Role of Antibiotic Stewardship on MDRO Control: Evidence Base

Version Sun 25

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“Antimicrobial resistance is a consequence of antimicrobial use, and there is a clear relation between use and emergence of resistance at both the individual and population levels. Consumption of antibiotics correlates with the frequency of resistance at country level, as evidenced by data from the European Surveillance of Antimicrobial Consumption (ESAC-Net) and European Antimicrobial Resistance Surveillance Network (EARS-Net)”


Implications for Practice

“The evidence supports the theory that limiting the use of specific antimicrobial drugs will reduce the prevalences of resistant gram-negative bacteria and CDAD. For gram positive bacteria, there is a lack of evidence rather than evidence of no effect.”

2009
The Acute Care Environment

- Misuse of antibiotics in hospitals drives development of antibiotic resistance.
- Large proportion of inpatients receive an antibiotic, up to 50% of all antibiotic use can be inappropriate.
- Misuse of antibiotics can increase colonised or infected with antibiotic-resistant bacteria (MRSA, VRE, GNB) as well as *C. difficile*.
- Prudent use of antibiotics can prevent the emergence and selection of antibiotic-resistant bacteria.
- Decreasing antibiotic use shown to result in lower incidence of *CDI*. 
Antibiotic use in Acute Care

Report on Point Prevalence Survey of Antimicrobial Prescribing in European Hospitals 2009 ESAC-3:
- 30% of inpatients were treated with antibiotics
- The proportion for treating HAI was 35%

Figure 17 Proportion of Hospital acquired infections
Multifaceted strategies can address and decrease antibiotic resistance in hospitals

Prudent use of antibiotics can prevent the emergence and selection of antibiotic-resistant bacteria. Decreasing antibiotic use has been shown to result in decreasing incidence of *Clostridium difficile* infections.

Antibiotic prescribing practices and decreasing antibiotic resistance can be addressed through multifaceted strategies including:

- Use of ongoing education
- Use of evidence-based hospital antibiotic guidelines and policies
- Restrictive measures and consultations from infectious disease physicians, microbiologists and pharmacists
Antibiotic stewardship in Acute Care

- A marriage of infection control and antibiotic management
- Selection of antibiotics that does the least collateral damage
- Appropriate de-escalation when culture results are available.
- Optimise clinical outcomes
- Minimise unintended consequences of toxicity/emergence of resistance/selection of pathogenic organisms e.g. *Clostridium difficile*
- Essential part of patient safety  
  Delitt et al. *Clin Inf Dis.* 2007; 44:159-177

However...

- 30-40% of patients do not receive care according to evidence
- 1/3 of patients in acute care receive antibiotics
- Significant proportion of antibiotic prescribing in acute setting is sub-optimal
- Hand hygiene compliance rarely exceeds 40%
- Staff adherence to best practice needs to be improved

How can we do better?
Antibiotic stewardship in Acute Care

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How can we do better?
27/28 Sept 2012
Antibiotic Workshop Hong Kong
“Role of AS Programme in combating antimicrobial resistance”

Now consider…

• Any gaps in evidence base and stewardship programmes?
• How can we do better?
Consider….

1. The role of behavioural interventions to improve and support best practice in antimicrobial prescribing.
2. The evidence base for behavioural change strategies
3. The role of care bundles, particularly within multi-modal strategies and the opportunities and limitations
4. The potential for greater broad multi-disciplinary involvement in antibiotic stewardship will be considered, particularly to address prescribing principles, patient safety and sustained quality improvement in clinical care.
5. The importance of monitoring potential unintended consequences of interventions
1. The role of behavioural interventions to improve and support best practice in antimicrobial prescribing.
Prescribing is a ‘behaviour’

- Antibiotic prescribing is complex
- A social process
- Under influence of many determinants
- Collateral impact not tangible at prescriber/patient level
- Expertise required but not universally used
- Principles need reinforcing/sharing
- Prescribing etiquette
Guidelines and policy developed to help decision making
These provide knowledge and awareness

BUT…..

They may not shift attitudes and change practice

The goal should be to make prudent prescribing the default and routine practice
Do we need to investigate habitual behaviour as a first step to changing it?

‘Mindlines not guidelines  Gabbay ,Le May  2004 BMJ 329

Recognise Factors affecting behaviour :
Personal, Social, Environmental
Policies and guidelines are not enough....

