

Antimicrobial Resistance Issues Worldwide and the WHO Approach to Combat it

Dr. Carmem Lúcia Pessoa-Silva, Health Security and Environment Cluster, WHO
Sponsored by the World Health Organization Patient Safety Agency

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Hosted by **Dr. Benedetta Allegranzi**
WHO Patient Safety Agency

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WHO Patient Safety Challenge
Clean Care is Safer Care

World Health Organization
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The History of Medicine

- 2000 B.C. — Here, eat this root.
- 1000 A.D. — That root is heathen. Here, say this prayer.
- 1850 A.D. — That prayer is superstition. Here, drink this potion.
- 1920 A.D. — That potion is snake oil. Here, swallow this pill.
- 1945 A.D. — That pill is ineffective. Here, take this penicillin.
- 1955 A.D. — Oops... bugs mutated. Here, take this tetracycline.
- 1960 - 1999 — more "oops"... Here, take this more powerful antibiotic.
- 2000 A.D. — The bugs have won! Here, eat this root.

WHO, 2000. *Overcoming antibiotic resistance.*

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Impact of introduction of Penicillin on mortality in the USA

Circle death rate for infectious diseases, USA, 1900-1996. Adapted from *Achievement in public health, 1900-1999: control of infectious diseases.* MMWR *Morbidity and Mortality Weekly Report* 1999; 48: 021-25; and Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. *JAMA* 1999; 281: 61-66.

Aiello & Larson, LID 2002.

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Patients with pneumonia and bacteria in the blood

Penicillin increased the chance of survival from 10% to 90%

Adapted from Austrian *et al.*
Ann. Int. Med 1964; 60: 759

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Unavoidable reality

More use = faster development of resistance

DDD: Defined Daily Doses
Total antibiotic use in outpatients versus prevalence of penicillin-nonsusceptible *Streptococcus pneumoniae* in 20 industrialized countries.

Source: The evolving Threat of Antimicrobial resistance. WHO, 2012. Adapted from Albrich EID 2004.

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1944: Gonorrhea treatment

Advice to World War II servicemen

Source: Wikipedia

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70 years later...

MailOnline


'Unstoppable' sex disease: New strain of gonorrhoea that resists all antibiotics could spread quickly

By Daily Mail Reporter
UPDATED: 17:41 GMT, 10 October 2011


A sexual disease that is resistant to all drugs has been discovered by scientists. They warn the strain of super-gonorrhoea could spread very quickly unless better treatments are developed. Although only one case has been confirmed, experts fear many more may have gone unreported.

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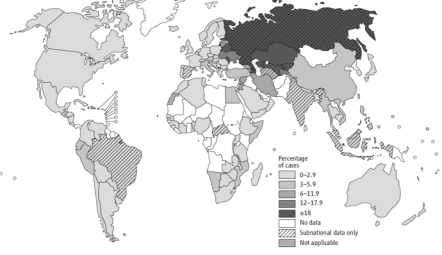
Spread of metallo-beta-lactamases causing resistance in gram negative bacteria



Source: **The evolving Threat of Antimicrobial resistance. WHO, 2012. Adapted from Cornaglia et al. LID 2011.**

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Percentage of new TB cases with MDR-TB




* Figures are based on the most recent year for which data have been reported, which varies among countries.

450,000 new MDR-TB cases in 2012. About 170,000 deaths due to MDR-TB in 2012.
By September 2013, 92 countries had reported at least one XDR-TB.

Source: **Global Tuberculosis Report. WHO, 2013.**

WHO HIV drug resistance report 2012

Countries (n=26) reporting results from WHO surveys of transmitted HIV drug resistance, 2004-2010




➤ 8 million people now taking ARVs in low – middle income countries

➤ 2010: 6.8% people initiating antiretroviral treatment with drug resistant HIV


Source: **WHO HIV Drug Resistance Report. WHO, 2012.**

Artemisinin-Resistant Malaria

- Widespread resistance to earlier generation antimalarial medicines.
- Mekong subregion, 2007– 2012
 - suspected or confirmed artemisinin resistance has been detected in therapeutic efficacy studies.




Map produced by: Global Malaria Program (GMP), World Health Organization Global Malaria Program (GMP), World Health Organization. Source of data: WHO Global Database on Antimalarial Drug Efficacy, as of November, 2012

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Important factors

- Misuse in many settings & ways
 - Clinical medicine, communities, agriculture
 - Unrestricted sale & use of antimicrobial drugs
 - Substandard or counterfeit → inadequate dose
- Widely used in food animals
 - Growth enhancement & therapeutic purposes
 - Same classes of antimicrobials as used in humans
- Globalized distribution of food
 - Food: important vector for spreading resistance


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Environmental contamination
Contamination from agri-and aquaculture, hospitals and pharmaceutical industries leads to antibiotic exposure to the ecosystems.

