

# ***Salmonellosis (Non-Typhoid/Paratyphoid)***

## **Surveillance and Investigation Protocol**

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### **I. ABOUT THE DISEASE**

#### **A. Clinical Presentation**

*Salmonellosis*, the illness caused by *Salmonella*, primarily results in a mild to severe diarrheal illness, known as acute gastroenteritis. Most people with *Salmonella* infection experience diarrhea (that can be bloody), fever, and/or stomach cramps. Some people may also have nausea, vomiting or a headache.

Symptoms usually start within 6 hours to 6 days after infection and last 4-7 days. Asymptomatic infections may occur. Sometimes *Salmonella* infection can become invasive and spread to the urinary tract, blood, bones, joints, brain, or the nervous system. These invasive infections can be severe and potentially life-threatening, but only occur in about 8% of persons with laboratory-confirmed *Salmonella* infection. This may occur as bacteremia, meningitis, osteomyelitis, or septic arthritis.

#### **B. Etiologic Agent**

*Salmonella* organisms are gram-negative bacilli that belong to the family *Enterobacteriaceae*. More than 2600 *Salmonella* serovars have been described, but as of 2016, the most commonly reported human isolates in the United States were Enteritidis, Newport, Typhimurium, Javiana, and Enterica which accounted for approximately 45% of all *Salmonella* infections in the United States.

#### **C. Reservoir**

*Salmonella* lives in the intestinal tracts of humans and animals. The main reservoirs are birds, mammals, reptiles, and amphibians. The major food vehicles of transmission to humans include seeded vegetables and other produce, as well as food of animal origin (such as poultry, beef, eggs, and dairy products).

#### **D. Incubation Period**

The incubation period is usually 6-48 hours, but incubation periods of a week or more have been reported.

#### **E. Mode of Transmission**

You can get *Salmonella* infection from a variety of sources, including eating contaminated food or drinking contaminated water or touching infected animals and not washing your hands afterward.

#### **F. Period of Communicability**

Risk of transmission of infection to others persists as long as an infected person sheds *Salmonella*. Shedding for 12 weeks after infection is most common. Antimicrobial therapy can prolong shedding. Approximately 1% of adults continue to shed organisms for more than 1 year.

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### **II. DISEASE CONTROL AND PREVENTION**

#### **A. Disease Control Objectives**

Reduce the occurrence of secondary cases of *Salmonellosis* by:

- Appropriate investigation of outbreaks and clusters to identify and remove any common source of disease.
- Identification and exclusion of cases and probable cases (symptomatic epi-linked contacts) from high-risk settings such as daycare and food preparation.
- Identify transmission sources of public health concern (e.g., a restaurant or a contaminated public water supply) and stop transmission from such sources.

#### **B. Disease Prevention Objectives**

Reduce risk of disease by educating the general public on prevention strategies:

- Always wash your hands after contact with animals, using the toilet, changing diapers, helping someone with diarrhea clean up after using the toilet, and before, during, and after fixing food.
- If you have *Salmonellosis*, you should not prepare food or drinks for others until you no longer have diarrhea.
- Practice proper food handling, including thorough cooking of eggs, meat, and poultry, washing of fruits and vegetables prior to consumption, and avoidance of cross-contamination.
- Avoid unsafe foods such as unpasteurized milk, cheese, juice, and cider.
- Maintain foods at the proper temperature prior to serving.
- Before traveling to developing countries, educate yourself about safe food and water practices, and check with your local health department about the necessary immunizations.

#### **C. Disease Treatment**

Preventing dehydration is important for those with *Salmonellosis*. Oral fluids are usually sufficient, but people with severe diarrhea may require intravenous (IV) fluids. Most people do not require antibiotics. Antibiotics are not recommended for treating most patients with *Salmonella* infection. In healthy people with *Salmonella* infection, antibiotics generally do not shorten the duration of illness, diarrhea, or fever. Antibiotics are recommending for:

- Patients with HIV infection or other immunocompromised patients (organ transplant recipients, those taking immunosuppressive agents, those with cancer, those with sickle cell disease, etc.).
- Patients older than 50 years with cardiac, valvular, or endovascular abnormalities, or substantial joint disease.
- People who have severe illness, such as severe diarrhea (9-10 stools per day), high or persistent fever, or a condition requiring hospitalization.
- Adults 65 years or older.

