Global and UK Drivers for Antimicrobial Stewardship (barriers and opportunities)

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<table>
<thead>
<tr>
<th>Name of bacterium/resistance</th>
<th>Examples of typical diseases</th>
<th>No. of 194 MS providing national data</th>
<th>No. of WHO regions with national reports of 50% resistance or more</th>
<th>Range of reported proportion of resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>Urinary tract infections, blood stream infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-vs 3&lt;sup&gt;rd&lt;/sup&gt; gen. cephalosporins</td>
<td>84</td>
<td>5/6</td>
<td></td>
<td>0-82</td>
</tr>
<tr>
<td>-vs fluoroquinolones</td>
<td>90</td>
<td>5/6</td>
<td></td>
<td>3-96</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>Pneumonia, blood stream infections, urinary tract infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-vs 3&lt;sup&gt;rd&lt;/sup&gt; gen. cephalosporins</td>
<td>85</td>
<td>6/6</td>
<td></td>
<td>2-82</td>
</tr>
<tr>
<td>-vs carbapenems</td>
<td>69</td>
<td>2/6</td>
<td></td>
<td>0-68</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>Wound infections, blood stream infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-vs methicillin “MRSA”</td>
<td>83</td>
<td>5/6</td>
<td></td>
<td>0.3-90</td>
</tr>
</tbody>
</table>
## Bacteria Mainly Causing Infections in the Community

<table>
<thead>
<tr>
<th>Name of bacterium/resistance</th>
<th>Examples of typical diseases</th>
<th>No. of 194 MS providing national data</th>
<th>No. of WHO regions with national reports of 25% resistance or more</th>
<th>Range of reported proportion of resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>Pneumonia, meningitis, otitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-non-susceptible to penicillin</td>
<td></td>
<td>66</td>
<td>6/6</td>
<td>0-73</td>
</tr>
<tr>
<td><strong>Nontyphoidal Salmonella</strong></td>
<td>Foodborne diarrhoea, blood stream infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-vs fluoroquinolones</td>
<td></td>
<td>66</td>
<td>3/6</td>
<td>0-96</td>
</tr>
<tr>
<td><strong>Shigella species</strong></td>
<td>Diarrhoea (&quot;bacillary dysenteria&quot;)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- vs fluoroquinolones</td>
<td></td>
<td>34</td>
<td>2/6</td>
<td>0-47</td>
</tr>
<tr>
<td><strong>Neisseria gonorrhoeae</strong></td>
<td>Gonorrhoea</td>
<td>42</td>
<td>3/6</td>
<td>0-36</td>
</tr>
<tr>
<td>-vs 3rd gen. cephalosporins</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Draft WHO AMR Action Plan 2014

1. Increasing **AMR awareness**, insight, education and engagement

2. Identifying most important approaches for **infection prevention**. Effective implementation.

3. **Optimizing the use** of existing antimicrobials (human, animals and agriculture)

4. Identifying and closing critical **gaps in knowledge**

5. **Develop** & distribute **new antibiotics** and technologies

6. Long term economic, developmental and social costs and implications of AMR. **Investment**
ANTIMICROBIAL RESISTANCE: A WORLDWIDE MOBILIZATION
First Global Survey of Antimicrobial Stewardship

Philip Howard, Celine Pulcini, Gabriel Levy Hara, Stephan Harbarth, Dilip Nathwani & Ian Gould on behalf of ESCMID ESGAP & ISC AMSG

In Press: Journal of Antimicrobial Chemotherapy
Do you have a hospital AMS programme?

58% have an ASP, 22% are planning one

Mean ASP duration: 3 years (Europe 5yr to Africa 1yr)
What are the three key objectives for your current or planned antimicrobial stewardship programme?

