Implementing a One Health approach: the example of Antimicrobial Resistance – the UK perspective

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25,000 people per year in Europe die of infections caused by resistant bacteria. **€1.5 billion** in hospital and societal costs.

Globally, by 2050 drug-resistant infections could cause **10 million extra deaths a year** and have a cumulative cost of **US$ 100 trillion**.

- 5,000 patients die in the UK of Gram-negative sepsis each year, half with a resistant organism.
- 23,000 deaths/year from sepsis caused by resistant bacteria in United States (a conservative estimate).
- Lack of new classes of antibiotics.
• Key goal of the UK five year Antimicrobial Resistance (AMR) Strategy (2013 to 2018) to improve the knowledge and understanding of AMR through cross-professional collaboration in human and veterinary medicine.

• AMR features on the cross-government National Risk Register
Key aims of the UK strategy

- **PREVENT** (people from being infected – infection prevention and control)
- **PRESERVE** (the antibiotics we have – good stewardship)
- **PROMOTE** (development of new antimicrobials, new approaches, better diagnostics – the independent review by Jim O’Neill)

**Underpinned by:**
- Surveillance
- R&D
- One Health approach
- International collaboration
One health: A Comprehensive, Integrated Programme

• Implementing the Strategy: We cannot deliver the actions alone.

• Contributions secured across several sectors:
  
  ☐ Human Health and Social Care;
  
  ☐ Livestock, food retail and veterinary;
  
  ☐ Research councils, academics institutions;
  
  ☐ The pharmaceutical industry.
SEVEN KEY AREAS: NATIONAL ACTION

1. Improving infection prevention and control practices in human and animal health

2. Optimising prescribing practice

3. Improving professional education, training and public engagement

4. Developing new drugs, treatments and diagnostics

5. Improving use of surveillance data

6. Improving identification and prioritisation of AMR research

7. Strengthening international collaboration

UK Five Year Antimicrobial Resistance Strategy
2013 to 2018
We have clear outcome measures

- Trends in changes in resistance in key infections;
- Improvement in knowledge of antimicrobials and their use;
- Address use of antibiotics in animals – in particular, the Critically Important Antibiotics (CIAs),
- Global alignment in addressing AMR.
- Improvements in the quality of prescribing in primary and secondary care compared to baseline.
Antimicrobial Prescribing, England

<table>
<thead>
<tr>
<th>Antibiotic group</th>
<th>England 2013 (DDD per 1000 inhabitants per day)</th>
<th>England 2013 compared to England 2010</th>
<th>Europe 2011 (Median DDD per 1000 inhabitants per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillins</td>
<td>13.7</td>
<td>↑</td>
<td>10.4</td>
</tr>
<tr>
<td>Other β-lactam antibacterials</td>
<td>0.6</td>
<td>↓</td>
<td>2</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>4.9</td>
<td>↑</td>
<td>2.2</td>
</tr>
<tr>
<td>Sulfonamides and trimethoprim</td>
<td>1.9</td>
<td>↑</td>
<td>0.5</td>
</tr>
<tr>
<td>Macrolides &amp; similar</td>
<td>4.1</td>
<td>↑</td>
<td>3</td>
</tr>
<tr>
<td>Quinolones</td>
<td>0.6</td>
<td>↑</td>
<td>1.5</td>
</tr>
<tr>
<td>Other</td>
<td>1.7</td>
<td>↑</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>27.4</td>
<td>↑</td>
<td>21.3</td>
</tr>
</tbody>
</table>
Prescribing behaviour: a concern

Antibiotic prescribing is increasing: Carbapenem usage

- Carbapenems = 0.3% of total antibiotic consumption in 2013
- BUT use increased by 31.3% in England between 2010 and 2013
- Mostly in the hospital sector, <1% in primary care.
- Meropenem = 89% of carbapenem use
We want to change behaviour

Knowledge → Attitude → Behaviour

Goal: Improving antimicrobial stewardship and conserving existing treatments

- **Professionals**: improving prescribing practices
  - Primary care: GP prescribing
  - Secondary care: hospital prescribing

- **Public**: improving understanding about appropriate antibiotic use
UK AMR High Level Steering Group (HLSG)

Meets three times a year to drive and oversee delivery against strategic aims. Tasked with publishing an implementation plan, detailed outcome metrics and an annual report on progress. 
Chair: Felicity Harvey; Members: PHE, Defra, DH, BIS, DFID, UK Health departments in Devolved Administrations, NHS England, NICE, HEE, MHRA, FCO, CO, (HMT)

Expert Advisory Groups - ACDP, ARHAI, DARC, ACMSF. Commissioned by DH, Defra and FSA to undertake specific work, including outcome measures, to support the HLSG.

