SPRING MEETING 2014

Antimicrobial stewardship in human and animal health

Thursday 20 March
Royal College of Physicians, London

Programme & abstracts
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Public Health England and the Department of Health, London, United Kingdom

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2 Environmental Health Department, Forest of Dean District Council, Coleford, GL16 8HG

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b School of Pharmacy, University College Cork, Ireland

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1 Darent Valley Hospital, Dartford, United Kingdom; 2 University General Hospital of Athens, Athens, Greece; 6 Charité Hospital – Medical University Berlin, Berlin, Germany; 7 Hospital Edmundo Vasconcelos, São Paulo, Brazil; 8 General Hospital Of Athens “Evangelismos”; Athens, Greece; 9 Novartis Healthcare Pvt. Ltd., Hyderabad, India; 10 Novartis Pharma AG, Basel, Switzerland

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2 Clinical Microbiology and Public Health Laboratory, PHE, Cambridge, UK
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University Hospital of North Durham, County Durham and Darlington NHS Foundation Trust

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Department of Infectious Diseases, University Hospital of North Staffordshire (UHNS)

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2 Infection, Imperial College Healthcare NHS Trust and the National Centre for Infection Prevention and Management imperial College London, London, United Kingdom.
3 Microbiology, Darent Valley Hospital Dartford and Gravesham NHS Trust, Dartford Kent, United Kingdom.

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2 Microbiology, Darent Valley Hospital Dartford and Gravesham NHS Trust, Dartford Kent, United Kingdom.
3 Haematology, Darent Valley Hospital Dartford and Gravesham NHS Trust, Dartford Kent, United Kingdom.

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AJ Smith*, College of Medical, Veterinary and Life Sciences, University of Glasgow.
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Dept. of Medical Microbiology, Waterford Regional Hospital, Republic of Ireland

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Christopher Tang*, Corinna Smith*, Varsha Kadaba*, Eitan Brizman*
*: co-authors
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Williams A, Vanstone G, Balakrishnan I.
Royal Free London NHS Foundation Trust, London
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0945 Welcome & introductory remarks

SESSION ONE: Antimicrobial Stewardship in human and animal health
Chair: Dr Nick Brown, Cambridge

1000 What is antimicrobial stewardship? The current landscape
Professor Peter Davey, Dundee

1020 The future landscape – are we interpreting stewardship correctly and what could we do differently?
Dr David Jenkins, Leicester

1040 Antimicrobial stewardship in veterinary medicine
Mr Peter Jones, Immediate Past President, British Veterinary Association

1100 Coffee and poster viewing

SESSION TWO: Free Papers
Chair: Dr Mike Cooper, Wolverhampton

1130 A Community Outbreak of New Delhi Metallo-beta-lactamase-1 (NDM-1) Escherichia coli in Scotland: Implications for Antimicrobial Stewardship
Dr Nigel Calvert, Dumfries

1140 A qualitative approach to explore motivations for antimicrobial prescribing by veterinary surgeons in UK pig practice
Miss Lucy Coyne, Liverpool

1150 The development and evaluation of a peer education workshop for school aged children on hygiene and the prevention of infection
Dr Vicki Young, Gloucester

1200 Development of the first national antimicrobial prescribing and stewardship competences
Dr Diane Ashiru-Oredope, London

1210 High-throughput sequencing to monitor faecal effluents for antimicrobial resistance
Mr Will Rowe, Cambridge

1220 Q&A
1230  AGM / LUNCH & POSTER VIEWING

SESSION THREE: The Garrod Lecture
Chair: Dr Nick Brown, Cambridge

1400  The Garrod Lecture 2014:
Antimicrobial Susceptibility Testing – are we heading towards global standardisation?
Professor Gunnar Kahlmeter, Sweden

SESSION FOUR: Innovation in Technology and Social Science
Chair: Professor Peter Davey, Dundee

1445  Inflammatory and other surrogate markers in assessing bacterial infections and aiding prescribing decisions
Professor Stephan Harbarth, Geneva

1510  No action about us without us – importance of driving professional behaviour change in successfully implementing new technologies and stewardship strategies
Professor Susan Michie, Health Psychologist, UCL, London

1535  Closing remarks

1545  Meeting close
Development of the first national antimicrobial prescribing and stewardship competences
Ashiru-Oredope D, Cookson B, Fry C, Hopkins S, on behalf of the Department of Health ARHAI Professional Education Subgroup and the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR)
Public Health England and the Department of Health, London, United Kingdom

The clinical, public health and economic implications of antimicrobial resistance (AMR) pose a significant threat to future healthcare delivery.

Antimicrobial stewardship (AMS) is essential for the prevention and control of antimicrobial resistance. The ultimate goal of any AMS programme is to improve patient safety and outcomes and should aim to promote the appropriate use of antimicrobials, reduce AMR and decrease the spread of infections caused by drug-resistant organisms, especially multiply-resistant strains (1). Educating the public and clinicians in the prudent use of antimicrobials as part of an AMS programme is of paramount importance to preserve these crucial treatments and to help control AMR. Improving surveillance, and infection prevention and control are other key strategies (2,3) and are often embedded into AMS strategies.

Using current available evidence, regulatory documents and national antimicrobial stewardship guidance for primary and secondary care, five dimensions for Antimicrobial Prescribing and Stewardship competences were developed in England (4), through an independent multi-professional group led by the Department of Health’s (England) Advisory Committee on Antimicrobial Resistance and Healthcare Associated infection and Public Health England. There were also representatives of the three other devolved administrations (table 1)

The competences are designed to complement the United Kingdom’s National Institute for Health and Care Excellence National Prescribing Centre’s (NPC) Generic competency framework for all prescribers which are relevant to any independent prescriber, doctor, dentist or non-medical practitioner (5).

The Competency Framework:
Each of the five dimensions includes statements which describe the activity and outcomes which prescribers should be able to demonstrate. The five dimensions comprise:
1) Infection prevention and control – all independent prescribers must understand the principles and demonstrate competence in preventing and controlling infections.(5 statements)
2) Antimicrobial resistance and antimicrobials – including modes of action and spectrum of activities of antimicrobials and the mechanisms of resistance. (6 statements)
3) Prescribing antimicrobials – including the key elements in prescribing appropriate antimicrobial agents for prophylaxis and treatment (8 statements)
4) Antimicrobial stewardship – demonstrating an understanding and including antimicrobial stewardship in day to day practice. (8 statements)
5) Monitoring and learning – all independent prescribes must demonstrate continuing professional development in antimicrobial prescribing and stewardship. (4 statements)

We believe these are the first antimicrobial prescribing and stewardship competences to be developed world-wide and their implementation will be an important contribution to the delivery of the UK 5 year Antimicrobial Resistance Strategy (6).

The new national body ESPAUR (English Surveillance Programme for Antimicrobial Utilisation and Resistance) has an important role to help facilitate the implementation of these competences.

Table 1
Multi-professional body/organisations led by ARHAI involved in the development and consensus of statements:
• Department of Health
• Department of Health’s Expert Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infections (ARHAI)
• Health Protection Agency (now Public Health England)
• Scottish Antimicrobial Prescribing Group (SAPG)
• The British Society for Antimicrobial Therapy (BSAC)
• Wales Emeritus Professor (Cardiff)
• Public Health Wales
• Northern Ireland
• Infection Prevention Society (IPS)
• Royal College of Physicians (RCP)
• Faculty of General Dental Practice (FGDP)
• Royal College of General Practitioners (RCGP)
• Royal College of Nursing (RCN)
• Royal College of Surgeons (RCS)
• Royal Pharmaceutical Society (RPS)
• Royal College of Paediatrics and Child Health (RCPCH)
• Intensive Care Society (ICS)
• Society of Chiropodists and Podiatrists (SCP)
• British Infection Association (BIA)
• Chartered Society of Physiotherapists (CSP)
• National Prescribing Centre (NPC: in April 2011 the NPC integrated into the National Institute for Health and Clinical Excellence (NICE) as the Medicines and Prescribing Centre)
A Community Outbreak of New Delhi Metallo-beta-lactamase-1 (NDM-1) Escherichia coli in Scotland: Implications for Antimicrobial Stewardship

Calvert N(1), Batchelor L(2), Connor M(2), Murray J(1), Ross E(2), Whelan A(1).
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Introduction
This submission reports on the investigation of an outbreak of 3 cases of Urinary Tract Infection caused by New Delhi Metallo-beta-lactamase-1 (NDM-1) Escherichia coli in the community. There have been 12 Scottish isolates of this organism since 2007, mostly associated with acute settings, so the occurrence of three community infections in a small geographical area is of public health significance.

Statement of methods
All cases were identified by the local clinical diagnostic laboratory, which had implemented testing of urine samples by E. coli species PCR in 2013. Upon the samples being positive for E. coli NDM-1, typing of isolates was carried out by the Public Health England Antibiotic Resistance Monitoring & Reference Laboratory (ARMRL) in Colindale. Surveillance was increased in the local laboratory, and prompt dispatch of suspicious isolates to the reference laboratory was arranged. Final reporting from Colindale concluded that isolates showed a very high degree of similarity but were not identical. This is likely to be due to the mutative nature of E. coli NDM-1.

The outbreak itself was investigated using standard epidemiological methods. Since no specific questionnaire was available for community outbreaks, a new form was developed based on the existing Public Health England acute questionnaire.

Surveillance of catheter urine specimens for E. coli NDM-1 was continued for a period of several weeks after the outbreak was identified but no further isolates were obtained.

Summary of the results obtained
Some links between cases were discovered. A locum doctor may have been the route by which the organism was introduced into the area and transmitted to the index case was identified. In addition, there was a strong epidemiological link between two cases involving a local dental surgery. It seemed probable that there had been environmental contamination and as part of the control measures, a deep clean – using a standard protocol – was organised.

Specific conclusions
- It is unusual to have a community cluster of this rare organism in small area. There have been cases in North West England and this may represent the spread of the problem into Scotland
- We have suggested a plausible hypothesis for this outbreak.
- Attendance at dental surgeries and similar community healthcare facilities may be an under-recognised route for the spread of infections such as these.
- Continued surveillance efforts are important across Scotland, and the UK as a whole
- Antibiotic stewardship in clinical practice is vital in limiting the spread of these highly resistant organisms
- Regulation of the use of antibiotics in agriculture should be considered as this may be an important factor in the development of resistant organisms
- In recent decades, pharmaceutical companies have not been as active in developing novel antibiotics. Initiatives which promote the development of new classes of antibiotics should be implemented across the UK and internationally.

A qualitative approach to explore motivations for antimicrobial prescribing by veterinary surgeons in UK pig practice.

