Antibiotic Stewardship Global Scenario: How far has the world travelled?

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GLOBAL

A failure to address the problem of antibiotic resistance could result in:

10 million deaths by 2050

Costing £66 trillion
1 in 3 patients in hospitals in England are on an antibiotic at any one time.

1 in 3 individuals in England takes at least one course of antibiotics each year.
Extensive misuse in healthcare

Inappropriate use
• Unnecessary exposure

Various studies on inpatient antibiotic prescriptions identify 30-60% inappropriate

Also consider:
• C. difficile
• Toxicity and drug interaction
• IV line usage


Access must be considered as well as excess

A resource that must be protected

Holmes et al.(2015) The Lancet 387, No.1004. published online http://dx.doi.org/10.1016/S0140-6736(15)00473-0
We must stop squandering our precious antibiotics
We must stop squandering our precious antibiotics

Drug-resistant infections are a challenge on the scale of climate change

Jeremy Farrar
Director Wellcome Trust
Pharma 'cash call' for new antibiotics

By James Gallagher
Health editor, BBC News website

21 January 2016

More than 80 pharmaceutical companies have called on governments to develop new ways of paying them to develop antibiotics.

In a joint declaration, at the World Economic Forum, they said the value of antibiotics “does not reflect the benefits they bring to society”.
CMO Annual Report 2011*

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

* March 2013

‘One Health’
Prescribing in England

WHO IS PRESCRIBING?

- **74%** General practice
- **11%** Hospital inpatients
- **7%** Hospital outpatients
- **5%** Dental practices
- **3%** Other community settings
Antibiotic prescribing in hospitals

34% NHS inpatients on antibiotics
(47% in independent sector hospitals)

Of those on antibiotics

- 53% for community infection
- 20% for HAI
- 13% surgical prophylaxis
  (30% > one day)

*English National Point Prevalence Survey on Healthcare-associated Infections and Antimicrobial Use, 2011*
• AS must be part of IPC
• A whole healthcare economy approach is required

Health Foundation Report
Nov 2015
Policies and guidelines for AS

- Guidelines, policy help with decision-making, by providing knowledge and awareness

  But, they may not shift attitudes or change practice

  *J Carthey et al BMJ 2011; 343*

- Make optimal antibiotic prescribing default, routine practice

- ‘Mindlines’ not guidelines

  *Gabbay, Le May. 2004; BMJ 329*
Antibiotic Prescribing context

- Policies and guidelines not enough
- Collateral impact not tangible at prescriber/patient level
- Behaviour and social science underutilised
- Qualitative evidence highlights the influence of social norms, attitudes, beliefs, important influence of peer leaders
- Social process, the sense of community, shared understanding, systems with networks and teams

Charani E et al CID, October 2011;53(7):651–662
Prescribing is a ‘behaviour’

- Antibiotic prescribing is complex, influenced by many determinants
- Social sciences and qualitative perspective needed
- Consider human factors and supporting **choice architecture**
- Making some small changes to existing systems to support optimal prescribing choices
- Principles of optimal prescribing need reinforcing/sharing
- Unwritten rules of prescribing behaviour need recognising
Understanding the Determinants of Antimicrobial Prescribing Within Hospitals: The Role of “Prescribing Etiquette”

E. Charani, E. Castro-Sanchez, N. Sevdalis, Y. Kyratzis, L. Drumright, N. Shah, and A. Holmes

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Background. There is limited knowledge of the key determinants of antimicrobial prescribing behavior (APB) in hospitals. An understanding of these determinants is required for the successful design, adoption, and implementation of quality improvement interventions in antimicrobial stewardship programs.

Methods. Qualitative semistructured interviews were conducted with doctors (n = 10), pharmacists (n = 10), and nurses and midwives (n = 19) in 4 hospitals in London. Interviews were conducted until thematic saturation was reached. Thematic analysis was applied to the data to identify the key determinants of antimicrobial prescribing behaviors.

