Listeriosis

Signs and Symptoms	• Acute febrile gastroenteritis in immunocompetent; may be minimal symptoms • Flu-like illness in pregnant woman or preterm birth, stillbirth, or miscarriage • Sepsis or meningitis in immunocompromised, newborn and elderly
Incubation	Estimated 3 weeks, range 3-70 days (based on rare outbreaks)
Case classification	**Clinical criteria**: sepsis, meningitis, fetal loss, neonatal infection, may be mild symptoms
	Confirmed: Clinically consistent with *L. monocytogenes* isolated from specimen from a normally sterile site (i.e. invasive infection of blood or CSF; less commonly: hepatobiliary, peritoneal, pleural, pericardial, or vitreous fluid; orthopedic site such as bone marrow, bone or joint; or other sterile site including organ such as spleen, liver, or heart; not source such as urine, stool, or external wounds); **OR For maternal isolates**: In the setting of pregnancy, pregnancy loss, intrauterine fetal demise, or birth, *L. monocytogenes* isolated from products of conception (e.g. chorionic villi, placenta, fetal tissue, umbilical cord blood, amniotic fluid) collected at the time of delivery; **OR For neonatal isolates**: In the setting of live birth, *L. monocytogenes* isolation from a non-sterile neonatal specimen (e.g., tracheal aspirate, meconium; not products of conception) collected within 48 hours of delivery.
Differential diagnosis	Campylobacteriosis, parasitic diarrhea, salmonellosis, shigellosis, STEC infection, vibriosis, viral gastroenteritis, yersiniosis, meningitis, septic arthritis
Treatment	Appropriate antibiotics
Duration	Case fatality rate 30-50% or higher; asymptomatic shedding for months in stool
Exposure	Soft cheeses, ready-to-eat meats, deli salads, raw milk, cross-contaminated foods; person-to-person transmission woman to fetus (vaginal fluid, urine)
Laboratory testing	Local health jurisdiction (LHJ) and Communicable Disease Epidemiology (CDE) can arrange food and environmental testing if an outbreak is suspected • Washington State Public Health Laboratories (PHL) does routine WGS on *Listeria* isolates • **Best specimens**: isolate for PGFE, food or environmental if an outbreak is suspected • Keep culture at ambient temperature, environmental or food specimens **cold**, ship with Microbiology form https://www.medialab.com/dv/dl.aspx?d=1887088&dh=52b1a&u=69790&uh=0e2a1 • Specimen Collection and Submission Instructions https://doh.wa.gov/public-health-healthcare-providers/public-health-laboratories/lab-test-menu
Public health actions	LHJ can consult with CDE 206-418-5500 or 877-539-4344 for testing in outbreaks. Complete the CDC listeriosis initiative (LI) form for every case and attach to WDRS case event summary screen or fax to CDE: https://www.cdc.gov/listeria/pdf/listeria-initiative-case-report-form-p.pdf • Identify potential exposures • Identify potential outbreaks from common sources • Educate persons at risk (pregnant, immunocompromised, elderly) about high risk items including hotdogs, ready-to-eat meats, deli foods, unpasteurized dairy products (especially soft cheeses), raw sprouts, or refrigerated smoked seafood • Persons with diarrhea should avoid close contact with immunocompromised persons *Infection Control:* standard precautions; add contact precaution if diapered or incontinent person

Listeriosis

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To identify outbreaks and related cases.
2. To identify sources of contaminated food products and prevent further transmission from such sources.
3. To determine the public health impact of contaminated food products.

B. Legal Reporting Requirements

1. **Healthcare providers and Healthcare facilities:** notifiable to **local health jurisdiction** within 24 hours.
2. **Laboratories:** notifiable to **local health jurisdiction** within 24 hours; submission required – isolate or if no isolate specimen associated with positive result, within 2 business days. Specimen submission is required – isolate (2 business days).
3. **Local health jurisdiction:** notifiable to the Washington State Department of Health (DOH) Communicable Disease Epidemiology (CDE) within 7 days of case investigation completion or summary information required within 21 days.