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Increasing levels of antimicrobial resistance in human and veterinary medicine have raised concerns over the issue of overprescribing and the indiscriminate use of antimicrobials. With a limited number of novel antibiotics becoming available there is a great need to maintain efficacy through promoting prudent prescribing practices. Their use in food producing animals is under scrutiny due to the treatment and prophylaxis of large numbers of animals, and the perceived risk from the zoonotic transfer of resistant pathogens from animals to humans. In the UK, the greatest amount of single species antimicrobial products sold for use in farm animals are for pigs; the majority of these products are for administration through medicated feedstuffs.

Qualitative research methods have been used increasingly in human medicine to investigate prescribing behaviours. This study used focus groups and in-depth interviews to explore the drivers and motivators behind prescribing patterns in veterinary surgeons in pig practice in the UK.

A series of two focus groups were completed. The first consisted of four participants in a region of moderate pig density, whilst the second consisted of five participants in a region of high pig density. The themes defined from the focus groups were explored in more depth using semi-structured interviews. A purposively selected sample of twenty one veterinary
surgeons was interviewed. The sampling aimed to incorporate individuals from different areas of pig density, mixed species and specialist pig practices, both junior and senior veterinary surgeons with a distribution of age and gender.

Thematic analysis of transcripts of the focus groups and in-depth interviews revealed eight common themes including ‘agricultural factors’, ‘drug-related factors’, ‘disease epidemiology and outcomes’, ‘responsibility’, ‘economic factors’, ‘external pressures’, ‘vet-client relationship’ and ‘knowledge base’ that were considered to influence prescribing behaviour most commonly, whereas ‘agricultural factors’, relating to housing, and the management of systems, were the deliberated more commonly through the interviews.

The focus groups elicited the motivations and behaviours behind prescribing practices within a group discussion setting and provided a framework for gaining further detailed insight across a wider population of pig veterinary surgeons.

Gaining in-depth insight and understanding into the influences behind prescribing decisions can identify behaviours associated with over or inappropriate use. Such qualitative studies have been used in human medicine to identify potential interventions and assess their efficacy on promoting prudent use. It is hoped that by understanding prescribing practices in veterinary medicine better, similar interventions may be developed to promote the judicious use of antimicrobials.

High-throughput sequencing to monitor faecal effluents for antimicrobial resistance
Rowe, W. Baker-Austin, C. Verner-Jeffreys, D. Ryan, J. Maskell, D. Pearce, G.
University of Cambridge, UK.

Objectives
Here we report the results of a pilot study demonstrating the suitability of a high-throughput sequencing approach to monitoring farm and nosocomial wastewater effluents for the release of antimicrobial resistance genes (ARGs) and pathogenic bacteria into the environment.

Metagenomics and metatranscriptomics were used to determine the diversity, relative abundance and expression of ARGs in the bacterial communities present in faecal effluents entering the aquatic environment. Antimicrobial usage data was used to correlate with ARG abundance.

Methods
Farm faecal effluents were collected from the slurry lagoon of a 400-cow dairy farm, prior to the effluents being distributed on neighbouring fields as agricultural fertiliser. Nosocomial wastewater effluent was collected from a 1,180-bed city hospital. Grab sampling was used to collect 10L of effluent from the two drains serving the wards of the hospital. Vacuum filtration through a pre-filter was used to remove debris and then the filtrate was re-filtered through 0.22μm membranes to capture the bacterial cells. The bacterial cells were then lysed, RNA and DNA was extracted and used to generate Illumina sequencing libraries, which were then sequenced on an Illumina HiSeq2500.

A novel bioinformatics pipeline was used to analyse the sequencing data. In brief, the pipeline cleaned the sequencing data, clustered reads to a custom ARG database and then mapped read clusters to the reference sequence for each cluster. The pipeline output generated ARG annotations, consensus sequences and relative abundance of annotated ARGs. Relative abundance of ARGs and corresponding transcripts were correlated with antimicrobial usage data.

Results
ARGs were identified in both faecal effluents. At the most stringent annotation settings (100% mapping coverage), only 1 ARG (tetW) was identified in the animal faecal effluent compared to 18 in the nosocomial faecal effluent (conferring resistance to beta-lactams, fluoroquinolones, glycopeptides, macrolides, phenicol, rifamycin, sulphonamides and tetracyclines). The most abundant ARG in the nosocomial effluent was the beta-lactam resistance gene blaGES, accounting for 26% of the total ARGs found. Other ARGs of clinical significance, such as blaOXA, blaVIM and the quinolone ARG aac(6’)-Ib-cr, were found at high relative abundance in the nosocomial sample. There was a significant correlation between the relative abundance of total ARGs and (i) the presence of corresponding transcripts found in the nosocomial effluent ($r^2 = 0.940$, $p < 0.001$) and (ii) the relative amount of each class of antimicrobial used in the hospital environment ($r^2 = 0.876$, $p < 0.001$). Also, there was a significant correlation between the relative abundance of transcripts and the antimicrobial usage ($r^2 = 0.919$, $p < 0.001$).

Conclusion
This pilot study demonstrated that nosocomial and animal faecal effluents contribute to the environmental resistome and the degree of expression of ARGs in these effluents may be a result of selection pressures from antimicrobial usage. The work described here and on-going experimental work demonstrates the use of high-throughput sequencing in monitoring the environmental release of ARGs as a viable approach that can be utilised in coordinated antimicrobial stewardship programmes.
The development and evaluation of a peer education workshop for school aged children on hygiene and the prevention of infection

Young, Vicki L 1, Lecky, Donna M 1, Fettis, Dennis2, Pritchard, Beth 2, Hawking, Meredith KD 1 and McNulty, Cliodna AM 1.
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Peer education is becoming an increasingly popular and trusted method for health education initiatives, in which both the 'educators' and the 'students' gain from the experience. Students feel that their peers can be a trusted and credible source of information, whilst the peer educator gains in terms of knowledge, skills, attitudes and confidence. Public Health England, in collaboration with the Environmental Health Department has piloted one such peer education initiative in Gloucestershire. Year 8 students were trained to deliver to their peers a science road show consisting of five stands, including one on prudent antibiotic use. Groups of three to five peer educators were trained on one of the five stands and given a take-home information booklet.

Peer educators expressed concern that antibiotic awareness was a particularly difficult topic, as they had received no previous education on the subject. During the intervention, however, it was evident that they adapted the suggested delivery of the materials to suit their own style and understanding, resulting in a successful, fun stand. The pilot was well received not only by the students but also by the school as a whole.

This initiative is currently being taken forward as a joint research project between Public Health England and the Environmental Health Department, and is partially funded by the BSAC. Following completion of the research phase, the initiative will be rolled out to all national Environmental Health Departments for delivery to schools in September 2014.

Poster abstracts

Are we dosing gentamicin and vancomycin appropriately?
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Introduction:
In recent years, the dosing of gentamicin and vancomycin has evolved to larger doses given less frequently of the former, and weight-based dosing at defined intervals of the latter1,2. In both instances, the regimen is adjusted for impaired renal function with consideration of the infection site, pathogen susceptibility and patient-specific factors2,3.

Aim/Objective:
This study aimed to assess the dosing of gentamicin and vancomycin at St. James's Hospital (SJH), in particular appropriateness of; (1) the initial dose prescribed, (2) time to therapeutic concentration (vancomycin) and (3) the serum drug level concentrations.

Methodology:
The study was observational and prospective in design. Inpatients on twelve wards, commenced on gentamicin or vancomycin therapy during the study period were included in the study. Each course of therapy was reviewed for appropriateness based on local guidelines of the initial dose prescribed, serum drug concentration results and the clinical management of serum drug concentrations outside the acceptable range.

Results:
For courses of gentamicin, the initial dose prescribed was appropriate for 84.0% (21/25) of courses and serum trough concentrations were within the acceptable range in 94.1% (32/34) of serum samples. For courses of vancomycin, the initial dose prescribed was appropriate for 30.2% (13/43) of courses and serum trough concentrations were within the acceptable range in 50.0% (76/152) of serum samples. Non-consideration of renal impairment and patient weight accounted for inappropriate initial doses of vancomycin. Therapeutic target concentrations were attained in 74.4% (32/43) of courses within seven days of vancomycin treatment initiation. 11.6% (5/43) of courses did not become therapeutic at any stage throughout therapy.

Conclusion:
While there is appropriate dosing of gentamicin at SJH, initial dosing and time to therapeutic concentration of vancomycin are sub-optimal. This issue is being addressed by a quality improvement plan by the hospital’s Antimicrobial Stewardship Committee with planned re-audit.
Are the appropriate staff group performing serum sampling for Therapeutic Drug Monitoring of gentamicin and vancomycin?
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Introduction:
Dose optimisation of gentamicin and vancomycin, utilising Therapeutic Drug Monitoring (TDM) has been shown to decrease toxicity and improve outcome and is standard practice in many institutions1. There is evidence that the practice of drug monitoring is beset with problems including inappropriate serum level requests and incorrect timing of serum sampling2-4. To our knowledge however, there are no published studies on the category of healthcare professional best placed to perform TDM of antimicrobials such as gentamicin and vancomycin.

Aim/Objective:
The study aimed to audit the process of TDM of gentamicin and vancomycin at St. James’s Hospital, in particular the appropriateness of; (1) timing of serum sampling and (2) timing of serum sampling by staff group.

Methodology:
The study was observational and prospective in design. Twelve ward areas were selected to include a distribution of all three staff groups currently performing serum sampling (phlebotomy, nursing and medical staff) and patients commenced on gentamicin or vancomycin therapy during the study period comprised the study population. Serum drug levels were reviewed for appropriateness of timing based on local guidelines, and the staff group involved in taking the level was noted. A chi-squared test was used to test for significance between staff groups. A p value < 0.05 was considered statistically significant.

Results:
For courses of gentamicin, the timing of sampling was appropriate for 76.5% (26/34) of samples. For courses of vancomycin, the timing of sampling was appropriate for 57.9% (88/152) of samples. Serum samples taken by nursing or medical staff were significantly (p <0.05) more accurately timed than those taken by phlebotomists.

Conclusion:
Based on the results of this audit, it is clear that nursing staff are best placed to perform dose-dependent or time-dependent serum sampling. A quality improvement plan addressing accuracy of sample timing through process review and re-engineering is in place with planned re-audit.

