authentic specimens of feces taken at intervals of not less than 24 hours, beginning at least 48 hours after cessation of specific therapy, if any was administered, have been determined, by a public health laboratory approved by the State Department of Health Services to be negative for *Salmonella* organisms." See [V. Applicable State Statutes](#) for complete language.

Additionally, the California Association of Communicable Diseases Controllers (CACDC) has proposed the following guideline for children in group setting, which is not bound by state statute (and therefore left to the discretion of the Health Officer):

- For children 5 years and younger in a group setting (e.g., day care): Restrict/exclude until 2 consecutive stool specimens, taken at least 48 hours after antibiotics are stopped and at least 24 hours apart, are negative. Alternatively, the child may return to a group setting when asymptomatic for at least 24 hours, and LHD monitors for transmission in the setting.

For additional information, see the [CACDC Enteric Disease Matrix](https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CACDC-Enteric-Disease-Matrix-2016-2017.pdf) (password protected) (<https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CACDC-Enteric-Disease-Matrix-2016-2017.pdf>).

### B. Management of Contacts

There are no specific applicable codes guiding the management of contacts.

CACDC has proposed the following guidelines for the management of contacts to confirmed *Salmonella* patients, which are not bound by state statute (and therefore, is left to the discretion of the Health Officer). See [CACDC Enteric Disease Matrix](#) for details.

- For a symptomatic contact in a sensitive occupation: Restrict/exclude until two consecutive stool specimens, taken at least 48 hours after antibiotics are stopped and at least 24 hours apart, are negative.
- For an asymptomatic contact in a sensitive occupation: No restriction is needed, though consider one stool specimen (and follow as a case if positive).
- For a child 5 years and younger in a group setting who is a contact to a confirmed case and is symptomatic: Restrict/exclude until two consecutive stool specimens, taken at least 48 hours after antibiotics are stopped and at least 24 hours apart, are negative.
- For a child 5 years and younger in a group setting who is a contact to a confirmed case and is NOT symptomatic: No restriction is needed. However, consider collecting one stool specimen if an outbreak is suspected; if negative, release, and if positive, investigate as a case.

### C. Infection Control Measures

Environmental inspection is indicated if a commercial food service facility (e.g., restaurant), child care center, or public drinking water supply is suspected as the source of infection.

Hospitalized patients should be cared for using standard precautions. Contact precautions should be used for diapered or incontinent persons for the duration of the illness to control institutional outbreaks.

The patient should be educated regarding effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. The importance of proper hygiene must be stressed, as excretion of the organism may persist for several weeks. Patient education resources can be found in [VI. Additional Resources](#).

## V. APPLICABLE STATE STATUTES

### A. California Code of Regulations, Title 17, Public Health, Section 2612:

[\*Salmonella Infections \(Other Than Typhoid Fever\)\*](#)

(<https://govt.westlaw.com/calregs/Document/IA6B6E4A35A2011EC8227000D3A7C4BC3>)

(a) Any illness in which organisms of the genus *Salmonella* (except the typhoid bacillus) have been isolated from feces, blood, urine or pathological material shall be reported as a *Salmonella* infection. A culture of the organisms on which the diagnosis is established shall be submitted first to a local public health laboratory and then to the State Microbial Diseases Laboratory for definitive identification. The period of isolation in accordance with Section 2518 shall be until clinical recovery. The patient shall be subject to supervision by the local health officer who may require, at his discretion, release specimens of feces for testing in a laboratory approved by the State Department of

