Monthly Webinar
Tuesday 16\textsuperscript{th} January 2018, 16:00

“That Was The Year That Was”: Selections from the 2017 Antimicrobial Stewardship Literature

Audio dial-in (phone): 01 526 0058
Instructions

• Interactive
  – Please use chat box function for questions and comments
    • Select send to “Everyone”

• Sound
  – Better over phone
    • 01 526 0058

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- How would you design an AMS programme to specifically target junior doctors?
- Have you considered the role of CMOCs?
Social and professional influences on antimicrobial prescribing for doctors-in-training: a realist review

Chrysanthi Papoutsi1*, Karen Mattick2, Mark Pearson3, Nicola Brennan4, Simon Briscoe3 and Geoff Wong1

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Received 21 February 2017; returned 16 March 2017; revised 20 May 2017; accepted 22 May 2017
Background

• AMS interventions often target junior and senior doctors as a uniform group

• Aim
  – Identify range of possible explanations about how AMS interventions work for doctors-in-training at different levels, and why they may work in particular circumstances and not in others
Methods

• Realist Review
  – Interpretive, theory-driven approach to synthesizing evidence from qualitative, quantitative and mixed-methods research

• Consultation with diverse stakeholder group

• Detailed evidence search
  – Secondary search following literature analysis and stakeholder consultation
Methods

• Review structured around three questions:

1. What are the ‘mechanisms’ by which antimicrobial prescribing behaviour change interventions are believed to result in their intended outcomes?

2. What are the important ‘contexts’ which determine whether the different mechanisms produce intended outcomes?

3. In what circumstances are such interventions likely to be effective?
Results

• Interventions for doctors-in-training
  – Often focused on knowledge or skills alone
  – Not described in enough detail
  – Mainly evaluated using pre-/post-study designs

• Focused prescribing decisions by trainees in the presence of challenges
  – e.g. diagnostic uncertainty, inexperience, lack of knowledge
Context – Mechanism – Outcome configurations (CMOCs)

• Influence of medical hierarchy on prescribing decisions
  – In a context of learning through role-modelling within hierarchical relationships (C), junior doctors passively comply with the prescribing habits and norms set by their seniors (O), due to fear of criticism (M) and fear of individual responsibility for patients deteriorating (M)
  – In a context where career progression depends on hierarchical power relationships (C), junior doctors feel they have to preserve their reputation and position in the hierarchy (fitting-in) (M), by actively following the example of their seniors and avoiding conflict (O)
Overarching Realist Programme Theory

Hierarchical relationships

Powerful prescribing norms

Lack of clear roles & responsibilities

Implicit knowledge & engagement boundaries

Fear of criticism

Fear of individual responsibility

Managing own reputation

Fitting in with the team

 Appearing as competent

Passively complying with/actively choosing to follow:
- senior prescribing practices
- the way seniors take into account prescribing aids and sources of support
- the way seniors take into account patient expectations
- the way seniors take into account the opinion of other health professionals

Reluctance/willingness to ask questions or to challenge senior decisions
(growing willingness as training progresses but still within the influence of prescribing norms and hierarchies)
Designing AMS for doctors in training
TeamSTEPPS 2.0

Framework and Competencies

Team Competency Outcomes
Knowledge
- Shared Mental Model

Attitudes
- Mutual Trust
- Team Orientation

Performance
- Adaptability
- Accuracy
- Productivity
- Efficiency
- Safety
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- How can we sustain improvements delivered by a targetted AMS programme?
- Have you considered using a stepped-wedge approach to rolling out an AMS programme?
Transition from a dedicated to a non-dedicated, ward-based pharmacist antimicrobial stewardship programme model in a non-academic hospital and its impact on length of stay of patients admitted with pneumonia: a prospective observational study

