

National Enteric Disease Surveillance: *Listeria* Annual Summary, 2013

Listeria Initiative Data

An overview of the *Listeria* Initiative surveillance system is available at <http://www.cdc.gov/listeria/surveillance.html>.

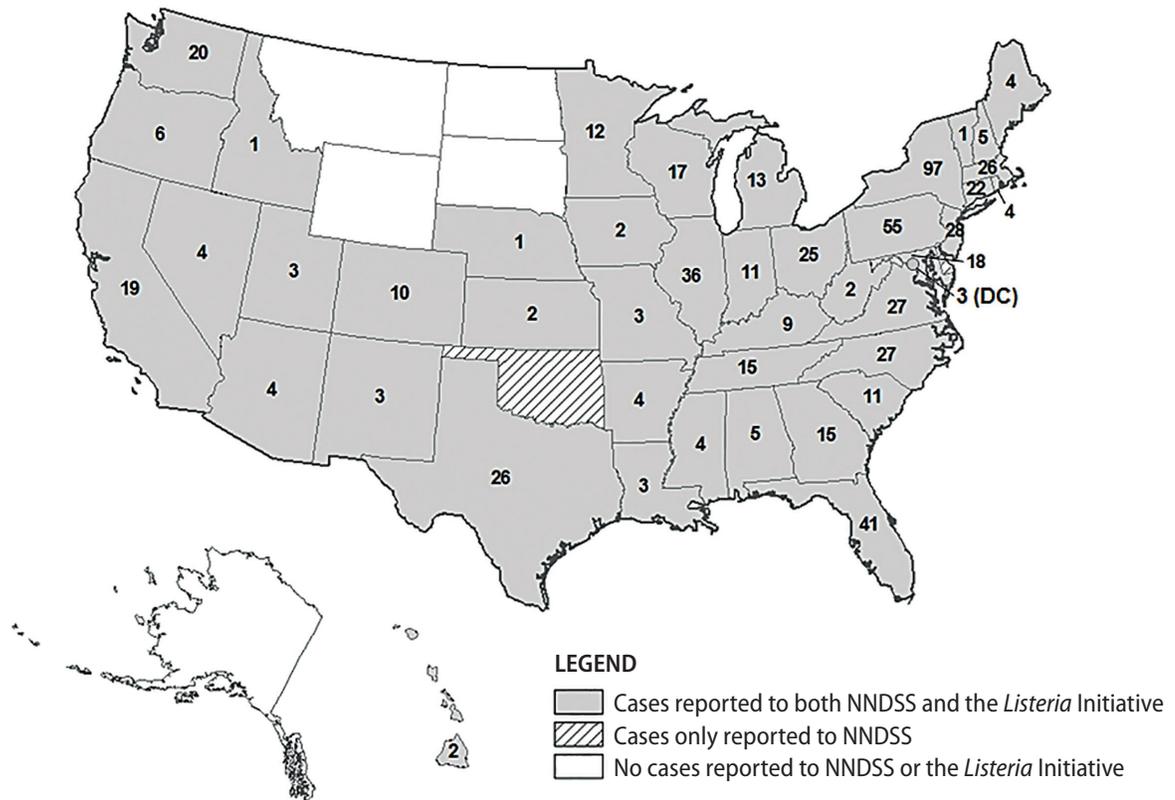
For this report, a case of invasive listeriosis is defined as isolation of *Listeria monocytogenes* from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF]) or from products of conception (e.g., amniotic fluid, placental or fetal tissue). For cases in which *L. monocytogenes* is isolated from multiple anatomical sites, the case is considered to be invasive if any isolate was obtained from a normally sterile site. For cases in which *L. monocytogenes* was isolated from multiple normally sterile anatomical sites, the annual summary reports the most invasive site, using a hierarchy (in descending order of invasiveness: CSF, bone or joint fluid, blood, other sterile site, and products of conception).

