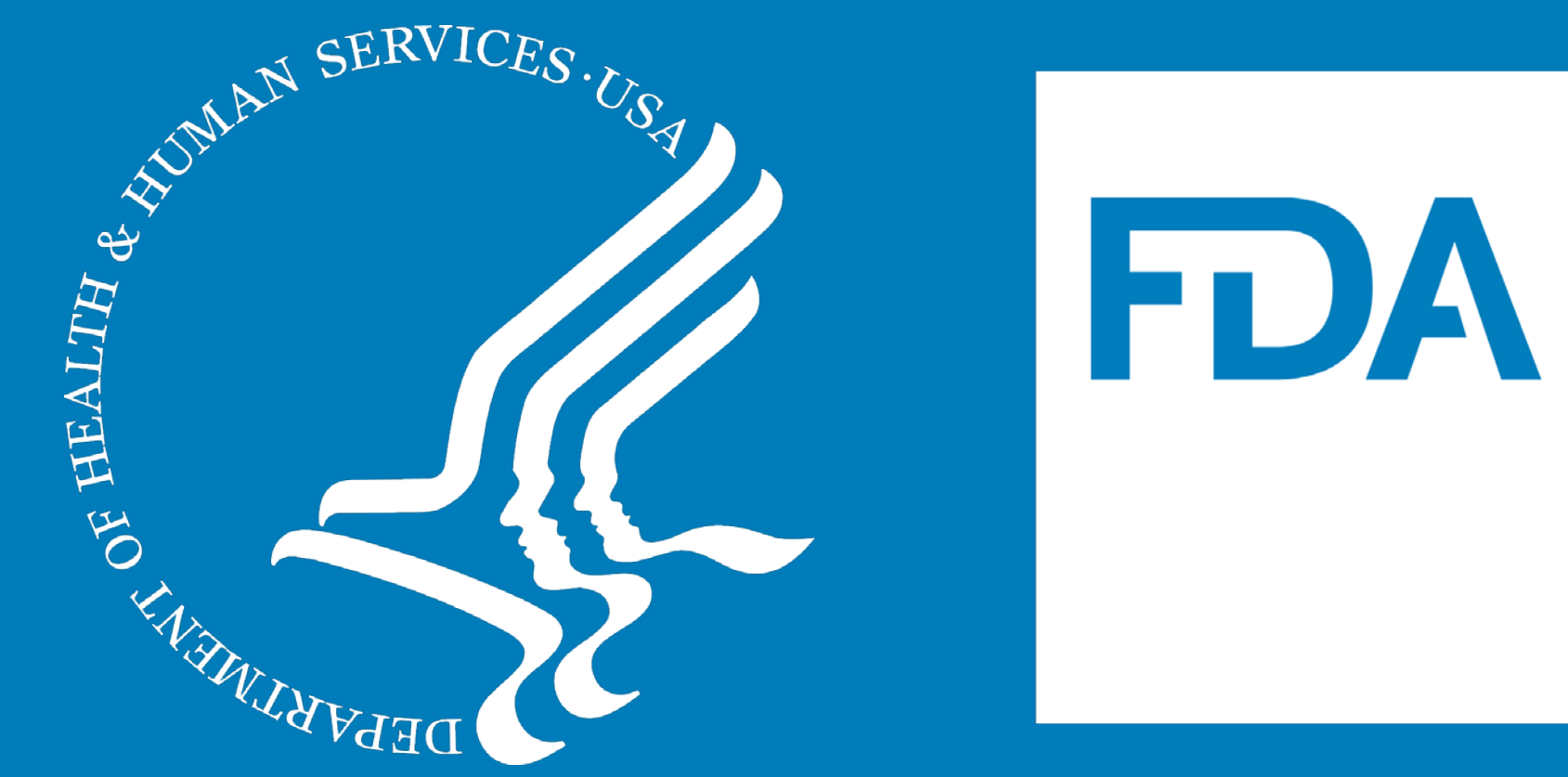


The Power of Us: Multiagency Partnership to Solve Outbreak in North Carolina

RRT: Coordinating to Share Resources during Food Emergencies

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Abstract

Between May –October 2019, fourteen cases of *Salmonella* London occurred in several rural counties in North Carolina. Low incidence over a six month period and few commonalities made source identification challenging. A multidisciplinary response through the Rapid Response Team (NC RRT) led to the identification of contaminated equipment at a retail establishment as the source of illness.

