# Role of Antibiotic Stewardship on MDRO Control: Evidence Base

Version Sun 25

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## WHO 2012 : Options for Action

"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)"



van de Sande-Bruinsma N et al. Antimicrobial drug use and resistance in Europe. Emerging Infectious Diseases, 2008, 14(11):1722-30

Gottesman BS et al. Impact of quinolone restriction Clin infect Dis **2009**; 49:869–75



#### **Implications for Practice**

"The evidence supports the theory that limiting the use of specific antimicrobial drugs will reduce the prevalences of resistant gramnegative 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 <sup>,</sup>up to 50% of all antibiotic use can be inappropriate.
- Misuse of antibiotics can increase colonised or infected with antibioticresistant 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%





# Multifaceted strategies can address and decrease antibiotic resistance in hospitals

Prudent use of antibiotics can prevent the emergence and selection of antibioticresistant 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

### Antibiotic stewardship in Acute Care

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### 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?

## 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 multimodal 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

BMJ

BMJ 2011;343:d5283 doi: 10.1136/bmj.d5283

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#### **ANALYSIS**

### Breaking the rules: understanding non-compliance with policies and guidelines

Healthcare organisations use policies and guidelines to standardise and clarify care and improve efficiency, productivity, and safety. But **Jane Carthey and colleagues** are concerned that their burgeoning number makes it impossible to distinguish the essential from the irrelevant and is affecting compliance

Jane Carthey *human factors consultant*<sup>1</sup>, Susannah Walker *anaesthetic registrar*<sup>2</sup>, Vashist Deelchand *research associate*<sup>2</sup>, Charles Vincent *professor of clinical safety research*<sup>2</sup>, William Harrop Griffiths *consultant anaesthetist*<sup>3</sup>

<sup>1</sup>Imperial College London, London, UK: <sup>2</sup>Department of Biosurgerv and Technology. Imperial College London: <sup>3</sup>Department of Anaesthesia. Imperial



 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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#### The MINDSPACE Report

In 2010, Ivo Vlaev and Dominic King co-authored the <u>MINDSPACE</u> report, jointly published by the Cabinet Office and Institute for Government. With Paul Dolan (LSE), Michael Hallsworth and David Halpern (IfG), the report explores how behaviour change theory can help meet current policy challenges such as smoking and obesity. The MINDSPACE framework is now being used extensively across Government.



J Antimiarob Chemother 2010; **65**: 2275–2277 doi:10.1093/jac/dkq357 Advance Access publication 16 September 2010

#### Antibiotic stewardship programmes—what's missing?

Journal of Antimicrobial

Chemotherapy

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Inappropriate antibiotic use and antibiotic resistance are now major global issues. Antimicrobial stewardship programmes are increasingly being used to optimize antibiotic prescribing in acute care. The central tenet of these programmes tends to be policy and guidelines aimed at prescribers. However, rules and guidelines alone may not be sufficient to bring about effective and sustainable optimization of practice. Best practice needs to be positively reinforced by an environment that facilitates and supports optimal prescribing choices, i.e. a 'choice architecture' that makes prudent antibiotic prescribing the path of least resistance. To make prudent antibiotic management an integral part of the behaviour of all healthcare professionals and to bring about quality improvement it is necessary to adopt a whole-system approach. To do this it is necessary first to understand the factors that influence antibiotic management and prescribing.

Keywords: antibiotics, choice architecture, prescribing

Decision architecture....

### 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 noncontrolled 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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Clinical Infections Diseases 2011;53(7):651-662 40 The Author 2011, Published by Oxfard Linker sty Press on behalf of the Infections Diseases Society of America. All points recorded. For Permissions, please e-mail journals permissione@exp.com. 1058-433(2011):872-401051 4.00

D0t 10.1093/cid/ci445

and subtherapeutic dosing, which can contribute to treatment failure. In an effort to improve the quality of antimicrobial prescribing in acute care, antimicrobial stewardship (AS) initiatives have been recommended [9, 10]. AS

Behavior Change Strategies in Antimicrobial Prescribing • CID 2011:53 (1 October) • 651

Charani E et al Behavior Change Strategies to Influence Antibiotic Prescribing in Acute Care: A Systematic Review. CID, October 2011;53(7):651–662

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

Recommendation	Descriptor
Conduct primary research	Engage in multidisciplinary primary research. Include expertise from social and behavioral sci- ences [41] to identify the key behavioral determinants of antimicrobial prescribing in the target audience in whom a change in behavior is desired.
Tailor interventions	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.
Evaluate intervention outcomes	Evaluate the effectiveness of interventions to bring about prescribing behavior change.
Address sustainability	Monitor the long-term adoption and implementation of the intervention and recognize the im- portance of building sustainability into the intervention model.

