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A collection of stories



# Spreading Knowledge, not Resistance

**Through antimicrobial stewardship, healthcare professionals can manage their use of antibiotics and slow the spread of resistance.**

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# Courses in stewardship are needed. Millions of patients are in danger

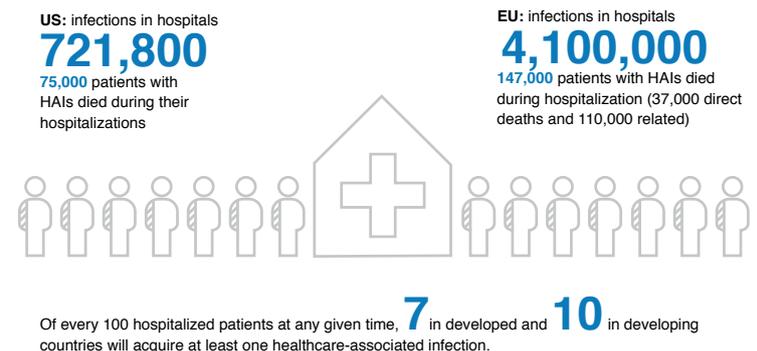
Outside of England's Dunswood Hospital, angry shouts erupt from a group of protesters. Their loved ones have died in the clinic from an infection, and they demand to know who is to blame. Is this a worst-case scenario coming true? Fortunately, the scene is fictional. It is part of a video in a course on antimicrobial stewardship [1]. With such training courses, healthcare professionals learn ways to slow the spread of drug-resistant bacteria. Courses like these are urgently needed, because millions of patients worldwide are in danger<sup>1</sup>.

## Closing the Knowledge Gap

Antimicrobial resistance (AMR) is one of the largest global health threats today<sup>2</sup>. The cause is as simple as it is hard to address: microorganisms develop resistance when they survive doses of drugs that are intended to kill them. As a consequence, certain antibiotics are no longer effective, and hundreds of thousands of people worldwide every year die from infections and infectious diseases that would otherwise be treatable<sup>1</sup>. But because the general public, patients, and medical professionals have insufficient information about the proper and state-of-the-art use of antimicrobials, AMR continues to spread. "There is a severe knowledge gap," says Professor Dilip Nathwani, OBE, Hon. Professor of Infection at Ninewells Hospital in Scotland.

## Healthcare associated Infections

Estimated total number (2014)



AMR is an increasingly urgent problem. People who take antibiotics can develop resistance every time they take antibiotics, or spread resistant bacteria without knowing it. Drug-resistance is also spread by animals that are given antibiotics, or through food<sup>3</sup>. "The knowledge gap about AMR includes the role of antimicrobial use in animals and agriculture, and the overuse and misuse in humans - our rather unhealthy relationship with antibiotics. We need to shape and change behavior," Professor Nathwani continues.

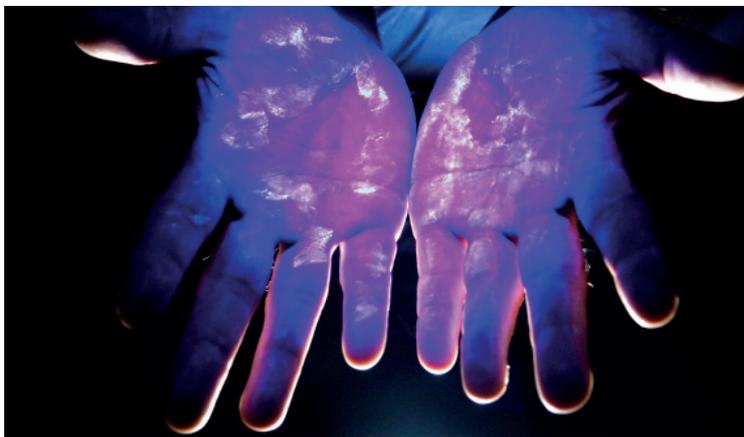
“We need to shape and change behavior on our rather unhealthy relationship with antibiotics.”

**Professor Dilip Nathwani**

OBE, Hon. Professor of Infection at Ninewells Hospital in Scotland.

