# AMD Overview

Innovate • Transform • Protect

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CDC's Advanced Molecular Detection (AMD) initiative fosters scientific innovation to transform public health and protect people from disease threats.

Advanced molecular detection (AMD) combines the latest pathogen identification technologies with enhanced capabilities in bioinformatics and advanced epidemiology to be more effective in understanding, preventing, and controlling infectious diseases.

Traditional Epidemiology

+

Next-generation Genomic Sequencing

+

Bioinformatics

=

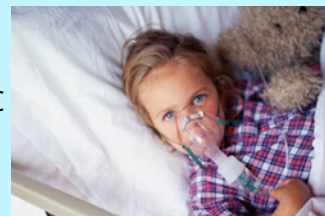**Advanced Molecular Detection**
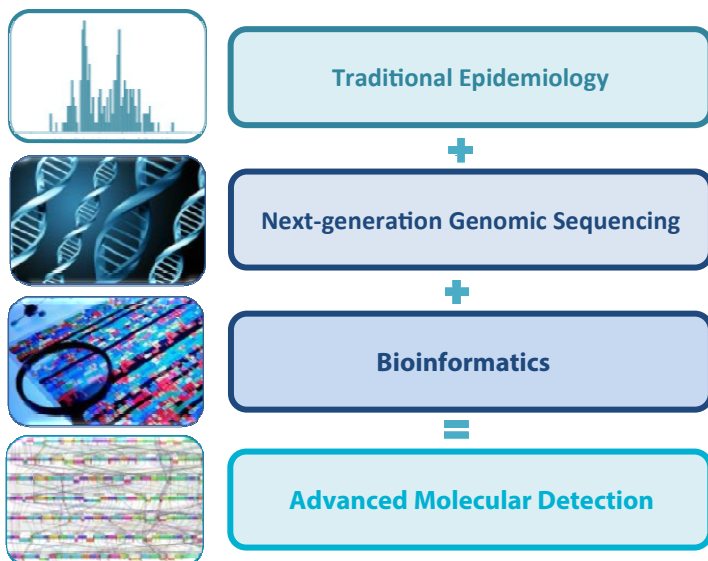
Examples of public health benefits of AMD include more precise and accurate ways of:

- Diagnosing known and emerging infections
- Detecting and responding to outbreaks
- Understanding, characterizing, and controlling antibiotic resistance
- Developing and targeting prevention measures, including vaccines

AMD in Action: Identifying Enterovirus D68 in Children with Respiratory Illness

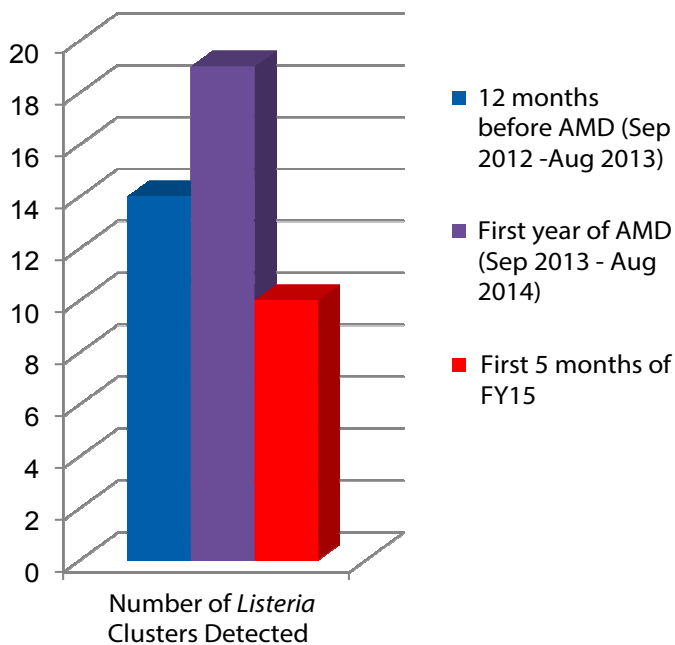In mid-August 2014, hospitals in Missouri and Illinois notified CDC of an increase in admissions of children with severe respiratory illness. The hospitals confirmed the presence of enterovirus. CDC identified enterovirus D68 (EV-D68) in most of the specimens. AMD methods helped CDC develop a rapid test for EV-D68 and deploy it to states, increasing state laboratories' abilities to detect the virus. Between August and December 2014, CDC and states identified over 1,100 cases of EV-D68, a much greater number than reported in previous years.

Whole genome sequencing: The future of food safety

Whole genome sequencing has the potential to transform foodborne disease tracking, stop foodborne outbreaks faster, and *greatly* improve food safety. CDC fosters an interagency collaboration between the National Institutes of Health (NIH), U.S. Department of Agriculture (USDA), and U.S. Food and Drug Administration (FDA) to detect *Listeria* outbreaks. These agencies – along with state public health departments – compared whole genome sequencing with traditional laboratory methods. These comparisons revealed that AMD methods detect clusters faster and speed investigations. Lessons learned from this demonstration project will further transform outbreak detection and response for other priority foodborne infections, such as *E. coli* and *Salmonella*.

Improving *Listeria* Detection

- 12 months before AMD (Sep 2012 -Aug 2013)
- First year of AMD (Sep 2013 - Aug 2014)
- First 5 months of FY15

Number of *Listeria* Clusters Detected

AMD in Action: Finding Unexpected Sources of Foodborne Illness

In 2014, AMD methods revealed food sources of *Listeria* that were never suspected before, including lettuce, peaches, and nectarines. Knowing these items can potentially be contaminated will help food safety partners better detect and respond to outbreaks in the future.

Building Partnerships

CDC is working with state and local partners to begin incorporating AMD methods into nationwide disease surveillance systems. CDC is helping partners build laboratory and bioinformatics capacity to implement AMD technologies in national networks, improving state and local health departments' ability to detect and respond to outbreaks. These advances will fundamentally change and modernize public health's ability to protect Americans' health.

Priority Areas for AMD Investments

- Improving pathogen identification and detection

- Developing next-generation diagnostics to meet evolving public health needs

- Supporting states to coordinate meeting future needs

- Implementing enhanced, sustainable, and integrated laboratory information systems

- Developing tools for prediction, modeling, and early recognition of emerging infections

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