Our place in the world

Antimicrobial resistance: the good, bad and downright ugly of global & local trends

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Format

- Examine global resistance trends in 3 infection syndromes
- Analyse and compare local with global microbiological data
- Consider prospects for future rational prescribing
Background

- ~ 15 years of increasing awareness of AMR problems
- Initial focus on reducing specific HCAIs (eg MRSA)
- Subsequent development of closer links with international surveillance centres
- Multiple indicator organism comparisons
Estimates of Burden of Antibacterial Resistance

**European Union**  
*population 500m*  
25,000 deaths per year  
2.5m extra hospital days  
Overall societal costs  
(€ 900 million, hosp. days)  
Approx. €1.5 billion per year  
(Source: ECDC 2007)

**Thailand**  
*population 70m*  
>38,000 deaths  
>3.2m hospital days  
Overall societal costs  
US$ 84.6–202.8 mill. direct  
>US$1.3 billion indirect  
(Source: Pumart et al 2012)

**United States**  
*population 300m*  
>23,000 deaths  
>2.0m illnesses  
Overall societal costs  
Up to $20 billion direct  
Up to $35 billion indirect  
(Source: US CDC 2013)
- ABR by region
- National reports where possible
- 7 indicator bacteria
- Separate from existing disease-specific programmes
Available national data, 2013

- >5 (n=89)
- 2-5 (n=22)
- 1 (n=3)
- National data not available (n=15)
- Not applicable

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

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UK Govt 7-point action plan

- improve *infection prevention* and control practices in human *and animal* health
- optimise *prescribing practice* through implementation of antimicrobial stewardship programmes that promote rational prescribing and better use of existing and *new rapid diagnostics*
- improve professional education, training and *public engagement* to improve clinical practice and promote wider understanding of the need for more sustainable use of antibiotics
- develop *new drugs*, treatments and *diagnostics*
- better access to and use of *surveillance* data
- better identification and prioritisation of *AMR research* needs
- strengthened *international collaboration*
Example infection syndromes

- SSTIs: Strep.pyogenes (GAS)  
  Staph.aureus

- UTIs:  
  E.coli

- STIs: N.gonorrhoea
Invasive GAS (iGAS)

- 2.5 – 3 / $10^5$ cases / yr
- Cyclical variation
- Risk:
  - Age

![Graph showing age distribution of GAS incidence](image-url)
Weekly scarlet fever notifications, England (PHE)

Weekly iGAS notifications, England (PHE)
Resistance in GAS, locally.

NB Penicillin = 0%
WHO:

- 5 out of 6 global regions report > 50% MRSA
- National rates vary 0.3% - 90%
S. aureus, data UCLH community

Local MRSA ~ 10%
National numerical rise in PVL reports (? ascertainment bias)

Most PVL-MRSAs exhibit limited resistance pattern
Gonorrhoea

- WHO: 3/6 regions report N.gonorrhoea with > 25% resistance to CIII
- Well documented treatment failures
- UK: GRASP survey 2012 data
Global CIII resistance and failures
Gonorrhoea. Penicillin % Resistance rates
Gonorrhoea. Ciprofloxacin % Resistance rates
Formal resistance

"Shifting MIC" hump

Formal resistance
Gonorrhoea. Cefixime % Resistance rates
Figure 15: Antimicrobial prescribing practice 2004-2012

- Cefixime
- Ceftriaxone with Azithromycin
- Ciprofloxacin

% Ciprofloxacin resistance (≥1mg/L)
% Cefixime decreased susceptibility (≥0.125mg/L)
Is time running out for antibiotics?

PLUS Should we value socially connected people more highly?
Health care and the US presidential campaign
Treating H pylori infection

REVENGE OF THE Killer Microbes
Are we losing the war against infectious diseases?
The global issue of multi-resistant Gram negatives.....Doomsday scenario

- 5/6 regions report > 50% E.coli with Ciprofloxacin resistance (3-96%)
- 5/6 regions report > 50% E.coli with CIII resistance (0-82%)
- 6/6 regions report > 50% K.pneumoniae with CIII resistance (2-82%)
- 2/6 regions report > 50% K.pneumoniae with Carbapenem resistance (0-68%)
E. coli in UTIs – UCLH community

% Resistance

- Amox
- Trim
- Aug
- Cipro
- Ceftaz
- Mero
- Nitro

2007 2008 2009 2010 2011 2012 2013 2014
E. coli in UTIs – UCLH ITU / Haem

% Res

Amox  Trim  Aug  Cipro  Cefurox  Ceftaz  Mero

2006  2007  2008  2009  2010  2011  2012  2013  2014
Final thoughts

- Resistance acquisition is evolutionarily normal
- Not all microbes are “equal” in resistance capacity
- Some extremely worrying global trends
- Massive data black holes
- Surveillance can/should influence prescribing
- Need good communication