C. Local Health Jurisdiction Investigation Responsibilities

1. Report all confirmed cases to CDE. Complete the listeriosis case report form https://www.doh.wa.gov/Portals/1/Documents/5100/210-035-ReportForm-Listeriosis.pdf and enter the data into the Washington Disease Reporting System (WDRS).
2. Obtain a detailed case food history using the CDC "Listeria Initiative Form" https://www.cdc.gov/listeria/pdf/listeria-initiative-case-report-form-p.pdf and attach to case event summary screen in WDRS or fax this form to CDE at 206-364-1060.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Listeria monocytogenes are gram-positive rods that cause infection primarily in pregnant women, newborns, the elderly and immunocompromised persons. Both sporadic cases and outbreaks have occurred among immunocompetent persons associated with very highly contaminated food products. Routine stool cultures do not detect *Listeria* so non-invasive cases may be missed.

B. Description of Illness

Symptoms of listeriosis depend on the host. Immunocompromised, neonatal, and elderly persons usually present with sepsis or meningitis. Listeriosis in pregnant women may cause a flu-like illness (i.e., fever, headache, muscle aches) or preterm birth, stillbirth, or miscarriage. Immunocompetent persons may have acute febrile gastroenteritis.

Invasive listeriosis has a high case-fatality rate; 30–50% of infants infected prenatally and

over 60% among adults aged 60 years or older. Most cases of listeriosis are sporadic; however outbreaks associated with consumption of contaminated foods have occurred.

C. Listeriosis in Washington State

DOH has received 11 to 29 reports of *Listeriosis* per year during recent years with 0-5 deaths, primarily among the elderly with rare neonatal fatalities. Stillbirths are not included in death statistics. Of cases since 2005, 63% were age 50 years or older. Excluding one infant death, mean age for fatal cases was 67 years.

D. Reservoirs

L. monocytogenes are common in the environment. The organism is easily recovered from soil, water, sewage, vegetation, silage, commercial meat, and dairy products. Domestic and wild mammals, birds, and man may be asymptomatic carriers of *Listeria* in their intestinal flora. Up to 5% of humans may be excreting *L. monocytogenes* in their stools at any given time, although person-to-person transmission is rare.

E. Modes of transmission

Listeriosis is primarily a foodborne infection. Consuming contaminated food items has been identified as the source of infection in both sporadic and outbreak-associated cases. *Listeria* can be found in a variety of foods, including soft cheeses (e.g. Brie, Camembert, Mexican-style fresh cheeses, Roquefort, Bleu), hot dogs and other ready-to-eat meats, smoked fish, lettuce, coleslaw, other salad items, ready-to-eat foods purchased from store delicatessens, and raw milk. Home-made raw milk soft cheeses are a particular risk. Cross-contamination of ready-to-eat foods may also play a role in transmission. *Listeria* contamination frequently causes food product recalls. National listeriosis outbreaks have been associated with many products including: frozen vegetables (2016), raw milk (2016), packaged salads (2016), commercial domestic and imported soft cheese (multiple), ice cream (2015), caramel apples (2014), and whole cantaloupes (2011): https://www.cdc.gov/listeria/outbreaks/index.html

Women infected during pregnancy may pass *L. monocytogenes* to the fetus, either transplacentally or at birth. Infection in a fetus may result in stillbirth or preterm delivery while infection in a neonate may present as meningitis or septicemia. Rare outbreaks in neonatal nurseries have been attributed to contaminated equipment or materials.

F. Incubation period

The incubation period is not known with certainty but probably ranges from 3–70 days with an estimated median incubation period of 3 weeks.

G. Period of communicability

Person-to-person transmission, other than from mother to fetus or newborn, is rare. Mothers of infected newborns can shed the agent in vaginal discharges and urine for 7–10 days after delivery. Asymptomatic carriage of *L. monocytogenes* is well documented and infected individuals can shed the organism in stools for several months.