Giulio DiDiodato, Leslie McAthur

ABSTRACT
Pharmacists play an integral role in antimicrobial stewardship (AS). Some AS programmes employ dedicated pharmacists, sometimes with infectious diseases (ID) training, while others employ ward-based pharmacists. The role and impact of both are under investigation. This study compares the length of stay (LOS) of patients admitted to hospital with community-acquired pneumonia (CAP) after the implementation of an AS programme initially led by a dedicated ID-trained pharmacist, and then transitioned to a ward-based pharmacist. Starting 1 April 2013, all adult patients admitted with CAP were a dedicated 0.8 full-time equivalent (FTE) infectious diseases (ID)-trained pharmacist and a 0.2 FTE ID-trained clinician researcher. We modelled our approach after the ‘Start Smart-Then Focus’ AS programme employed across acute care trusts in the National Health Service. In addition, we embedded two research projects a priori into the AS programme to ensure that we could evaluate the effectiveness of our approach in reducing both the length of stay (LOS) in patients
Background and methods

• 339-bed community hospital, Barrie, Ontario
  – Requirement to have AMS programme to achieve full hospital accreditation

• AMS intervention for all patients admitted with CAP
  – Phase 1: ID physician and ID pharmacist responsible for all AMS audits/interventions
  – Phase 2: ward-based pharmacist responsibility

• Primary outcome = LOS
  – Secondary outcome = DOT
Training of ward-based pharmacists (prior to Phase 2)

• Provided with IDSA CAP guidelines
  – Instructed on their rationale and interpretation by the AS team

• Series of monthly web-based teaching vignettes (n=6) for pharmacists to complete, and given feedback

• Option of daily review of AS audits and recommendations with ID pharmacist and ID physician
Stepped-wedge implementation of the antimicrobial stewardship programme over 36-month study period

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*AS = intervention, X = no intervention (control intervals)*

DiDiodato G, McAthur L. BMJ Open Quality 2017;6:e000060
Primary Outcome: time to hospital discharge in AS-exposed and non-exposed patients

Median reduction 0.5 days (19.4%) LOS in AS-exposed patients

DiDiodato G, McAthur L. BMJ Open Quality 2017;6:e000060
Other Results

• Time to AS audit and feedback shorter in Phase 2 (2.59 days) vs Phase 1 (2.87 days)
  – No difference in acceptance of AS recommendations (84.3%)
• No difference in mean reduction total or IV DOT between Phases 1 and 2
  – After adjustment for confounders
• 13.6% fewer patients had AS intervention in Phase 2
  – Reflection of competing priorities for ward-based pharmacists
Discussion

• Study design
  – Accounted for time-dependant bias
    • Otherwise would underestimate impact on LOS
  – ‘Doubly robust@ model specification for exposure and outcome
    • Reduced risk of biased effect estimate
    • Allowed estimation of causal AS intervention effect
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• What do Donald Rumsfelt and AMS programmes have in common?
A framework for ensuring a balanced accounting of the impact of antimicrobial stewardship interventions

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Background and methods

• Cochrane systematic review of the impact of AMS in hospitals
  – 221 studies included
    • 49 RCTs
    • 110 ITS
Outcomes measured in included studies

<table>
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<th>Type of outcome measured</th>
<th>RCT (n=49)</th>
<th>ITS (N=110)</th>
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<tbody>
<tr>
<td>Antimicrobial treatment</td>
<td>46 (93.8)</td>
<td>101 (91.8)</td>
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<td>Surgical antimicrobial prophylaxis</td>
<td>3 (6.1)</td>
<td>9 (8.2)</td>
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<tr>
<td>Microbial outcomes</td>
<td>5 (10.2)</td>
<td>26 (23.6)</td>
</tr>
<tr>
<td>Mortality</td>
<td>28 (57.1)</td>
<td>4 (3.6)</td>
</tr>
<tr>
<td>Length of hospital stay</td>
<td>15 (30.6)</td>
<td>2 (1.8)</td>
</tr>
<tr>
<td>Other outcomes *</td>
<td>23 (46.9)</td>
<td>8 (7.2)</td>
</tr>
</tbody>
</table>

*e.g. Delays in starting antimicrobial treatment, duration of fever, time spent on mechanical ventilation, increased allergic reactions.*
There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know.