One way to change behavior is through public awareness campaigns, for example, that teach patients they should not stop antibiotics treatment early. Abandoning treatment produces bacteria that are resistant to the antibiotics that were used, or even to other antimicrobials. Such behavior could lead to a resistant infection that people spread in their communities.

But in hospitals, antimicrobial resistance presents an even more acute and deadly problem. Patients' immune systems are already weak. And when antibiotics no longer kill pathogens, the medical areas of oncology, surgery, or treatment of infections are no longer possible. Many *Staphylococcus aureus* strains, for example, are methicillin-resistant (MRSA), but increasingly, other types of resistant bacteria [2], particularly so-called Gram negative bacteria, [3] present a growing danger, too<sup>4</sup>.



Methicillin-resistant *Staphylococcus aureus*, or MRSA, bacterium seen as a greenish glow on a person's hands under ultraviolet light. Credit: Jeff Swensen /© The New York Times/Redux/laif

### Stewardship Essentials

One important way to address the problem is through antimicrobial stewardship, a set of strategies for optimizing antimicrobial use. Antimicrobial stewardship rests on the so-called “5 Ds” of antimicrobial prescriptions: optimal diagnosis, drug selection, dosage, de-escalation and duration<sup>4</sup>. In other words, give the right drug in the right amount at the right time – but only when needed, and only as long as necessary<sup>5</sup>. This can include using a variety of antibiotics, rather than one drug in all circumstances, so pathogens do not develop resistance to one specific antibacterial substance. Only as a last resort, physicians can turn to new products.



Petri dishes contain various types of bacteria. Research helps to identify microbes and target them with the most-effective antibiotics. Controlling infection and the spread of resistance is possible through antimicrobial stewardship.

Healthcare professionals who prescribe antibiotics need to learn how to reduce diagnostic uncertainty by improving the use of current diagnostic techniques, and how to develop and use new rapid diagnostics and point-of-care tests, says Nathwani. Antimicrobial stewardship programs are designed to do that effectively. They also instruct medical staff on using good hygiene practices to avoid infections in the first place. Closely observing patients, as well as tracking and reporting resistance patterns, are also key. And the focus on a team during training is critical, Nathwani says, as it reflects modern clinical practice.

### Sharing Information

Faced with the global threat of antibiotic resistance, healthcare professionals in every country appreciate guidelines for antimicrobial stewardship. Online courses offer a global reach, and international bodies, medical organizations and national initiatives all offer excellent training material, information and resources on both antimicrobial resistance and stewardship.

More than 31,000 learners from nearly 180 countries have taken the Antimicrobial Stewardship [1] course, created by the British Society of Antimicrobial Chemotherapy [4], partnering with The University of Dundee and the online-education platform Future Learn. “Online educational resources also provide a forum where people can exchange ideas and experiences, which can lead to more effective treatments and means of prevention,” says Nathwani, the course’s instructor.

The global response to such training offerings is encouraging. The medical community is eager to install stewardship, and by sharing crucial information, they can slow the pace of antimicrobial resistance, improve patient outcomes, and reduce or avoid deadly infections.

## Antibiotic Resistance

### Teaching people through tutorials

Educating patients and the general public is critical to the fight against antimicrobial resistance. A popular way to transport information and raise public awareness is storytelling. Explainer videos, also called tutorials, can be used to present health messages in a clear way. Tutorials typically tell a story (narrative), and may include characters (exemplars) who talk about their experiences. In 2016, communication students at the University of Erfurt, Germany, wanted to find out which combination of elements works best to inform people about the critical public-health issue of antibiotic resistance. They created and tested a series of narratives and discovered that stories influence the viewer's attitude, while characters help



to improve risk perception. Their conclusions could be useful for creating further tutorials in the health sector, and are an important contribution to raising awareness of the threat of antimicrobial resistance, and what can be done to slow its spread.