Results. The APB of healthcare professionals is governed by a set of cultural rules. Antimicrobial prescribing is performed in an environment where the behavior of clinical leaders or seniors influences practice of junior doctors. Senior doctors consider themselves exempt from following policy and practice within a culture of perceived autonomous decision making that relies more on personal knowledge and experience than formal policy. Prescribers identify with the clinical groups in which they work and adjust their APB according to the prevailing practice within these groups. A culture of “noninterference” in the antimicrobial prescribing practice of peers prevents intervention into prescribing of colleagues. These sets of cultural rules demonstrate the existence of a “prescribing etiquette,” which dominates the APB of healthcare professionals. Prescribing etiquette creates an environment in which professional hierarchy and clinical groups act as key determinants of APB.

Conclusions. To influence the antimicrobial prescribing of individual healthcare professionals, interventions need to address prescribing etiquette and use clinical leadership within existing clinical groups to influence practice.

Keywords. prescribing etiquette; antimicrobial prescribing; prescribing behavior.
Unwritten Rules

Understanding the Determinants of Antimicrobial Prescribing Within Hospitals: The Role of “Prescribing Etiquette”

1. Non-interference with the prescribing decisions of colleagues: Reluctance to interfere with the prescribing decisions of colleagues. In the case of antimicrobial prescribing there is a reluctance to intercept antimicrobial prescriptions started by colleagues. This recognises the autonomous decision making process of prescribing.

2. Accepted non-compliance to policy: Deviations from policy recommendations are tolerated and put in the context of the prescriber’s experience, expertise and the specific clinical scenario. This leads to hierarchy and expertise, and not policy as determinants of prescribing practice behaviours.

3. Hierarchy of prescribing: Prescribing as an activity is performed by junior doctors. But it is the senior doctors who decide what is prescribed.
**Conclusion**

To influence the antimicrobial prescribing of individual healthcare professionals, interventions need to address these behaviours **and use clinical leadership within existing clinical groups** to influence practice.
Clinical Leadership Required for AS

- Professional organisation involvement or research collaboration enhances success

- Redefine problem as a social problem that can be solved i.e. involving human action and behaviour, not simple technical fix

- Social process, sense of community

- Systems with network and teams and sense of ownership

- Clinicians’ behaviours influenced by trusted peers (Dopson et al. 2003).

- Leaders with authority to “breathe legitimacy” critical (Hwang and Powell 2005).
Broadening stakeholder involvement

Multidisciplinary approach to antibiotic stewardship has largely included:

- Microbiologists, ID physicians, Pharmacists
- More recently role of nurses considered, non prescribing ‘knowledge brokers’
- The Chennai declaration 2012: harnessed leadership of multiple medical specialities at start

Need to broaden stakeholder involvement:

- Directly involving clinical specialities and their leaders
- Engaging local opinion leaders
- Consider as a key aspect of patient safety and quality clinical care
- Sharing and promoting the principles of optimal prescribing
Principles of optimal prescribing

Start Smart

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

Then Focus

Clinical review check microbiological results and make and document antimicrobial decision

Focus = Clinical review and antimicrobial decision making at 48 hrs

- Shift to principles..
- Keep simple..
- Opportunities to share principles across professions...

Antimicrobial Stewardship: "START - THEN FOCUS"


Pulcini C, Defres S, Aggarwal I, Nathwani D, Davey P. Design of a 'day 3 bundle' to improve the reassessment of inpatient empirical antibiotic prescriptions. JAC . 2008
Principles of optimal prescribing (SSTF)

**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

**Then Focus**
- 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 hrs
  - 5. OPAT**

**Focus = Clinical review and antimicrobial decision making at 48 hrs**


Pulcini C, Defres S, Aggarwal I, Nathwani D, Davey P. Design of a 'day 3 bundle' to improve the reassessment of inpatient empirical antibiotic prescriptions. JAC . 2008
Further National actions...