Charani et al CID 2011

### Findings echoed in IPC

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

- 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



Edwards R et al. Optimisation of infection prevention and control in acute health care by behaviour change: a systematic review. TLID 2012 Feb16

# 3.The role of care bundles, particularly within multimodal strategies- and opportunities and limitations

### The missing care bundle...

Antimicrobial Agents

www.ischemo.org



International Journal of Antimicrobial Agents 30 (2007) 25-29

Review

The missing care bundle: antibiotic prescribing in hospitals

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Received 21 March 2007; accepted 21 March 2007

#### Abstract

The care bundle involves grouping together key elements of care for procedures and the management of specific diagnoses in order to provide a systematic method to improve and monitor the delivery of clinical care processes. In short, care bundles aim to ensure that all patients consistently receive the best care or treatment, all of the time. This approach has been successfully applied to the management of various conditions, particularly in the critical care setting. The Institute for Healthcare Improvement's 100 K lives campaign' consisted of six care bundles, three of which have addressed preventing hospital-acquired infections (HCAIs), includes six 'high-impact infections (HCAIs), includes ing methicillin-resistant *Staphylococcus aureus* (MRSA), includes six 'high-impact interventions', which are care bundles to reduce HCAIs. However, we suggest that one key intervention is missing, and consider this intervention.

- 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

Cooke, F.J., Holmes, A.H. (2007) The missing care bundle: antibiotic prescribing in hospitals. Int. J. Antimicrobial Agents; 30: 1, 25–29

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

Pulcini C, Defres S, Aggarwal I, Nathwani D, Davey P. JAC 2008 Jun;61(6):1384-8.

A shift to principals....

Journal of Antimicrobial Chemotherapy (2008) 61, 1384–1388 doi:10.1093/jac/dkn113 Advance Access publication 26 March 2008

### Design of a 'day 3 bundle' to improve the reassessment of inpatient empirical antibiotic prescriptions

Céline Pulcini<sup>1,2\*</sup>, Sylviane Defres<sup>3</sup>, Ila Aggarwal<sup>3</sup>, Dilip Nathwani<sup>3</sup> and Peter Davey<sup>2,3</sup>

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## Evidence on care bundles and checklists

### 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 <u>how</u> and <u>why</u> 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

#### The art of medicine Reality check for checklists

checklist" as a solution to patients' safety problems. Yet the selected and converted into a standardised checklist. widespread interest in this study is a dual-edged sword.

for the lay public. The problem is that the story may well ought to have. The reasons for this are primarily social have been oversimplified. The emphasis on checklists is a and cultural. In part, the way that physicians are social-Hitchcockian "McGuffan", a distraction from the plot that ised creates resistances and interferences to the use of improve culture by building expectations of performance disrupt these deeply entrenched norms is a much greater standards into work processes. We propose that widespread challenge than identifying the components of a checklist. and to high-quality care.



Catheter-related blood stream infections in the intensive as producing a prompt to remember the milk. But figuring care unit (ICU) are common, costly, and potentially lethal. out what should form the content of a checklist for a clinical The Dec 28, 2006, issue of The New England Journal of problem is a nonetheless achievable ambition: there are Medicine reported that an evidence-based intervention well-defined processes for identifying and synthesising in 103 intensive care units in the Michigan Keystone ICU research evidence. For the Keystone programme, programme had resulted in a large sustained reduction in interventions with a potential to improve outcomes were rates of these infections. The study was widely reported in identified, and the five procedures that had the strongest the popular media and elsewhere as a triumph of the \*simple evidence and the lowest barriers to implementation were

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deployment of checklists without an appreciation of how The mistake of the "simple checklist" story is in the or why they work is a potential threat to patients' safety assumption that a technical solution (checklists) can solve an adaptive (sociocultural) problem. To improve safety, Attributing the reduction of infection in the Keystone health care needs to get the technical and adaptive work programme solely to the use of checklists is an easily made but right. Without attention to adaptive work, checklists would crucial mistake. Checklists are a good way of making certain probably suffer the same fate as guidelines-often left that tasks get done, as anyone who has taken a shopping unused, even when very robust. Summarising evidence is list to the supermarket can testify. If wise, checklists can help a necessary but not sufficient step for translating evidence workers perform a task by reducing ambiguity about what into practice. Evidence summaries need to be combined to do. Of course, determining the best way of proceeding with an understanding of, and a strategy for, mitigating in a complex health-care setting is not as straightforward the technical and social/political and psychological (even emotional) barriers to using the evidence, and with feedback about performance. Emphasising checklists as the explanatory mechanism for the reduction in catheterrelated infections obscures the complex labour necessary to create a collective local faith in checklists. How support was mobilised for coordinating work around infection control is the real story of the Keystone ICU project.

