

From Data to Action:

CDC Responds to Antibiotic Resistance Threats

CDC's Antibiotic Resistance Laboratory Network (AR Lab Network) is one of the leading nationwide systems to rapidly detect antibiotic-resistant pathogens and genes. CDC and health departments use these critical data to inform local responses to prevent spread and protect people.

Funded by CDC's AR Solutions Initiative, the AR Lab Network empowers public health laboratories in all 50 states and several large cities and territories to identify antibiotic resistance threats in health care, the community, the food supply, and the environment. The network includes 7 regional laboratories and the National Tuberculosis Molecular Surveillance Center (NTMSC).

When antibiotic resistance threats are reported through the AR Lab Network, CDC works directly with public health departments to provide expertise and support for outbreak response.

Based on the success of the AR Lab Network in the United States, CDC is establishing a complementary, global network to detect and respond to antibiotic-resistant pathogens.

500,000+

Different tests for tracking resistance performed, including:*



150,000+

antibiotic susceptibility tests and isolates characterized to identify resistance



250,000+

whole genome sequences—to identify pathogens that may be related, predict resistance, and/or identify underlying causes of resistance in a pathogen



100,000+

colonization screenings—to identify if a person is carrying an antibiotic-resistant pathogen

*Tests performed since funded in 2016

Keeping a Pulse on Top U.S. AR Threats by Testing:

Threats in Health Care

- › *Acinetobacter* species
- › *Candida*, including *Candida auris*
- › Carbapenem-resistant Enterobacterales (CRE)
- › Carbapenem-resistant *Pseudomonas aeruginosa*
- › *Clostridioides difficile*

Threats in Animals & Food Supply

- › *Campylobacter*
- › *Salmonella*

Threats in the Environment

- › Azole-resistant *Aspergillus fumigatus*

Threats in the Community

- › *Mycobacterium tuberculosis* (TB)
- › *Shigella*
- › *Neisseria gonorrhoeae*
- › *Streptococcus pneumoniae*

Learn more: www.cdc.gov/DrugResistance/Laboratories



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Transforming AR Detection and Response

The AR Lab Network monitors for Urgent, Serious, and Concerning threats to human health, including Watch List pathogens from CDC's [2019 AR Threats Report](#).



CANDIDA AURIS

THREAT LEVEL **URGENT**

(Drug-resistant *Candida* is a **Serious** Threat.)

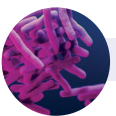
- › **Why AR Lab Network Tests:** *C. auris* is an emerging multidrug-resistant yeast that can cause severe infections and spreads easily in hospitals and nursing homes.
- › **How this protects people:** In 2019, the AR Lab Network confirmed *C. auris* samples were resistant to all three available antifungals, meaning the infections were essentially untreatable. Identifying these cases immediately led to aggressive infection control measures and screening to contain its spread, preventing additional infections.



CARBAPENEM-RESISTANT ENTEROBACTERIALES

THREAT LEVEL **URGENT**

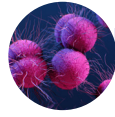
- › **Why AR Lab Network Tests:** CRE threatens patients in healthcare settings. Enterobacteriales includes several healthcare-related bacteria, such as *Klebsiella pneumoniae* and *Escherichia coli*, which are often resistant to nearly all antibiotics, leaving more toxic or less effective treatment options.
- › **How this protects people:** The AR Lab Network identified carbapenemase genes never before detected in their geographic area. Public health departments are alerting local partners and implementing infection prevention strategies to contain the spread.



MYCOBACTERIUM TUBERCULOSIS (TB)

THREAT LEVEL **SERIOUS**

- › **Why AR Lab Network Tests:** Multidrug-resistant TB and extensively drug-resistant TB can cause serious and difficult-to-treat illness, and are a leading cause of death from drug-resistant pathogens globally.
- › **How this protects people:** Annually, NTMSC performs whole genome sequencing (WGS) on about 8,000 TB samples to look for and alert health departments to genetic mutations associated with resistance to anti-TB drugs. CDC releases about 100 alerts annually on resistance to rifampin, a first-line drug used in treating TB disease, so that health departments can ensure additional testing and that patients receive the most effective treatment regimen.



NEISSERIA GONORRHOEAE (GONORRHEA)

THREAT LEVEL **URGENT**

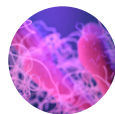
- › **Why AR Lab Network Tests:** Gonorrhea, a common sexually transmitted disease, has rapidly developed resistance to antibiotics. Cases of drug-resistant gonorrhea have increased by 124% since 2013 and is not likely to decrease given clinic closures during the COVID-19 pandemic.
- › **How this protects people:** A collaboration between the Las Vegas, Nevada Health Department, the Texas State Laboratory, and CDC identified the first gonorrhea case carrying a unique resistance gene in the U.S., prompting increased patient follow-up, and stopping further spread. This highlights the importance of gonorrhea surveillance in the U.S.



STREPTOCOCCUS PNEUMONIAE (S. PNEUMONIAE)

THREAT LEVEL **SERIOUS**

- › **Why AR Lab Network Tests:** *Streptococcus pneumoniae* is the leading cause of bacterial pneumonia and meningitis and is commonly the cause of bloodstream, ear, and sinus infections.
- › **How this protects people:** Although there are effective vaccines for *S. pneumoniae*, regional labs use WGS to accurately identify new serotypes—groups within a single species of bacteria that share distinctive surface structures—which the vaccines might not cover.



SALMONELLA

THREAT LEVEL **SERIOUS**

- › **Why AR Lab Network Tests:** Nontyphoidal *Salmonella* can spread from animals to people through food and from contact with feces from infected people or animals. Some infections can spread to the blood, causing life-threatening complications.
- › **How this protects people:** The AR Lab Network, via PulseNet, detected an outbreak of multidrug-resistant *Salmonella* Newport—linked to soft cheese in Mexico and beef in the U.S.—with decreased susceptibility to azithromycin, leading to 255 infections and 60 hospitalizations. WGS was key to rapidly identify antibiotic resistance and link cases to each other and to possible sources of infection.

Learn more: www.cdc.gov/DrugResistance/Laboratories



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