Donald Rumsfeld
Potential outcomes from AMS interventions

• Expected, desirable consequences
  – Intervention goals
    • Prescribing levels, AMR, mortality, etc

• Expected, undesirable consequences
  – Intervention trade-offs
    • ↑LOS, diversion of resources, user fatigue, etc

• Unexpected, undesirable consequences
  – Unpleasant surprises
    • ‘Pseudo-outbreak’ and erosion of trust (response to antibiotic restriction), ↑AKI, unnecessary treatment of non-CAP

• Unexpected, desirable consequences
  – Pleasant surprises
    • ↓LOS, ↓time to 1st dose, ↓phlebitis, etc
Types of consequences from AMS

Strategies to reduce unintended consequences of AMS measurement

<table>
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<tr>
<th>Strategy</th>
<th>Examples from the Cochrane review</th>
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</table>
| **Involve staff at all levels**         | Forming inter-professional improvement teams with front-line staff involving senior and junior doctors, nurses and pharmacists.\(^{20,62}\)  
Involving management at clinical service and hospital levels.\(^{20,62}\)  
Involving junior doctors\(^{63}\) and other front-line staff\(^{19,20}\) such as pharmacists in interpreting and learning from collected data. |
| **Retain flexibility in the use of performance indicators** | Using process maps to identify performance indicators and tests of change to modify them.\(^{20,62}\)  
Using run charts to identify outliers and chart review to investigate causes and targets for change.\(^{20}\)  
Using staff coaching to identify factors contributing to performance lapses and invite suggestions for improvement.\(^{19}\) |
| **Quantify every important outcome**   | Two studies identified delay in treatment of other patients as a potential consequence of reducing time to first antibiotic dose for children with sepsis in emergency departments.\(^{19,20}\) However, only one went on to test and implement quantitative measures of identified trade-offs (time left without being seen for all patients in the emergency department and time to first dose of β-agonist for children with asthma).\(^{20}\) |
| **Keep system under constant review**  | Specifying two or more intervention periods to allow review of consequences and adaptation of intervention.\(^{19,20,62}\) |
• How do we address the role of overdiagnosis and resultant overtreatment?
TOO MUCH MEDICINE

Mapping the drivers of overdiagnosis to potential solutions
Thanya Pathirana and colleagues explore strategies to tackle the problem of too much medicine

Thanya Pathirana PhD scholar, Justin Clark senior information specialist, Ray Moynihan senior research fellow

Center for Research in Evidence Based Practice, Bond University, Australia
Key messages

• Interest is growing in tackling the problems of overdiagnosis and overtreatment

• Possible drivers and potential solutions arise across five inter-related domains
  1. Culture
  2. The health system
  3. Industry and technology
  4. Healthcare professionals
  5. Patients and the public

• More work is needed to develop and evaluate interventions aimed at preventing overdiagnosis

• Raising public awareness of overdiagnosis is a priority
Possible drivers

Culture
- Beliefs; for example, more = better
- Faith in early diagnosis
- Intolerance of uncertainty
- Biased media reporting
- Medicalisation

Health system
- Financial incentives
- Expanding disease definitions
- Quality measures
- Complexity of care
- Guidelines
- Screening

Industry and technology
- Industry promotion
- Diagnostic test sensitivity
- Medicine as a business
- Industry expands markets

Professionals
- Fear of litigation
- Fear of missing disease
- Flaws in training
- Lack of confidence or knowledge
- Over-reliance on tests

Patients and public
- Over-reliance on tests
- Lack of confidence or knowledge
- Expectation clinicians will “do something”

Possible solutions

Culture
- Awareness/information campaigns
- Healthy scepticism about early diagnosis
- Address uncertainty
- Improve media reporting

Health system
- Reform incentives from quantity to quality
- Reform disease definition
- Reform quality measures
- Reform guidelines
- Reform screening
- More research on OD and OU
- Multicomponent interventions

Industry and technology
- Better regulate promotion
- Better evaluation of tests
- Declare, reduce, exclude COIs
- Better evaluate disease definitions

Professionals
- Reform litigation driver
- Comfort with uncertainty
- Educate and inform
- Interventions for providers
- Reduce test over reliance

Patients and public
- Shared decision making
- Education and information campaigns
- Promote “doing nothing”
• How can the laboratory, and lab/user interactions, support AMS?
Viewpoint
August 15, 2017
Diagnostic Stewardship—Leveraging the Laboratory to Improve Antimicrobial Use

Daniel J. Morgan, MD, MS1,2; Preeti Malani, MD, MSJ3,4; Daniel J. Diekema, MD, MS5,6