Health Services. However, no patient shall be released from supervision to engage in any occupation involving the preparation, serving or handling of food, including milk, to be consumed by individuals other than his immediate family, nor to engage in any occupation involving the direct care of children or of the elderly or of patients in hospitals or other institutional settings until two successive authentic specimens of feces taken at intervals of not less than 24 hours, beginning at least 48 hours after cessation of specific therapy, if any was administered, have been determined, by a public health laboratory approved by the State Department of Health Services to be negative for *Salmonella* organisms. (See Section 2534.) (b) Carriers. Any person who harbors *Salmonella* organisms three months after onset is defined as a convalescent carrier and may be restricted at the discretion of the local health officer. Any person continuing to harbor *Salmonella* organisms one year after onset is a chronic carrier. Any person who gives no history of having had Salmonellosis or who had the illness more than one year previously who is found to harbor *Salmonella* organisms on two successive specimens taken not less than 48 hours apart is also considered to be a chronic carrier. Chronic carriers of *Salmonella*, other than *S. typhoid*, shall be restricted at the discretion of the local health officer. (c) Contacts. Restrictions on contacts shall be at the discretion of the local health officer.

**B. California Code of Regulations, Title 17, Public Health, Section 2612.1:**

[Turtle Salmonellosis](https://govt.westlaw.com/calregs/Document/IA6BF70235A2011EC8227000D3A7C4BC3)

(<https://govt.westlaw.com/calregs/Document/IA6BF70235A2011EC8227000D3A7C4BC3>)

(a) Except as otherwise provided in this section, it shall be unlawful to import, sell or offer for sale or distribution to the public any live turtle(s) with a carapace length of less than 4 inches.

(b) The Department or any authorized representative thereof, or any local health officer or his representative may order the humane destruction of any turtle(s) that are unlawful to import, sell or offer for sale or distribution to the public under subsection (a) above.

(c) The Department or any authorized representative thereof, or any local health officer or his representative may quarantine turtles, take samples of tank water or any other appropriate samples of or from turtles offered for sale or distribution for the purpose of testing for *Salmonella* and Arizona organisms. The Department or any local health officer may order the immediate humane destruction of any lot of turtles found contaminated with *Salmonella*, Arizona, or other organisms which may cause or have caused disease in humans.

(d) Shipments of turtles under 4 inches in carapace length are permitted to a governmental agency, or to a recognized research or educational institution for research or teaching purposes or to a zoological garden for display.

(e) The following warning shall be posted conspicuously for buyer information at every display of turtles for retail sale or distribution or where the public may come in contact with turtles:

CAUTION: Turtles may transmit bacteria causing disease in humans. It is important to wash the hands thoroughly after handling turtles or material that had contact with

turtles. Do not allow water or any other substance that had contact with turtles to come in contact with food or areas where food is prepared. Make sure that these precautions are followed by children and others handling turtles.

(f) For each sale of turtle(s) at retail, a sales slip shall be issued by the seller to the purchaser at time of the sale. The sales slip shall include the name, address and telephone number of the purchaser and the seller, and the date of sale. The sales slip shall have printed legibly on its front the warning statement contained in subsection (e) above. The seller shall keep a copy of the sales slip, which shall include the name, address and telephone number of the purchaser for not less than one year, and keep a complete record of all purchases, losses and other dispositions of turtles.

Note: Authority cited: Sections 102 and 208, Health and Safety Code. Reference: Sections 205, 3051-3053, Health and Safety Code

**C. California Code of Regulations, Title 17, Public Health, Section 2505 (m):**

(m) An isolate or a specimen as listed in this subsection shall be submitted as soon as available to the public health laboratory designated in Section 1075 for the local health jurisdiction where the patient resides. The following information shall be submitted with the isolate or specimen: the name, address, and the date of birth of the person from whom the isolate or specimen was obtained, the patient identification number, the isolate or specimen accession number or other unique identifier, the date the isolate or specimen was obtained from the patient, the name, address, and telephone number of the health care provider for whom such examination or test was performed, and the name, address, telephone number and the laboratory director's name of the laboratory submitting the isolate or specimen.

