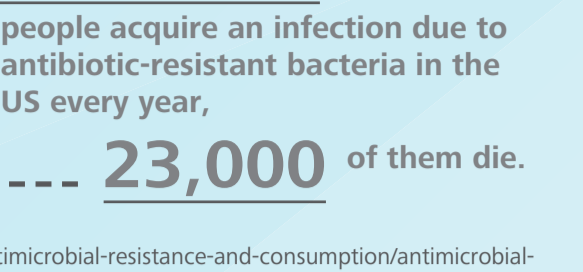
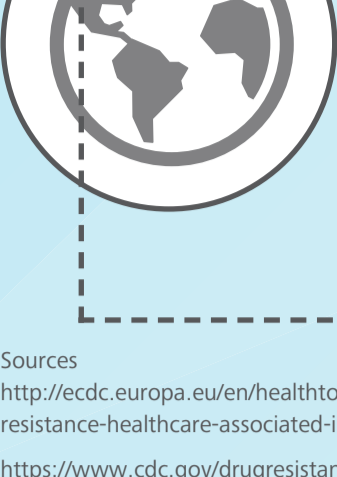


Antimicrobial resistance: From a global problem to a multimodal solution



Antibiotic-resistant pathogens are on the rise throughout the world. Antibiotics are increasingly ineffective against them resulting in bacterial infections which are either resistant to treatment or can be treated less effectively. Bacteria resistant to several antibiotic classes are referred to as multidrug-resistant organisms (MDROs).



25,000 people die due to antibiotic resistance in Europe every year.

2,000,000 people acquire an infection due to antibiotic-resistant bacteria in the US every year,

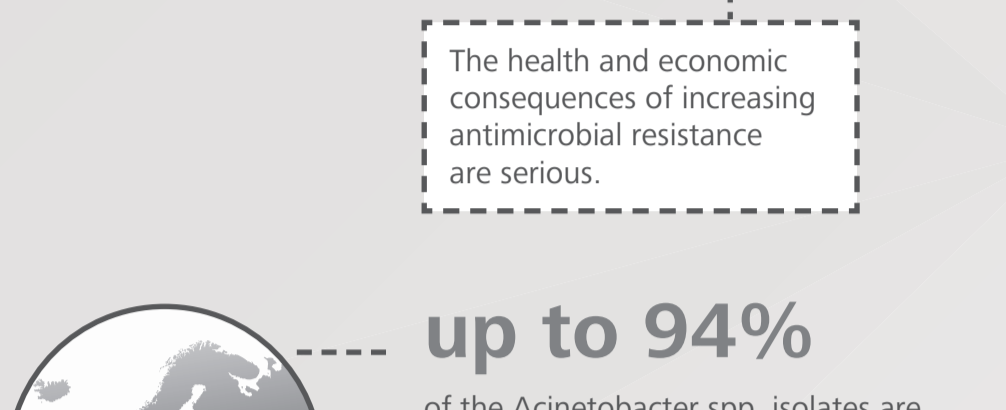
23,000 of them die.

Sources

<http://ecdc.europa.eu/en/healthtopics/antimicrobial-resistance-and-consumption/antimicrobial-resistance-healthcare-associated-infections-programme/Pages/ARHAI.aspx>

<https://www.cdc.gov/drugresistance/threat-report-2013/>

Resistance rates among selected pathogens



Source

European Centre for Disease Prevention and Control (ECDC). Surveillance Report. Antimicrobial Resistance Report in Europe, 2015.

5 alarming facts

The health and economic consequences of increasing antimicrobial resistance are serious.



up to 94% of the *Acinetobacter* spp. isolates are resistant to carbapenems in some countries (e.g. Greece). According to WHO, the most serious threat involving MDROs comes from carbapenem-resistant *Acinetobacter baumannii*.



64% higher mortality risk from infections by multidrug-resistant *Staphylococcus aureus* (MRSA) than from infections by antibiotic-sensitive Staphylococci.



6.4 days, on average, patients with antibiotic-resistant infections need to stay longer in hospital.



8,000,000 additional hospital days are caused by infections involving antibiotic-resistant microorganisms in the US every year.

\$20 billion per year: additional costs due to antibiotic-resistant organisms – a significant strain on the US health care.

Sources

[http://atlas.ecdc.europa.eu/public/index.aspx?Instance=GeneralAtlas; \(Chosen Data: Antimicrobial resistance / Acinetobacter spp / Carbapenems / 2015\).](http://atlas.ecdc.europa.eu/public/index.aspx?Instance=GeneralAtlas; (Chosen Data: Antimicrobial resistance / Acinetobacter spp / Carbapenems / 2015).)

<http://www.who.int/mediacentre/factsheets/fs194/en/> Accessed on 18 April 2017.

Ventola LC. The Antibiotic Resistance Crisis Part 1: Causes and Threats. Pharmacy & Therapeutics 2015 ; 4: 277-283.

5 good prospects



Rational antibiotic use, development of new antibiotics and consistent implementation of hygiene measures are the keys to combating antibiotic-resistant bacteria. The focus of hygiene measures is on **hand disinfection** due to its immediate preventive effect.

Up to 40% of all nosocomial infections could be prevented by **correct hand disinfection** alone.

