



APHL GLOBAL HEALTH CAPABILITIES

FOODBORNE SURVEILLANCE

DECEMBER 2023

The Association of Public Health Laboratories (APHL) works with countries around the world to strengthen public health laboratory-based surveillance systems for enteric foodborne diseases. APHL has over 25 years' experience with coordinating PulseNet activities both within the United States and globally.

Foodborne Surveillance for Enteric Pathogens

PulseNet International: Detecting Outbreaks with Molecular Subtyping

PulseNet was established in 1996 by the US CDC, state local public health laboratories and federal food regulatory agencies as a national molecular subtyping network to detect clusters of foodborne pathogens using molecular technologies. In the early 2000's, PulseNet International established regional coordinating centers to expand molecular-based subtyping capabilities. This created an international network of public health laboratories detecting and responding to outbreaks caused by pathogens such as *Salmonella*, shiga-toxin producing *Escherichia coli*, *Listeria monocytogenes*, *Vibrio* spp. and others. Today, PulseNet International is using next generation sequencing (NGS) methods as its primary tool to detect and monitor foodborne outbreak events around the world.

Global AR Lab & Response Network: Detecting Drug Resistance with Genetic Sequencing

In 2021, PulseNet International joined CDC's new Global AR Lab & Response Network initiative, to build laboratory capacity for antimicrobial resistance (AR) surveillance within PulseNet International regions. APHL is a key implementing partner, awarded funding to support public health laboratories with capabilities of using sequencing-based approaches to detect and monitor the spread of drug resistant strains of enteric bacteria throughout the PulseNet International network.

Whole Genome Sequencing Feasibility Study

To learn how effectively whole genome sequencing (WGS) techniques can be used in foodborne illness surveillance, APHL launched a pilot study in 2022 in collaboration with the PulseNet Asia-Pacific regional coordinators at the Peter Doherty Institute for Infection and Immunity. Six laboratories from the Asia-Pacific Region participated in the pilot. Members of their staff attended a training in Melbourne, Australia in February 2023 to learn PulseNet MiSeq protocols and bioinformatic analyses. Upon completion of the training, pilot sites are sequencing up to 100 bacterial strains to better understand and demonstrate the:

- Utility of WGS of enteric bacteria using NGS methods
- Use of existing tools for identification of AR resistance genes in enteric bacteria
- Capability to analyze NGS data using a common platform for communication and data sharing
- Identify processes for detection, surveillance and reporting of AR pathogens.



What's Next?

Some Anticipated New Developments for APHL Contributions to PulseNet International and Global AR Lab & Response Network:



Expanding Regional Laboratory Sequencing and Surveillance Capacity

APHL supports countries by implementing PulseNet International through network coordination, wet-bench sequencing and bioinformatics training for the detection and surveillance of enteric bacterial pathogens.



Utilizing Cloud Computing for Bioinformatics

APHL demonstrates the utility of bioinformatics platforms for analyzing enteric bacterial strains within cloud-based computing environments. Use of these platforms will enable laboratories to perform near real-time, laboratory-based surveillance on enteric bacterial pathogens and monitor trends of antimicrobial resistance over time.



Building Workforce Capacity and Communities of Practice

APHL supports in-person and virtual trainings and meetings that allow laboratory scientists to build knowledge and relationships and to develop the skillsets needed to perform high-quality sequencing and bioinformatic analyses within PulseNet International regions. These communities of practice continue to grow as more public health scientists are trained in methods developed by PulseNet International.



Participants of
APHL's 2023
WGS Feasibility
Pilot training.