Antibiotic Prescribing Practices in Take Home Medications
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Very little data has been published regarding antibiotic prescribing practices for patients leaving hospital and completing their course of treatment at home. In this study we reviewed the take home prescriptions issued from a major Welsh teaching hospital and looked at the frequency, range and duration of antibiotics which were prescribed in order to assess current practice. After an initial pilot study, covering a single day in December 2012, the scope of the study was extended. In this extended study all take home prescriptions were reviewed on five consecutive days of five consecutive weeks in July and August 2013. Both the pilot and the larger studies showed approximately 30% of all patients left the hospital with at least one antibiotic item and that Co-amoxiclav was the most frequently prescribed antimicrobial. In the larger study 224 out of 738 prescriptions contained one or more antibiotic (30.4%) and 101 patients went home with Co-amoxiclav, which accounted for 38.4 % (101/263) of all antibiotic items on take home prescriptions. One finding of concern was that the duration of Co-amoxiclav treatment did not appear to account for treatment received in hospital with most patients leaving hospital with either five or seven days supply. By tightening practice there appears to be scope to reduce the duration of antibiotics prescribed in take home prescriptions with the potential benefit of reducing both drug expenditure and improving antimicrobial stewardship.

Audit: The use of screening for ESBL and multi-resistant strains at University Hospital of North Staffordshire (UHNS)
Authors: Dr B Arnold, Dr R Tunnell, Dr K Banavathi
Audit conducted at The University Hopsital of North Staffordshire (UHNS)

With hospitals becoming a growing environment for multi-resistant bacteriae, the potential threat from these when not treated appropriately is life-threatening.

UHNS medical guidelines clearly state criteria to identify high-risk patients that need to be screened for multi-resistant strains on admission to hospital, thus allowing early treatment and isolation of those colonizing these strains.

A route cause analysis at UHNS identified that a patient that died of sepsicaemia from a Carbapenem resistant strain had met criteria for screening on admission, however this was not done. This patient had been in hospital for three weeks prior to diagnosis, being exposed to over 30 patients during his journey, putting them at risk too.

Continued...
The decision was made to educate all departments on the necessity and potential threat of multi-resistant strains, so as to prevent this from happening again.

After the education of nursing staff an audit was carried out of the screening of patients admitted. The aim being to identify whether or not 100% of those patients meeting criteria were being screened on admission, and if there was still deficit, which departments were lacking in consistency.

Data was collected on a retrospective basis, looking at all of the patients admitted to an acute elderly male ward; whether they met criteria for screening, and whether they were screened on admission.

Results showed that one third of patients meeting the criteria for screening were being missed.

With this being a significant deficit putting patients at risk, discussions with the trust’s Infection Prevention and Control team concluded that urgent action had to be taken. Further education of nursing staff would be vital to improve consistency. Further discussions with the microbiology team will be taking place to see whether it may become appropriate to screen all patients on admission to hospital, as with MRSA screening.

Antimicrobial Stewardship: Developing an English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR)

Ashiru-Oredope D, Hopkins S & the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR)
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Antimicrobial resistance (AMR) is a major personal and public health issue that poses a significant threat to future healthcare delivery. Infections due to selected multidrug-resistant bacteria in the region result in extra healthcare costs and productivity losses of at least €1.5 billion each year.

In England, antimicrobial stewardship measures, including national initiatives and regulatory frameworks, as well as local hospital and primary care programmes, have been developed over the past several years. These aim to improve the quality of prescribing through behavioural change by encouraging prescribers to adopt antimicrobial stewardship initiatives, including following local policies and restricting their use of certain antibiotics.

Understanding local, regional and national variation in antimicrobial prescribing is essential for assessing the impact of interventions to change prescribing behaviour. Prescribing data need to be linked to antimicrobial resistance data and patient outcomes to ensure that both positive and negative potential outcomes are evaluated. Until 2013 no national programme in England brought elements of antimicrobial resistance and utilisation together across the healthcare economy.

In response to the threat posed by AMR, as highlighted in the Report of the Chief Medical Officer and on the request of the Department of Health, Public Health England developed a new national programme, the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) in 2013. The oversight group for this programme convened in July 2013 (Figure 1) and is professionally led by PHE, with the membership comprising a range of relevant stakeholders from the NHS (including primary, secondary and mental health trusts) and national and professional bodies. Members are drawn from a range of fields, interested organizations and professional bodies who have expertise or interest in antimicrobial stewardship, epidemiology and data capture and analysis.

The aim of the ESPAUR is to develop and maintain robust data information and surveillance/monitoring systems to measure antimicrobial utilisation and resistance in England and its impact on antimicrobial resistance and patient/public safety. ESPAUR will also collaborate with other key stakeholders on the development of quality measures and methods to monitor unintended outcomes of antimicrobial stewardship and both public and professional behaviour interventions.

The objectives of the ESPAUR will focus on delivering objectives within the UK Five-Year Antimicrobial Resistance Strategy.

With the development of the ESPAUR Programme in England, PHE aims to measure the consequences of policy and guidance interventions through a cohesive surveillance programme on antimicrobial utilisation and AMR across the healthcare economy at a local, regional and national level. The ultimate aim is to improve patient safety not only today but for the foreseeable future.

Figure 1.Key stakeholders represented on the membership of the oversight group of the ESPAUR.
• Public Health England
• Department of Health
• NHS England
• Department of Health Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infections (ARHAI)
• Health and Social Care Information Centre
• IMS Health
• Rx-info Ltd (software provider for pharmacy in secondary and primary care)
• British Society for Antimicrobial Chemotherapy
• UK Clinical Pharmacy Association: Infection Management Group
• Care Quality Commission
• National Institute for Health and Care Excellence Medicines and Prescribing Group
• British National Formulary
• Pharmaceutical Adviser’s Group
• Frontline secondary care Chief Pharmacist and Community Pharmacist via the Royal Pharmaceutical Society
• Royal College of Nurse, Physicians, General Practitioners and Surgeons
Inhibitors of plasmid-mediated antibiotic-resistance selected medicinal sources
Blessing Mbaebie, Paul Stapleton and Simon Gibbons
Department of Pharmaceutical and Biological Chemistry, UCL School of Pharmacy, London.

In a project to identify natural product bacterial resistance modifying agents, we have shown that rottlerin (1), natural cannabinoids and some natural alkaloids inhibited bacterial conjugal transfer of resistance genes on E. coli-bearing plasmids PKM101 and TP114 which confer kanamycin- and amoxicillin-resistance. The compounds were isolated using bioactivity-guided isolation by monitoring a decrease in plasmid transfer. The frequencies of transfer of plasmids to the transconjugants in the presence of extract ranged from 7.29 x 10^{-5} to 1.04 x 10^{-2} cfu/mL for PKM101, and 5.71 x 10^{-4} to 7.05 x 10^{-2} cfu/mL for the TP114 transconjugants per donor strain. Starting premating population of the recipient E. coli was 6.8 x 10^{7} cfu/mL and donors were 11.5 x 10^{7} and 1.40 x 10^{7} cfu/mL for TP114 and PKM101 respectively. There was moderate to high levels of inhibition of the plasmids from the donor to recipients and our observations suggest the potentials of chemical agents from natural source that could be responsible for the marked decline in plasmid transfer.

QASI – measuring the quality of antimicrobial prescribing, not just the quantity
Bruce, R Berrington, A
City Hospitals Sunderland NHS Trust, UK

The importance of antimicrobial stewardship is well documented in publications from the Department of Health Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI)1 and the UK Five Year Antimicrobial Resistance strategy.2 The aim of antimicrobial stewardship is to ensure prudent prescribing and reduce the risk of antibiotic resistance from inappropriate prescribing.

Antimicrobial use is traditionally measured quantitatively, for instance using the hospital consumption metric ‘Defined Daily Doses per 1000 bed days’. However there is little evidence that consumption data correlate with stewardship outcomes in hospitals nor that data can reliably be used to compare organisations. Accordingly, although we are able to generate comprehensive quantitative data from our Electronic Prescribing system, we also wanted to progress to measuring the quality of antimicrobial prescribing.

The antimicrobial stewardship team developed and implemented an enhanced audit tool, the Quality of Antimicrobial Stewardship Index (QASI). A numeric score of up to 10 points is assigned to an antimicrobial course, capturing information about the decision-making processes at initiation, individual components of the course and evidence of review. An important principle of this tool is the definition of a course, being defined as a period of antimicrobial treatment given for the same clinical problem, no matter how many changes are made during the course. The tool also incorporates an assessment of clinical review both routinely and when there are opportunities to de-escalate. Points are removed if opportunities are deemed to have been missed.

QASI was piloted then improved by the antimicrobial stewardship team and has been used on wards escalated to High Impact Intervention (HII) because of concerns over C. difficile infection. This proved a useful way of assessing the quality of antimicrobial prescribing in areas deemed high risk. Assigning a numeric score improves understanding when providing feedback to the medical team and allows comparison between different wards or time periods. Feedback has been well received as it is done in a non-judgemental way and encourages education on issues raised by the audit to the junior medical team.

The advantage of QASI is that it yields insights about prescribing that do not emerge from more quantitative analysis. Current prescribing trends or themes can be detected at the time of auditing. Limitations to the audit tool are that it is time consuming to complete, and that some of the components audited involve a subjective rather than objective decision by the auditor.

Future plans are to extend the use of the QASI tool Trustwide and to validate its use so that it can act as a performance indicator.

A retrospective study on the investigation and management of Staphylococcus aureus bacteraemia in a DGH.
Dabrowski H, Clegg A, Satta G
North Middlesex University Hospital

Staphylococcus aureus bacteraemia (SAB) remains an important infection due to a high mortality rate of 29% coupled with a high prevalence, with approximately 9000 UK cases annually. There is a clinical consensus on investigation and management but this remains poorly followed. We performed a retrospective observational study from March 2011-Oct...
Of 80 with SAB we collected 50 complete data sets. Of these 50, 35 (70%) were female and the mean age was 67 (range 18-94). 42 (84%) had predictors for complicated disease with 35 (70%) being community acquired, 14 (28%) having pyrexia at 48hrs post anti-staphylococcal treatment and 4 (8%) having positive repeat blood cultures, though disappointingly only 17 (34%) had repeat cultures. 25 underwent transthoracic echocardiography (5 went on to have transoesophageal echocardiography) with 4 demonstrating evidence of vegetations. Of those with predictors of complicated disease only 23 had echocardiography. 12 (24%) had bone imaging of which 3 had evidence of osteomyelitis. Of those with predictors of complicated disease only 11 had bone imaging. 8 patients isolated MRSA and interestingly 4 of these were hospital acquired. 14 (28%) had long lines in-situ of which 10 were removed as likely sources. Of 6 with deep sources amenable to surgery, 3 were drained, 1 transferred and 2 treated with antibiotics alone. A primary source was identified in 42 (11 skin/soft tissue, 9 CVC, 5 native valve endocarditis, 4 septic arthritis, 3 urinary, 3 abdo/pelvic, 3 PVC, 2 respiratory, 1 ENT, 1 osteomyelitis). 3 had secondary sources (2 osteomyelitis, 1 lung abscess). 70% had predisposing co-morbidities (immunosuppression (28%), diabetes (50%), IVDU (4%)). 12 had a contraindication to flucloxacinil (4 allergy, 8 MRSA) but disappointingly only 25 (65%) received flucloxacinil first line. Of those with MRSA only 5 were treated with a glycopeptide first line. Excluding patients transferred the mean IV duration treatment 15 days (range 0-42); the mean for total antibiotic therapy was 20 days (2-60). 11 died during their admission with 9 transferred, 2 self-discharged and 1 discharge to a hospice. We had a 3-month mortality of 34%.