The NC RRT initiated this response in accordance with its mission to characterize, investigate, mitigate, and conclude food and feed emergencies as part of a coordinated federal-state-local integrated food safety system. The rapid and successful collaborative response to this public health threat led to the source identification and prevention of additional illness. This response is a result of partnerships and protocols supported by the Rapid Response Team concept.

Multi-disciplinary Investigational Activities

This investigation heavily depended on the multi-disciplinary skills and capabilities of the multiple agencies that partnered to assist in the detection, investigation and control of this health hazard. The coordinated efforts resulted in identification of and remediation of contaminated food preparation equipment and prevention of additional illness. Without the framework established via the RRT initiative, this collaborative investigative approach would not have been possible. The investment into the team concept to protect public health was directly associated with prevention of illness among consumers.

The following agencies played critical roles in this investigation:

NC DHHS: The North Carolina Department of Health and Human Services (NC DHHS) conducted epidemiologic, environmental health and laboratory activities for this investigation. Representatives from both the local and state public health offices were integral parts of the team. Local communicable disease staff initially detected the disease cluster via the routine disease reporting system. This trigger alerted state public health and state lab staff to focus on this specific serotype. Statewide disease surveillance data led to the identification of 14 cases across six counties between May-October 2019. National disease surveillance detected additional cases outside of North Carolina that were ultimately determined not to be related to this outbreak. The epidemiologic investigation determined that 64% of cases had consumed food from the same local BBQ restaurant within 3 days of illness onset. Local environmental health officials conducted an environmental assessment at the restaurant that identified multiple violations including: not washing produce prior to use; potential for cross-contamination of produce and meat and lack of adequate handwashing facilities. NC DHHS partnered with NCDA&CS to conduct environmental swabbing. Results indicated that foodservice equipment was contaminated with the outbreak strain of *S. London* and the retail permit was revoked until employee stool testing and subsequent environmental swabbing was negative.

NCDA&CS: The North Carolina Department of Agriculture (NCDA&CS) partnered with local and state environmental health officials to conduct environmental swabbing at the retail establishment. A total of 73 swabs were collected, 9 of which tested positive for *Salmonella* and later identified as *Salmonella* London. WGS analysis was performed on 6 of the 9 isolates and were shown to be genetically similar to clinical isolates. The surfaces determined to be contaminated were related to equipment used to chop pork BBQ and catering equipment.

NC State Public Health Laboratory: The NCSLPH Enterics lab identified three initial clinical isolates as well as subsequent isolates associated with the investigation as *Salmonella* London utilizing conventional and molecular serotyping methodologies. Whole genome sequencing (WGS) was performed on 14 clinical and 6 environmental isolates by the Molecular Diagnostics and Molecular Epidemiology PulseNet Laboratory which determined the isolates to be closely related (0-5 alleles) by core genome (cg)MLST analysis.

Federal Partners: Both the CDC and FSIS assisted in this investigation by providing consultation.