H. Treatment

Treatment with antibiotics for infections diagnosed during pregnancy may prevent fetal or neonatal infections. Antibiotics are used for treatment for invasive disease.

3. CASE DEFINITIONS

A. Clinical Criteria for Diagnosis

Invasive listeriosis:

- **Systemic illness** caused by *L. monocytogenes* manifests most commonly as bacteremia or central nervous system infection. Other manifestations can include pneumonia, peritonitis, endocarditis, and focal infections of joints and bones.
- **Pregnancy-associated listeriosis** has generally been classified as illness occurring in a pregnant woman or in an infant age ≤ 28 days. Listeriosis may result in pregnancy loss (fetal loss before 20 weeks gestation), intrauterine fetal demise (≥20 weeks gestation), pre-term labor, or neonatal infection, while causing minimal or no systemic symptoms in the mother. Pregnancy loss and intrauterine fetal demise are considered to be maternal outcomes.
- **Neonatal listeriosis** commonly manifests as bacteremia, central nervous system infection, and pneumonia, and is associated with high fatality rates. Transmission of *Listeria* from mother to baby transplacentally or during delivery is almost always the source of early-onset neonatal infections (diagnosed between birth and 6 days), and the most likely source of late-onset neonatal listeriosis (diagnosed between 7–28 days).

Non-invasive *Listeria* infections:

- *Listeria* infection manifesting as an isolate from a non-invasive clinical specimen suggestive of a non-invasive infection; includes febrile gastroenteritis, urinary tract infection, and wound infection.

B. Laboratory Criteria for Diagnosis

Confirmatory laboratory evidence:

- Isolation of *L. monocytogenes* from a specimen collected from a normally sterile site reflective of an invasive infection (e.g., blood or cerebrospinal fluid or, less commonly: pleural, peritoneal, pericardial, hepatobiliary, or vitreous fluid; orthopedic site such as bone, bone marrow, or joint; or other sterile sites including organs such as spleen, liver, and heart, but not sources such as urine, stool, or external wounds);

  OR

- **For maternal isolates**: In the setting of pregnancy, pregnancy loss, intrauterine fetal demise, or birth, isolation of *L. monocytogenes* from products of conception (e.g. chorionic villi, placenta, fetal tissue, umbilical cord blood, amniotic fluid) collected at the time of delivery;

  OR

- **For neonatal isolates**: In the setting of live birth, isolation of *L. monocytogenes* from a non-sterile neonatal specimen (e.g., meconium, tracheal aspirate, but not products of conception) collected within 48 hours of delivery.

Presumptive laboratory evidence:

- Detection of *L. monocytogenes* by culture-independent diagnostic testing (CIDT) in a specimen collected from a normally sterile site (e.g., blood or cerebrospinal fluid or, less

commonly: pleural, peritoneal, pericardial, hepatobiliary, or vitreous fluid; orthopedic site such as bone, bone marrow, or joint; or other sterile sites including organs such as spleen, liver, and heart, but not sources such as urine, stool, or external wounds);

OR

- **For maternal isolates**: In the setting of pregnancy, pregnancy loss, intrauterine fetal demise, or birth, detection of *L. monocytogenes* by CIDT from products of conception (e.g., chorionic villi, placenta, fetal tissue, umbilical cord blood, amniotic fluid) collected at the time of delivery;

OR

- **For neonatal isolates**: In the setting of live birth, detection of *L. monocytogenes* by CIDT from a non-sterile neonatal specimen (e.g., meconium, tracheal aspirate, but not products of conception) collected within 48 hours of delivery.

Supportive laboratory evidence:

- Isolation of *L. monocytogenes* from a non-invasive clinical specimen, e.g., stool, urine, wound, other than those specified under maternal and neonatal specimens in the Confirmatory laboratory evidence section.

C. Epidemiologic Linkage

For probable maternal cases:

- A mother who does not meet the confirmed case criteria, **BUT**
- Who gave birth to a neonate who meets confirmatory or presumptive laboratory evidence for diagnosis, **AND**
- Neonatal specimen was collected up to 28 days of birth.