Each mother-infant pair in episodes of pregnancy-associated listeriosis is reported as a single case, even when clinical isolates are obtained from both the mother and the infant. The rationale is that an episode of pregnancy-associated listeriosis inherently involves both the mother and the infant, because the infant's infection, in most cases, occurs because the mother ate contaminated food. Cases are classified as pregnancy-associated if illness occurs in a pregnant woman or infant ≤ 28 days old; all other cases are considered to not be associated with pregnancy.

Reporting jurisdictions (states and District of Columbia) reporting at least one listeriosis case to the *Listeria* Initiative during 2013 are shown in Figure 1.

- Forty-three states and the District of Columbia reported 646 listeriosis cases in 2013.
- 633 (98%) cases were invasive
 - » 565 (89%) were not associated with pregnancy
 - » 68 (11%) were pregnancy-associated
- 13 (2%) cases were non-invasive (excluded from further analysis)

Figure 1. Jurisdictions reporting cases of listeriosis to the *Listeria* Initiative and National Notifiable Disease Surveillance System (NNDSS), 2013^{*,†}



* Number of cases reported to the *Listeria* Initiative in 2013 are indicated on each jurisdiction that reported.

† Jurisdictions that did not report any cases to the *Listeria* Initiative were Alaska, Delaware, Montana, North Dakota, Oklahoma, South Dakota, and Wyoming.

Invasive listeriosis not associated with pregnancy

Demographic and clinical characteristics of 565 patients with invasive listeriosis not associated with pregnancy are shown in Table 1.

Highlights

- The median age of patients was 72 years.
- Most isolates were from blood (83%) or cerebrospinal fluid (CSF) (13%).
- Ninety-one percent of patients were hospitalized.
- Twenty-one percent of patients died.

Table 1. Demographic and clinical characteristics of patients with invasive listeriosis not associated with pregnancy reported to the Listeria Initiative, 2013 (n=565).

Characteristic (number with information)	n	%
Age in years (n=565)		
Median (range)	72 (2-99)	
Sex (n=562)*		
Male	285	51
Female	277	49
Ethnicity (n=453)*		
Hispanic	37	8
Non-Hispanic	416	92
Race (n=480)*		
White	381	79
African American/Black	66	14
Asian	29	6
Native Hawaiian or Other Pacific Islander	2	<1
Multiracial	2	<1
Source of most invasive isolate (using source hierarchy) (n=565) [†]		
Blood	467	83
CSF	71	13
Other [§]	28	4
Hospitalized (n=538)	490	91
Died (n=448)	95	21

* Missing and unknown information was excluded from the denominator for each characteristic: sex (n=3), ethnicity (n=112), race (n=85).

[†] For cases in which *L. monocytogenes* was isolated from multiple normally sterile anatomical sites, the annual summary reports the most invasive site, using a hierarchy (in descending order of invasiveness: CSF, bone or joint fluid, blood, and other sterile site).

