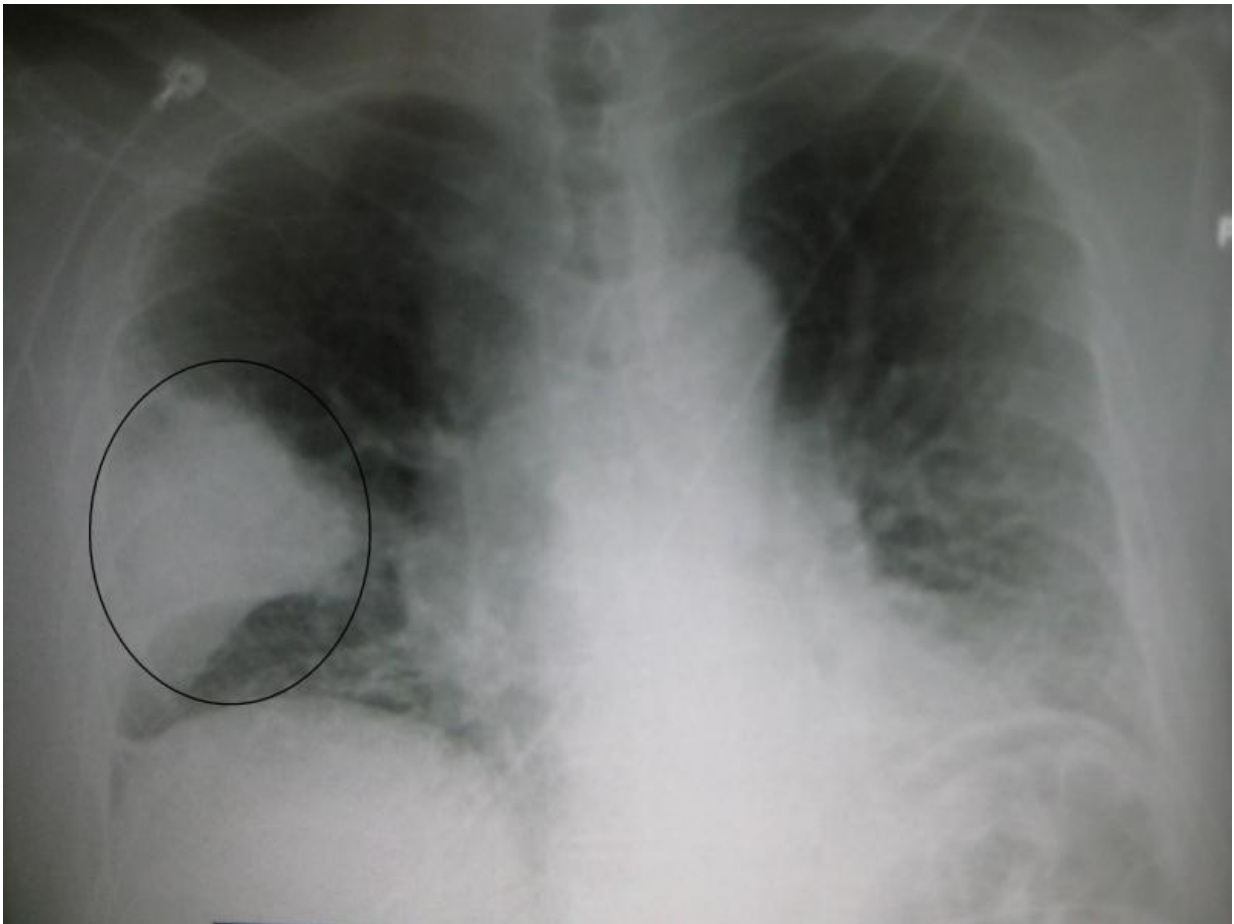


Antibiotic-resistant bacteria found in the US presents a triple threat

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A black and white X-ray picture showing a triangular white area on the left side. A circle highlights the area. Credit: James Heilman, MD./Wikipedia

Researchers from the Emory Antibiotic Resistance Center describe the first strain of carbapenem-resistant, hypermucoviscous *Klebsiella pneumoniae* exhibiting colistin heteroresistance and enhanced virulence isolated from a patient in the United States. The research is presented at ASM Microbe, the annual meeting of the American Society for Microbiology, held from June 7th to 11th, in Atlanta, Georgia.

"The problem of antibiotic resistance is becoming increasingly alarming. The combination of increased virulence and multidrug resistance makes the situation worse," said Dr. David Weiss, director of the Emory Antibiotic Resistance Center.

The researchers showed that the *K. pneumoniae* isolate was heteroresistant to the last resort antibiotic colistin. This means that a small subpopulation of cells showed resistance. Heteroresistance is more difficult to detect with standard antibiotic susceptibility tests in clinical microbiology labs, and this isolate was classified as susceptible to colistin by standard methods. This discrepancy is particularly important, as Weiss' lab has shown that such undetected colistin heteroresistance can cause antibiotic treatment failure in mice.

In a hospital in Hangzhou, China, a 2016 deadly outbreak of carbapenem-resistant, hypervirulent *K. pneumoniae* was recently reported in *Lancet Infectious Diseases*.

"The isolate we are studying is not nearly as virulent (able to cause disease) in a mouse model as the bacteria from China," said Dr. Weiss, "However, finding the combination of antibiotic [resistance](#) and enhanced virulence from a clinical isolate in the United States (New York) is still alarming." The previously reported hypervirulent forms were largely antibiotic susceptible. Carbapenem-resistant *K. pneumoniae*, part of the carbapenem-resistant enterobacteriaceae (CRE) superbug family, is considered an urgent (top 3) threat by the CDC.

The researchers are urging more monitoring for this form of bacteria, which have the potential for increased virulence and may be especially worrisome in healthcare settings.

Jessie Wozniak, a Microbiology and Molecular Genetics graduate student at Emory University School of Medicine, and her colleagues examined 265 isolates of carbapenem-resistant *K. pneumoniae* from the Emerging Infections Program's Multi-site Gram-negative Surveillance Initiative, using a simple "string test."

"The string test is very low-tech," Wozniak says. "You take a loop, touch it to the bacterial colony, and pull back. The hypermucoviscous one looks like a string of cheese being pulled from a pizza."

The stretchiness observed by the string test is a sign that the bacteria produce more capsule polysaccharide, and has been associated with enhanced virulence previously. Wozniak verified that the isolate was approximately ten times more virulent in mice than other isolates of the same sequence type.

She also used whole-genome sequencing to discover that the U.S. isolate carried several [antibiotic resistance](#) genes, along with a new arrangement of [virulence](#) genes, but not the same set seen in similar *K. pneumoniae* isolates from Asian countries.

Provided by American Society for Microbiology

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