1. Reduce or stabilise resistance: 70.3%
2. Improve clinical outcomes: 56.8%
3. Reduce amount of antibiotic prescribing: 52.9%
4. Reduce Clostridium difficile infection and other healthcare acquired infections: 43.7%
5. Reduce cost: 34.9%
6. Prevent unintended harm: 17.5%
7. Reduce mortality: 7.8%
8. Reduce length of stay: 6.9%
Hospitals top 3 barriers to providing a functional and effective AMS programme

Current AMS programme (763)
- No barriers: 7%
- Lack of information technology support and/or ability to get data: 23%
- Opposition from prescribers: 17%
- Administration not aware of AMS programme: 9%
- Other higher priority initiatives: 15%
- Lack of personnel or funding: 29%

Planned AMS programme (348)
- No barriers: 9%
- Lack of information technology support and/or ability to get data: 16%
- Opposition from prescribers: 12%
- Administration not aware of AMS programme: 14%
- Other higher priority initiatives: 20%
- Lack of personnel or funding: 29%
Indian hospital  

**Barriers to providing a functional and effective antimicrobial stewardship program**

Answered: 7   Skipped: 2

<table>
<thead>
<tr>
<th>Current AMS programme</th>
<th>27%</th>
<th>27%</th>
<th>9%</th>
<th>18%</th>
<th>9%</th>
<th>9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned AMS programme</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
<td>8%</td>
<td>25%</td>
<td>17%</td>
</tr>
</tbody>
</table>

- **Lack of personnel or funding**
- **Other higher priority initiatives**
- **Administration not aware of AMS programme**
- **Opposition from prescribers**
- **Lack of information technology support and/or ability to get data**
- **No barriers**
Formal review of ASP by 37%

- Antimicrobial resistance (67): 42% (Positive benefit shown), 58% (No benefit shown)
- Healthcare acquired infections (66): 29% (Positive benefit shown), 71% (No benefit shown)
- Inappropriate prescribing (80): 4% (Positive benefit shown), 96% (No benefit shown)
- Length of stay / mortality metrics (40): 35% (Positive benefit shown), 65% (No benefit shown)
- Usage of broad spectrum agents (96): 14% (Positive benefit shown), 86% (No benefit shown)
- Direct expenditure (87): 20% (Positive benefit shown), 80% (No benefit shown)

Legend:
- Red: No benefit shown
- Blue: Positive benefit shown
AMS Drivers in England

‘One Health’

Strategic aims

1. Improve the knowledge and understanding of AMR

2. Conserve and steward the effectiveness of existing treatments

3. Stimulate the development of new antibiotics, diagnostics and novel therapies

*published: March 2013
UK 5yr AMRS: 7 key areas for action

DH – High Level Steering Group

PHE
Human health

- Optimising prescribing practice
- Improving infection prevention and control
- Improving professional education, training and public engagement
- Better access to and use of surveillance data

Defra
Animal health

- Improving the evidence base through research
- Developing new drugs, vaccines and other diagnostics and treatments
- Strengthening UK and international collaboration

DH
# English Surveillance Programme for Antimicrobial Utilisation & Resistance

Table ES.1. Summary of key antibiotic resistance in bacteraemia in England

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Rate per 100,000, 2013 (compared to 2010)</th>
<th>Antibiotic or antibiotic class</th>
<th>% resistant 2013 (compared to 2010)</th>
<th>Change in number of resistant bacteria 2010 to 2013</th>
<th>% resistant Europe 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>52.6 (↑)</td>
<td>Ciprofloxacin</td>
<td>18.2 (↔)</td>
<td>↑</td>
<td>22.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Third-generation cephalosporins</td>
<td>10.9 (↔)</td>
<td>↑</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gentamicin</td>
<td>9.7 (↔)</td>
<td>↑</td>
<td>10.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imipenem/meropenem</td>
<td>0.1 (↔)</td>
<td>↑</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>8.8 (↑)</td>
<td>Ciprofloxacin</td>
<td>11.1 (↔)</td>
<td>↑</td>
<td>25.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Third-generation cephalosporins</td>
<td>11.4 (↔)</td>
<td>↑</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gentamicin</td>
<td>8.5 (↑)</td>
<td>↑</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imipenem/meropenem</td>
<td>1.0 (↑)</td>
<td>↑</td>
<td>6.2</td>
</tr>
<tr>
<td><em>Pseudomonas spp.</em></td>
<td>6.3 (↓)</td>
<td>Ciprofloxacin</td>
<td>10.4 (↔)</td>
<td>↑</td>
<td>21.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceftazidime</td>
<td>6.7 (↔)</td>
<td>↓</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gentamicin</td>
<td>3.6 (↓)</td>
<td>↓</td>
<td>18.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imipenem/meropenem</td>
<td>9.5 (↔)</td>
<td>↓</td>
<td>17.1</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>6.1 (↓)</td>
<td>Penicillin</td>
<td>3.1 (↔)</td>
<td>↓</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macrolides</td>
<td>8.1 (↑)</td>
<td>↑</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tetracycline</td>
<td>6.1 (↑)</td>
<td>↑</td>
<td>-</td>
</tr>
</tbody>
</table>
Antimicrobial usage reporting