OR

For probable neonatal cases:

- Neonate(s) who do not meet the confirmed case criteria, **AND**
    - Whose mother meets confirmatory or presumptive laboratory evidence for diagnosis from products of conception, **OR**
    - A clinically compatible neonate whose mother meets confirmatory or presumptive laboratory evidence for diagnosis from a normally sterile site.

Criteria to Distinguish a New Case from an Existing Case

- There is currently insufficient data available to support a routine recommendation for criteria to distinguish a new case of listeriosis from prior reports or notifications. Duplicate or recurring reports of listeriosis in an individual should be evaluated on a case by case basis.

D. Case Definition (2019)

Confirmed: A person who meets confirmatory laboratory evidence

Probable:

- A person who meets the presumptive laboratory evidence;

OR

- A mother or neonate who meets the epidemiologic linkage but who does not have confirmatory laboratory evidence

Suspected:

- A person with supportive laboratory evidence

Case Classification Comments

- Pregnancy loss and intrauterine fetal demise are considered maternal outcomes and would be counted as a single case in the mother.
- Cases in neonates and mothers should be reported separately when each meets the case definition. A case in a neonate is counted if live-born.

Comment: The usefulness of other laboratory methods such as fluorescent antibody testing or polymerase chain reaction to diagnose invasive listeriosis has not been established.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Diagnosis

The diagnosis of listeriosis is most commonly made by isolation of *L. monocytogenes* from a normally sterile site. Serologic testing is not useful in diagnosing acute invasive disease, but can be useful in detecting noninvasive disease (asymptomatic disease, gastroenteritis) in an outbreak or in other epidemiological investigations. The usefulness of other laboratory methods such as fluorescent antibody testing or polymerase chain reaction to diagnose invasive listeriosis has not been established. Stool testing is generally not performed and routine stool cultures do not detect *Listeria*.

B. Tests Available at DOH Public Health Laboratories (PHL)

Laboratories in Washington are required to submit *Listeria* isolates to PHL which performs serotyping and whole genome sequencing (WGS) on all submitted isolates. Finding isolates with close sequencing results may be consistent with but does not prove a common source, whereas isolates with dissimilar sequencing results presumptively came from different sources. PHL can provide confirmation for *L. monocytogenes* if needed.

Note that PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

C. Specimen Collection

Listeria isolates should be submitted to PHL at ambient room temperature on media that maintain its growth. In the event of an outbreak, contact Communicable Disease Epidemiology for assistance in determining which specimens should be collected. Include a completed Microbiology submission form: https://www.medialab.com/dv/dl.aspx?d=1887088&dh=52b1a&u=69790&uh=0e2a1. Also see: https://www.doh.wa.gov/ForPublicHealthandHealthcareProviders/PublicHealthLaboratories/MicrobiologyLabTestMenu

5. ROUTINE CASE INVESTIGATION

A. Evaluate the Diagnosis

Determine the clinical presentation (e.g., septicemia, meningitis), onset date, and risk factors (e.g., pregnant, immunocompromised, neonatal).

B. Manage the Case

1. Hospitalized patients should be treated using standard precautions.
2. To prevent the possible spread in daycare, enforce strict hand washing by personnel.
3. Food handlers, child care providers, and healthcare personnel with diarrhea should be excluded from work while symptomatic; however, no specific measures are needed to prevent or control transmission from asymptomatic *Listeria* carriers
4. No further case follow-up needed after infection control recommendations are made.

C. Contact Management

With the exception of mother-to-fetus/newborn, person-to-person transmission of listeriosis is rare.