> What happened in Michigan involved the creation of social networks with a shared sense of mission whose members were each able to reinforce the efforts of the other to cooperate with the interventions. Implementing the entire programme occurred over 9 months-it was not simply the case that the units were handed the checklist and immediately fell in line. The work was arduous and often laden with emotions. Before ICU units were allowed to take part in the intervention, each hospital had to assign a senior executive to work with participating units. Each ICU was required to identify a physician and nurse team leader. The executives were required to meet monthly with unit

Charles L Bosk, Mary Dixon-Woods, Christine A Goeschel, Peter J Pronovost The Lancet - 8 August 2009 ( Vol. 374, 444-445)

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"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."

Charles L Bosk, Mary Dixon-Woods, Christine A Goeschel, Peter J Pronovost The Lancet - 8 August 2009 ( Vol. 374. 444-445)

# MILBANK QUARTERLY

#### Explaining Michigan: Developing an Ex Post Theory of a Quality Improvement Program

#### MARY DIXON-WOODS, CHARLES L. BOSK, EMMA LOUISE AVELING, CHRISTINE A. GOESCHEL, and PETER J. PRONOVOST

University of Leicester; University of Pennsylvania; Johns Hopkins University

Context: Understanding how and why programs work—not simply whether they work—is crucial. Good theory is indispensable to advancing the science of improvement. We argue for the usefulness of ex post theorization of programs.

Mothods: We propose an approach, located within the broad family of theoryoriented methods, for developing ex post theories of interventional programs. We use this approach to develop an ex post theory of the Michigan Intensive Care Unit (ICU) project, which attracted international attention by successfully reducing rates of central venous catheter bloodstream infections (CVC-BSIs). The procedure used to develop the ex post theory was (1) identify program leaders' initial theory of change and learning from running the program; (2) enhance this with new information in the form of theoretical contributions from social scientists; (3) synthesize prior and new information to produce an updated theory.

Findings: The Michigan project achieved its effects by (1) generating isomorphic pressures for ICUs to join the program and conform to its requirements; (2) creating a densely networked community with strong horizontal links that exerted normative pressures on members; (3) reframing CVC-BSIs as a cial problem and addressing it through a professional movement combining "grassroots" features with a vertically integrating program structure; (4) using several interventions that functioned in different ways to shape a culture of

### Success based on.....

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

Address correspondence to: Mary Dizon-Woods, Department of Health Sciences, Adrian Building, University of Leicester, LE1 7AH, UK (email: md11@le.ac.uk).

### 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."

http://www.dh.gov.uk/prod\_consum\_dh/groups/dh\_digitalassets/documents/ digitalasset/dh\_131181.pdf

## **DH Start Smart Then Focus**





Charani E et al.. An analysis of the development and implementation of a Smartphone Application for the delivery of Antimicrobial Prescribing Policy: Lessons Learnt . Nov 2012. JAC in press

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?

Published in final edited form as: J Infect Prev. 2011 January ; 12(1): 6-10. doi:10.1177/1757177410389627.

#### Covering more Territory to Fight Resistance: Considering Nurses' Role in Antimicrobial Stewardship

R Edwards<sup>(1),\*</sup>, LN Drumright<sup>(1)</sup>, M Kiernan<sup>(2),(3)</sup>, and A Holmes<sup>(1),(4)</sup>

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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 carer, 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

Edwards, R, et al. (2011) *J. Infection Prevention* 12: 6-10 Charani E, et al. (2010) *J.Antimicrob Chemotherapy* 65: 2275-2277



- 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

Edwards, R, et al. (2011) *J. Infection Prevention* 12: 6-10 Charani E, et al. (2010) *J.Antimicrob Chemotherapy* 65: 2275-2277

## 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

(Edwards et al; 2011)

EU Antibiotic Awareness day18<sup>th</sup> November, 2010 CIPM launched the first Conference on Nurses' Role in Antimicrobial Stewardship

### Enhancing the nurses role in AS



EU Antibiotic Awareness day18<sup>th</sup> November, 2010 CIPM launched the first Conference on Nurses' Role in Antimicrobial Stewardship.