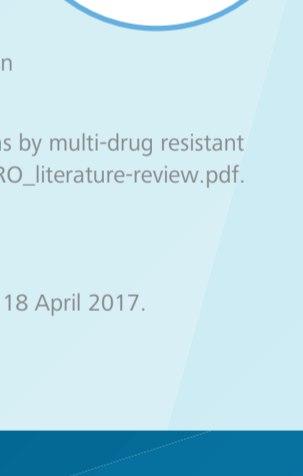
99.99% of all bacteria on the hands, including multi-drug-resistant bacteria, can be inactivated by **alcohol-based hand disinfection**.

\$24 added value per every US dollar invested in hand hygiene campaigns resulting from **reduction of infection rates and costs**.

1% increase in hand hygiene compliance leads to a **saving of approx. \$40,000** per year.

177 countries or areas pledged their commitment to hand hygiene as part of the global campaign

SAVE LIVES: Clean Your Hands.



Sources

Kampf G et al. Händehygiene zur Prävention nosokomialer Infektionen Dtsch Arztebl Int 2009; 40: 649-55.

WHO. Evidence of hand hygiene to reduce transmission and infections by multi-drug resistant organisms in health-care setting http://www.who.int/gpsc/5may/MDRO_literature-review.pdf. Accessed on 18 April 2017.

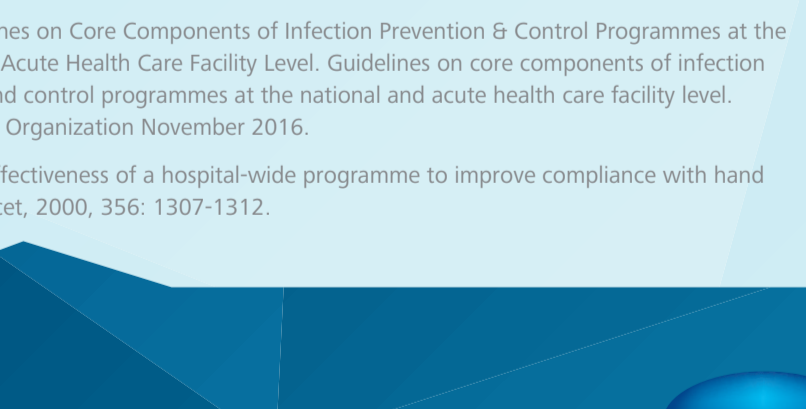
WHO. Registration update - countries or areas. http://www.who.int/gpsc/5may/registration_update/en/ Accessed on 18 April 2017.

Hand hygiene: Simple but not easy



Hand disinfection compliance rates are known to be inadequate: when there is no intervention, the average hand disinfection compliance rate is only between 41% and 55%. Implementing multimodal strategies and improving workflows are the core components of WHO's initiative to improve practices and reduce both nosocomial infection and antimicrobial resistance.

5 elements are included on average in multimodal strategy to improve hand hygiene compliance:



27 studies proved that multimodal hand hygiene programs increase the compliance among healthcare workers.



Almost 50% less nosocomial infections were achieved by the first multimodal hand hygiene-promoting program (Geneva, 2000).



Sources

WHO Guidelines on Core Components of Infection Prevention & Control Programmes at the National and Acute Health Care Facility Level. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. World Health Organization November 2016.

Pittet et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Lancet, 2000, 356: 1307-1312.

Best practice program: Hand Hygiene Evolution Concept

The Hand Hygiene Evolution Concept of HARTMANN and its BODE SCIENCE CENTER contains the core elements of WHO's strategy. The intervention program to enhance compliance with hand hygiene protocols combines scientifically based sets of measures with a continuous specialist on-site support.

Infrastructure/Availability
100ml more hand disinfectant can – according to a study – be used per day when the dispenser is installed in visible locations at the POC. The Hand Hygiene Evolution Concept offers advice and checklists for the best dispenser placement.

Education and training
83% of the medical staff recognised the right moment for hand disinfection thanks to the e-learning program of the Hand Hygiene Evolution Concept.

Monitoring and providing data feedback
Minimum 500 indications for hand hygiene should be at least observed in clinics every month. According to a study, apps such as the Observe App of the Hand Hygiene Evolution Concept can reduce the time needed for data transfer by up to 99%.

Improved workflow
A 97% hand hygiene compliance was achieved, according to a study, by improving workflow.

7 steps of the procedure to insert an indwelling transurethral urinary catheter involve a particular risk of infection. The new standard operating procedures (SOPs) of the Hand Hygiene Evolution Concept not only consider the placement technique, but also all individual hygiene-relevant steps.

Research for infection protection
bode-science-center.com

Sources

Reiners J. Aneignungsformation durch edukative Software. Analyse anhand des 5 Momente-E-Learning-Tools, eine Entwicklung von HARTMANN und dem BODE SCIENCE CENTER. Seminararbeit in MedienundKommunikationsindustrie, Hamburg; September 2014.

Thomas et al. Conspicuous vs Customary Location of Hand Hygiene Agent Dispensers on Alcohol-Based Hand Hygiene Product Usage in an Intensive Care Unit. Journal of the American Osteopathic Association, 2009, 109 (5): 263-267.

Yen Tan T. Letter to the Editor. An Android app for recording observation data. Journal of Hospital Infection 92, 2016, 344-345.

ASH: Reichert et al. Three years of national hand hygiene campaign in Germany: what are the key conclusions for clinical practice? Journal of Hospital Infection 83(S1) (2013) S11-S16.

Son et al. Practically speaking: Rethinking hand hygiene improvement programs in health care settings. American Journal of Infection Control. 2011; 39(9):716-24.