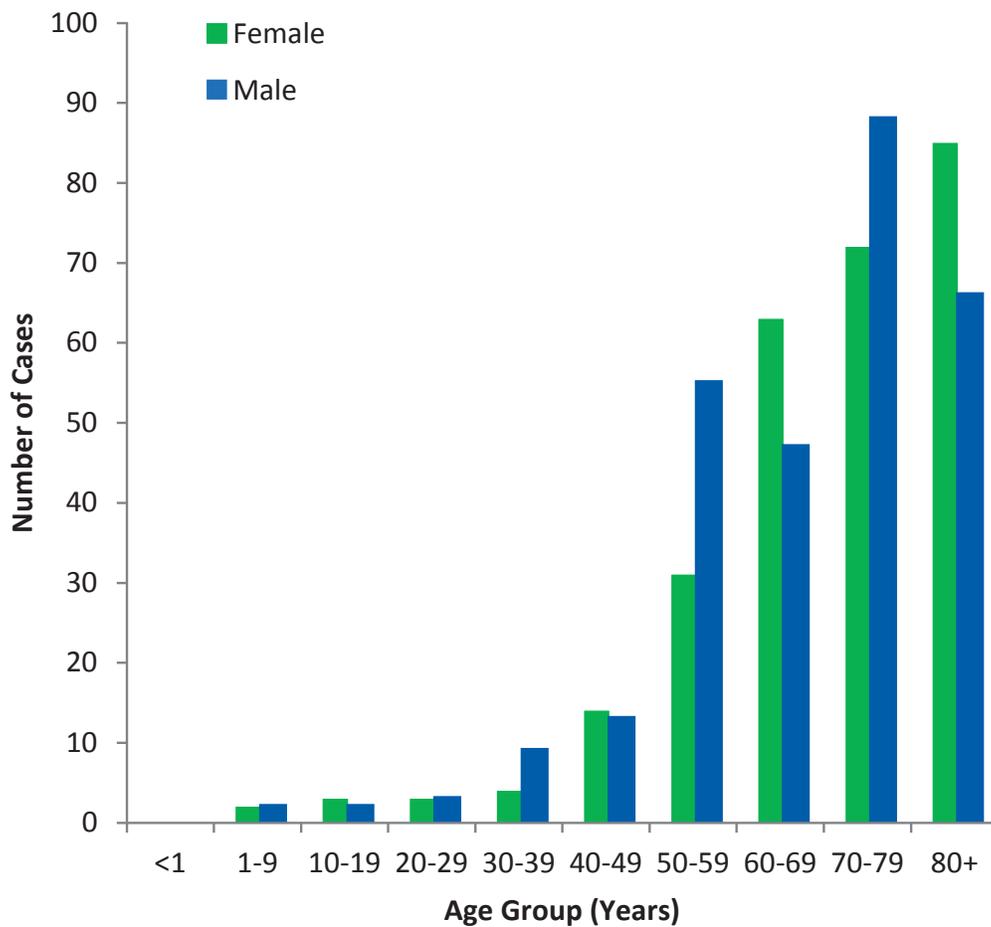
[§] Pleural fluid (8), peritoneal fluid (9), bone (4), brain (3), aorta (1), eye (1), liver (1).

Patients with invasive listeriosis not associated with pregnancy reported to the *Listeria* Initiative during 2013 are shown by patient age group and sex in Figure 2.

Highlights

- The number of cases in each 10-year age group increased with age among persons 1 to 79 years.

Figure 2. Patients with invasive listeriosis not associated with pregnancy, by age group and sex, *Listeria* Initiative, 2013 (n=562).



Pregnancy-associated listeriosis

Demographic and clinical characteristics of the 68 episodes of pregnancy-associated listeriosis are shown in Table 2.

Highlights

- Hispanic ethnicity was more common in the mothers in episodes of pregnancy-associated listeriosis (37%) than in patients with invasive listeriosis not associated with pregnancy (8%).
- Twenty-one percent of episodes of pregnancy-associated listeriosis led to fetal death; in addition, 3% were reported to have led to death of live-born infants (outcome not reported for all live births).

Table 2. Demographic and clinical characteristics of episodes of pregnancy-associated listeriosis cases reported to the Listeria Initiative, 2013 (n=68),*

Characteristic (number with information)	n	%
Mother's age in years (n=50) [†]		
Median (range)	27 (17-42)	
Mother's ethnicity (n=59) [†]		
Hispanic	22	37
Non-Hispanic	37	63
Mother's Race (n=56) [†]		
White	42	75
African American/Black	7	12
Asian	4	7
Native Hawaiian or Other Pacific Islander	2	4
Multiracial	1	2
Source of most invasive isolate (n=68) [§]		
CSF from neonate	14	21
Blood from both mother and neonate	2	3
Blood from neonate	22	32
Blood from mother	19	28
Other products of conception [¶]	11	16
Hospitalization ^{**}		
Mothers (n=62) ^{††}	32	52
Live born infants (n=43) ^{§§}	36	84
Pregnancy outcome (n=63) ^{¶¶}		
Live birth, infant survived	33	52
Live birth, infant died	2	3
Live birth, unknown infant outcome	12	19
Fetal death	13	21
Still pregnant at time of case report	3	5

*Cases involving mother-infant pairs are counted as a single case.

