

## First “truly pan-drug resistant bacteria” emerges



For decades scientists have warned of the growing threat of multidrug-resistant bacteria, known colloquially as “[superbugs](#),” and their potential to usher us into an era in which antibiotics will no longer be effective. Now, after a confirmed bacterial infection in a woman in Pennsylvania, health officials have reason to believe that that time might come sooner than they had previously imagined.

### The MCR-1 gene

[According to Modern Healthcare](#), a woman in Pennsylvania last month was found to be carrying in her urine a strain of E. coli bacteria with a mutated gene called [MCR-1](#). MCR-1 is resistant to colistin, an antibiotic often used as a last line of defense against multidrug-resistant gram-negative infections once other antibiotics fail to work.

The Centers for Disease Control and Prevention (CDC) launched a response in partnership with the Department of Defense, the Pennsylvania Department of Health, and local health departments to try to prevent the infection from spreading to those in contact with the woman.

Bacterial strains with the MCR-1 gene have appeared in other parts of the world – since it emerged in China in 2015, it has been found in 18 or more countries, according to the Natural Resources Defense Council. The Pennsylvania woman’s infection is the first known case in the United States.

Some researchers believe that the MCR-1 gene was passed to humans from livestock, since the gene is mostly found in livestock or meat.

Though colistin-resistant strains of bacteria have been around for years, a study published in the Lancet that discovered the MCR-1 gene in China raised concern because of where in the DNA researchers found the mutated gene. Its location on a plasmid means that the mutated genetic material could be transferred to other pathogens – including pathogens that are resistant to other last-hope antibiotics. If that were to happen, strains of bacteria resistant to all existing antibiotics could emerge, thrusting us into a “post-antibiotic era.”

### Curbing antibiotic overuse

The CDC estimates that drug-resistant bacteria cause two million illnesses and 23,000 deaths per year in the United States; meanwhile, a third of antibiotic prescriptions written for patients in the U.S. are unnecessary. Despite these scary realities, less than 40% of hospitals adhere to guidelines for curbing antibiotic overuse, according to an analysis published in the journal Clinical Infectious Diseases.

At the same time, R&D of new antibiotics has not kept pace with the increasingly worrisome resistance patterns being seen across the country.

[The National Action Plan for Combating Antibiotic-Resistant Bacteria](#) explains, “the emergence of drug resistance in bacteria is reversing the miracles of the past eighty years, with drug choices for the treatment of many bacterial infections becoming increasingly limited, expensive, and in some cases, nonexistent.”

As the overuse of antibiotics in both humans and livestock threatens to undermine these vital drugs’ efficacy



against deadly bacterial infections, the emergence of pan-resistant bacteria may well be the biggest public health crisis the nation will face in coming years. It will be vital that drug companies develop more antibiotics to put more weapons in the treatment arsenal. Otherwise, we may enter a harrowing new period that harkens back to the early 20<sup>th</sup> century, where simple infections once again kill.

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