

# Salmonellosis

## 1. DISEASE REPORTING

### A. Purpose of Reporting and Surveillance

1. To determine if there is a source of infection of public health concern (e.g., a food handler or commercially distributed food product) and to stop transmission from such a source.
2. To assess the risk of the case transmitting infection to others, and to prevent such transmission.
3. To identify other cases.

### B. Laboratory And Physician Reporting Requirements

Laboratories and physicians are required to report within one working day of identification/diagnosis. Reports should not be delayed for serotyping or final laboratory confirmation.

### C. Local Health Department Reporting and Follow-Up Responsibilities

1. Report all confirmed and presumptive (but *not* suspect) cases to the ODPE by the end of the calendar week of initial physician/lab report. If the investigation has not been completed, send in at least a preliminary report (with the demographics and available information) by faxing the first page of the Salmonellosis case investigation form (available on the ACDP web site). Note that isolation of *Salmonella* from any site (including urine cultures) meets the case definition.
2. Begin follow-up investigation within one working day. Submit a copy of the completed case investigation form to the ODPE within seven days of initial report. Fax is preferable to mail.
3. Ensure that labs forward the first isolate from each patient to the OSPHL for serotyping.
4. As indicated, complete summary forms for waterborne or foodborne disease outbreaks (available on web page) when investigation is complete. ACDP epidemiologists will typically be very involved in salmonellosis outbreak investigations and typically would complete these forms.

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

*Salmonella* spp. — Gram-negative bacteria. The way salmonellae are classified has changed a lot since 1990. Current taxonomy puts all *Salmonella* into only three or four species—only one of which you'll ever see: *Salmonella enterica*. *S. enterica* can be subclassified serologically into several serogroups (e.g., B, C1, C2-3, D1, E1, G) and into over 2000 serotypes, of which ~150 are typically seen in the U.S. in any given year. You will often see these serotypes referred to casually as *S. Enteritidis*, *S. Panama*, *S. Oranienburg*, etc., but their proper designation would be, for example, *S. enterica* serotype Heidelberg. While a few serotypes are relatively host or place specific (which can provide important clues as to origin), most are very widely distributed in nature and there is no clue a priori to their epidemiological origin.

### B. Description of 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. The infection may also present as septicemia, abscess, arthritis, cholecystitis and rarely as endocarditis, pericarditis, meningitis, pneumonia, or pyelonephritis.

Note that typhoid infections (caused by *S. Typhi* or, less commonly, *S. Paratyphi*) are covered in a different chapter.

### C. Reservoirs

Salmonellae are extremely widely distributed in the animal kingdom, including livestock, pets (including exotic animals), other wild mammals, poultry and other birds, reptiles, and amphibians. Most infected animals are chronic carriers. (In contrast, *S. Typhi* has only human reservoirs.)

## Salmonellosis

### D. Modes of Transmission

Fecal-oral and vehicle-borne.

Infection may result from ingesting food or water that has been contaminated with human or animal feces, or from direct exposure to same. Intact chicken eggs can be infected transovarially. A large dose of organisms ( $>10^5$ ?) is usually needed to cause infection, although there have been well-documented outbreaks with much lower inocula. Thus, foods handled in ways that permit multiplication of organisms (for example, due to inadequate refrigeration and/or inadequate cooking) are the most common vehicles. The infectious dose may be lower for children, the elderly, the immunocompromised, antibiotic users, and those with achlorhydria or who are regular users of antacids. It may also vary by serotype.

Commonly recognized vehicles or mechanisms of transmission include:

1. inadequately cooked or raw meat, poultry, or eggs;
2. others foods cross-contaminated with any of the above;
3. contaminated produce (e.g., sprouts, cantaloupe, mangos);
4. unpasteurized milk or milk products;
5. contact with the feces of pets and other infected animals;
6. contaminated and inadequately treated drinking water.
7. Person-to-person spread can occur when an infected person fails to wash hands thoroughly after defecation, but is surprisingly uncommon (reflecting high infectious dose?). It is more likely to occur when the infected person has diarrhea, rather than during the carrier state. Person-to-person spread is most commonly seen among preschool children in day care facilities or amongst home and neighborhood playmates. It may also occur in medical care settings where immunocompromised patients are at increased risk.

### E. Incubation Period

Although reported in some sources (e.g., the APHA *Control of Communicable Diseases Manual*) as "6 to 72 hours," 1–5 days, or even 7, is a more realistic range in our experience. The majority will manifest within 1-4 days, but the median exceeds 3- and even 4- days on occasion.

### F. Period of Communicability

As long as organisms are excreted in the feces, ranging from days to months. Concentrations (and hence, infectivity) are typically highest during the time of overt symptoms. Rarely, the carrier state may exceed a year. *Antibiotic treatment often prolongs the period of bacterial excretion in the feces.*

### G. Treatment

Antibiotic treatment of salmonellosis is usually inappropriate. Antibiotic therapy may prolong carriage and encourage the appearance of resistant strains; it does not shorten the course or ameliorate the symptoms of non-invasive (i.e., typical GI) infections. Treatment should be reserved for those with invasive disease (e.g., sepsis) or who are at elevated risk of developing invasive disease (e.g., infants, the elderly, or those with impaired immune functions). If treatment is indicated, antibiotic sensitivities should be ascertained first.

