

Multidrug Resistant *E. coli*

Dr. Roberta Harris-Daley

In 2014, a 76 year-old man presented to a New Jersey hospital with fever and pain in his side. He was diagnosed with a urinary tract infection caused by a common bacterium - *Escherichia coli*. Surprisingly, his infection did not respond despite treatment with various antibiotics, including colistin, a “last resort” antibiotic. It was later discovered that the bacterial strain of *E. coli* isolated was a superbug, resistant to a large number of antibiotics. This was believed to be the first case of multi-drug resistant *E. coli* infection found in the United States.



Escherichia coli is a bacterium known to be a common cause of urinary tract infections, pneumonia and gastroenteritis in both humans and animals. In the past, these infections would be treated successfully with antibiotics such as: penicillin derivatives (e.g. amoxicillin-clavulanic acid), fluoroquinolones, extended-spectrum cephalosporins and aminoglycosides; however, more and more, these antibiotics have proven ineffective against some strains of *E. coli*.

These strains are termed multi-drug resistant (MDR) *E. coli*. They contain genes which render protection against many antibiotics. These genes, which form part of the bacterial DNA makeup, can be transferred easily from one bacteria to another in the same environment, resulting in a full blown superbug infection and facilitating their rapid spread in hospitals, nursing homes etc. This then creates a major public health threat wherein there are no antibiotics available to combat certain infections, leading to greater healthcare costs, and increased morbidity and mortality from what used to be simple non-life-threatening infections.



<https://www.occupycorporatism.com/new-duke-university-algorithm-can-predict-superbug-outbreak/>

Multi-drug resistant *E. coli* has been isolated from human and animal patients mainly in African and Asian countries, but also in Brazil, Australia, some European countries and the frequency of occurrence is on the rise. A 2012 study showed that 92% of *E. coli* infections from a Sudanese human hospital were multi-drug resistant, and up to 30% of *E. coli* infections from dogs and cats in a U.S. study.

To prevent further spread of these superbugs, actions to be explored by both the human and veterinary health community include:

- 1) Implementing periodic drug resistance-surveillance
- 2) Researching new classes of antimicrobials to be used in treating these infections
- 3) Using antimicrobial combination therapy (e.g. doxycycline and amikacin) for synergistic effects to combat these bacteria
- 4) Investigating and encouraging use of non-antimicrobials to prevent/control these infections (e.g. vaccines, proanthocyanidin, probiotics)



These measures may help preserve the efficacy of antimicrobials against *E. coli*.

Dr. Roberta Harris-Daley, DVM, MVSc is a Small Animal and Equine Veterinarian