(2) The isolates pursuant to the reporting requirements in (m) are:

- ..... *Salmonella* isolates (see section 2612 for additional reporting requirements)

(3) If there is a laboratory test result indicating infection with any one of the pathogens listed in (m)(2), then the laboratory must attempt to obtain a bacterial culture isolate for submission to the public health laboratory in accordance with (m)(2). This requirement includes identification of Shiga toxin in a clinical specimen, but does not include latent tuberculosis infection identified by a positive laboratory test. The laboratory shall take steps necessary to obtain an isolate, including requesting that additional specimens be collected and sending specimens to a laboratory able to carry out bacterial culture as soon as possible.

For complete language, see the [CDPH IDB Surveillance and Statistics Section webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/SSS.aspx#) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/SSS.aspx#>).

## D. California Health and Safety Codes

[California Retail Food Code – Management and Personnel – Employee Health](https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=104.&title=&part=7.&chapter=3.&article=3)  
([https://leginfo.ca.gov/faces/codes\\_displayText.xhtml?lawCode=HSC&division=104.&title=&part=7.&chapter=3.&article=3](https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=104.&title=&part=7.&chapter=3.&article=3))

### [Section 113949.1](#)

It is the intent of the Legislature to reduce the likelihood of foodborne disease transmission by preventing any food employee who is suffering from symptoms associated with an acute gastrointestinal illness, or known to be infected with a communicable disease that is transmissible through food, from engaging in the handling of food until the food employee is determined to be free of that illness or disease, or incapable of transmitting the illness or disease through food as specified in this article.

Section 113949.1(a) When a local health officer is notified of an illness that can be transmitted by food in a food facility or by an employee of a food facility, the local health officer shall inform the local enforcement agency. The local health officer or the local enforcement agency, or both, shall notify the person in charge of the food facility and shall investigate conditions and may, after the investigation, take appropriate action, and for reasonable cause, require any or all of the following measures to be taken.....Section 113949.1(b) For purposes of this section, “illness” means a condition caused by any of the following infectious agents... *Salmonella spp*...

### [Section 113949.2](#)

The owner who has a food safety certificate issued pursuant to Section 113947.1 or the food employee who has this food safety certificate shall instruct all food employees regarding the relationship between personal hygiene and food safety, including the association of hand contact, personal habits and behaviors, and food employee health to foodborne illness. The owner or food safety certified employee shall require food employees to report the following to the person in charge: (a) If a food employee is diagnosed with an illness due to one of the following... *Salmonella spp*....

## VI. ADDITIONAL RESOURCES

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### A. Food Safety

Detailed food handling guidelines may be found at:

- [USDA Foodborne Illness and Disease website](https://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/foodborne-illness-and-disease)  
(<https://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/foodborne-illness-and-disease>)
- [U.S. Food & Drug Administration Safe Food Handling webpage](https://www.fda.gov/food/buy-store-serve-safe-food/safe-food-handling)  
(<https://www.fda.gov/food/buy-store-serve-safe-food/safe-food-handling>)

## B. Patient Education

- [CDPH Salmonellosis webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Salmonellosis.aspx)  
(<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Salmonellosis.aspx>)
- [CDC Salmonella website](https://www.cdc.gov/salmonella/) (<https://www.cdc.gov/salmonella/>)
- [CDC Food Safety Educational Materials and Videos](https://www.cdc.gov/food-safety/communication-resources/index.html) (<https://www.cdc.gov/food-safety/communication-resources/index.html>)

## C. References

- [CDPH Salmonellosis Information for Local Health Departments webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/SalmonellosisLHDs.aspx)  
(<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/SalmonellosisLHDs.aspx>)
- *Control of Communicable Diseases Manual, 20<sup>th</sup> Edition*. Washington, DC, American Public Health Association, 2015
- [CIFOR \(Council to Improve Foodborne Outbreak Response\) Guidelines](https://cifor.us/products/toolkit)  
(<https://cifor.us/products/toolkit>)
- [Foodborne Pathogenic Microorganisms and Natural Toxins Handbook \(The Bad Bug Book\) 2<sup>nd</sup> Edition:](http://www.fda.gov/Food/FoodbornellnessContaminants/CausesOfIllnessBadBugBook/)  
(<http://www.fda.gov/Food/FoodbornellnessContaminants/CausesOfIllnessBadBugBook/>)
- [Red Book Online. Salmonellosis](https://publications.aap.org/aapbooks/book/663/Red-Book-2021-Report-of-the-Committee-on)  
(<https://publications.aap.org/aapbooks/book/663/Red-Book-2021-Report-of-the-Committee-on>)
- [CDC National Antimicrobial Resistance Monitoring System for Enteric Bacteria \(NARMS\) webpage](https://www.cdc.gov/narms/index.html)  
(<https://www.cdc.gov/narms/index.html>)