## 3. CASE DEFINITIONS, DIAGNOSIS, AND LABORATORY SERVICES

### A. Confirmed Case Definition

Persons from whom salmonellae are cultured (again, from *any* site).

### B. Presumptive Case Definition

Diarrhea and fever in someone epidemiologically linked to a confirmed case.

### C. Suspect Case (*not reportable to OHD*)

Anyone with an undiagnosed, non epi-linked, febrile diarrheal illness.

## Salmonellosis

### D. Services Available at the Oregon State Public Health Laboratory

The OSPHL provides isolate confirmation/identification, serotyping, and stool culturing for *Salmonella* species. For isolate identification, submit a pure isolate of the organism growing on an agar slant of media that will support the growth (e.g., nutrient or blood agar). A swab with stool on it, completely submerged in a Cary-Blair tube, is required for stool culturing. Both specimens may be sent without a cold pack. All specimens must be properly packaged in double containers with absorbent material around them. Use the Bacteriology/Parasitology form (#75).

*N.B.*— Stool specimens will not be cultured unless obtained before initiation of antimicrobials, or after 48 hours have passed since discontinuation of antimicrobials.

## 4. ROUTINE CASE INVESTIGATION

Interview the case and others who may be able to provide pertinent information.

### A. Identify Potential Sources of Infection.

Ask about potential exposures during the 4 days before onset, including:

1. name, diagnosis, and telephone number or address of any acquaintances or household members with similar illnesses (*N.B.*—anyone meeting the presumptive case definition should be reported and investigated in the same manner as a confirmed case);
2. name, date, and location of any restaurant meals;
3. date, location, and sponsor of any public gathering where food was consumed;
4. consumption of raw/undercooked meat, poultry, or eggs;
5. consumption of raw milk or other unpasteurized dairy products;
6. travel outside the United States or contact with others known to have traveled outside the United States;
7. contact with reptiles or amphibians (snakes, lizards, turtles, frogs, etc.);
8. contact with pets, livestock, or other animals (including farms and petting zoos);
9. attendance or employment at a day care facility by the case or a household member.

### B. Identify Potentially Exposed Persons

If the case or a household member attends or works at a day care, health care, or residential care facility, or is food handler, refer to §6.

### C. Environmental Evaluation

If the source of infection appears to be associated with a day care facility, restaurant, dairy, or public drinking water supply; or, if the case attends, or works at, a day care facility or works as a food handler, health care provider, or residential care provider, see §6.

## 5. CONTROLLING FURTHER SPREAD

### A. Patient/Household Education

As indicated, provide basic instruction to cases and potentially exposed contacts about hand washing after defecation, diaper changing and before food preparation; about the importance of proper food handling and adequate cooking for meat, poultry, and eggs; and, in general, provide pointers about minimizing fecal consumption in daily life.

### B. Isolation of Cases

Cases should be cared for in accordance with standard precautions.

### C. School/Day Care/Occupational Restrictions

As of March 2002, restrictions are no longer imposed routinely on reported asymptomatic cases of non-typhoidal salmonellosis, nor are there any requirements for follow-up stool testing. Cases with diarrhea are restricted from school and day-care attendance, food handling, and patient care. Cases and/or their surrogates should be instructed in the art of hand-washing as necessary.

### D. Protection of Contacts

Generally, none.

### E. Environmental Measures

As indicated (see below)

## 6. MANAGING SPECIAL SITUATIONS

### A. Case Attends or Works at a Day Care Facility

1. Interview the operator and check attendance records to identify suspect cases that occurred during the previous month.
2. Instruct the operator and other staff in proper methods for food handling and hand washing, especially after changing diapers.
3. If other confirmed or suspected cases have occurred, collect stool specimens from all staff members and children who are symptomatic or who have had diarrhea during the previous 2 weeks.
4. If other possible cases are identified, do a sanitary inspection and consult with Acute and Communicable Disease Prevention program epidemiologists. We will discuss the advisability and feasibility of special control measures (e.g., cohorting, exclusions).
5. Instruct the operator to notify the LHD immediately if new cases of diarrhea occur. Call or visit once each week for 2 weeks after onset of the last case to verify that surveillance and appropriate hygienic measures are being carried out. Manage newly symptomatic children as outlined above.

### B. Case is a Food Handler

Absent particularly suspicious circumstances, no special follow-up is warranted. Consult with ACDP epidemiologists if you have concerns.

### C. Food Served at a Public Gathering Implicated

Determine if anyone who prepared food for the gathering had diarrhea at any time during the 2 weeks before the gathering; if so, collect stool specimens for culture. The extent of further investigation depends on circumstances. Consult with ACDP epidemiologists.

### D. Case Works at a Health Care or Residential Care Facility

Determine if there has been any unusual incidence of diarrheal illness within the past month. If so, investigate these reports to with an eye towards identifying possible common-source outbreaks or any continuing sources of exposure. If indicated, conduct a sanitary inspection of the facility. The extent of further investigation depends on circumstances. Consult with ACDP epidemiologists ■