*J Carthey et al BMJ 2011; 343*
• Behavioral interventions: Developing systems that address human factors (decision aids, desired action is the default, habits and patterns used in design, process clearly specified, takes advantage of pathways).
  
  *Rear R 2006 HSR 41.4,1677-89, Pronovost et al HSR 41:4 1599-1617*

• Nudge - *R Thaler and C Sunstein*
  
  Pronovost- “critical information for doctors was not being presented in a format that is easy for the brain to retrieve in critical situations………”

• *Behavioural Economics*…
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Nudge - R Thaler and C Sunstein
Pronovost- “critical information for doctors was not being presented in a format that is easy for the brain to retrieve in critical situations………”

Behavioural Economics…
What’s missing?

- Necessary to understand the factors that influence prescribing behaviour and decisions
- Address human factors
- Adopt a whole-system approach to support optimal prescribing choices.
- Supporting choice architecture.

Charani et al JAC 2010
2. The evidence base for behavioural change strategies
• Behaviour change a key element of optimising antibiotic prescribing
• Systematic reviews to date do not assess behaviour change
• An expanded approach to systematic review methodology developed
  – Inclusion of both qualitative and quantitative literature (1999-2009)
    *(E. Charani et al CID 2011)*
  – Expanding and Integrating Quality Criteria for Systematic Review of Multiple Study Designs within Healthcare: The ICROMS Tool: it builds on criteria established in the literature:
    ▪ The Cochrane Risk of Bias Tool for randomised controlled trials;
    ▪ The EPOC (Effective Practice and Organisation of Care) criteria for controlled and non-controlled before-and-after and controlled and non-controlled interrupted time series;
    ▪ Epidemiology studies *(Gordis 2000)* for prospective cohort studies;
    ▪ CASP (Critical Appraisal Skills Program) for qualitative studies *(Edwards, Drumright, Secci, Sevdalis, & Holmes, under review)*
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Behavior Change Strategies to Influence Antimicrobial Prescribing in Acute Care: A Systematic Review

Findings..

- Interventions to optimize antimicrobial prescribing behaviour are of poor quality and are not based on robust theoretical science.
- Behaviour and social science research is underutilized in the development of antimicrobial prescribing interventions.
- Qualitative evidence highlights the influence of social norms, attitudes, and beliefs on antimicrobial prescribing behaviour.
- When designing and evaluating interventions in antimicrobial prescribing, these influences on prescribing are generally not considered.
These findings stress the need for multidisciplinary research to investigate the utilization of behavioural and social sciences to assess prescribing behaviour and set standards.

The lack of this approach may be a contributing factor to the challenges that beset interventions aiming to influence prescribing behaviour and optimize antimicrobial prescribing.
Need a different approach to interventions?

- Work with healthcare professionals to improve the choice environment
- Environment of shared knowledge

- **Recommended Elements of an Intervention to Target Behavioural Change in Antibx Prescribing**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Descriptor</th>
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<tbody>
<tr>
<td>Conduct primary research</td>
<td>Engage in multidisciplinary primary research. Include expertise from social and behavioral sciences [41] to identify the key behavioral determinants of antimicrobial prescribing in the target audience in whom a change in behavior is desired.</td>
</tr>
<tr>
<td>Tailor interventions</td>
<td>Use data from primary research to identify key behavioral determinants and tailor interventions to (1) address identified barriers and (2) enhance the facilitators of the desired behavior change.</td>
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<tr>
<td>Evaluate intervention outcomes</td>
<td>Evaluate the effectiveness of interventions to bring about prescribing behavior change.</td>
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<tr>
<td>Address sustainability</td>
<td>Monitor the long-term adoption and implementation of the intervention and recognize the importance of building sustainability into the intervention model.</td>
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Charani et al CID 2011
Findings echoed in IPC

Psychological and social marketing frameworks are applied in qualitative studies, but rarely in intervention studies

1. Experiential and habitual nature of IPC behaviours: cannot be addressed as rational processes by interventions

2. Need to take into account social and cultural factors that affect behaviour in the design, implementation and reporting of interventions

3. Need to target the intervention to segmented groups of HCWs

3. The role of care bundles, particularly within multi-modal strategies and opportunities and limitations
The missing care bundle…

- Shift to principles..
- Keep simple..
- Include bring in expertise…
- Opportunities to share principles across professions…
A shift to principals....