D. Identify Potential Sources of Infection

Ask especially about the following exposures in the 3–70 days prior to onset:

1. Consumption of unpasteurized milk or unpasteurized dairy products (e.g. soft cheeses made with raw milk)
2. Consumption of prepackaged, ready-to-eat meat (e.g., hot dogs, turkey, bologna)
3. Consumption of refrigerated, prepared foods, or any foods from a deli
4. Consumption of dried, preserved or traditionally prepared meats (e.g., sausage, salami, jerky) or preserved, smoked, or traditionally prepared fish
5. Contact with farm animals or animal products

Outbreaks of listeriosis from commercial food products are difficult to detect due to long incubation periods, low attack rates, and limited laboratory detection. In order to increase the likelihood of identifying a contaminated product, obtain a detailed food history using the Centers for Disease Control and Prevention (CDC) "Listeria Case Form" that is used for national listeriosis surveillance:

https://www.cdc.gov/listeria/pdf/listeria-initiative-case-report-form-p.pdf

Attach to case event summary screen in WDRS or fax completed form to Communicable Disease Epidemiology (CDE) at 206-364-1060

C. Environmental Evaluation/Measures

An environmental evaluation is usually not needed since the source of the infection is rarely determined with certainty. Contact CDE if you have high suspicion for a source of infection. Regulatory agencies (e.g., Washington State Department of Agriculture) enforce U.S. laws regarding the presence of *L. monocytogenes* in ready-to-eat foods. In outbreak situations, implicated food products will be recalled.

6. ROUTINE PREVENTION

A. Vaccine Recommandations: There is no available vaccine.

B. Prevention Recommendations (available at: https://www.cdc.gov/listeria/prevention.html)

1. General recommendations for all persons:
   - Thoroughly cook raw food from animal sources, such as beef, pork, or poultry.
   - Wash raw vegetables thoroughly before eating.
   - Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
   - Avoid unpasteurized (raw) milk or foods made from unpasteurized milk.
   - Wash hands, knives, and cutting boards after handling uncooked foods.
   - Consume perishable and ready-to-eat foods as soon as possible.
2. Recommendations for persons at high risk, such as pregnant women and persons with weakened immune systems, in addition to the recommendations listed above:
   - Do not eat hot dogs, luncheon meats, or deli meats, unless they are reheated until steaming hot.
   - Avoid getting fluid from hot dog packages on other foods, utensils, and food preparation surfaces, and wash hands after handling hot dogs, luncheon meats, and deli meats.
   - Avoid ready-to-eat foods from delicatessen counters or leftover foods, unless heated/reheated to steaming hot before eating.
   - Do not eat soft cheeses such as feta, Brie, Camembert, blue-veined cheeses, or Mexican-style cheeses (e.g., queso blanco, queso fresco, Panela); unless they have labels that clearly state they are made from pasteurized milk.
   - Do not eat refrigerated pâtés or meat spreads. Canned or shelf-stable pâtés and meat spreads may be eaten.
   - Do not eat refrigerated smoked seafood, unless it is contained in a cooked dish, such as a casserole. Refrigerated smoked seafood, such as salmon, trout, whitefish, cod, tuna or mackerel, is most often labeled as "nova-style," "lox," "kippered," "smoked," or "jerky." The fish is found in the refrigerator section or sold at deli counters of grocery stores and delicatessens. Canned or shelf-stable smoked seafood may be eaten.
   - Do not eat raw or lightly cooked sprouts

ACKNOWLEDGEMENTS

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UPDATES

2010 revisions:

Sections 1c and Section 5: Adds request to obtain food history using CDC Listeria Case Report Form for all confirmed cases. These reports are part of national surveillance to detect contaminated commercial products distributed to multiple jurisdictions.

Section G: Adds second paragraph on asymptomatic carriage.

Sections 1c.3 and Section 5b: Adds link to CDC supplemental form (revised 2010).

January 2011:

The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision.

March 2014:

Sections 5 and 6: Format was reorganized without change in content.

Section 4: Updated to include information about PHL sending all Listeria isolates to CDC for Whole Genome Sequencing (WGS).

January 2017:

Front page added.

April 2018:

General review and changes for WDRS.

July 2019:

Updated CSTE case definition.

December 2022:

For 2023 WAC revision combined provider and facility reporting requirement, updated laboratory submission (Section 1B); updated links to Specimen Collection and Submission Instructions and CDC "Listeria Initiative Form".