Investigation Timeline

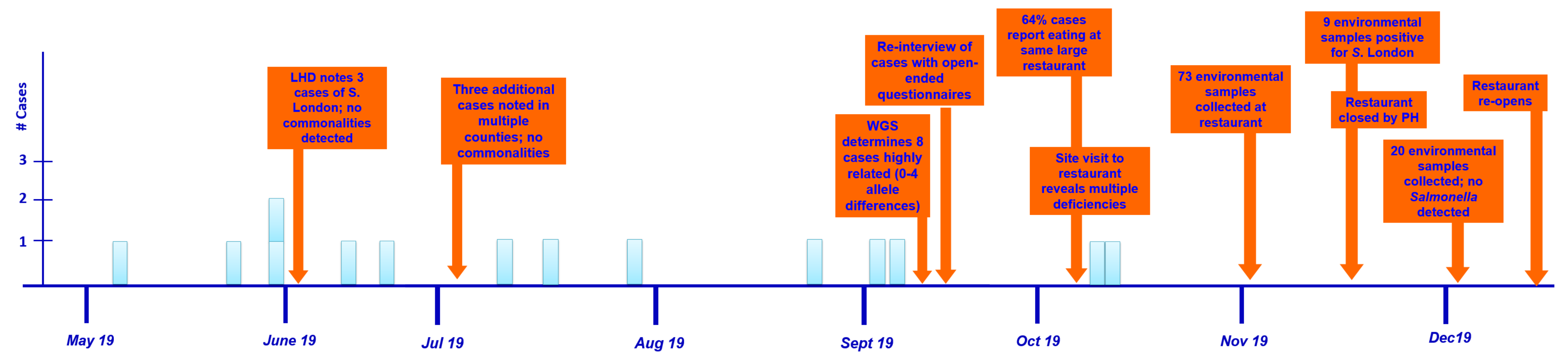


Figure 3. NCDA&CS inspectors collecting environmental swabs on site

Investigation Challenges

The primary challenge in this investigation was the low incidence over a six month period, which led to significant delays in cluster recognition and thus, recall of exposures among cases. Although ultimately 64% of cases reported consumption of food from the same restaurant, this was not the case initially. A series of interview strategies including open-ended interviews and menu reviews were conducted to determine the source of illness. The suspected restaurant operated Wednesday – Saturday. It was noted that 93% (13/14) of cases had onset between Thursday – Sunday, which further supported the potential connection as the most common incubation period for *Salmonella* is within the first 36 hours after exposure.

The restaurant was closed by local environmental health officials following the positive environmental swabbing results and remained closed until environmental swabbing results were negative.

Conclusion

It is likely that foodservice equipment contaminated with *S. London* would have continued to result in sporadic severe illness requiring hospitalization had this multiagency investigation not occurred. This investigation demonstrated the strengths of multiagency communication and response capacities. Effective swabbing and testing protocols, timely information sharing among partners, joint site visits and appropriate regulatory control measures led to the efficient removal of contaminated products from the marketplace and ultimately, the protection of the public's health.

For additional information regarding this response, please contact: Daniel Gaines, Food Administrator
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Investigation Overview

Fourteen cases of *S. London* occurred across six counties in a rural area of the state between May –October 2019. While there were no reported deaths, 80% of the patients were hospitalized. This outbreak primarily affected adults over age 65.

In June 2019, a communicable disease nurse at the Nash County Health Department noted a cluster of 3 *Salmonella* London cases across two rural counties over a four week period. Initial epidemiologic information from case interviews did not yield commonalities. By September 2019, the cluster had grown to 8 cases and the State Public Health Laboratory (SPHL) determined that all 8 cases are highly related (0-5 alleles) using whole genome sequencing (WGS).

While epidemiologic evidence lacked a “smoking gun”, it was noted that 45% (4/9) cases report consumption of food from the same local BBQ restaurant. Efforts were made to re-interview cases. By October, the cluster had grown to 14 cases and 64% (9/14) reported consumption at the same local BBQ restaurant. Environmental assessments at the restaurant revealed multiple violations that led to the collection of 73 environmental samples for testing by the NC Department of Agriculture. Nine environmental samples were positive for the outbreak strain of *S. London*. Due to contamination of food preparation equipment, the restaurant's permit was suspended and reinstated 4 weeks later after employee stools and subsequent environmental swabs tested negative.