Given the trend towards higher mortality in those without a clear source it is disappointing that only a small number of our patients underwent echocardiography and bone imaging. This coupled with the high percentage of our patients with predictors of complicated disease would suggest missed complications of metastatic spread. The poor use of flucloxacinil first line is a cause for concern and may be reflected in our higher than average mortality rates. We have found that despite clinical consensus investigation and management remained varied and suggests the need for further clinical guidance.

Daptomycin treatment in a large cohort of patients with surgical-site and other wound infections: results from the EU-CORESM registry
Armando Gonzalez-Ruiz 1, K Malizos 2, M Allen 3, G Dogan 4, P Gargalianos-Kakolyris 5, P Dohmen 6, A Timerman 7, A Skoutelis 8, R Pathan 9, A Tylesinski 10 on behalf of the EU-CORESM study group 10
1 Darent Valley Hospital, Dartford, United Kingdom; 2 University General Hospital of Larissa, Larissa, Greece; 3 Novartis Pharmaceuticals UK Limited, Surrey, United Kingdom; 4 Herz- und Diabetesszentrum NRW, Bad Oeynhausen, Germany; 5 “G. Gennimatas” General Hospital of Athens, Athens, Greece; 6 Charité Hospital – Medical University Berlin, Berlin, Germany; 7 Hospital Edmundo Vasconcelos, São Paulo, Brazil; 8 General Hospital Of Athens “Evangelismos”; Athens, Greece; 9 Novartis Healthcare Pvt. Ltd., Hyderabad, India; 10 Novartis Pharma AG, Basel, Switzerland

Objectives: Surgical site infections (SSIs) and non-surgical wound infections generally involve Gram-positive pathogens and are a leading cause of decreased hospital stay and increased mortality. This accentuates the need for rapidly-acting therapies providing resolution of infection. Daptomycin, a rapidly bactericidal agent against Gram-positive pathogens, has proven efficacy in patients with complicated skin and soft tissue infections. Here we report results from the European Cubicin® Outcome Registry and Experience (EU-CORESM) in patients with SSIs and non-surgical wound infections.

Methods: Data were collected from EU-CORESM, a retrospective, non-interventional, multicentre registry. This study included patients with SSIs (superficial incisional, deep incisional, organ/space) and non-surgical wound infections, who received at least one dose of daptomycin between January 2006 and April 2012. Clinical outcomes assessed at the end of therapy were success (sum of cured and improved), failure or non-evaluable. Safety was assessed up to 30 days after termination of daptomycin therapy.

Results: Of 5551 patients enrolled, 972 (63% male; 43% aged ≥65 years) patients were identified with wound infections including superficial incisional SSIs (22%), deep incisional SSIs (27%), organ/space SSIs (13%) and non-surgical wound infections (38%). 85% patients had significant underlying diseases, most commonly cardiovascular disease (53%) and diabetes mellitus (23%). Chest (27%) and lower extremity (21%) were the most common sites of infection. Culture results were available for 82% of patients, of which the most frequently reported pathogen was Staphylococcus aureus (35%), 62% being methicillin-resistant. 64% patients received daptomycin as empirical therapy before culture results were available, and 68% patients as second-line therapy. 39% patients received an initial dose of daptomycin 6 mg/kg, 35% received 4 mg/kg and 6% received >6 mg/kg. Median duration of therapy was 10 days (range: 10-210). 67% of patients received concomitant antibiotics (most frequently carbapenem (25%), fluoroquinolone (14%) and penicillin (12%)). Overall clinical success was achieved in 83% of patients (40% cure; 43% improved). Success rates by depth of infection were: 89% superficial incisional, 83% deep incisional, 77% organ/space and 82% other wounds. Daptomycin was generally well tolerated. Adverse events (AEs) and serious AEs, possibly related to daptomycin, were reported in 2% (including 2 cases of blood creatine phosphokinase elevation) and 1% patients, respectively.

Conclusion: 6 year results from the EU-CORESM registry support the efficacy and generally favourable safety profile of daptomycin in surgical and non-surgical wound infections.

Study funded by Novartis Pharma AG.
Improving access to guidelines: a baseline survey for developing a mobile platform
Dyar, OJ; Pulcini, C; Harbarth, S; Howard, P; Stålsby-Lundborg, C; Nathwani, D

Objectives
We are developing a platform for prescribers to access local antimicrobial guidelines on mobile devices, alongside additional prescribing support. Fourteen UK trusts accepted an invitation to participate in the pilot in 2014. Here we present the results of a baseline survey conducted at these pilot sites to investigate current guideline formats and their accessibility.

Methods
A 15-item questionnaire was developed in consultation with a panel of experts in infectious diseases, public health and antibiotic guidelines. Each pilot site antimicrobial team was invited to participate by email, with reminders sent after one week. Participation was voluntary and without compensation.

Results
All 14 invited pilot teams completed the questionnaire. The most common guideline formats currently used at the pilot sites were quick reference cards, and web pages or pdfs accessible on the local intranet, with four sites maintaining four or more different guideline formats. In all but two sites prescribers were actively informed when updates were made to guidelines, through email communications, educational sessions and updated physical copies of guidelines.

The pilot teams mentioned several problems with current guidelines, such as challenges to access (difficulty locating computers, slow to navigate to the appropriate guideline, restricted access for community prescribers) and ensuring that all prescribers were using up to date versions of guidance. Nine out of the fourteen sites did not provide a calculator for gentamicin or vancomycin dosing.

Twelve of the fourteen pilot sites did not actively monitor guideline access or usage, beyond identifying levels of appropriate prescribing in point prevalence surveys. The antimicrobial teams intended for the new platform to be used by a broad range of individuals, including hospital doctors, pharmacists, prescribers in primary care and medical students.

Conclusions
We have identified areas of current guideline formatting and methods of access that our mobile platform will be able to improve upon. The pilot teams intend for the platform to be used widely amongst current prescribers, and will be able to access data on guideline use that is not currently captured at most sites.

Antifungal drug prescribing in patients requiring intensive (ICU) and high-dependency (HDU) care
Authors: AF Talento* D. Collins, T. Ryan, TR Rogers
St. James’s Hospital, Dublin, Ireland

Background:
Patients receiving intensive and high-dependency care are at risk of invasive fungal disease (IFD). The implementation of evidence-based policies for antifungal use in this group of patients for antifungal use is hampered by non-specific signs and symptoms and inadequate sensitivity of available diagnostic tests.

Objectives
1. To review and assess the appropriateness of antifungal prescribing in the ICU and HDU of St. James’s Hospital.
2. To assess alignment to published international evidenced based guidelines.

Methods:
Two prospective audits on antifungal prescribing were carried out at the intensive and high-dependency care units of St. James’s Hospital on October 2012 and 2013 using an audit proforma. The different antifungal treatment strategies namely prophylaxis, empiric, pre-emptive and targeted were defined by the authors based on published evidence prior to the first audit. When applicable, the EORTC/MSG 2008 guidelines were used to define IFD. All patients receiving antifungal therapy in ICU and HDU were included. The following data were collected: patients’ demographics including risk factors for IFD; fungal disease characteristics; antifungal therapy including the decision maker, indication, dose, duration; and patient’s outcome. The results of the audit conducted in October 2012 were presented to the intensive care physicians and the clinical microbiology team and criteria for initiating antifungal therapy were proposed to both teams. Measures to promote antifungal stewardship were implemented. A re-audit was carried out using the same proforma in October 2013. Data on antifungal consumption expressed in daily defined doses per 100 bed day use (DDD/100 BDUs) and total costs for both years were collected.

Results:
Twenty seven and 24 patients were prescribed antifungal therapy in October 2012 and October 2013 respectively. In October 2012, 17 (17/27, 63%) patients were prescribed antifungal therapy within 24 hours of ICU/HDU admission compared to 8 (8/24, 33%) in October 2013. Overall, empiric therapy was the most common indication for initiating antifungal therapy in both time periods. Anidulafungin was the most frequently prescribed antifungal agent. Fluconazole was prescribed more frequently during the re-audit than in the first audit. We noted a decrease in total antifungal consumption and costs in 2013 compared with 2012.

Conclusion:
Antifungal stewardship must be emphasised in patients requiring intensive and high-dependency care. Implementing measures such as developing criteria for initiating antifungal therapy, daily review of continuing indication for antifungal agents and de-escalation when feasible can lead to a decrease in antifungal use in critical care patients.
An audit of Antimicrobial Stewardship compliance with national and local recommendations for antimicrobial prescribing
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Heatherwood and Wexham Park Hospitals NHS Foundations Trust, Slough.

Objectives
In November 2011 the Department of Health released the guidance "Antimicrobial stewardship: Start smart - then focus”, in order to provide an outline of evidence-based Antimicrobial Stewardship (AS) recommendations in hospitals. The purpose of this study is to assess the appropriateness of that prescribing and to make recommendations for the optimisation of local antimicrobial prescribing.

Methods
Standards assessed were as follows: Documentation of the indication or provisional diagnosis and the duration/review dates of antimicrobials at the time of prescribing, compliance with local guidance on choice of antimicrobials and antimicrobial prescription appropriateness. Information was obtained through fortnightly Point Prevalence Surveys (PPS) on antimicrobial prescriptions on all wards of our Trust from April 2012 to April 2013. PPS data collection was based on inspection of clinical notes and prescription drug charts. Antimicrobial prescription appropriateness was assessed by twice weekly multidisciplinary Antimicrobial Management Team (AMT) rounds which followed defined criteria.

Results
A total of 2,273 antimicrobial prescriptions across 17 wards were reviewed by PPS. Clinical indication and duration/review date were documented on 49.2% and 80.6% drug charts, respectively, with only one ward scoring above 85% in both. A total of 558 patients' across 17 wards were reviewed by the AMT. Overall compliance with local guidelines in the choice of antimicrobial was 91%. However, 62% of the antimicrobial prescriptions were considered appropriate and 38% were considered inappropriate. The main reasons for inappropriateness were unnecessary prolonged duration, lack of compliance with local guidance and no clinical need for antimicrobials.