[†] Missing and unknown information was excluded from the denominator for each characteristic: age (n=18), ethnicity (n=9), race (n=12).

[§] For cases in which *L. monocytogenes* was isolated from multiple normally sterile anatomical sites, the annual summary reports the most invasive site, using a hierarchy (in descending order of invasiveness: CSF, bone or joint fluid, blood, other sterile site, and other products of conception).

[¶] Other products of conception include placenta (n=10), amniotic fluid (n=1).

^{**} Hospitalization related to *Listeria* infection.

^{††} Thirty (94%) of 32 mothers hospitalized for *Listeria* infection had a culture yielding *L. monocytogenes*.

^{§§} Thirty-six (100%) of 36 infants who were hospitalized for *Listeria* infection had a culture yielding *L. monocytogenes*.

^{¶¶} Outcomes were unknown for 5 cases.

Investigations

The *Listeria* Initiative was designed to expedite investigation of and response to clusters and outbreaks. (By cluster, we mean 2 or more people whose isolates are very similar and whose illnesses may or may not have been linked to a common source; clusters of ill persons that were linked to a common source are called outbreaks.) By participating in the *Listeria* Initiative, including use of the standard questionnaire, state and local health departments contribute data on food exposures that can be pooled for rapid investigation of clusters and other epidemiological analyses.

During 2013, state and local health officials, regulatory agencies, and CDC investigated 17 clusters of listeriosis. Two outbreaks were identified. Both outbreaks included patients who resided in more than one state. Highlights of these investigations are below. More information on *Listeria* outbreaks can be found at [CDC's Foodborne Outbreak Online Database \(FOOD\) \(www.cdc.gov/foodborneoutbreaks/\)](http://www.cdc.gov/foodborneoutbreaks/).

- In an outbreak of 6 cases reported from 5 states (reference 1), case-case epidemiologic analysis using the *Listeria* Initiative database identified soft cheese as a risk factor. For the first time in a US investigation of listeriosis, investigators used whole genome sequencing (WGS) to compare patient, food, and environmental isolates. Investigators ultimately implicated certain cheeses as the source.
- In an outbreak of 8 cases reported from 2 states (reference 2), information collected by the *Listeria* Initiative revealed that 7 patients reported consuming soft or semi-soft Hispanic-style cheese and all shopped at different locations of the same food store chain. Laboratory testing by WGS of products collected at retail and the production facility showed that strains isolated from cheese were highly related to strains from patients. As a result of this investigation, regulators suspended the registration of the food facility, halting the company from distributing any products.

Listeria serotypes

The CDC *Listeria* Reference Laboratory serotyped 500 isolates from cases reported to the *Listeria* Initiative in 2013 (Table 3).

Highlights

- Serotype 4b was the most commonly identified serotype, accounting for 52% of isolates.

Table 3. Serotypes of *Listeria monocytogenes* isolated from invasive cases reported to the *Listeria* Initiative, 2013 (n=500).

Serotype	n	%
4b	261	52
1/2a	148	30
1/2b	61	12
Other serotypes	21	4
Untypeable	9	2

Reporting Statistics

Prompt interviewing of all patients with listeriosis, timely submission of *Listeria* Initiative standardized questionnaires to CDC, rapid pulsed-field gel electrophoresis (PFGE) subtyping, and uploading of PFGE results to PulseNet allow for rapid detection and investigation of listeriosis clusters. To help meet these objectives, reporting statistics and goals for the *Listeria* Initiative (below) were proposed at the 2012 Council of State and Territorial Epidemiologists (CSTE) Annual Meeting (3).

CDC sends state-specific summaries to state epidemiologists. Health department personnel may also request their state's reporting statistics by emailing edebresponse@cdc.gov.