## VII. UPDATES

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- Original version finalized and completed on November 12, 2015.
- August 15, 2017: Section II, CSTE Surveillance Case Definition has been updated to reflect the 2016 definitions which incorporates CIDT. MDL resources for WGS have been included. Links to the CDPH forms page have been updated.
- March 13, 2020: Updated the laboratory section to reflect the exclusive use of WGS; corrected website links; minor formatting and content updates.
- August 21, 2024: Updated the laboratory section to reflect updates to MDL testing and reporting process; added appendices A and B; corrected website links; minor formatting and content updates.

VIII. SUMMARY OF ACTION STEPS: SALMONELLOSIS (NON-TYPHOIDAL)

Action	Specific Steps
<input type="checkbox"/> Begin investigation as soon as <i>Salmonella</i> is reported from a clinical laboratory or healthcare provider	<ul style="list-style-type: none"> <li>• Review information in CDPH IDB Guidance, and other resources as needed.</li> <li>• Obtain and review clinical documentation, medical records, and lab reports as applicable.</li> <li>• Contact patient for interview.</li> </ul>
<input type="checkbox"/> Confirm case definition	<ul style="list-style-type: none"> <li>• To count as a confirmed case, only laboratory confirmation that <i>Salmonella</i> has been isolated from a human specimen is needed. The specimen site can be sterile (such as blood) or unsterile (such as stool). <i>Salmonella</i> identified by non-culture testing methods is considered to be a probable case. Clinically compatible illness is not necessary.</li> <li>• Nontyphoidal salmonellosis includes <i>S. Paratyphi B</i> tartrate <b>positive</b>, but NOT <i>S. Paratyphi A, B</i> tartrate <b>negative</b>, or <i>C</i>.</li> <li>• Please refer to <a href="#">Appendix A: Salmonella (Nontyphoidal) Infections Diagram for CDPH Case Classification and Reporting</a>.</li> </ul>
<input type="checkbox"/> Attempt to identify source of exposure	<ul style="list-style-type: none"> <li>• Use the state Salmonellosis CRF (either CalREDIE tabs or corresponding PDF form CDPH 8640) to guide your interview, or use the protocol set by your local health department.</li> <li>• Include as many details that may later trigger memory, such as parties or special events, and inform patient that they may be contacted again.</li> <li>• If patient appears to be part of an outbreak, follow your protocol for foodborne outbreak investigations; this should include notifying CDPH about the outbreak. Suspected <i>Salmonella</i> outbreaks, including point-source outbreaks and WGS clusters within your jurisdiction, should be reported immediately to CDPH.</li> </ul>

