
Multistate Outbreak of Multidrug-Resistant *Salmonella* I 4, [5],12:i:- and *Salmonella* Infantis Infections Linked to Pork (Final Update)

Posted December 2, 2015 1:30 PM ET

This outbreak appears to be over. However, *Salmonella* is an important cause of human illness in the United States. For more information about *Salmonella* and steps that people can take to reduce their risk of infection, visit CDC's [Salmonella](#) webpage.

Highlights

- **Read the Recall & Advice to Consumers, Restaurants, and Retailers »**
- This outbreak appears to be over. However, *Salmonella* is an important cause of human illness in the United States. For more information about *Salmonella* and steps that people can take to reduce their risk of infection, visit CDC's [Salmonella](#) webpage.
- Epidemiologic, laboratory, and traceback findings identified pork produced by Kapowsin Meats as the likely source of this outbreak of *Salmonella* I 4,[5],12:i:- and *Salmonella* Infantis infections.
- 192 people infected with the outbreak strains of *Salmonella* I 4,[5],12:i:- (188) and *Salmonella* Infantis (4) were reported from five states.
 - Most ill people were reported from Washington.
 - 30 ill people were hospitalized, and no deaths were reported.
- CDC's National Antimicrobial Resistance Monitoring System (NARMS) laboratory conducted antibiotic-resistance testing on clinical isolates collected from 10 ill people infected with one of the outbreak strains of *Salmonella* I 4,[5],12:i:-.
 - All 10 isolates (100%) were multidrug resistant. This included resistance to ampicillin, streptomycin, sulfisoxazole, and tetracycline.
 - Antibiotic resistance may be associated with increased risk of hospitalization, development of a bloodstream infection, or treatment failure in patients.
- On August 27, 2015, Kapowsin Meats issued an expanded recall (<http://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/recall->

case-archive/archive/2015/recall-110-2015-release-expansion) of approximately 523,380 pounds of pork products that might be contaminated with *Salmonella* 4,[5],12:i:-.

- Consumers should check their homes and freezers for the recalled pork products and should not cook or eat them. Retailers should not sell these products and restaurants should not serve them.

Outbreak Summary

Introduction

The Washington State Department of Health (<http://www.doh.wa.gov/>) (DOH), Public Health—Seattle & King County (<http://www.kingcounty.gov/healthservices/health.aspx>) (PHSKC), several states, CDC, and the U.S. Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS) investigated an outbreak of *Salmonella* 4,[5],12:i:- and *Salmonella* Infantis infections linked to pork.

Public health investigators used the PulseNet system to identify illnesses that may be part of this outbreak. CDC coordinates PulseNet, the national subtyping network of public health and food regulatory agency laboratories. DNA "fingerprinting" is performed on *Salmonella* bacteria isolated from ill people using techniques called pulsed-field gel electrophoresis (PFGE) and whole genome sequencing (WGS). WGS gives a more detailed DNA fingerprint than PFGE. PulseNet manages a national database of these DNA fingerprints to identify possible outbreaks of enteric illness. Six DNA fingerprints (outbreak strains) were included in this outbreak investigation. The six strains are rare in Washington but more common in other U.S. states. WGS was performed on clinical isolates from ill people in other states who were suspected to be part of the outbreak. Some of these isolates were found to be closely genetically related to clinical isolates from Washington. This close association provided additional evidence that illnesses that occurred in other states were related to the illnesses in Washington.

A total of 192 ill people infected with the outbreak strains of *Salmonella* 4,[5],12:i:- (188) and *Salmonella* Infantis (4) were reported from five states. The number of ill people reported from each state was as follows: Alaska (1), California (2), Idaho (2), Oregon (3), and Washington (184). Most of the ill people infected in states other than Washington traveled to Washington in the week before their illness started.

Among people for whom information was available, illnesses started on dates ranging from April 25, 2015, to September 25, 2015. Ill people ranged in age from less than 1 year to 90, with a median age of 35. Fifty-one percent of ill people were female. Among 180 ill people with available information, 30 (17%) were hospitalized, and no deaths were reported.