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Now facing a global public health crisis

Increasing resistance to antimicrobial medicines

- bacteria
- viruses
- parasites

➔

Few new antimicrobial medicines in pipeline

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Consequences of antimicrobial medicine resistance

- Reduced public health control over many infectious diseases
 - Bacteria like tuberculosis, gonorrhoea, pneumonia
 - Viral diseases like HIV/AIDS
 - Major tropical diseases like malaria
- Reduced safety net for patients undergoing medical procedures such as surgery, transplantation
- Impact on specific groups
 - Vulnerable populations






Photo: CL Pessoa-Silva

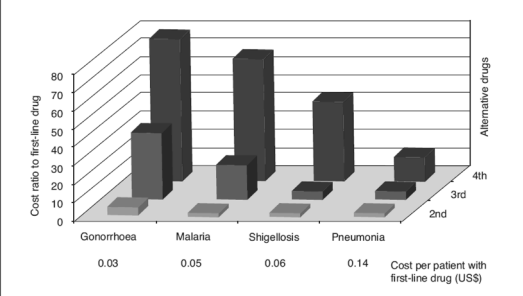
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High morbidity and costs


- In the EU
 - 2.5 million extra hospital days in 2007
 - 25 000 deaths per year
 - Overall about 1.5 billion € per yearECDC 2009. Joint technical report: the bacterial challenge—time to react.
- Thailand
 - > 140,000 cases/yr AMR infected patients
 - 2.0 billion USD per year

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Higher treatment costs when first line antimicrobials can't be used



Source: Containing antimicrobial Resistance. In WHO Policies perspectives on Medicines. WHO, 2005.


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High costs: lives and resources



2011

- 12 million cases of TB
- 630,000 involved multi-drug resistant TB strains.
- Only slightly more than 50% will be cured.

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Economic Impact: beyond medical costs

- Significant impact of AMR on consumer income, employment, national savings, investment spending, healthcare delivery.
- Gross domestic product (GDP) losses: 1.4% to 1.6%

World Economic Forum 2013 Global Risks Report

Roberts et al CID 2009; 49:1147-84.

The pie chart shows that Societal Costs (represented by a larger grey slice) constitute the majority of AMR costs, while Medical Costs (represented by a smaller white slice) are a smaller portion.

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Who owns the AMR-problem?

AMR is a social and economic issue beyond the health sector!

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True scope of AMR much broader

- Global, social, multisectoral, ethical, security dimensions
- Need much higher engagement by many in all countries
 - Governments: decision makers, regulatory authorities
 - Health sector: health systems, doctors, pharmacists ..
 - Communities: consumers, patients, families ...
 - Agriculture: farmers ...
 - Industry: medicine companies..

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Challenges

- Lack of capacity
 - Laboratory, diagnostic, quality assurance, regulatory, and surveillance capacity
 - Control over how antimicrobials are obtained and used
 - Control of spread of drug resistant pathogens
- Utter poverty

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WHO guidance

- Comprehensive plan, accountability, civil society engagement
- Strengthen surveillance and laboratory capacity
- Access to essential medicines of assured quality
- Rational use of medicines
- Enhance infection prevention and control
- Foster innovation and R&D for new tools

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The way forward: need for global action

- WHO AMR Strategic and Technical Advisory Group provided advice to WHO on the development of global strategies, including:
 - Intersectoral engagement and partnering
 - Fostering comprehensive national plans
 - Strengthening the evidence on the magnitude of the AMR problem
 - Better national and international regulatory mechanisms to foster optimal use of diagnostics, antimicrobial drugs and vaccines
 - Prevention and control of infections
 - Innovation for development of new tools to tackle AMR
 - Social mobilization

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AMR, Another "Tragedy of the Commons"

- "The Tragedy of the Commons" Garrett Hardin, Science, 162(1968):1243-1248.
- No quick or easy solutions: will require years of effective action to reduce AMR
- Key actions urgently needed
 - Awareness & engagement beyond health community
 - Behavioural change
 - Development & application of innovative strategies





Photo: Sharon Loxton at geograph.org.uk.

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COMBAT DRUG RESISTANCE



No action today, no cure tomorrow

7 APRIL 2011 WORLD HEALTH DAY  World Health Organization

2013 WHO Teleclass Schedule

Clean Care is Safer Care

February 6
Improving the Patient Safety Culture as a Successful Component of Infection Control Strategies, Dr. B. Allegranzi

March 6
Patient Participation in Hand Hygiene Promotion and Improvement, Dr. Y. Longtin & Dr. M. McGuckin

April 9
Innovation and New Indicators in Hand Hygiene Monitoring, Prof. J. Boyce

May 6
Special Lecture for 5 May, Prof. D. Pittet

July 10
Risk Assessment and Priority Setting in Infection Control in Low to Middle Income Countries, Prof. N. Damani,

August 7
Decontamination of High-Touch Environmental Surfaces in Healthcare: A Critical Look at Current Practices and Newer Approaches, Prof. S. Sattar

September 3
Preventing Central Line-Associated Bloodstream Infections: The Matching Michigan Approach Applied in the USA and Other Countries, Prof. P. Pronovost

October 9
Implementing Infection Control Through a Patient Safety Partnership Approach in Africa, J. Storr

November 11
Antimicrobial Resistance Issues Worldwide and the WHO Approach to Combat it, Dr. C. Pessoa da Silva

December 4
Control of Multi-Drug Resistant Organisms in the Nursing Home Setting, Prof. A. Voss

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