On initiation of prescription:
1. Clinical rationale for initiation
2. Appropriate specimens sent for MC&S
3. Adherence to local prescribing guidelines
4. Additional clinical interventions to manage infection (e.g. remove indwelling device, surgical procedure)

On continuation of prescription:
1. Daily review based on clinical response and laboratory results regarding: De-escalation, IV to Oral switch, Stopping
2. Correct therapeutic drug monitoring

Toth NR, Chambers RM, Davis SL. Am J Health Syst Pharm. 2010 May 1;67(9):746-9.
A shift to principals....

Design of a ‘day 3 bundle’ to improve the reassessment of inpatient empirical antibiotic prescriptions

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¹Service d’Infectiologie, Hôpital l’Archet 1, Centre Hospitalier Universitaire de Nice, Route St Antoine de Ginestière, BP 3079, 06202 Nice Cedex 3, France; ²Informatics Section, Division of Community Health Sciences, MacKenzie Building, Kirsty Semple Way, Dundee DD2 4BF, Scotland, UK; ³Infection Unit, East Block, Level 4, Ninewells Hospital and Medical School, Dundee DD1 9SY, Scotland, UK

Reduce infection rates
(e.g. Michigan Keystone ICU programme for catheter-related BSIs)
But…part of multimodal strategy only…

However they are not the holy grail
→ We need to understand **how** and **why** programmes work, not only whether they work:

- **They have to be adapted to the context** Social and psychological characteristics of professional each group, barriers and culture specific to each unit
- **They work effectively if part of multimodal strategies** Key: support, coordination, communication, multidisciplinary approach, leadership, staff engagement
- **How they contribute to sustain changes in behaviour needs to be understood** Need to pay attention to attitude change and removal of barriers, in addition to measuring infection outcomes
When we begin to believe and act on the notion that safety is simple and inexpensive, that all it requires is a checklist, we abandon any serious attempt to achieve safer, higher quality care. Reporting the Keystone initiative as a success of checklists teaches the wrong lesson: namely, that reliable, safe care requires nothing more than insisting upon routine, standardised procedures. Nothing threatens safety so much as the complacency induced when an organisation thinks that a problem is solved.

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Success based on…..

- Social process
- The sense of community
- Bottom up approach
- Importance of systems with network and teams
Care bundles

Conclusion of Cochrane reviews:

insufficient evidence to draw firm conclusions and need for more rigorous studies (Gould 2011, Brady 2011, Hughes 2011)

However

In order for the research in the field to progress and take into account all the socio-cultural and behavioural aspects that can influence the effectiveness of bundles, it is necessary to:

• Broaden the evidence-based and include robust
  ▪ Non-controlled before-and-after studies
  ▪ Qualitative studies
• Develop innovative methods to
  ▪ assess the quality of the evidence gathered by systematic review
  ▪ grade such evidence (and the recommendations)
DH ‘Start Smart then Focus’ programme
Launched November 2011
Letter to all CEOs

“The aim of this guidance is to provide an outline of evidence-based antimicrobial stewardship in the secondary healthcare setting. Following this Guidance will help organisations to demonstrate compliance with Criterion 9 of The Health and Social Care Act 2008: Code of Practice on the prevention and control of infections and related guidance.”

4. The opportunities for greater broad multi-disciplinary involvement particularly to address prescribing principles, patient safety and sustained quality improvement
Multidisciplinary approach has primarily included:

- Infectious Disease Physicians
- Clinical Microbiologists
- Clinical or Infectious Disease Pharmacists
- Epidemiologist
- Infection prevention and control teams

**Can nurses contribute to antimicrobial stewardship?**
Covering more Territory to Fight Resistance: Considering Nurses’ Role in Antimicrobial Stewardship

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1. The National Centre for Infection Prevention and Management, Division of Infectious Diseases, Imperial College London, London, W12 OHS, UK
2. Infection Prevention Society, UK
3. Southport and Ormskirk Hospital NHS Trust, UK
4. Imperial College Healthcare NHS Trust, London, UK

Abstract

The potential contribution nurses can make to the management of antimicrobials within an inpatient setting could impact on the development of antimicrobial resistance (AMR) and healthcare associated infections (HCAIs). Current initiatives promoting prudent antimicrobial prescribing and management have generally failed to include nurses, which subsequently limits the extent to which these strategies can improve patient outcomes. For antimicrobial stewardship (AS) programmes to be successful, a sustained and seamless level of monitoring and decision making in relation to antimicrobial therapy is needed. As nurses have the most consistent presence as patient carers, they are in the ideal position to provide this level of service. However, for nurses to truly impact on AMR and HCAIs through increasing their profile in AS, barriers and facilitators to adopting this enhanced role must be contextualised in the implementation of any initiative.
How can Nurses Contribute?