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5Division of Medical Microbiology, Department of Pathology, University of Iowa Carver College of Medicine, Iowa City
6Division of Infectious Diseases, Department of Internal Medicine, University of Iowa Carver College of Medicine, Iowa City

<table>
<thead>
<tr>
<th>General principles</th>
<th>Ordering (Preanalytic)</th>
<th>Collection (Preanalytic)</th>
<th>Processing (Analytic)</th>
<th>Reporting (Postanalytic)</th>
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<tbody>
<tr>
<td>Test only if clinical presentation is consistent with the infectious etiology (high pretest probability)</td>
<td>Pay attention to sample collection and transport, to optimize yield and reduce contamination</td>
<td>Use adjunctive laboratory tests to distinguish colonization from infection</td>
<td>Report results in a format that guides appropriate practice</td>
<td></td>
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<tr>
<td>Urine cultures</td>
<td>Test only when symptoms suggest urinary tract infection or, if asymptomatic, concordant with guidelines (eg, urologic surgery, pregnancy)</td>
<td>Use aseptic technique—midstream clean catch after periurethral cleansing Obtain catheter sample from collection port (not bag), prefer newly inserted catheter</td>
<td>Only perform urine culture if pyuria present</td>
<td>Text interpreting result, eg, “multiple organisms indicating likely contamination”; “no pyuria, culture not performed” Selective reporting of antibiotic susceptibilities—display preferred antibiotics only</td>
</tr>
<tr>
<td>Blood cultures</td>
<td>Test only when symptoms of infection present (fever) Avoid repeat cultures unless concern for persistent or endovascular infection</td>
<td>Use aseptic technique—prefer peripheral samples obtained by trained phlebotomists Avoid catheter draws</td>
<td>Consider rapid testing on initial positive results, eg, polymerase chain reaction, PNA-FISH, MALDI-TOF</td>
<td>Text interpreting result, eg, “likely skin contaminant”; “Staphylococcus aureus, likely pathogen consider infectious diseases consult” Selective reporting of antibiotic susceptibilities</td>
</tr>
<tr>
<td>Clostridium difficile testing</td>
<td>Test only when disease likely (eg, recent antibiotic exposure, &gt;3 loose stools/d, duration &gt;24 h, and no recent laxative use) Avoid tests of cure</td>
<td>Only collect and send loose stool (ie, that conforms to the container)</td>
<td>Consider use of a testing algorithm that includes toxin immunoassay</td>
<td>Text interpreting result, eg, “toxin−/PCR+ indicating possible colonization rather than disease”</td>
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<tr>
<td>Molecular detection panels (ie, “syndromic testing”)</td>
<td>Test only when pretest probability moderate to high for ≥2 targets on the panel, and when results will influence management</td>
<td>Use recommended collection and transport conditions to reduce contamination and optimize yield</td>
<td>Selective suppression of results for tests on panel if other testing approach used in the laboratory (eg, C. difficile testing on stool pathogen panel) Text interpreting results discussing colonization</td>
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</tr>
<tr>
<td>Forms of automation</td>
<td>Clinical decision support requiring documentation of symptoms Hard stops for contraindications—eg, laxative use within 48 h of C difficile test</td>
<td>Recording site and method of collection Orders requiring supplementary tests—eg, urinalysis before urine culture</td>
<td>Laboratory support systems performing cascades of tests</td>
<td>Prepopulated reports that can be reviewed and modified by laboratory personnel</td>
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<tr>
<td>Clinician education</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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Abbreviations: PNA-FISH, peptide nucleic acid–fluorescence in situ hybridization; MALDI-TOF, matrix-assisted laser desorption/ionization time-of-flight.
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- What do perioperative antibiotic prophylaxis and Joe Schmidt have in common?
Perspective

Opportunities for system level improvement in antibiotic use across the surgical pathway

E. Charani\textsuperscript{a,*}, R. Ahmad\textsuperscript{a}, C. Tarrant\textsuperscript{b}, G. Birgand\textsuperscript{a}, A. Leather\textsuperscript{c}, M. Mendelson\textsuperscript{d}, S.R. Moonesinghe\textsuperscript{e}, N. Sevdalis\textsuperscript{f}, S. Singh\textsuperscript{g}, A. Holmes\textsuperscript{a}