ESPAUR Report 2014

Figure 3.2 Consumption of total antibiotics, expressed as DDD per 1000 inhabitants per day, England, 2010-2013
Antimicrobial stewardship in hospitals

- 2003: £12m 3yr funding to establish AMS
- National AMS Standards in 2011: Start Smart then Focus

Table 4.1 Antimicrobial Policy key elements, 2011 and 2014 surveys, n=99

<table>
<thead>
<tr>
<th>Antimicrobial Policy: key elements reported by Trusts</th>
<th>2011</th>
<th>2014</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimicrobial formulary</td>
<td>96%</td>
<td>93%</td>
<td>-3%</td>
</tr>
<tr>
<td>Empiric usage guidance</td>
<td>99%</td>
<td>93%</td>
<td>-6%</td>
</tr>
<tr>
<td>Reserved antibiotic list</td>
<td>91%</td>
<td>85%</td>
<td>-6%</td>
</tr>
<tr>
<td>IV-Oral switch</td>
<td>87%</td>
<td>81%</td>
<td>-6%</td>
</tr>
<tr>
<td>Surgical antibiotic prophylaxis</td>
<td>100%</td>
<td>98%</td>
<td>-2%</td>
</tr>
<tr>
<td>Automatic stop policy</td>
<td>36%</td>
<td>21%</td>
<td>-14%</td>
</tr>
<tr>
<td>Separate antibiotic drug chart/section</td>
<td>32%</td>
<td>58%</td>
<td>+26%</td>
</tr>
<tr>
<td>Restricted antibiotics list</td>
<td>90%</td>
<td>90%</td>
<td>0%</td>
</tr>
</tbody>
</table>
ANTIMICROBIAL STEWARDSHIP

Right drug, right dose, right time, right duration... ...every patient

Start Smart

Do not start antibiotics in the absence of evidence of bacterial infection
- Take history of relevant allergies
- Initiate prompt effective antibiotic treatment within one hour of diagnosis (or as soon as possible) in patients with life threatening infections
- Comply with local prescribing guidance
- Document clinical indication and dose on drug chart and clinical notes
- Include review/stop date or duration
- Ensure relevant microbiological specimens taken

Clinical review & decision* at 48 hours

Clinical review check microbiology, make and document decision*

1. STOP

2. IV/oral switch

3. Change: to narrow spectrum agent

4. Continue and review after 24 hours

5. OPAT**

DOCUMENT DECISION

* Antimicrobial Prescribing Decision
** Outpatient Parenteral Therapy

SINGLE DOSE SURGICAL PROPHYLAXIS*

Clean surgery involving placement of a prosthesis or implant
Clean contaminated surgery
Contaminated surgery
Surgical prophylaxis ONE DOSE within 60 minutes before knife to skin

* A repeat dose dose of prophylaxis may be required for prolonged procedures or where there is significant blood loss. A treatment course of antibiotics may also need to be given (in addition to appropriate prophylaxis) in cases of dirty surgery or infected wounds. The appropriate use and choice of antibiotics should be discussed with infection specialists for each case.

England AMS Standards
Start Smart then Focus
2015-6 England drivers

• Quality Premium
  – Overall aim, return to 2010 prescribing levels
  – Reduce antibiotic prescribing by 1%
  – Hospitals: validate data & ↓ carbapenems by 1%
  – Primary care: 1%↓ quinolones + cefalosporins + amoxicillin-clavulanate as % of total ABs

• NICE Antimicrobial Stewardship guideline
  – Consultation on draft in Dec-14, launch Apr-15
  – Quality standards to assess implementation
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