Continued...
Burkholderia multivorans in ICU patients: antibiotic profile and possibilities of the treatment
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Introduction:
Strains of Burkholderia cepacia complex (Bcc) are intrinsically resistant, opportunistic pathogens known mainly in cystic fibrosis (CF) patients in which they cause a life threatening necrotizing pneumonia. In our previous studies we demonstrated that Burkholderia multivorans (which also belonged to Bcc) is also a dangerous pathogen for non-CF patients hospitalized in ICUs which can lead to death due to hospital acquired pneumonia (HAP). These strains were also considered to be highly transmissible, with local outbreaks evident in different hospitals. Historically there is no evidence base for the effective treatment of these strains due to absence of relevant data about their resistance profiles and breakpoints.

The aim of this study was to describe the antibiotic profiles of Burkholderia multivorans strains obtained from non-CF patients and try to establish tentative epidemiological cut-off (ECOFF) values for antibiotics potentially useful for treatment of HAP.

Methods:
In total 207 strains of Burkholderia multivorans deposited in our collection were tested against eleven antibiotics (co-trimoxazole, ciprofl oxacin, ofl oxacin, piperacillin, piperacillin/tazobactam, cefotaxime, ceftazidime, cefepime, meropenem, tigecycline and tetracycline) and 185 strains to aztreonam. All strains were well genetically characterised and their similarity was defined by PFGE. Using the broth microdilution method the minimum inhibitory concentration (MIC) of each drug was determined as well as MIC50 and MIC90. By visual examination of range of MICs tentative ECOFF values were proposed for antibiotics where non-wild type (NWT) strains appeared.

Results:
Antibiotics with the lowest MIC90 were piperacillin/tazobactam and tigecycline (1mg/L both). The highest were for co-trimoxazole (16mg/L) and cefepime, meropenem and tetracycline (8mg/L each). Tigecycline also showed the narrowest range of MICs. Differences of MIC values within groups of genetically similar strains, were observed in a group of ST439 strains. Tentative ECOFF values for six antibiotics were established.

Conclusion:
In this study the large group of Burkholderia multivorans strains were tested and tentative ECOFFs for six antibiotics were established. Diversity of MIC values within genetically similar strains is negligible except for ST439 strains, which were found to be the strains with the highest mortality in non-CF patients. The most effective antibiotics for treatment of HAP due to Burkholderia multivorans strains were piperacillin/tazobactam or tigecycline, although tigecycline is not currently licensed for treatment of HAP. These results have not been published yet.
not always finish their full course. Factors contributing to taking antibiotics for respiratory tract infections included: antibiotics are seen as a ‘cure all’ amongst their peer group and there is an associated belief that antibiotics are required to treat these illnesses. Also, antibiotics are easily accessible to young adults, and there is low knowledge about the difference between antibiotics and painkillers, and the difference between viral and bacterial infections. The barriers to prescription adherence included: low awareness of antibiotic resistance and the consequences of non-adherence, forgetting to take their antibiotics when symptoms reduced, experiencing side effects, and difficulties with taste and swallowing tablets.

Conclusions:
The results will be used to inform the development of an appropriate educational resource for young adults, using the social marketing framework to facilitate sustained behavioural change, to help contain antimicrobial resistance for themselves and future generations.

Systematic analysis of funding awarded for antimicrobial resistance research to institutions in the UK, 1997–2010
Head MG*, Fitchett JR, Cooke MK, Wurie FB, Atun R, Hayward AC, Holmes A, Johnson AP, Woodford N.
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Objectives
To assess the level of research funding awarded to UK institutions specifically for antimicrobial resistance-related research and how closely the topics funded relate to the clinical and public health burden of resistance.

Methods
Databases and web sites were systematically searched for information on how infectious disease research studies were funded for the period 1997–2010. Studies specifically related to antimicrobial resistance, including bacteriology, virology, mycology and parasitology research, were identified and categorized in terms of funding by pathogen and disease and by a research and development value chain describing the type of science. Funding from public and philanthropic organisations was included. Private sector investments were not available for similar detailed analysis.

Results
The overall dataset included 6165 studies receiving a total investment of £2.6 billion, of which £102 million was directed towards antimicrobial resistance research (5.5% of total studies, 3.9% of total spend). Of 337 resistance-related projects, 175 studies focused on bacteriology (40.2% of total resistance-related spending), 42 focused on antiviral resistance (17.2% of funding) and 51 focused on parasitology (27.4% of funding). Pre-clinical research received £58.0 million across 191 studies, Phase I-III studies received £1.2 million across 3 studies, product development research received £4.2 million across 20 studies, and implementation and operational research received £38.6 million across 123 studies. Mean annual funding ranged from £1.9 million in 1997 to £22.1 million in 2009.

Conclusions
Despite the fact that the emergence of antimicrobial resistance threatens our future ability to treat many infections, the proportion of the UK infectious disease research spend targeting this important area is small, though there is also a clear data gap with the exclusion of industry investment and other private sector funding. It is also difficult to assess associations with other areas of research that are not directly related to resistance, but which nonetheless have an impact, e.g. preventative measures such as vaccine development. However, notwithstanding these limitations, the study highlights the dearth of research in this general area. There are more recently encouraging signs of increased investment, and national and global political leadership, but it is important that this is sustained and targeted at areas of projected greatest burden (such action could and should have been implemented years ago). This is a global problem and requires global solutions. Two areas of particular concern requiring more investment are tuberculosis and multidrug-resistant Gram-negative bacteria. Surveillance systems in low and middle income countries also require strengthening to allow early identification of emerging strains. Smarter prescribing of antibiotics should be implemented. A proactive approach should be taken to disease areas of high burden but currently little resistance, e.g. mycology.

Monitoring meropenem prescribing using electronic tools without electronic prescribing.
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Introduction:
The Department of Health 5 year Antimicrobial Resistance Strategy (2013) summarises the direction in which the UK should be heading in terms of reducing the risk that antimicrobial resistance poses to our healthcare economy. This, together with the ‘Start Smart then Focus’ document (2011), makes it clear that monitoring antibiotic prescribing and consumption is viewed as a key part of antimicrobial stewardship. Carbapenems in particular are vital antibiotics that need to be conserved in the era of increasing antibiotic resistance. Electronic prescribing (EP) provides a relatively simple way to track the prescribing of these agents, yet many trusts in England do not have EP. We describe the approaches we have taken to monitor and track our meropenem consumption, using simple electronic tools that are likely to be available to the majority of antimicrobial stewardship teams.

Methods:
We developed an automated alerting system using Crystal Reports to alert our antimicrobial stewardship team when meropenem was dispensed. We were then able to review the microbiology patient records to ascertain if the antibiotic had been recommended by microbiology. Cases where approval was not apparent were then reviewed in more detail by a member of the antimicrobial stewardship team to determine the appropriateness of the prescription, taking into account microbiology results and clinical diagnosis.

Continued...
A Snapshot of Antimicrobial Knowledge Among Junior Doctors
Kanani, S; Malik, N; ElHag, N
Southend University Hospital NHS Foundation Trust

Current antibiotic prescribing knowledge among junior doctors can be difficult to determine. An antibiotic quiz was designed with the purpose of identifying lapses in knowledge and areas needing further education. A twenty question quiz was designed by the microbiology team at Southend University Hospital with a mixture of true-false and multiple choice questions. This was then sent out via email to all junior doctors at the hospital and also placed at the tabling event for Antibiotic Awareness Day. A deadline of three weeks was granted for the quiz to be completed with an incentive prize of three £50 Amazon vouchers to those with the most correct answers.

Twenty junior doctors responded and their responses analysed with an average score of 15.2 ± 2.3 (average ± standard deviation). Respondents were found to have good knowledge of general prescribing practices (e.g. reviewing IV antibiotics daily, documenting the indication for antibiotics, when to take vancomycin serum levels etc.) and appropriate prescribing in clinical scenarios (e.g. not always treating anaerobes and Pseudomonas isolated from leg ulcers, ‘strong’ urine not being an indication for antibiotic treatment etc.). On further analysis, their background microbial knowledge was deemed adequate for their level of training and day-to-day job requirements. However, two areas of improvement were identified. Firstly, one-quarter of respondents (25%) marked the statement ‘IV vancomycin can be used to treat Clostridium difficile’ as ‘true’. Hence further awareness is needed about the treatment of C. difficile. Secondly, in identifying penicillin-related antibiotics, less than half of respondents selected cephalosporins and meropenem and only one respondent was able to correctly quantify the risk of allergic reaction in giving cephalosporins to patients allergic to penicillin. Hence further education is needed about penicillin-related antibiotics and the risk of cross-allergy with cephalosporins.

Based on these findings, three key areas have been identified for improvement for re-audit: improving response rate for future quizzes, increasing awareness of C. difficile treatment, and education about penicillin-related antibiotics and the risk of cross-allergy. Response rate could be improved with more time for advertising beforehand, increasing the scope and number of prizes, and giving out quizzes at grand round and other departmental teaching for juniors to complete. Education regarding C. difficile treatment and penicillin-related antibiotics should be incorporated into induction teaching as well as regular junior doctor teaching sessions taking place weekly. Finally, the penicillin traffic light system can be put up in the form of posters in treatment rooms and printed in the form of stickers for juniors to attach to the back of ID cards for quick reference.

This audit provided a snapshot picture of the current antimicrobial awareness amongst junior doctors. With these recommendations implemented, the lapse of knowledge identified by this audit quiz can be remedied with the aim of further yearly quizzes improving current practice to a greater extent.

The Role of Positive Blood Cultures In Patient Management
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Over 7000 sets of blood cultures (BCs) are analysed at Southend University Hospital every year. Three problems were identified with current practice: BC reporting procedures of positive results back to the clinical team by microbiology staff were thought to be time-consuming and not evidence-based, BC request forms were found to be filled inaccurately and hence not useful to staff, and a recent suspicion of high contamination rates with concern raised about doctors being primarily responsible.

Hence the aim of this audit was threefold: to assess whether current BC reporting procedures impact patient management, evaluate if blood culture requests are fit-for-purpose, and investigate contamination rates to identify areas of improvement.
Data was collected prospectively on all sets of blood cultures flagged up positive per patient episode within a four week period. A change of management was retrospectively defined as telephone advice recommending starting or changing antibiotics, further investigations, a clinical review to look for a potential source, provisional advice if the patient deteriorates, or specifying duration of antibiotic treatment.