Investigation of the Outbreak

Epidemiologic, laboratory, and traceback findings identified pork produced by Kapowsin Meats as the likely source of this outbreak of *Salmonella* 4,[5],12:i:- and *Salmonella* Infantis infections.

In interviews, ill people answered questions about foods eaten and other exposures in the week before they became ill. Of 123 people for whom information was available, 94 (76%) reported eating pork in the week before becoming ill. This proportion was significantly higher than results from a [survey](#) [PDF - 29 pages] of healthy people in which 43% reported eating pork in the week before they were interviewed.

In addition, numerous ill people were identified as part of illness clusters following events such as pig roasts. An illness cluster is defined as two or more people who do not live in the same household who report eating at the same restaurant location, attending a common event, or shopping at the same location of a grocery store in the week before becoming ill. Investigating illness clusters can provide critical clues about the source of an outbreak. If several unrelated ill persons ate or shopped at the same location of a restaurant or store within several days of each other, it suggests that the contaminated food item was served or sold there.

Laboratory testing confirmed the outbreak strains in environmental samples collected by Washington State DOH from the Kapowsin Meats facility. On August 13, 2015, Kapowsin Meats voluntarily [recalled](http://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/recall-case-archive/archive/2015/recall-110-2015-release) approximately 116,262 pounds of whole pigs that might be contaminated with *Salmonella* 4,[5],12:i:-. The product was shipped to individuals, retail locations, institutions, and distributors in Alaska, Oregon, and Washington.

While Kapowsin Meats took steps to address sanitary conditions at their facility after the original [recall](http://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/recall-case-archive/archive/2015/recall-110-2015-release) on August 13, 2015, USDA-FSIS [conducted](http://www.fsis.usda.gov/wps/portal/fsis/home!/ut/p/a1/04_Sj9CPykssy0xPLMnMz0vMAfGjzOINAg3MDC2dDbwsfDxdDDz9AtyMgnyMDf31dmy&page=gov.usda.fsis.internet.newsroom&urile=wcm%3apath%3a%2FFSIS-Content%2Finternet%2Fmain%2Ftopics%2Frecalls-and-public-health-alerts%2Frecall-case-archive%2Farchive%2F2015%2Frecall-110-2015-release-expansion) intensified sampling. The intensified sampling identified *Salmonella* 4,[5],12:i:- and *Salmonella* Infantis on whole pigs for barbeque, on associated pork products, and throughout the facility. Kapowsin Meats voluntarily suspended operations and on August 27, 2015, expanded its [recall](http://www.fsis.usda.gov/wps/portal/fsis/home/)

[ut/p/a1/04_Sj9CPykssy0xPLMnMz0vMAfGjzOINAg3MDC2dDbwsfDxdDDz9AtyMgnyMDf3t1dmy&page=gov.usda.fsis.internet.newsroom&urile=wcm%3apath%3a%2FFSIS-Content%2Finternet%2Fmain%2Ftopics%2Frecalls-and-public-health-alerts%2Frecall-case-archive%2Farchive%2F2015%2Frecall-110-2015-release-expansion\)](http://p/a1/04_Sj9CPykssy0xPLMnMz0vMAfGjzOINAg3MDC2dDbwsfDxdDDz9AtyMgnyMDf3t1dmy&page=gov.usda.fsis.internet.newsroom&urile=wcm%3apath%3a%2FFSIS-Content%2Finternet%2Fmain%2Ftopics%2Frecalls-and-public-health-alerts%2Frecall-case-archive%2Farchive%2F2015%2Frecall-110-2015-release-expansion) to include approximately 523,380 pounds of pork products that might be contaminated with *Salmonella* 4,[5],12:i:-. Recalled pork products included whole pigs for barbeque, various pork offal products, pork blood, and pork trim. The products were shipped to individuals, retail locations, institutions, and distributors in Alaska, Oregon, and Washington. A review of the PulseNet database identified 4 people infected with the same DNA fingerprint of *Salmonella* Infantis, and these ill people were included in the outbreak case count. Interviews were conducted with 3 of the 4 ill people; all 3 people reported eating pork in the week before their illness started.