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### **III. DISEASE INVESTIGATION**

#### **A. Case Definition and Case Classification**

##### **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**

###### *Supportive laboratory evidence*

- Detection of *Salmonella* spp. in a clinical specimen using a culture-independent diagnostic tests (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.

##### **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.

##### **Case Classifications**

###### *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.

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### **B. Reporting Time Frame to Public Health**

Report all cases to the local health department as soon as possible, but within the following time frame:

- Sporadic case of *Salmonellosis*: within 72 hours of diagnosis.
- Outbreak of *Salmonellosis*: immediately (see outbreak recognition and definition below).

### **C. Outbreak Recognition**

Outbreak of *Salmonellosis*: greater than expected number of cases reported during a certain time frame, or 2 or more epidemiologically linked cases from 2 or more households.

Foodborne Disease Outbreak: 2 or more persons who experience a similar illness after ingestion of a common food.

When you suspect a foodborne outbreak:

- Contact the Office of Epidemiology and Prevention Services (OEPS) epidemiologist on-call at (304) 558-5353, ext. 2 to report the outbreak. Also notify the regional epidemiologist and district sanitarian as early as possible in the investigation.
- Conduct interviews, compile line lists and record onset dates and times as well as other important epidemiological data.
- Obtain clinical specimens from symptomatic individuals. Consult the Office of Laboratory Services for appropriate collection, handling, and shipping of specimens.
- Conduct a complete environmental investigation of the facility or site of a suspected outbreak. Request assistance from district sanitarian and/or WV Office of Environmental Health Services (OEHS) to complete in a timely manner.
- Collect food, water, and other specimens as needed.
- Provide education to food workers regarding proper food handling and personal hygiene.
- Assist with or develop a final outbreak report and forward a copy with all supporting documentation to OEPS.
- For more information, see the [Foodborne Disease Investigation Manual](#).

### **D. Healthcare Provider Responsibilities**

1. Report all positive *Salmonella* tests to the local health department in the patient's county of residence within 72 hours of results. Electronically report the lab result or fax a copy of the result, including antibiotic sensitivities.

### **E. Laboratory Responsibilities**

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1. Submit all *Salmonella* isolates for serotyping to the Office of Laboratory Services along with the completed [Microbiology Laboratory Specimen Submission Form](#). For instructions on specimen collection, see [Stool Specimen Collection Instructions](#) (Enteric). Send specimens to the Office of Laboratory Services at 167 11th Avenue, South Charleston, WV 25303. For questions, call (304) 558-3530.

### **F. Local Health Responsibilities**

Start investigating cases within 72 hours of first notification.

1. Interview the case-patient using the [Enteric Case Report Form](#) including the extended food history portion of the questionnaire.
2. Identify other cases, including probable cases (symptomatic persons who are epidemiologically linked to a case that meets supportive or confirmatory lab criteria). If an epidemiologically linked case is identified, open a case investigation in the West Virginia Electronic Disease Surveillance System (WVEDSS) and complete the Case Report Form as above.
3. Enter case investigation and laboratory information into WVEDSS attach the Enteric Case Report Form to the *Attachments* section in the *Supplemental Info* tab.
4. Help coordinate sending specimens to OLS for WGS.
5. Educate cases about [appropriate control measures](#).
6. Stay up to date on [current national outbreaks](#).
7. Institute appropriate control measures:
  - a. If case works in or attends a daycare facility.
    - i. Interview manager/operator and check attendee records to identify any additional cases within the past month.
    - ii. Provide educational information on proper food handling and hand washing, especially after changing diapers.
    - iii. Collect stool samples from any symptomatic staff members and/or attendees.
    - iv. Conduct an environmental inspection if there are any other suspected cases.
    - v. Instruct the manager/operator to notify the local health department if new cases or GI illness occur.
    - vi. Exclude symptomatic individuals who directly care for infants.
    - vii. Exclude symptomatic attendees.
  - b. If the case is a food handler:
    - i. Conduct an environmental inspection of the facility. Interview the manager/operator and check attendee records to identify suspect cases that occurred the previous month. Ask if there have been any complaints from any patrons during the past month.
    - ii. Collect stool samples from all symptomatic individuals.
    - iii. Exclude symptomatic individuals who are involved in food handling based on exclusion criteria found in the [2022 FDA Food Code section 2-201](#).
    - iv. Educate staff on the importance of good handwashing, personal hygiene, and excluding themselves from work when they have diarrheal illness.