Fifty-six total BC sets were analysed with a change in management advised in 47% (N=26) of cases when reported back to the clinical team. There were no significant differences in whether patient management was impacted based on gram stain, isolated organism or whether the team was informed at the time of the initial gram stain result or when the organism was later identified. In BC request forms, a potential source was only mentioned in 39% (N=22), with 7% (N=4) containing inappropriate details. Only 23% (N=13) of BC requests included a named antibiotic, and from these, none specified whether this was the current or intended medication. Out of all pathogens isolated (N=60), one-quarter (N=15) were found to be contaminants, all of which were coagulase-negative Staphylococci. There were no differences between A&E and ward contamination rates per blood culture sets taken. Medical emergency assistants (MEAs) were responsible for taking the majority of BCs compared to other staff (N=39 vs. N=17). However, doctors were found to have a higher contamination rate compared to MEAs (50% vs. 18%).

A change of management was advised in nearly half of all BCs flagged up positive, with no identifiable factors in terms of gram stain, organism and time of reporting. Hence current BC reporting procedures were deemed evidence based with no identifiable factors to reduce time spent on this task. BC requesting procedures are currently inadequate and not fit-for-purpose. Modifying the criteria of information needed for requesting BCs over the computerised system would ensure useful clinical details are given with accurate antibiotic information. Finally, the BC contamination rate acquired in this study show an increase compared to the previous year (25% in 2013 vs. 19% in 2012) and doctors were found to have a disproportionately high contamination rates, although further study is needed to prove the validity of this due to low sample size and to determine possible underlying reasons.

Evaluation of the effectiveness of a series of videos shown in GP surgery waiting rooms on patient awareness of prudent antibiotic use.

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Background:
High rates of antimicrobial prescribing in children, combined with widespread misunderstanding among the general public about appropriate use of antibiotics is a major cause for concern. There is little evidence that the traditional poster based campaigns used in isolation are effective therefore it may be concluded that for campaigns to be truly successful, a focussed multi-channel approach be adopted. Taking this into consideration a series of videos on prudent antibiotic use were developed to be displayed in GP surgeries via the Life Channel network. This pilot study aimed to evaluate the effectiveness of these videos in GP surgery waiting rooms on patient awareness of prudent antibiotic use.

Objectives:
1. To determine if patients recall the key messages from the life channel animal videos
2. To determine if patient’s attitude to antibiotics use has changed as a result of seeing the videos

Methods:
A pilot questionnaire was tested on a small focus group of four individuals and modified accordingly. It was assumed that video screening in all surgeries was repeated every 20minutes. 9 surgeries in the Birmingham area fell under the following selection criteria:
- Showing the life channel videos
- Patient population ≥ 6,000
- DMI score ≥ 40.1% to include social classes C, D and E.

These surgeries were placed in a random order and approached by Life Channel until 3 surgeries agreed to participate. Each surgery was visited during normal working hours until 130 questionnaires were completed by people who recalled seeing the videos. Where appropriate, patients self-completed the questionnaires.

Results:
3119 patients in total were observed in 3 surgeries during the research visits. 145 of these patients (4.6%) who appeared to be watching the videos were approached to take part in the study. Of these 132 (4.2% of the total 3119 patients observed) actually remembered seeing the video and completed the questionnaires. Almost 60% of respondents stated that watching the video would positively change their attitude (make them less likely) towards seeing a GP for coughs and colds or asking the GP for themselves. Less than 30% however stated that watching the video would positively change their attitude (make them less likely) towards seeing a GP for coughs and colds or asking the GP when it came to their children.

Conclusions:
This research is limited as this was a pilot study carried out in 3 surgeries in 1 region, Life Channel controlled when the videos were aired and the videos were evaluated in isolation to other patient resources on prudent antibiotic use. Previous research highlighted that individuals have a higher awareness of prudent antibiotic use when exposed to two or more interventions and that multifaceted campaigns repeated over several years have greatest effect. Future research should consider carrying out a full evaluation in other GP surgeries combined with other patient facing materials.
Risk of Acute Kidney Injury associated with gentamicin surgical prophylaxis
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In 2008 Scottish Government issued a new target to reduce Clostridium difficile infection by 30% in three years. Consequently Scottish hospitals restricted antibiotics with high risk for Clostridium difficile and changed from cephalosporins to gentamicin for surgical antibiotic prophylaxis. In response to physicians’ concerns regarding increasing rates of postoperative acute kidney injury (AKI), this study aimed to examine postoperative AKI before and after the use of gentamicin in surgical prophylaxis.

The study population was all adults undergoing surgery with antibiotic prophylaxis (orthopaedics, urology, vascular, gastrointestinal and gynaecology) between the 1st October 2006 and 30th September 2010. Post-operative AKI was defined by the Kidney Disease Improving Global Outcomes criteria. Study design was an interrupted time series with segmented regression analysis.

12,482 patients were included in the study. In orthopaedic patients, change in policy was associated with a 94% increase in AKI (p=0.04, 95% CI 93.8-94.3%). The antibiotic policy change was not associated with significant increase in AKI in any of the other groups. Rates of postoperative AKI in vascular surgery were high at 24%, increased in gastrointestinal surgery steadily throughout the study period and could only be ascertained in 52% urology and 47% gynaecology patients due to lack of creatinine testing.

The change in antibiotic policy from cefuroxime to flucloxacillin (2 doses of 1g) and single dose gentamicin (4mg/kg) was associated with increased rates of AKI in patients undergoing orthopaedic surgery within the Tayside region of Scotland and so should be avoided in orthopaedic patients in the peri-operative period. Our findings also raise concerns about the increasing prevalence of postoperative AKI and of failures to consistently measure postoperative renal function.

European Antibiotic Awareness Day (EAAD) in Addenbrookes Hospital: An Antimicrobial Stewardship Quiz
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Introduction:
The CMO’s report on antimicrobial resistance1 (AMR) highlighted the importance of implementing antimicrobial stewardship strategies in healthcare settings as a key weapon to combat AMR. Every year, the European Union and Department of Health promotes European Antibiotic Awareness Day (EAAD) as an opportunity to highlight the need to use antimicrobials judiciously to healthcare professionals, patients and visitors.

Aim:
To design and launch a short quiz on key antimicrobial stewardship messages targeted at healthcare professionals.

Methods:
As part of the November 2013 EAAD activities, we designed a quiz with 15 true /false statements and invited all hospital staff to participate. We had a dedicated stand next to the staff canteen and members of the antimicrobial stewardship team also spoke to staff and distributed leaflets. The quiz was available both electronically via SurveyMonkey® and as printed copies, and was widely publicised (posters, hospital intranet and via emails). Reminders were issued weekly and the electronic link was active for 3 weeks. Participation was encouraged by offering high street shopping vouchers to the winners.

Results:
A total of 160 entries were received (158 electronic and 2 paper). Of these, 99 (62%) submissions attempted one or more questions but were incomplete. Only 61 (38%) completed all 15 questions and analysed further.

The largest proportion of respondents were nurses, (22/61; 36%), followed by doctors (16/61; 26%), pharmacists (12/61; 20%), pharmacy technicians (3/61; 5%) and others (physiotherapists; non-healthcare staff e.g. managers (8/61;13%).

All 61 respondents scored above 47%. The scoring range was divided into 3 parts: those scoring in the range: 47% to 67% amounted to 15/61 (25%), those in the middle range of 73% to 93% were the majority, with 32/61 (52%) and 14/61 (23%) scored 100%. Average scores obtained were: 92.7% for doctors, 91.3% for pharmacists and 72.7% for nurses.

The question which respondents tended to answer correctly was the statement: “An extended-spectrum β-lactamase (ESBL) producer is resistant to a number of antibiotics” (60/61; 98%) correctly said the statement was true. In contrast, the statement which individuals scored most poorly: “Vancomycin is used for treating Gram-negative infections and requires therapeutic drug-monitoring” (24/61; 39%) incorrectly said the statement was true.

Conclusion:
Using EAAD as a suitable platform, we describe an easily-adaptable and alternative method to standard educational strategies on antimicrobial stewardship. This method was found to engage healthcare staff on key issues concerning antimicrobial prescribing and stewardship.
Antimicrobial Stewardship: Does it really work? Yes I does!
University Hospital of North Durham, County Durham and Darlington NHS Foundation Trust

Introduction:
Antimicrobial Stewardship is a key component to reduce Healthcare Acquired Infections (HCAI) and many professional society guidelines describe strategies for achieving antimicrobial stewardship goals. In 2008, the Trust breached its upper threshold for both MRSA and C difficile and the organisation was under pressure to address HCAIs with several measures. Objectives: To set up and implement a Trust wide Antimicrobial Stewardship programme (ASP) with a view to optimising usage of antibiotics in our Trust and controlling broad spectrum use, thereby addressing HCAIs in our Trust.

Methods:
In 2009, County Durham and Darlington NHS Foundation Trust established an Antimicrobial Stewardship Programme (ASP) to address poor HCAI rates. With support from senior Executives, resources were allocated to employ a dedicated antibiotic pharmacist and Microbiologist to lead on this programme. We introduced an evidence based antibiotic formulary, restriction of Cephalosporins and Quinolones, intensive education and training, assurance framework of antibiotic audit with feedback and establishment of an Antimicrobial Management Team (AMT). There was a dedicated core team with clear commitment to the goals. Structures were established so that there was Trust wide engagement at all levels and clear lines of accountability. The AMT worked hand in hand with the Trust HCAI Reduction Group and had the responsibility to report to the Board.

Results:
Following introduction of the programme, rates of C difficile fell for three consecutive years in our Trust. Rolling programme of antibiotic audit indicated increasing compliance of choice of antibiotics in line with Trust formulary from 70% to > 90% and Stop/Review dates improved from 30% to 60%. There was engagement from all grades of medical and non medical prescribers and the intensive education and audit programme achieved a change in culture of prescribing. The total consumption of antibiotics was reduced as was use of broad spectrum agents like Cephalosporins and Quinolones. In 2012, following integration with Community Health Services, there were significant changes to the organisational structure. These changes posed several challenges to our ASP and led to fewer Antimicrobial initiatives. A slight increase in our C difficile rate in 2012 led to further review of our ASP. We introduced new initiatives including: Trust wide executive led antibiotic walk rounds, introduction of a new medication chart with a dedicated area to prescribe antimicrobials with built-in review dates, restrictions on the use of Co-amoxiclav, review of the Formulary and use of Fidaxomicin. Reinvigoration in the ASP has led to a reduction in the rate of C difficile in our Trust again as well as improvement in Stop/Review dates to greater than 90%.