The National Antimicrobial Resistance Monitoring System (<http://www.fda.gov/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/NationalAntimicrobialResistanceMonitoringSystem>) (NARMS) is a U.S. public health surveillance system that tracks antibiotic resistance in foodborne and other enteric bacteria found in people, raw meat and poultry, and food-producing animals. NARMS is a partnership among the CDC, the U.S. Food and Drug Administration (FDA), USDA, and state and local health departments.

The NARMS human surveillance program at CDC monitors antibiotic resistance in *Salmonella* and other bacteria isolated from clinical specimens submitted to NARMS by public health laboratories. CDC's NARMS laboratory conducted antibiotic resistance testing on clinical isolates collected from 10 ill people infected with one of the outbreak strains of *Salmonella* 4,[5],12:i:-. Of the 10 isolates tested, all (100%) were multidrug resistant. This included resistance to ampicillin, streptomycin, sulfisoxazole, and tetracycline. Antibiotic resistance may be associated with increased risk of hospitalization, development of a bloodstream infection, or treatment failure in patients.

December 2, 2015

Final Case Count Update

Since the last update on August 28, 2015, 40 more ill people were reported, including 32 people from Washington and 8 people from Alaska (1), California (2), Idaho (2), and Oregon (3).

A total of 192 ill people infected with the outbreak strains of *Salmonella* 4,[5],12:i:- (188) and *Salmonella* Infantis (4) were reported from five states. The number of ill people reported from each state was as follows: Alaska (1), California (2), Idaho (2), Oregon (3), and Washington (184).

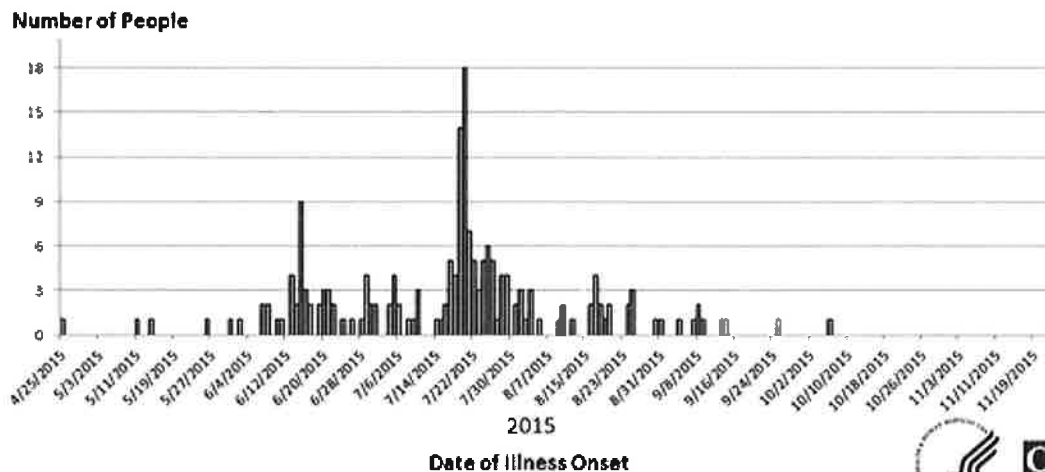
Among people for whom information was available, illnesses started on dates ranging from April 25, 2015, to September 25, 2015. Ill people ranged in age from less than 1 year to 90, with a median age of 35. Fifty-one percent of ill people were female. Among 180 ill people with available information, 30 (17%) were hospitalized, and no deaths were reported.

> August 28, 2015

> Initial Announcement

At A Glance

- Case Count: 192
- States: 5
- Deaths: 0
- Hospitalizations: 30
- Recall: Yes



[CLICK TO VIEW EPI CURVE GRAPHS](#)



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More Information

- [Recall & Advice to Consumers](#)
- [Signs & Symptoms](#)
- [Key Resources](#)

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Content source: Centers for Disease Control and Prevention (<http://www.cdc.gov/>)

National Center for Emerging and Zoonotic Infectious Diseases (NCEZID) ([/ncezid/index.html](http://www.cdc.gov/ncezid/index.html))

Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) ([/ncezid/dfwed/index.html](http://www.cdc.gov/ncezid/dfwed/index.html))