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\textsuperscript{b} Department of Health Sciences, University of Leicester, Centre for Medicine, Leicester, UK
\textsuperscript{c} King’s Centre for Global Health & Health Partnerships, Division of Health & Social Care Research, Faculty of Life Sciences & Medicine, King’s College London, UK
\textsuperscript{d} Division of Infectious Diseases and HIV Medicine, Department of Medicine, University of Cape Town, Groote Schuur Hospital Observatory, Cape Town, South Africa
\textsuperscript{e} Centre for Anaesthesia Critical Care and Pain Medicine, University College London Hospitals, London, UK
\textsuperscript{f} Centre for Implementation Science, Institute of Psychiatry, King's College London, Denmark Hill, UK
\textsuperscript{g} School of Medicine, Amrita University, Tamilnadu, Kochi, India
Key Points

• Optimising antibiotic prescribing across the surgical pathway is key to tackling important drivers of antimicrobial resistance (AMR)
• Evidence from around the world indicates that antibiotics for surgical prophylaxis are administered ineffectively, or are extended for an inappropriate duration of time postoperatively
• Much of the scientific research in infection management in surgery is related to infection prevention and control in the operating room
• The surgical pathway has many actors, steps, and actions, specifically related to infection management and antibiotic use
• There is a lack of clarity around responsibility for antibiotic prescribing in surgery
• Interventions in surgery should target the specific behavior determinants and they should be developed in closer collaboration with surgical leaders
<table>
<thead>
<tr>
<th>Gaps in practice that potentially impact infection management and antibiotic prescribing</th>
<th>The surgical pathway</th>
<th>Postoperative period</th>
<th>Follow-up care (primary/social/home) and surveillance</th>
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<tbody>
<tr>
<td>Lack of clarity on whose responsibility it is to decide on the choice, dose, and timing of antibiotic prophylaxis</td>
<td>Gaps in the diagnosis and management of hospital-acquired infections in the postoperative patient</td>
<td>Follow-up care:</td>
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<td>Lack of clear understanding of the influence of culture and team dynamics \cite{Tchuan et al., 2015} on the implementation of the surgical checklists, e.g., WHO checklist Operating room design issues, e.g., thoroughfare, airflow disruption, or poor temperature control, or poorly designed surfaces</td>
<td>Lack of leadership in antibiotic decision-making</td>
<td>Community follow-up of care in the postoperative period to ensure patient recovery</td>
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<tr>
<td>LMIC-specific: lack of equipment to avoid infection, lack of access to antibiotics</td>
<td>Lack of knowledge on the influence of culture and team dynamics on antibiotic prescribing decisions in surgery</td>
<td>Surveillance:</td>
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<td></td>
<td>LMIC-specific: lack of access to antibiotics</td>
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<td>Impact on clinical processes and patient outcomes</td>
<td>Inappropriate antibiotic prophylaxis resulting in increased risk of SSIs</td>
<td>Inappropriate management of hospital-acquired infections in the postoperative patient, including prolonged duration of antibiotic therapy</td>
<td>No system for linking SSI outcomes to antibiotic prescribing behaviours before, during, and after surgery</td>
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<tr>
<td>Ineffective environmental precautions to prevent HCAIs</td>
<td>Lack of postoperative critical care training leading to over-diagnosis of sepsis in the postoperative period</td>
<td>Lack of adherence to SSI programmes</td>
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<td>Opportunities for change</td>
<td>Simple solutions such as:</td>
<td>Provision of education and training at post-graduate level</td>
<td>Developing a co-ordinated package of follow-up care in the community</td>
</tr>
<tr>
<td>Clarity on roles and responsibilities for antibiotic prophylaxis in the operating room</td>
<td>Provision of national and local guidelines for antibiotic prescribing in surgery</td>
<td>Building on existing surveillance and developing new surveillance systems using a pragmatic approach, e.g., National Surgical Quality Improvement Programme (USA) or using mobile phone-based surveillance (LMIC)</td>
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<td>Monitoring operating room traffic and airflow to improve the operating room environment and prevent infections</td>
<td>Inclusion of and engagement with surgical teams in antibiotic stewardship interventions</td>
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<td>Organizational support and leadership in implementing the changes</td>
<td>Developing better routes of access to antibiotics</td>
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<td>Across the entire pathway</td>
<td>A greater understanding of the influence of culture and context on antibiotic prescribing behaviours</td>
<td>Developing context-specific antimicrobial stewardship interventions</td>
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<tr>
<td></td>
<td>Development of context-specific antimicrobial stewardship interventions</td>
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WHO, World Health Organization; LMIC, low- and middle-income countries; SSI, surgical site infection; HCAI, healthcare-associated infection.
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• Assuming we are all reasonably healthy adults, what proportion of the participants in this webinar are likely to currently have bacteriuria?
“Urinary Tract Infection”—Requiem for a Heavyweight