### Stewardship Resources

The medical community offers free training and material on antibiotic stewardship and antibiotic resistance. Here is a selection of English-language resources:

#### Coalitions and Initiatives

AMR Control <http://resistancecontrol.info/?s=stewardship>  
 Joint Programming Initiative on Antimicrobial Resistance <http://www.jpiamr.eu/>  
 Joint Commission Resources (toolkits) <http://www.jcrinc.com/antimicrobial-stewardship-toolkit/>  
 Stewardship Education <http://www.stewardship-education.org/>  
 Target Webinars <http://www.target-webinars.com/>

#### Public Health Agencies and Institutes

Stewardship Association for Professionals in Infection Control and Epidemiology (APIC) <http://www.apic.org/Professional-Practice/Practice-Resources/Antimicrobial-Stewardship>  
 British Society of Antimicrobial Chemotherapy (BSAC) <http://www.bsac.org.uk/introduction-and-overview/>

#### Infectious-Diseases institutes Centers for Disease Control and Prevention (CDC)

<http://www.cdc.gov/getsmart/healthcare/>  
 NHS Scotland <http://www.nes.scot.nhs.uk/education-and-training/by-theme-initiative/healthcare-associated-infections/training-resources/antimicrobial-stewardship-workbook.aspx>  
 Public Health England <https://www.gov.uk/government/publications/antimicrobial-resistance-resource-handbook>  
 Universities, Medical Centers, MOOCs  
 Antimicrobial Stewardship, University of Dundee <https://www.futurelearn.com/courses/antimicrobial-stewardship>

Center for Infections Disease Research and Policy, University of Minnesota <http://www.cidrap.umn.edu/asp>  
 Nebraska Medicine <http://www.nebraskamed.com/careers/education-programs/asp>  
 Stanford University <https://cme.class.stanford.edu/courses/CME/018/2015/about>

### Antimicrobial Resistance – General Information

#### MOOCs

Antimicrobial Resistance -Technical University of Denmark <https://www.coursera.org/learn/antimicrobial-resistance>  
 Antibiotic-Resistance: the Silent Tsunami - Uppsala Universitet, Sweden <https://www.futurelearn.com/courses/antibiotic-resistance/1/steps/96252>

#### International Campaigns

World Health Organization - World Antibiotic Awareness Week <http://www.who.int/campaigns/world-antibiotic-awareness-week/en/>  
 World Alliance Against Antibiotic Resistance (WAAAR) <http://www.waaar.org/>  
 The Center for Disease Dynamics, Economics & Policy Worldwide Resistance Maps <https://resistancemap.cddep.org/index.php>  
 European Centre for Disease Prevention and Control (European Antibiotics Awareness Day)  
 Antibiotic Action



Professor Dilip Nathwani

Professor Dilip Nathwani is Honorary Professor of Infection at the University of Dundee. He serves as Director of Medical Education Scotland, National Speciality Adviser for Infectious Diseases to the Scottish Government Health Department and is President-elect of the British Society for Antimicrobial Chemotherapy (BSAC). Professor Nathwani was awarded the Order of the British Empire (OBE) in 2015 for services to the treatment of infectious diseases.

Links:

- [1] <https://www.futurelearn.com/courses/antimicrobial-stewardship>
- [2] <https://www.ncbi.nlm.nih.gov/pubmed/25743999>
- [3] <https://www.sandoz.com/stories/access-medicines/survival-fittest>
- [4] <http://www.bsac.org.uk/introduction-and-overview/>
- [5] <http://medicine.dundee.ac.uk/news/professor-dilip-nathwani-obe>

Footnotes:

- 1 <https://amr-review.org/>
- 2 <http://www.who.int/mediacentre/factsheets/antibiotic-resistance/en/>
- 3 <http://www.who.int/mediacentre/news/releases/2014/amr-report/en/>
- 4 <https://www.ncbi.nlm.nih.gov/pubmed/25743999>
- 5 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3203003/>
- 6 <http://www.cdc.gov/getsmart/healthcare/>

Lead image: A microbiologist at the U.S. Centers for Disease Control (CDC) inspects two Petri dish culture plates that have been inoculated with methicillin-resistant *Staphylococcus aureus* (MRSA) bacteria. Credit: Centers for Disease Control (CDC)/Melissa Dankel/James Gathany

Find this story at: <https://www.sandoz.com/stories/access-medicines/spreading-knowledge-not-resistance#AntibioticResistance>