Has run in Nov 2011 and Nov 2012.

Gaining momentum.

## Enhancing the nurses role in AS



# 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

E Ferlie.et al 2003 British Journal of Management, 14, S1: S1-14.

### Reinforcing AS : Regulation and Self Assessment

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
- Cooke J, Alexander K, et al. (2010). Antimicrobial stewardship: an evidence-based, antimicrobial self-assessment toolkit (ASAT) for acute hospitals. JAC

### 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?

#### Annals of Internal Medicine

Improving Patient Care

#### Public Reporting of Antibiotic Timing in Patients with Pneumonia: Lessons from a Flawed Performance Measure

Robert M. Wachter, MD; Scott A. Flanders, MD; Christopher Fee, MD; and Peter J. Pronovost, MD, PhD

The administration of antibiotics within 4 hours to patients with community-acquired pneumonia has been criticized as a quality standard because it pressures clinicians to rapidly administer antibiotics despite diagnostic uncertainty at the time of patients' initial presentations. The measure was recently revised (to 6 hours) in response to this criticism. On the basis of the experience with the 4-hour rule, the authors make 5 recommendations for the development of future publicly reported quality measures. First, results from samples with known diagnoses should be extrapolated cautiously, if at all, to patients without a diagnosis. Second, for some measures, "bands" of performance may make more sense than "all-or-nothing" expectations. Third, representative end users of quality measures should participate in measure development. Fourth, quality measurement and reporting programs should build in mechanisms to reassess measures over time. Finally, biases, both financial and intellectual, that may influence quality measure development should be minimized. These steps will increase the probability that future quality measures will improve care without creating negative unintended consequences.

Ann Intern Med. 2008;149:29-32. For author affiliations, see end of text. www.annals.org

### 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

- Singh N, Yu VL.. Chest. 2000 May;117(5):1496-9.
- Lesch CA, Itokazu GS,et al . Diagn Microbiol Infect Dis. 2001 Nov;41(3):149-54.
- Ansari F, Erntell et al Clin Infect Dis. 2009 Nov 15;49(10):1496-504.
- Davey P, Brown E, et al Cochrane Database Syst Rev. 2005(4).
- Willemsen I, Groenhuijzen A, et al. Antimicrob Agents Chemother. 2007 Mar;51(3):864-7.
- Safdar N, Maki DG. Ann Intern Med. 2002 Jun 4;136(11):834-44.
- Tacconelli E, De Angelis G, et al . Antimicrob Agents Chemother. 2009 Oct;53(10):4264-9.
- Fowler S, Webber A, J Antimicrob Chemother. 2007 May;59(5):990-5.
- Bradley SJ, Wilson AL, J Antimicrob Chemother. 23. De Man P, Verhoeven BAN et al Lancet. 2000;355(9208):973-8.
- Byl B, Clevenbergh P,et al. Clin Infect Dis. 1999 Jul;29(1):60-6
- Lepper PM, Grusa E, et al. Consumption of imipenem correlates with beta-lactam resistance in Pseudomonas aeruginosa. Antimicrob Agents Chemother. 2002 Sep;46(9):2920-5.
- Carling P, Fung T, Killion A, Terrin N, Barza M. Favorable impact of a multidisciplinary antibiotic management program conducted during 7 years. Infect Control Hosp Epidemiol. 2003 Sep;24(9):699-706
- De Man P, Verhoeven BAN, Verbrugh HA, Vos MC, Van Den Anker JN. An antibiotic policy to prevent emergence of resistant bacilli. Lancet. 2000;355(9208):973-8
- Chung A, Perera R, Brueggemann AB, et al.Effect of antibiotic prescribing on antibiotic resistance in individual children in primarycare: prospective cohort study. BMJ **2007**; 335:429.
- Malhotra-Kumar S, Lammens C, Coenen S, Van Herck K, Goossens H. Effect of azithromycin and clarithromycin therapy on pharyngeal carriage of macrolide-resistant streptococci in healthy volunteers: a randomised, double-blind, placebo-controlled study. Lancet **2007**; 369:482–90.



Hammersmith Campus.

If you are a researcher, dinician, 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.

# Imperial College London

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Protecting people Presenting harm Preparing for threats

Please rsvp to Rachel Wood: r.wood@imperial.ac.uk