Thomas E. Finucane, MD

From the Johns Hopkins Bayview Medical Center, Baltimore, Maryland.
Address correspondence to: Thomas E. Finucane, MD, Johns Hopkins Bayview Medical Center, 5200 Eastern Ave., MFL-C, Suite 2200, Baltimore, MD 21224. E-mail: tfinucan@jhmi.edu
DOI: 10.1111/jgs.14907
Key points

• “Significant bacteriuria”
  – Central to most definitions of “UTI”
    • Little significance in identifying individuals who will benefit from treatment

• “Urinary symptoms”
  – Similarly uninformative
    • Treatment benefit often minimal

• Recognition of urinary microbiome
  – Everyone has bacteruria (and viruria)!

• “Urinary Tract Dysbiosis”
Key points

• “I think this patient has a UTI”
  – Often means “I want to give this patient antibiotics”
• Decision to treat “UTI” often based on cognitive error
  – WYSIATI: “What you see is all there is”
    • e.g. infection can cause delirium ➔ “UTI” is an infection ➔ standard bacteriuria is a “UTI” ➔ antibiotic treatment for standard bacteriuria should help resolve delirium ➔ delirium frequently does resolve with treatment
• Choose to ignore
  1. Bacteriuria is present in all individuals, with or without delirium
  2. Delirium and bacteriuria can each resolve spontaneously
Next webinar:
Tuesday 20\textsuperscript{th} February @ 16:00
AMS Insight Monthly Antimicrobial Stewardship Webinar

AMS Insight is an annual seminar on antimicrobial stewardship, which draws together multi-disciplinary participants from around Ireland and features presentations from national and international experts in the field. HPSC, in collaboration with the AMS Insight team, presents a monthly antimicrobial stewardship (AMS) webinar. The webinars are usually held on the second Tuesday of each month from 16:00 to 17:00 (the date may vary for some months, to allow for public holidays etc.) and are open to anyone interested in ensuring the rational and effective use of antimicrobials. Each month has a featured topic/presentation on a particular aspect of AMS.

In addition to the featured topic/presentation, webinars may include other components such as literature reviews, Q&A sessions, stewardship “intervention of the month”, etc. The webinars are delivered via the WebEx platform, which supports interactive participation for anyone joining the webinar, via a “chatbox”, real-time polls, interactive graphics, etc.

You can stay informed of upcoming webinars and other events by following us on Twitter @AMSInsight.

Upcoming Webinars:

January 2018

Featured Topic: “That was the year that was” (highlights from 2017 AMS literature)

Speaker: Rob Cunney, HPSC

Date/Time: Tuesday 16th January, 16:00 – 17:00

1. Pre register at: https://hse-ie.webex.com/hse-ie/onstage/g.php?MTID=e49156917e0c17677af3a8666b9e336a7

Event number: 840 650 681

Event password: JOINUP

2. Click “Register”.

3. On the registration form, enter your information and then click “Submit”.

You will receive a confirmation email message with instructions on how to join the event. Please ensure on the day of the webinar to log in a few minutes before the start time. Sound is better accessed through your phone and a phone number can be accessed on joining, but sound can be broadcast through your computer too.

Previous Webinar Slide Sets

November 2017: “CURB Your Enthusiasm” (Eoghan O’Neill and Bernie Love, Connolly Hospital)

December 2017: “Brewing Up a Little Storm” (Alay Oza, HPSC)