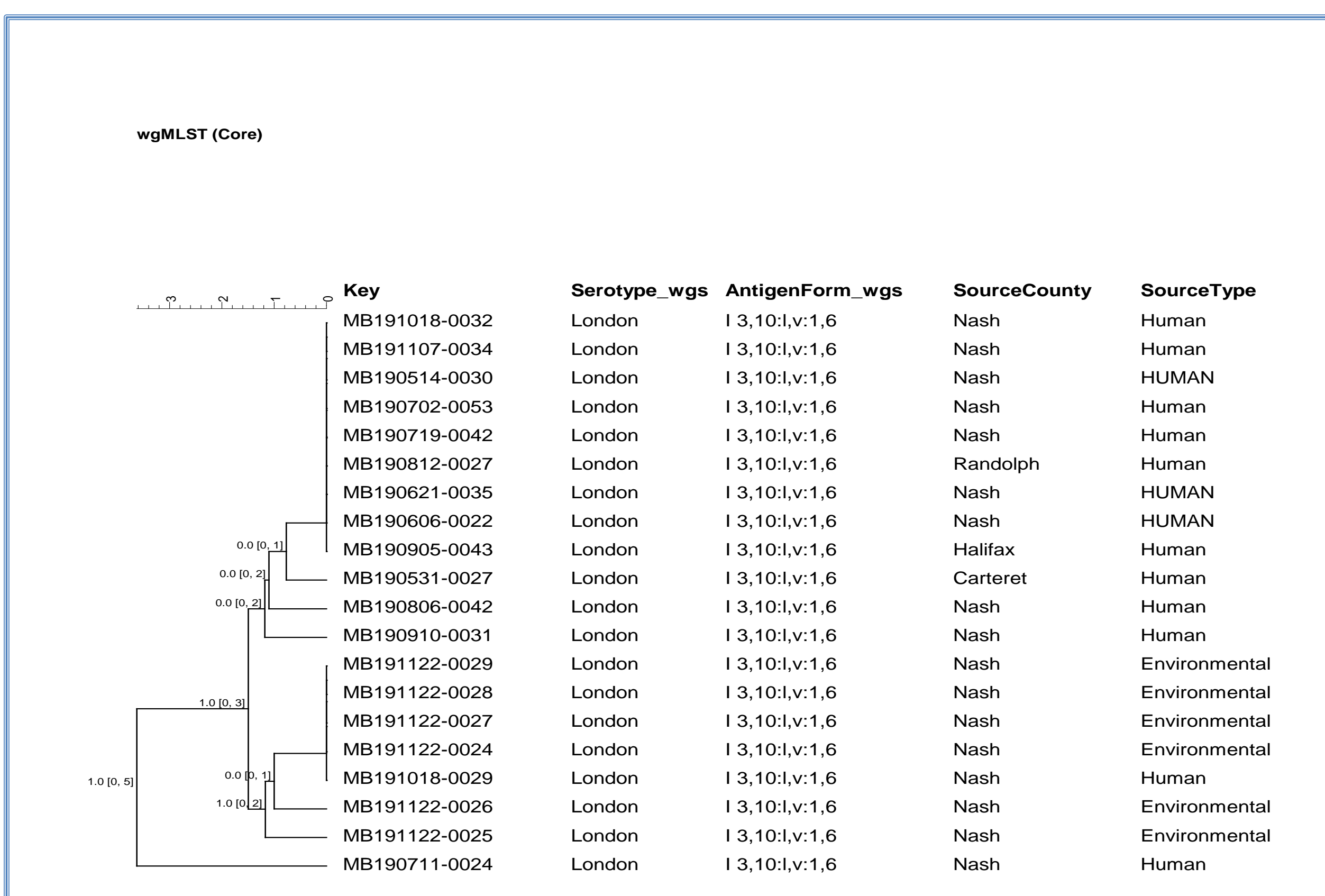
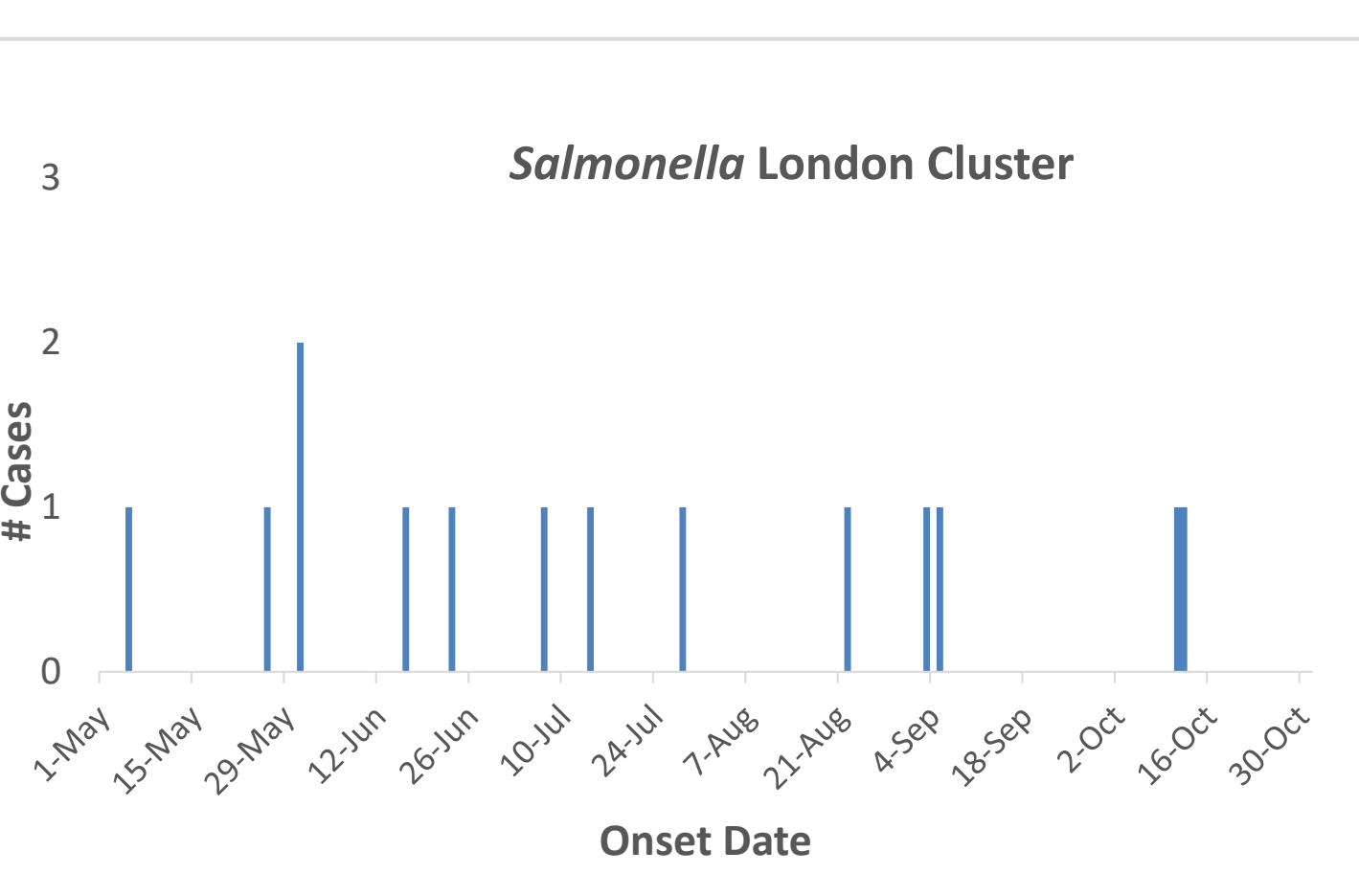