UK AMR Programme Management Office, DH Health Protection Programmes

AMR policy and coordination
DH leads on 3 action areas: new drugs, treatments and diagnostics; research and international.

AMR Cross-Whitehall International Steering Group
Responsible for delivery of the international element of the UK AMR Strategy. Chair: Julien Braithwaite.

Human Health and Social Care sectors
PHE leads coordination in 4 action areas across England; IPC, optimised prescribing, awareness / surveillance

PHE AMR Priority Programme Delivery Board - External.
NHSE, HEE, CQC, NHS TDA, NICE, RCGP, RCN, Defra, DAs, LGA, ADPH, ARHAI, DH

PHE AMR Priority Programme Board – Internal. PHE AMR activity and ESPAUR.

Animal Health, Agriculture, Food and the Environment
Defra leads on animal health, agriculture, food and the environment.

VMD leads on animal health aspects across the Strategy

NHS England AMR Strategy Implementation Group

Health Education England AMR working group

DARC – Defra antimicrobial resistance coordination group; ACDP - Advisory Committee on Dangerous Pathogens; ARHAI – Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection; ACMSF – Advisory Committee on Microbiological Safety of Food; ESPAUR – English Surveillance Programme for Antimicrobial Usage and Resistance;
O’Neill: Five steps to be taken now

INDEPENDENT REVIEW COMMISSIONED BY THE PRIME MINISTER, JULY 2014 TO REVITALIZE ANTIBIOTIC DISCOVERY – FOCUSED ON ECONOMICS.

1. **Set up a global AMR innovation fund to boost the number of early research ideas**: Too many good ideas are not being pursued for lack of funding.

2. **Make existing drugs go further**: dosing or combining them with other agents or other antimicrobials could slow down the spread of drug resistance.

3. **Support the development and use of relevant diagnostic technologies**: if we had the right diagnostics, more patients would receive the right antibiotic to treat their infection, but fewer antibiotics would be prescribed unnecessarily.

4. **Attract and retain a high calibre skills base**: Invest in the people who will solve the problem.

5. **Modernise the way surveillance of drug resistance is done and used globally**: improve access to real time global-scale surveillance information.
So where do we want to get to?

**Human health**

- We aim to return antibiotic prescribing to 2010 levels in primary care and 2012 levels in secondary care. Changes will be measured in 2014/15 by:
  - In **Primary Care** – the total antibiotic consumption, and proportion of antibiotics prescribed from the cephalosporin & fluoroquinolone classes;
  - In **Secondary Care** - the total antibiotic consumption per annum and total carbapenem antibiotic consumption per annum.

**Animal health**

- Reduce antimicrobial use in livestock production in real terms over the next four years;
- Ensure that sales of fluoroquinolone and modern cephalosporin classes of antibiotics remain low and reduce further as a proportion of total antibiotic sales;
- Improve prescribing by focussing on measuring changes in total prescribing – particularly in terms of the Critically Important Antibiotics.
Participating on AMR work in a wide range of international forums. We:

- Champion new work to implement the new WHO AMR Global Action Plan in a way which applies a “One-Health” approach,

- Influence further tripartite working with the OIE and FAO to deliver actions that will support of the One-Health approach,

- Develop the Commonwealth laboratory twinning initiative between higher and lower income countries to contribute to strengthening control of AMR, and Contribute to the Global Health Security Agenda.

- Good communication and collaboration between countries is critical!
Use of Antibiotics in Livestock

The Dutch Policy

Christanne Bruschke
Chief Veterinary Officer
Livestock production in The Netherlands

• 4 million cattle
• 12 million swine
• 325,000 horses
• 1,5 million sheep and goats
• 100 million poultry

share 34,000 sq km land

• with 17 million people
Antibiotic reduction policy

Primary motivation reduction policy in public health: low level of AMR in human population

**Figure 9.** Sales for food-producing species, including horses, in mg/PCU, of the various veterinary antimicrobial classes, for 26 countries in 2012.