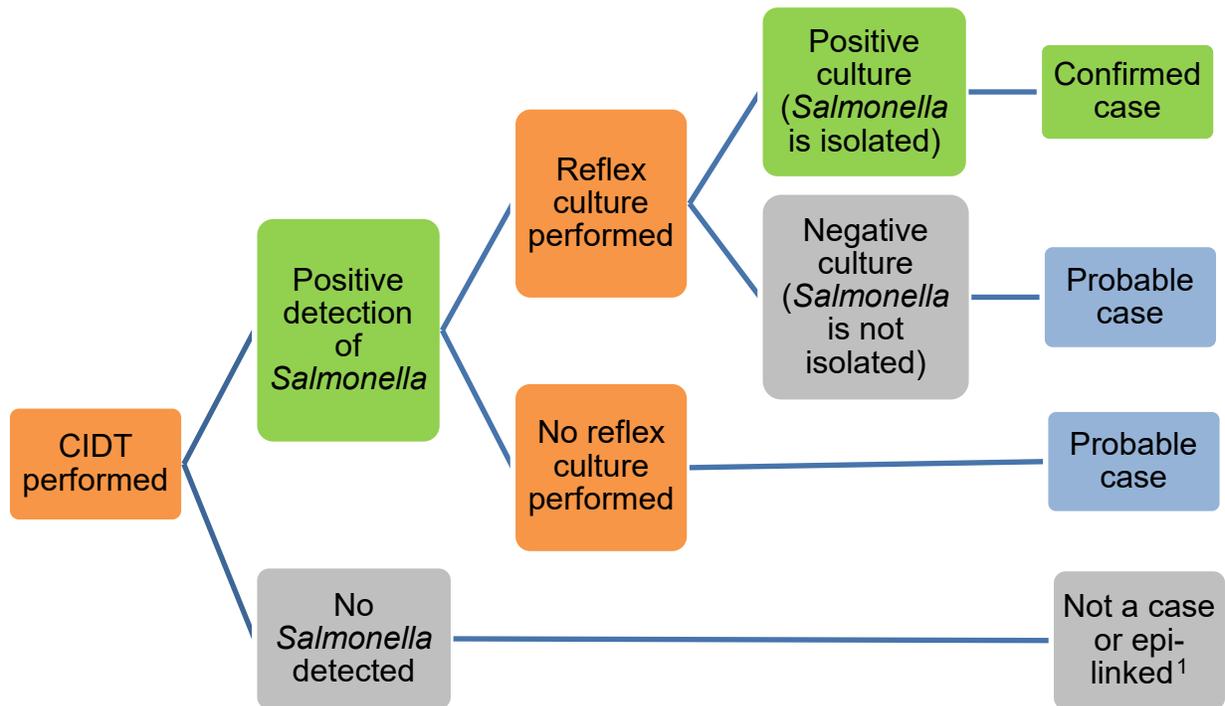
Action	Specific Steps
<input type="checkbox"/> Implement control measures	<ul style="list-style-type: none"> <li>• Determine if the patient is in a sensitive occupation; administer appropriate infection control recommendations. See CACDC Enteric Disease Matrix. Restriction of those in SOS is mandated per CCR.</li> </ul>
<input type="checkbox"/> Confirm status of <i>Salmonella</i> isolate	<ul style="list-style-type: none"> <li>• Ensure that the <i>Salmonella</i> isolate is forwarded to MDL or other reference public health laboratory for serotyping and/or WGS.</li> </ul>
<input type="checkbox"/> Report to CDPH; confirmed and probable salmonellosis cases must be reported	<ul style="list-style-type: none"> <li>• Create CalREDIE incident, selecting “<b>Salmonellosis (Nontyphoidal)</b>” as “Disease Being Reported”. Update serotype information before closing, if possible.</li> <li>• If the isolate is <i>S. Typhi</i>, or <i>S. Paratyphi A</i>, <i>B</i> tartrate <b>negative</b>, or <i>C</i>, select “<b>S. Typhi Infection</b>” or “<b>S. Paratyphi Infection</b>” as “Disease Being Reported.”</li> <li>• EDEJs must also complete the corresponding forms.</li> </ul>
<input type="checkbox"/> If the patient appears to be part of a point-source outbreak, follow your protocol for outbreak investigations	<ul style="list-style-type: none"> <li>• Suspected outbreaks should be reported immediately to CDPH.</li> </ul>

*If you require assistance with your investigation, call IDB DIS at 510-620-3434.*