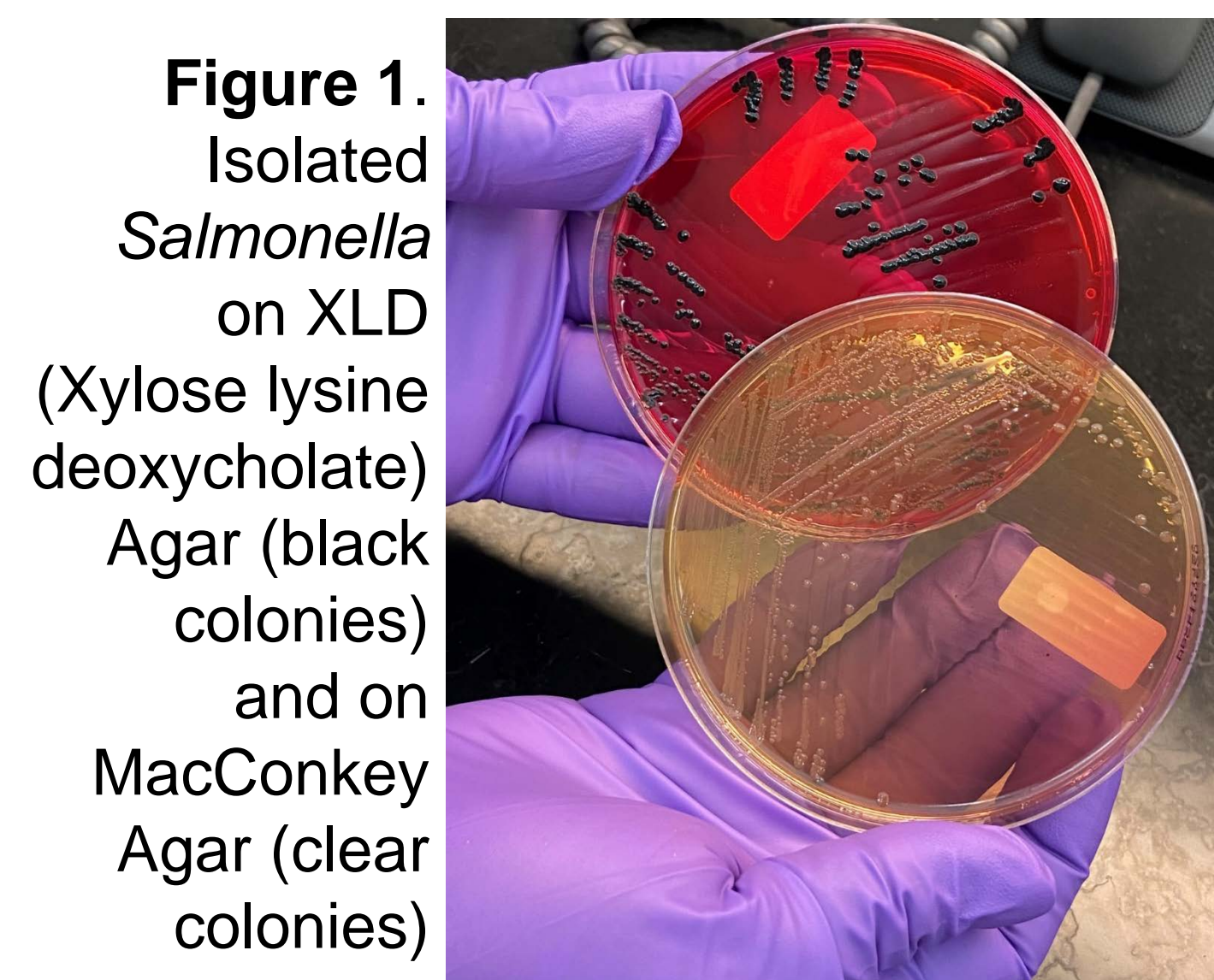


Figure 3. Relatedness tree constructed from cgMLST containing clinical and environmental isolates.

Figure 2. Epidemic curve of *S. London* cases)