**Longitude prize challenge**...
create a cost-effective, accurate rapid and easy-to-use test for bacterial infections

**Prime minister’s Commission on Antibiotic Resistance**...
encouraging the development of new antibiotics...

**Research coordination**...
UK AMR Funders Forum....
Joint Programming Initiative on AMR (Europe)....
## Antimicrobial Prescribing Quality Measures November 2014

<table>
<thead>
<tr>
<th>Measures to reduce total antibiotic prescribing</th>
<th>Primary care</th>
<th>Secondary care</th>
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<tbody>
<tr>
<td>Total antibiotic prescribing to be reduced to 2010 levels at CCG level as measured by number of antibiotic prescriptions (“items”) per 1000 patients per year</td>
<td></td>
<td>Total antibiotic consumption to be reduced by 1% per year 2015-2019 as measured by DDD per 1000 admissions per year</td>
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<th>Measures to encourage narrow spectrum antibiotic prescribing</th>
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<td>Proportion of antibiotics from cephalosporin, quinolone or co-amoxiclav classes to be reduced to less than the current median for English CCGs as measured by the number of prescriptions (“items”) from target classes in comparison with the total number of antibiotic prescriptions per year.</td>
<td></td>
<td>Total carbapenem consumption to be reduced to 2010 consumption levels as measured by DDD per 1000 admissions per year.</td>
</tr>
</tbody>
</table>
UK Stakeholder engagement

Encouraging responsible prescribing

What you can do:

- Check antibiotic prescribing patterns with peer professionals
- Follow national guidance on antimicrobial stewardship
- Use PHE's national toolkits - TARGET and Start Smart Then Focus
UK Stakeholder engagement

GPs
- Can issue a delayed prescription that the patient can use at a later date if symptoms do not improve or get worse.

Local Authorities
- Should provide information on antimicrobial resistance to stakeholders, and work with CCGs to support the implementation of the NICE guidance.

Pharmacists
- Can educate the public with self-care advice and play a role in AMR stewardship.

Nurses
- Can educate patients about the importance of hygiene in reducing infection risk and encourage responsible use of antibiotics.

WE ALL HAVE A ROLE TO PLAY

Medical Royal Colleges & Health Education England
- Undergraduate and postgraduate curricula should include topics on antibiotic use and resistance.

Directors of Infection Prevention and Control
- Should ensure that they have an active surveillance programme of antibiotic resistance and antibiotic use.

Hospital Prescribers
- Review patients prescribed antibiotics at 48-72 hours and regularly thereafter.
Many Aspects and Models of Antimicrobial Stewardship
Global stewardship perspectives

Junior doctor involvement in AMS – only one example in self-stewardship, from Canada...

Annals of Internal Medicine

Antibiotic Self-stewardship: Trainee-Led Structured Antibiotic Time-outs to Improve Antimicrobial Use

Todd C. Lee, MD, MPH; Charles Franetta, MD; Dav Jayaraman, MD, MPH; Lawrence Gross, MD; and Louise Pilote, MD, MPH, PhD*

Background: Antibiotic use is an important quality improvement target. Nearly 50% of antibiotic use is unnecessary or inappropriate. To combat overtuse, the Centers for Disease Control and Prevention (CDC) proposed “time-outs” to reevaluate antibiotics.

Objective: To optimize antibiotic use through trainee-led time-outs.

Design: Before-after study.

Setting: Internal medicine (2 units, 46 beds) at a university hospital.

Patients: Inpatients (n = 652).

Intervention: From January 2012 until June 2013, while receiving monthly education on antimicrobial stewardship, resident physicians adjusted patients’ antibiotic therapy through twice-weekly time-out audits using a structured electronic checklist.