* Amphenolics, cephalosporins, other quinolones and other antibacterials (classified as such in the ATCvet system). 1 Differences between countries can partly be explained by differences in animal demographics, in the selection of antimicrobial agents, in dosage regimes and in type of data sources, among other factors.
Key elements of antibiotic reduction policy

• self-regulation, responsibility where it belongs

• Transparency

• Independent monitoring and benchmarking

• Political will (e.g. reduction targets: -20%, -50%, -70%)
Timeline

2008
Agreement on AB-resistance in animal husbandry

2008
Taskforce government, sector and vets

2006
EU ban on growth promotors

2010
Reduction targets 20% end of 2011, 50% end of 2013

2011
Benchmarking of farmers

2010
Installation SDa

2011
Report Health Council

2011
Central registration on farm level

2012
Reduction target 70% end of 2015

2012
Reduction result 32%

2013
Mandatory susceptibility testing before administering critical antibiotics

2013
Reduction result 49%

2014
Benchmarking of Veterinairians

2014
March 2014 New legislation on prudent use (“UDD”)

2015
Reduction result 56%

2015
Dec 2014 Reduction result 58%

2015
Follow up policy 2016 - 2020

2015
Dec 2015 Reduction result ?

2016 - 2020

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2020
Benchmarking approach

Example: frequency distribution of ADD/Y

red: immediate action required by vet and farmer
orange: attention required
green: no specific action
### Results benchmarking 2012-2014

Shifts in the proportion of livestock farms in the various benchmark zones between 2012 and 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of livestock farm</th>
<th>Target zone %</th>
<th>Signaling zone %</th>
<th>Action zone %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>’12 ’13 ’14</td>
<td>’12 ’13 ’14</td>
<td>’12 ’13 ’14</td>
</tr>
<tr>
<td>Veal calves</td>
<td>White veal farms</td>
<td>33 49 48</td>
<td>50 41 44</td>
<td>17 10 8</td>
</tr>
<tr>
<td></td>
<td>Rosé veal starter farms</td>
<td>36 39 33</td>
<td>48 48 56</td>
<td>16 13 11</td>
</tr>
<tr>
<td></td>
<td>Rosé veal fattening farms</td>
<td>38 46 48</td>
<td>33 33 34</td>
<td>29 21 19</td>
</tr>
<tr>
<td></td>
<td>Rosé combination farms</td>
<td>- 60 50</td>
<td>- 30 40</td>
<td>- 10 10</td>
</tr>
</tbody>
</table>

SDa report: “Het gebruik van antibiotica bij landbouwhuisdieren in 2014”
Long term development in antibiotic use based on MARAN and SDa data

SDa-report ‘Het gebruik van antibiotica bij landbouwhuisdieren in 2014’
Trends, benchmarken van bedrijven en dierenartsen
Results: 58% reduction in 2014
Decrease of antimicrobial resistance in broilers, veal calves and pigs: policy is effective
Our future policy, 2016 and onwards

The follow up policy:
• prevent development and spreading AMR
• increase in basic animal health (including pets)

Using:
• Update of report 2011 from The Health Council
• Advice from the Dutch Council for Animal Affairs on preserving animal health and animal welfare

2016: follow up of the Dutch policy on AMR during the Dutch EU-presidency.
Dutch policy objectives for regulation veterinary medicinal products

• Harmonisation of market authorisation at EU level

• More emphasis on risk of resistance in market authorisation procedure

• Re-evaluate and restrict of off-label use (cascade)

• International cooperation to combat illegal (internet) trade
Further international policy objectives

• Towards concrete plans for restrictive and responsible use in all MS
• Discouragement of use of CIA’s for veterinary purposes
• No new veterinary authorizations for critical and new antimicrobials
• Mandatory susceptibility testing before using critical antibiotics
Turning the tide: we are in it together!
A one health approach to changing our habits on antibiotics:
- As patients
- As doctors
- As animal keepers and veterinarians