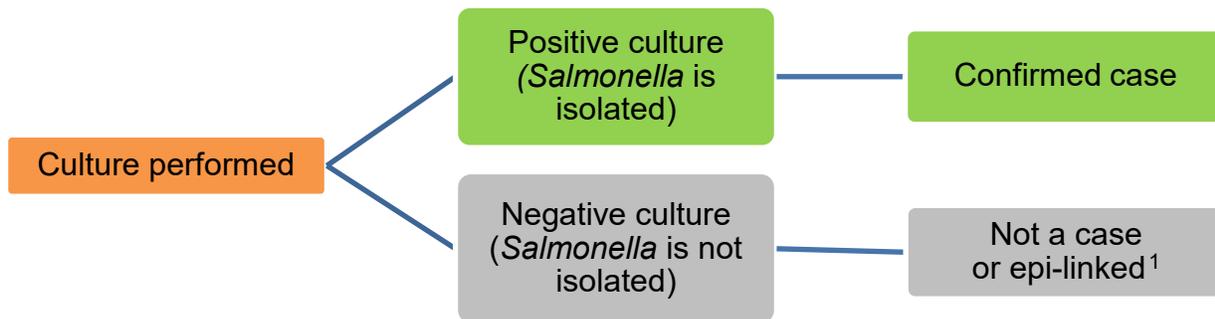
Appendix A: *Salmonella* (Nontyphoidal) Infections Diagram for CDPH Case Classification and Reporting

Salmonellosis (*Salmonella* spp.) 2017 Case Definition<sup>1</sup>

Case Classification Based on Culture-Independent Diagnostic Test (CIDT)<sup>2</sup> Results



Case Classification Based on Culture Results (No CIDT<sup>2</sup> Results)



<sup>1</sup> For [CSTE 2017 case definition](https://ndc.services.cdc.gov/case-definitions/salmonellosis-2017/), see <https://ndc.services.cdc.gov/case-definitions/salmonellosis-2017/>

<sup>2</sup> CIDTs include PCR-amplified, antigen-based and/or multi-analyte panel tests.

Appendix B: Summary Table for CDPH MDL Testing and Reporting

What is the type of isolate?	What test should I request from MDL?	Are WGS results* reported in CaREDIE?	What report will my laboratory receive?
<b>Pure <i>Salmonella</i> isolate with Serogroup</b>	<i>Salmonella</i> Identification and Serotyping	Yes	Close-out Report <b>ONLY**</b> for isolates from stool and urine sources. No clinical report with lab results issued. <b>Or</b> Traditional Serotyping Clinical Report*** for isolates from sterile sources (primarily blood).
<b>Pure <i>Salmonella</i> isolate without Serogroup</b>	<i>Salmonella</i> Serogrouping	Yes	Traditional Serogrouping Clinical Report*** for stool and urine isolates. <b>Or</b> Traditional Serotyping Clinical Report*** for isolates from sterile sources (primarily blood).
<b>Pure Presumptive or Inconclusive <i>Salmonella</i> Identification without Serogroup</b>	<i>Salmonella</i> Identification and Serogrouping	Yes	Identification confirmation, and Traditional Serogrouping Clinical Report*** for stool and urine isolates. <b>Or</b> Traditional Serotyping Clinical Report*** for isolates from sterile sources (primarily blood).

Please note that testing and reporting algorithms may change. Please contact MDL at [MDL.Submissions@cdph.ca.gov](mailto:MDL.Submissions@cdph.ca.gov) for the most up-to-date information.

\* WGS will not be performed on duplicate isolates from the same patient and same source collected within 3 months unless approved in advance.

\*\* “Close-out” final reports are issued to indicate that an isolate will be tested for epidemiologic purposes only if it meets acceptability criteria (e.g., pure isolate, non-duplicate). For LHDs, the WGS identification, serotyping results, antigenic formula and sequence identification number (NCBI SAMN number) are sent via CaREDIE and should not be added to patient clinical record.

\*\*\* Clinical reports are issued for traditional *Salmonella* serogroup results (isolates from all sources, as applicable), traditional serotyping results primarily for isolates from blood, suspected *S. Typhi* / *S. Paratyphi*, or other clinically indicated requests, including identification confirmation.