Conclusions:
Our learning lesson is that ASP teams need to maintain focus, walk the extra mile to deliver sustained efforts in order to sustain stewardship goals.

Selective vs. Universal screening for Extended Spectrum Beta Lactamases (ESBL) in a tertiary hospital.
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Introduction & Objectives:
Rising antibiotic resistance and the decreasing effectiveness of antibiotics are currently threatening the global community. We aimed to compare selective screening for ESBL with universal screening in an Infectious Diseases (ID) Unit.

Patients & Methods:
This study was conducted during October and December 2013 in the Infectious Diseases ward of University Hospital of North Staffordshire. Data was collected on all patients admitted to the ID unit during Oct 2013 when hospital guidelines on ESBL screening were followed and in December 2013 when universal screening for ESBL was carried out. The hospital guidelines recommend ESBL screening in patients who were admitted with a long-term urinary catheter in situ, patients who have a history of ESBL or Multi- Gram negative bacilli (MGNB), patients who have had an overnight stay in any healthcare facility or care home in the last 12 months in UK or abroad and patients who have travelled outside Europe in the previous 12 months. Patients' data and results were collected from the hospital's electronic systems.

Results:
Fifty and fifty-eight patients were admitted in the Infectious Diseases ward during October and December 2013 respectively. During October 28/50 patients were screened for ESBL; one of these was found to be colonised with ESBL (2.0%). Out of the remaining twenty two patients, who were not screened, 10 (45%) fulfilled criteria for screening. All of these had a previous inpatient stay or an overnight admission within the last 12 months. During December all 58 admissions were screened for ESBL and 5 were positive (8.6%). Out of these, 3 had an inpatient stay, 1 was tagged previously ESBL positive and 1 did not have any identifiable risk factors.

There was no significant difference between the 2 groups in terms of number of positive ESBL screens. (chi squared test (p> 0.10).)

Conclusion:
1. Almost half the admissions to the ID unit in whom screening was indicated were not tested for ESBL.
2. There is a need for further education on the importance of ESBL screening.
3. A universal screening policy may be more effective at identification of patients colonised with ESBL. A further study with a larger sample size is planned to evaluate the impact of a universal screening policy.
Introduction and evaluation of the ‘candida score’ for adult critical care patients: a prospective, observational pilot cohort study
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Introduction and Objectives
Invasive candidiasis is a severe illness which is associated with a high mortality. Early diagnosis and appropriate prompt management of this condition remains a challenge due to diagnostic difficulties. One patient population this affects is critical care. A scoring system such as the ‘candida score’ has been developed by a Spanish group as a means of identifying high risk critical care patients that could benefit from empirical antifungal therapy. This scoring system to our knowledge has not been evaluated in the UK and a pilot study was carried out to evaluate its potential use including whether the score would lead to the over prescribing of antifungals which could have economic, medical and mycological implications.

Methods
A prospective observational cohort study was performed in the critical care unit at Darent Valley Hospital (DVH), UK from 1st October 2012 to 31st March 2013. All adult patients that remained in critical care for greater than 1 week were included and followed up until they were discharged or the study end date was reached. All included patients had a ‘candida score’ calculated at weekly intervals and were split into 2 groups ‘candida score’ positive and ‘candida score’ negative.

Results
Sixty five patients were included in the study. There were 39 (60%) patients in the negative ‘candida score’ group and 26 (40%) in the positive ‘candida score’ group. Candida spp. colonisation was detected in 9 (13.8%) patients. Only one case of invasive candidiasis, confirmed by blood culture, was detected with a positive ‘candida score’. Specificity of the ‘candida score’ in this study was 60.9% (95% CI 47.9-72.9). The potential excess cost for patients with a false positive ‘candida score’ was calculated as £22,499.25 based on empirical antifungal drug acquisition costs. Gender ratio, median critical care length of stay, proportion of medical patients, presence of co-morbidities and the number of patients with multifocal Candida colonisation and confirmed invasive candidiasis vary between the pilot study cohort and the original Spanish group’s study population.

Conclusion
We found the ‘candida score’ to not be specific enough to predict invasive candidiasis in critical care. The low specificity of the score could lead to an overuse of antifungal agents (and corresponding costs) if it was used to guide treatment. Further work is need in this area. As the mortality associated with invasive candidiasis correlates in part to the diagnostic difficulties and delayed therapy the main challenge that we have for the future is to develop better diagnostic methods. This would facilitate earlier diagnosis and would hopefully improve the prognosis of patients.

Prophylaxis and Treatment of Invasive Fungal Infections in Clinical Haematology
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Background
Invasive fungal infections (IFI) occur in high-risk patients with haematological malignancies e.g. patients with acute leukaemia receiving induction chemotherapy and cause substantial morbidity and mortality. The risk for IFI increases with the duration and severity of neutropenia, prolonged antimicrobial use and number of chemotherapy cycles. Interest in antifungal prophylaxis for high-risk patients receiving chemotherapy has been prompted by the rising incidence of life-threatening IFI amongst cancer patients, the difficulty in establishing the diagnosis early in the course of infection and the recognition that treatment outcome are poor, if initiation of therapy is delayed.

Aims & Objectives
- To audit current practice on antifungal prophylaxis and empirical antifungal treatment of suspected fungal infections in patients with haematological malignancies
- To develop a cost effective, evidence based diagnostic driven Trust wide guideline

Methodology
Analysis of retrospective data including all clinical haematology patients that have had treatment with posaconazole, caspofungin, voriconazole and Ambisome® from January to December 2011. Patients on fluconazole and itraconazole were excluded.

Results
Review of 24 patients with a mean age of 66 years and 17 patients with myeloid disorders. Posaconazole was used for secondary prophylaxis for an average of 89 days and there were 2 probable breakthrough fungal infections. Patients with breakthrough infections were not in remission. There were 29 episodes of antifungal treatment in 19 patients (average 2.4 episodes per month). Average duration of treatment was 12 days for Ambisome® and 12.5 days for voriconazole. Voriconazole was associated with higher proportion of drug intolerance mainly confusion and visual disturbances. CT scans were performed in 19/29 episodes with 11 scans with suspected fungal infection. Three patients had a BAL, 1...
Increasing bacterial resistance to antimicrobial drugs is a serious and growing health concern worldwide. Among Gram-negative bacteria, the most prominent causes of antibiotic resistance are the extended-spectrum beta-lactamase (ESBL) enzymes, which destroy beta-lactam rings of the most common beta-lactam antibiotics such as penicillins, cephalosporins and monobactams. CTX-M enzymes have become the most prevalent sub-class of ESBLs and to date more than 100 blaCTX-M gene variants have been identified. Traditional ESBL diagnostics rely strongly on conventional antimicrobial susceptibility testing which is time-consuming. In addition, using available ESBL detection tests Klebsiella oxytoca carrying the chromosomal K1 gene is often misinterpreted as ESBL producing due to expression of K1 genes and permeability changes. Thus rapid molecular tests would be of use. Our objective was to develop a sensitive real-time PCR assay for simultaneous detection of the majority of known CTX-M variants excluding the detection of the K1 gene in K. oxytoca.

Fully complementary CTX-M primers and probes were designed to detect at least 90% of the known CTX-M variants and not the K1 gene. Real-time detection of the PCR amplification products was based on state-of-the-art switchable lanthanide luminescence label technology, where one probe of a probe pair was conjugated at 3’ to a non-luminescent chelate carrying a lanthanide ion (Eu3+), and the other probe was conjugated at 5’ to a non-luminescent light harvesting antenna ligand molecule. The two probes of a probe pair were designed to hybridize adjacently to the PCR amplicon resulting in the assembly of a highly luminescent lanthanide complex. Performance of the assay was tested with bacterial DNA from patient samples (n=6) belonging to phylogenetic CTX-M subgroups 1, 2 and 9, and from K. oxytoca (n=3) and CTX-M negative Escherichia coli (n=1).

In this preliminary study the assay detected all the CTX-M variants. K. oxytoca and CTX-M negative Escherichia coli were classified as CTX-M negative. Detection limit of this assay was 10 genome copies with all the tested CTX-M variants. Due to the promising assay performance and simple closed-tube detection, the assay could be useful in CTX-M diagnostics in combination with suitable sample preparation method and easy-to-use test platform.

Putting antimicrobial stewardship in dentistry on the map
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Antimicrobial prescribing in dentistry represents a small but significant fraction (10% in Wales) of the total volume of antimicrobials prescribed in primary care, there is evidence of both over prescribing and inappropriate prescribing regimens (Roy et al BDJ 2000; Palmer et al 2000; Palmer et al JAC 2001). The Association of Clinical Oral Microbiologists proposes to use a bundle approach to improve prescribing patterns in dental practice in order to enhance patient care. The aim of this poster is to provide an overview of a new initiative to improve antimicrobial stewardship in dentistry. Working in collaboration with stakeholders such as the Faculty of General Dental Practitioners and BSAC, we are developing an antimicrobial stewardship bundle that comprises primary dental care and maxilla-facial surgery specific prescribing guidelines, undergraduate education programmes, collecting surveillance data on susceptibility patterns in oral and maxillo-facial infections in the UK, audit support and Social media campaigns. In conclusion, a multi-discipline consortium is assembling a Stewardship programme for improving antibiotic prescribing in dentistry, but this will require time for this strategy to impact on prescribing practice.
The Spread of CTX M types - ESBL Resistance and Change in Antibiotic Tactics
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Background:
There is increasing resistance to antibiotics used to treat infections due to Extended Spectrum Beta Lactamase (ESBL) producing Escherichia Coli. Genes conferring resistance are located on the bacterial plasmid and are spreading rapidly through the population. CTX-M types have been shown to be the most common causes of multidrug resistance in E.Coli from different areas of the world including the Indian Subcontinent.

Objectives:
To use a literature review to examine both the prevalence and patterns of spread of CTX M types in the areas of Shropshire and Birmingham; to use this to identify and predict gene movement through a population.

Methods:
The search was carried out on OVIDmedline using key terms (E.coli, CTX M, antibiotic resistance, ESBL), search was limited to the UK and papers from 2009 onwards. Two papers were compared, the first looked at the distribution of the ST 131 clone after an initial outbreak in Shropshire. Isolates from blood and urine cultures were taken from 13 laboratories in the West Midlands which underwent polymerase chain reaction (PCR) and high performance liquid chromatography (HPLC). Antibiotic resistance was identified using disc diffusion. The second paper was based in Birmingham, stool samples were cultured on chromogenic agar and underwent PCR and HPLC to establish genotype and prevalence within different ethnic communities (Middle East and South Asia, Africa and Europe).