- Duration of Treatment
- Route of antimicrobial administration
- Timing of antimicrobial administration
- Therapeutic drug monitoring
- Outpatient Antibiotic Therapy (OPAT)

Knox et al; MacDougall & Polk;
Lespirit & Brun-Buisson
Edwards et al. 2011
Oosterheert et al; Mertz et al
Organisational Memory

• **Refers to the retrievable information contained within an organisation ……as well as in the minds of the organisation members** (Paoli & Prencipe, 2003).

• **Organisational memory of antimicrobial therapy**
  – Prescribing most commonly performed by junior doctors
  – Outside area of expertise with varying levels of senior support
  – High rotation of junior doctors
  – Loss of local knowledge
  – Antibiotic prescribing sits outside one specialty
  – However, nurses can contribute to this local knowledge as the least transient population

Multidisciplinary teams can also provide resilience and organisational memory

Important role of nurses in antibiotic stewardship

Antibiotic prescribing most commonly performed by junior doctors, outside area of expertise with varying levels of senior support

High rotation of junior doctors, loss of local knowledge

Nurses least transient

Nurses role as ‘knowledge brokers’ and in clinical decision making

Enhancing the nurses role in AS

Difficulties to face

• Time and Resources
• Knowledge
• Motivation
• Skills

• Nurses ability to discuss or challenge decisions associated with constructs of knowledge and power

• Prescribing etiquette: refers to prescribers reluctance to change colleagues decisions

EU Antibiotic Awareness day 18th November, 2010
CIPM launched the first Conference on Nurses’ Role in Antimicrobial Stewardship

(Edwards et al; 2011)
Enhancing the nurses role in AS

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EU Antibiotic Awareness day 18th November, 2010

Do you prescribe, administer or check antibiotics? If so are you ready to START SMART then FOCUS? Visit the Start Smart Then Focus pages of the Source for further details.
Managerial involvement and support

Need a social science perspective: data are not enough…….
Addressing Antibiotic Stewardship as an organisational change issue need to consider:

• Issues and agendas: Political science concept of a crowded decision making agenda;

• Power and influence: Specialists and generalists, Who ‘owns’ antibiotic stewardship? Coalition building needs?

• Governance framework

• Roles and relationships: difficult move from a narrow technical role to a broader strategic role, coalition of supporters

• Organisational culture and learning

• Supporting Knowledge bases

Regulation: Code of practice, CQC

Self assessment: A Toolkit

• Operational delivery of antibiotic strategy
  • Evidence-based self-assessment toolkit (ASAT)
  • Optimising care and Benchmarking
  • To assess longitudinal progress of stewardship initiatives
Supporting Organisational Structures and Systems

1) Structures, lines of responsibility and high-level notification to the Board.
2) Operational delivery of an antimicrobial strategy- with operational standards of good antimicrobial stewardship.
3) Risk assessment for antimicrobial chemotherapy.
4) Clinical governance assurance
5) Education and training
6) Antimicrobial pharmacist -with systems in place for ensuring optimum use.
7) Patients, Carers and the Public-address information needs
Caution- Monitor unintended Consequences

- Must ensure patients receive early effective treatment and prompt care not compromised.
- Should build in balances/checks, mechanisms to mitigate and monitor potential unintended consequences, poorly treated infections etc
- Deliver on the Surviving sepsis care bundle-
  (Obtain blood cultures prior to antibiotic administration and administer broad-spectrum antibiotic, *within 3 hrs of A&E admission*) – *yet ensure subsequent de-escalation*
- Improved monitoring of clinical outcomes
• Need improved monitoring of clinical outcomes?
• What about unintended consequences of well intentioned quality improvement initiatives?
CONCLUSION,

Build on platform of what has been achieved in antibiotic stewardship

BUT

Address gaps and diversify and broaden involvement to increase effectiveness, to maintain momentum and for resilience and sustainability
The National Centre for Infection Prevention & Management will be holding its annual meeting at the Hammersmith Campus.

If you are a researcher, clinician, medical staff, NHS manager or student and have an interest in infection and its prevention, please join us for our annual meeting. This will be a valuable opportunity to hear the Centre’s researchers and collaborators talk about their work to date.

The event will be followed by a drinks reception.

Please RSVP to Rachel Wood; r.wood@imperial.ac.uk