Table 4. National listeriosis surveillance metrics by year, Listeria Initiative, 2009-2013

	2009	2010	2011	2012	2013
Number of jurisdictions reporting to LI ¹	40	42	47	44	44
Number of case reports received	525	577	621	582	646
Proportion of NNDSS cases reported to LI ²	66%	71%	67%	78%	85%
Proportion of human PulseNet isolates reported to LI ³	53%	65%	69%	82%	86%
Reporting Timeliness					
Proportion of interviews reported to CDC within 7 days of interview date ⁴	21%	15%	19%	21%	31%
Proportion of clinical isolates uploaded to PulseNet within 14 days of specimen collection date ⁵	44%	45%	57%	53%	56%
Reporting Completeness					
Proportion of reports using the standard LI questionnaire ⁶	76%	77%	83%	78%	82%
Proportion of reports with "complete" food history ⁷	50%	49%	57%	53%	58%

¹Includes District of Columbia

²Is not calculable in instances where no cases are reported to NNDSS

³Is not calculable in instances where no human isolates are reported to PulseNet

⁴Is not calculable in instances where no LI reports are received or when interview date was not completed; CDC did not begin tracking received date until 2008

⁵Is not calculable in instances where no human isolates are reported to PulseNet or when specimen collection date and/or PulseNet upload date are not completed

⁶Is not calculable in instances where no LI reports are received

⁷Is not calculable in instances where no LI reports are received; for purposes of this report, complete food history is defined as information on consumption history for all of the following items: turkey breast, blue cheese, cole slaw, smoked fish, yogurt

Table 5. Proposed 2- and 4-year national listeriosis reporting goals, the *Listeria* Initiative

	Proposed National Goals			Status (2011)
	Current (2011)	2-year (2014)	4-year (2016)	
Number of jurisdictions reporting to LI ¹	44	All	All	Needs improvement
Proportion of NNDSS cases reported to LI ²	85%	≥90%	≥100%	Needs improvement
Proportion of human PulseNet isolates reported to LI ³	86%	≥90%	≥100%	Needs improvement
Reporting Timeliness				
Proportion of interviews reported to CDC within 7 days of interview date ⁴	31%	70%	90%	Needs improvement
Proportion of clinical isolates uploaded to PulseNet within 14 days of specimen isolation date ⁵	56%	70%	90%	Needs improvement
Reporting Completeness				
Proportion of reports using the standard LI questionnaire ⁶	82%	95%	100%	Needs improvement
Proportion of reports with "complete" food history ⁷	58%	80%	90%	Needs improvement

¹Includes District of Columbia

²Is not calculable in instances where no cases are reported to NNDSS; can be greater than 100% if more cases are reported to LI than to NNDSS

³Is not calculable in instances where no human isolates are reported to PulseNet; can be greater than 100% if more cases are reported to LI than to PulseNet

⁴Is not calculable in instances where no LI reports are received or when interview date was not completed; CDC did not begin tracking received date until 2008

⁵Is not calculable in instances where no human isolates are reported to PulseNet or when specimen collection date and/or PulseNet upload date are not completed

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Other Sources of Surveillance Data

NNDSS Data

The National Notifiable Disease Surveillance System (NNDSS) collects and compiles reports of nationally notifiable infectious diseases, including listeriosis. Reports can be found at http://www.cdc.gov/mmwr/mmwr_nd/index.html.

Outbreak Data

The Foodborne Disease Outbreak Surveillance System (FDOSS) collects reports of foodborne disease outbreaks from local, state, tribal, and territorial public health agencies. Reports can be found at <http://www.cdc.gov/foodsafety/fdoss/data/annual-summaries/index.html>.

References

1. Centers for Disease Control and Prevention. Notes from the field: multistate outbreak of listeriosis linked to soft-ripened cheese—United States, 2013. *MMWR Morb Mortal Wkly Rep.* 2014 Apr 4;63(13):294–295. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6313a5.htm>
2. Centers for Disease Control and Prevention. Multistate outbreak of listeriosis linked to Roos Foods dairy products (final update). April 18, 2014 [cited 2015 May 5]. <http://www.cdc.gov/listeria/outbreaks/cheese-02-14/>

Reference Citation:

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