

How clean hospitals can reduce antibiotic resistance and save lives

January 17 2023



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A new paper in *Evolution, Medicine, and Public Health* indicates that antibiotic resistance may result from poor hygiene practices in hospitals or other medical facilities.

Proper [hand hygiene](#) in clinical work is a cornerstone of patient safety, but compliance is still poor. This is even though hand hygiene is simple, safe, and cheap. Antibiotics save lives and make much of modern medicine possible. But bacteria that evolve resistance so that they are no longer killed by antibiotics threaten those medical gains, particularly when they spread from patients in [health care](#) settings.

When a patient takes antibiotics, that inhibits any drug-sensitive bacteria in the body. If that patient carries bacteria resistant to antibiotics, that's an environment where they can thrive. Good hygiene, in both health care and the community, is central to infection control. This is well known. But what's less clear is how hygiene (or other transmission control measures) affects the evolution of antibiotic resistance.

Researchers here addressed whether hygiene weakens the effect of antibiotic pressure on resistance evolution. The authors first developed a mathematical model of resistance to predict how good or poor hygiene might affect how rapidly resistant bacteria increase in abundance due to antibiotic treatment.

Then they tested this model against antibiotic resistance information from the European Center for Disease Prevention and Control. Data collected at 691 [long-term care facilities](#) in 19 European countries in 2013 suggest that this is the case. Countries where staff at such facilities made better use of alcohol-based hand rubs saw less enrichment of antibiotic-resistant bacteria, here resistant *E. coli* bacteria, for their antibiotic use.

This indicates that staff keeping hospitals and other facilities like nursing homes clean, using training and procedures, will prevent patients from acquiring resistant bacteria from others—and thereby prevent the explosive amplifications that accelerate the spread of drug-resistant diseases.

"Health care hygiene is a cornerstone of good clinical practice," said the paper's lead author, Kristofer Wollein Waldetoft. "It's also key to the management of [antibiotic resistance](#) by protecting patients from the acquisition of resistant strains. The importance of hygiene, especially hand hygiene, is well appreciated by health care professionals, but compliance has nonetheless been shown to be poor. There is thus opportunity to improve on this important, yet simple, aspect of resistance management."

More information: Magnus Aspenberg et al, Hygiene May Attenuate Selection For Antibiotic Resistance By Changing Microbial Community Structure, *Evolution, Medicine, and Public Health* (2023). [DOI: 10.1093/emph/eoac038](#)

Provided by Oxford University Press

Citation: How clean hospitals can reduce antibiotic resistance and save lives (2023, January 17) retrieved 6 May 2024 from <https://medicalxpress.com/news/2023-01-hospitals-antibiotic-resistance.html>

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