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- v. Excluded food handlers should only return to work after two consecutive negative stool cultures that are collected 24 hours apart. If antibiotics are given, the initial culture should be taken at least 48 hours after the last dose.
- c. If the case works at a healthcare or residential care facility:
  - i. Identify any abnormal incidence of diarrheal illness within the last month and identify any common source outbreaks or sources of exposure.
  - ii. Conduct an environmental inspection of the facility.
  - iii. Exclude symptomatic individuals who are involved in the care of the elderly, immunocompromised, and institutionalized patients until two negative stool samples are taken 24 hours apart and at least 48 hours after the last dose of antibiotics are taken.
  - iv. Asymptomatic individuals with adequate hygienic habits do not need to be excluded but should be counseled on the importance of good handwashing, personal hygiene, and removing themselves from working and notifying their supervisor whenever they have diarrheal illness.

For the purpose of case investigation, ***lost to follow-up (LTF)*** is defined as a disease investigation outcome reported by a local health department staff in WVEDSS after:

- Three phone calls have been made on three separate occasions (different days and times) **AND**
- A letter was mailed to the patient's address asking them to call the local health department **AND**
- A medical record review has been conducted via WVHIN or obtaining medical records from the facility where the patient was seen **AND**
- Attempts to contact patient or obtain information has been clearly documented in WVEDSS *General Comments* section, **AND**
- Documentation has been completed within 30 days of the patient's laboratory report.

### **G. State Health Responsibilities**

1. Provide consultations to local health departments and regional epidemiologists regarding *Salmonella* outbreaks and cases as needed.
2. Work with the Centers for Disease Control and Prevention (CDC), U.S. Food and Drug Administration (FDA), United States Department of Agriculture (USDA) and West Virginia Office of Environmental Health Services (OEHS) on multi-state outbreaks.
  - a. When a case is identified as part of a CDC-identified outbreak, provide the local health department with the CDC Case Report Form to complete for the case.
  - b. When case form is completed, send completed case form to CDC contact, and enter information into the System for Enteric Disease Response, Investigation, and Coordination (SEDRIC).
3. Open, review, and close *Salmonellosis* cases in WVEDSS.

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**No Public Health Action** is defined as incomplete disease investigation and no activity occurring at the local level for at least 60 days since the date of the patient's laboratory report. The state health department staff should document "no public health action" in WVEDSS *General Comments* section before administratively closing the investigation.

#### **IV. DISEASE SURVEILLANCE**

##### **A. Public Health Significance**

While most cases of non-typhoidal *Salmonella* are sporadic, this bacteria can cause large and dramatic outbreaks due to contamination of commercial food products. Multi-state and even international outbreaks have been described with this pathogen. Smaller clusters occur frequently due to person-to-person transmission, contamination of foods during preparation or handling, or temperature abuse of foods. Outbreaks are most commonly reported from foods of animal origin; however, large outbreaks have also been associated with tomatoes, cantaloupes, sprouts, grain products, and even non-chlorinated public water supplies. CDC estimates *Salmonella* bacteria cause about 1.35 million infections, 26,500 hospitalizations, and 420 deaths in the United States every year.

##### **B. Disease Surveillance Objectives**

1. To identify cases promptly.
2. To determine the incidence of *Salmonellosis* in West Virginia.
3. To define the epidemiologic characteristics of *Salmonellosis* cases.
4. To identify and manage *Salmonella* outbreaks.

##### **C. Surveillance Indicators**

1. Report on proportion of cases with complete information.
2. Report on proportion of cases with specimens sent to Office of Laboratory Services for serotyping.

#### **V. REFERENCES**

1. *Salmonella*. Centers for Disease Control and Prevention (CDC). Available at <https://www.cdc.gov/salmonella/index.html>.
2. American Academy of Pediatrics (2021). Red Book 2021-2024 Report of the Committee on Infectious Diseases 32nd Edition. *Salmonella* Infections. 655-663.