Measurements: Antibiotic costs were standardized and compared in the year before and after the audits. Use was measured as World Health Organization defined daily doses (DDDs) per 1000 patient-days. Total antibiotic use and the use of moxifloxacin, carbapenems, antipseudomonal penicillins, and vancomycin were compared by use interrupted time series. Rates of nosocomial Clostridioides difficile infection were compared by using incidence rate ratios.

Results: Total costs in the units decreased from $149,743CAD (January 2011 to January 2012) to $80,319 (January 2012 to January 2013), for a savings of $69,424 (46% reduction). Of the savings, $54,150 (78%) was related to carbapenems and $15,274 (22%) was due to other antibiotic classes. Adherence with the auditing process was 80%. In the time-series analyses, the only reliable and statistically significant change was a reduction in the rate of moxifloxacin use, by 1.9 DDDs per 1000 patient-days per month (95% CI, −3.8 to −0.02; P = 0.048). Rates of C. difficile infection decreased from 24.2 to 19.6 per 10,000 patient-days (incidence rate ratio, 0.8 [CI, 0.5 to 1.3]).

Limitation: Other temporal factors may confound the findings.

Conclusions: An antibiotic self-stewardship bundle to implement the CDC’s suggested time-outs seems to have reduced overall costs and targeted antibiotic use.

Primary Funding Source: None.

* Former Robert Wood Johnson Foundation Clinical Scholar.
Global stewardship perspectives

Tanzania and Uganda

Implementation of the ADDO Program in Tanzania

Vietnam

Providing Impetus, Tools, and Guidance to Strengthen National Capacity for Antimicrobial Stewardship in Vietnam


Global stewardship perspectives

Challenges are very different....

- Resource-limited settings
- Single visit/only chance approach
- Lack of infrastructure – hygiene/water challenges
- Tendency for polypharmacy and parenteral treatment preference
- Uncontrolled medication sales
- Quality assurance issues
- Supply matters
Accredited Drug Dispensing Outlet (ADDO) model for access to antimicrobials – Tanzania and Uganda

- Retail medicine shops – selling illegal medicines by unqualified staff. First point of access to healthcare for many
- MSH and Gates Foundation funded ADDO
- ‘Goal is to improve access to affordable, quality medicines and pharmaceutical services where few or no pharmacies exist’
- System approach combining training, accreditation, business incentives, regulatory enforcement
- Increased consumer demand for quality product and service
- Scalable intervention which addresses the gaps in rural settings

www.msh.org
www.drugsellerinitiatives.org
Thailand Antibiotic Smart Use Program

- Knowledge is the first step – but not enough to change behaviour
- Massive stakeholder engagement
- Rewriting of policy. A conceptual framework for changing behaviours – identifying the predisposing and enabling factors to change behaviours
- Incentive for joining the program
- Local lead with local healthcare teams designing and naming their own projects
- Can ask for support and materials

Activities include:
- Training and group discussions
- Herbal medicine substitution
- Local/provincial policy
- Positive competition

http://newsser.fda.moph.go.th/rumthai/
AMREF Initiative

- Advocacy. Research. Documentation
- Accreditation of laboratories
- Establishing minimum standards for clinical and laboratory diagnostic services
- Use of mHealth
  - Virtual school for nurses
  - Accreditation of skill and knowledge transfer
  - Impilo Health in My Hand project South Africa
  - Changes the profile of people reached

Dr Ravi Ram
• The critical role of clinical leaders in shaping prescribing practice and behaviour
• Shared goal of optimising use of antibiotics as intrinsic to quality clinical care and public health
• Ensuring access to effective antimicrobials, minimising negative impact of exposure and sustaining effectiveness
• Models of AS to fit the health system context, opportunities for international learning
Harnessing Organisational change for AS

Belief in a shared purpose

Reinforcement systems

Organisational change to drive AS and HCAI reduction

Skills required for change

Consistent role models

Holmes, Dinneen, Public Services Review, 8, 2006 HSJ Feb 2006


http://www.rcpath.org/resources/pdf/bulletinapril08.pdf