Results:
In the West Midlands there was an 89% prevalence of CTX-M type among E.Coli. 82% of isolates were multidrug resistant including trimethoprim and ciprofl oxacin. The predominant clone was CTX M15. In Birmingham there was the highest carriage of CTX-M type (22.8% of subjects) in the Middle East and South Asian origin population group.

Conclusions:
CTX M 15 is the predominant clone in the West Midlands and has spread rapidly through the population. Movement of the genotype has links with travel to high prevalence areas. This is important for both antibiotic policy and predicting the spread of new genotypes such as New Delhi metallo-β-lactamase 1 (NDM-1).

Rapid Identification of Vancomycin-resistant Enterococcus (VRE) from Blood Culture using MALDI-TOF and targeted PCR assay.
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Objectives:
The incidence of VRE blood stream infections has been increasing steadily in Ireland for several years and is now the highest in Europe. Appropriate antimicrobial treatment can be delayed for days due to the time taken to identify the organism from blood culture and perform phenotypic sensitivity tests using standard laboratory methods.

We describe the experimental validation of a new algorithm for the rapid detection of VRE within 5 hours of the blood culture instrument flagging positive.

Methods:
44 blood cultures were spiked with 22 VRE and 20 vancomycin susceptible Enterococcus spp. Identification of the organism was performed using MALDI-TOF of light growth from a prewarmed Columbia Blood Agar plate after 4 to 6 hours incubation. PCR assay for Van A and B, using a sweep of growth from the same plate, was then performed. The GeneXpert VRE PCR assay has been validated for detection of Van A and B genes in rectal swabs for infection control screening purposes. We adapted this system to give early warning of the presence of resistance genes in Enterococcus spp identified from blood cultures.

Results:
Rapid MALDI-TOF identification demonstrated 93% sensitivity and specificity at 4 hours and 100% sensitivity and specificity at 6 hours. Results of PCR testing were compared to standard sensitivity testing methods and the overall sensitivity, specificity, positive predictive value and negative predictive value were: 100%, 75.8%, 75.9% and 100% respectively.

Conclusions:
There were 7 false positive results in this study, all due to the presence of Van B in Enterococcus faecium isolates that were phenotypically susceptible to glycopeptides. This observation is consistent with previously described high rates of false negative detection of Van B from rectal specimens. Despite this limitation the algorithm has a negative predictive value of 100% for VRE, which will help guide appropriate antimicrobial therapy prior to the availability of standardised sensitivity test results. By rapidly identifying Enterococcus spp likely to be sensitive to beta-lactams or glycopeptides the use of expensive novel antimicrobial agents with activity against VRE can be reduced.

Rapid detection of VRE direct from blood culture results in earlier institution of correct antimicrobial treatment, reduced patient costs and decreased length of inpatient stay. Crucially our algorithm uses flexible platforms and can be easily integrated into the laboratory workflow. By targeting the relatively expensive PCR testing only at significant blood stream isolates the unnecessary use of PCR can be avoided and costs contained. This algorithm has also been adapted to the rapid identification of MRSA from blood cultures.
An audit cycle investigating antibiotic prescription on two surgical wards in a London District General Hospital
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* co-authors
Audit performed at Barnet General Hospital

Background:
In recent years there have been increasing concerns surrounding the emergence of antibiotic resistant organisms and the development of antibiotic-associated infections, and therefore there is a need to optimise antibiotic prescription in hospitals. Central to this is the need to clearly document the indication and duration of antibiotic prescription, in order for appropriate use of antibiotic therapy. Indeed, both local Trust guidelines and guidelines issued by the Department of Health have stated the need for 100% documentation of indication and duration of therapy when prescribing antibiotics.

Objectives:
We investigated antibiotic prescriptions across two surgical wards in a London District General Hospital, and looked at whether documentation of the antibiotic indication and duration was noted on the patient drug chart.

Methods:
We analysed all the patient drug charts on two surgical wards over a five day period, noting whether antibiotic indication and duration were documented when antibiotics were prescribed. We presented our findings at a local surgical department meeting, which also served as a teaching session on good practice for antibiotic prescribing to the surgical staff. We also publicised the local Trust policies on antibiotic prescribing in the doctors' offices on both wards. We then re-audited over a second five day period using the same method as the first audit cycle, and again presented at a local surgical department clinical governance meeting.

Results from the first audit cycle showed very poor adherence to the Trust antibiotic prescription policy regarding documentation of both antibiotic indication and duration (see table above). Upon re-audit, we observed a marked increase in both indication (14% to 60%) and duration (6% to 37%) documentation. However, these results still fall short of the expected 100% documentation of both indication and duration.

Conclusion:
Our audit cycle has shown that initially there was a very poor adherence to Trust antibiotic prescribing. On re-audit, results indicated a dramatic improvement in both criteria, however these still do not meet the Trust standards. Feedback from juniors during presentation of the re-audit data suggested that they are sometimes lacking senior guidance regarding the rationale behind prescribing antibiotics, and we have addressed this by encouraging senior-led teaching during ward rounds.

We will aim to re-audit for a third cycle and then aim to extend the audit into other wards within the hospital.

Real-time PCR Assay for the Detection of Methicillin-Resistant Staphylococcus aureus Carrying mecA or mecC
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Methicillin-resistant Staphylococcus aureus (MRSA) is a continuing health concern worldwide. The mecA gene carried by MRSA confers the methicillin resistance. Recently, isolates of S. aureus have been discovered that carry a novel mecA variant mecC (mecALGA251) with only 70% nucleotide homology to the conventional mecA gene. Due to the sequence difference, the mecC variant may not be detected by the currently available molecular methods for MRSA. Efficient detection is a prerequisite for understanding the prevalence and significance of mecC-carrying S. aureus. Our aim was to develop a real-time PCR assay for the simultaneous detection of mecA and mecC MRSA.

PCR primer sequences were designed to allow the amplification of both mecA and mecC variants with the same primer pair. The real-time detection of the amplification products was based on state-of-the-art switchable lanthanide...
ion (Eu³⁺ or Tb³⁺), and the other probe at 5’ to a lanthanide-specific non-luminescent light harvesting antenna ligand molecule. The probes were designed to hybridize adjacent to the PCR amplicon resulting in the assembly of a highly luminescent lanthanide complex. The simultaneous identification of mecA and mecC targets was performed using variant-specific probes where Tb³⁺ indicated the presence of the mecA target and Eu³⁺ the mecC target.

Both mec variants were amplified efficiently and the probes produced variant-specific signals with no cross-reactivity. The limit of detection was 1 copy of MRSA genome for both variants.

The developed test enables simple closed-tube detection of MRSA strains carrying mecA or mecC. Both variants can be detected in one reaction, where specific signals for mecA and mecC are produced.

Direct Detection of carbapenemase-producing Enterobacteriaceae and Pseudomonas spp. from positive blood cultures.
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Objectives
The rapid detection of carbapenemase-producing Gram-negative bacteria from positive blood cultures is critical to implementing optimal antibiotic therapy and appropriate infection control procedures. Currently, detection is based on phenotypic methods that can take 72 hours to complete.

We evaluate two methods for the rapid detection of carbapenemase producing organisms direct from positive blood cultures. Check-Direct CPE [Check-Points] is a commercial multiplex real-time PCR for the simultaneous detection and differentiation of KPC, NDM, VIM and OXA-48 carbapenemases. Rapid CARB screen Diatabs [Rosco Diagnostica] rely on the direct detection of imipenem hydrolysis from bacterial extracts using a colorimetric indicator.

Methods
4 NCTC carbapenemase control strains (KPC n = 1, VIM n = 1, NDM-1 n = 1 and OXA-48 n = 1) and 14 characterised clinical carbapenemase-positive isolates (KPC n = 3, VIM n = 6, NDM n = 2 and OXA-48 n = 2 and IMP = 1) spiked into negative blood cultures were used to optimise conditions and evaluate for both assays.

The Check-Direct CPE assay was evaluated on the Rotorgene Q (using DNA extracted from 3 μl of spiked blood [BD GeneOhm Lysis Kit]) and the BD MAX (using on-board extraction). The PCR was run according to the manufacturer’s instructions on both platforms.

Rapid CARB Screen was performed on blood cultures spiked with all carbapenemase positive isolates and 15 AmpC and ESBL positive (carbapenemase negative) isolates initially following manufacturer’s guidelines, and subsequently using an enrichment subculture step.

Results
All KPC, VIM, NDM and OXA-48 isolates were detected directly from blood cultures in less than 3 hours on the RotorGene and BD MAX with a detection limit of 1 x 10⁵ cfu/ml. This is well below the cfu/ml at which blood cultures flag positive (approximately 1 x 10⁹ cfu/ml).

For the Rapid CARB screen assay, we found the manufacturer’s instructions to use bacteria direct from blood cultures gave indeterminate results. However, when bacterial cells from a two hour subculture of the blood culture in nutrient broth with imipenem were collected by centrifugation, washed in sterile water, and used as the starting material for the assay this method detected 18/18 carbapenemase producing strains, including 3/3 OXA-48 strains, which can be difficult to detect by phenotypic methods. No false-positive reactions were obtained when tested against ESBL or AmpC producing strains.

Conclusions
We demonstrate two robust and reliable mechanisms for the detection of carbapenemase-producing organisms direct from positive blood cultures.

The detection time of the carbapenemase producing isolates was reduced by >10 fold compared with standard methods. These simple and rapid techniques have the potential to dramatically improve patient outcome and facilitate rationalisation of both antibiotic use and infection control practices much earlier than currently possible.
For the treatment of complicated intra-abdominal infections (cIAI) and complicated skin and soft tissue infections (cSSTI) excluding diabetic foot infections

Tygacil should be used only in situations where it is known or suspected that other alternatives are not suitable

References:

Prescribing information can be found overleaf.
Abbreviated Prescribing Information

▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 of the SmPC for how to report adverse reactions. TYGACIL® (tigecycline). See Summary of Product Characteristics (SmPC) before Prescribing.

Presentation: Tygacil 50mg Powder for Solution for Infusion (powder for infusion). Each 5 ml Tygacil vial contains 50mg of tigecycline. After reconstitution, 1 ml contains 10mg of tigecycline.

Indications: Tygacil is indicated in adults for the treatment of complicated skin and soft tissue infections (cSSSI), excluding diabetic foot infections and complicated intra-abdominal infections (cIAI). Tygacil should be used only in situations where it is known or suspected that other alternatives are not suitable. Consideration should be given to official guidance on the appropriate use of antibacterial agents. Dosage (Intravenous infusion only over 30 to 60 minutes): The recommended dose for adults is an initial dose of 100mg followed by 50mg every 12 hours for 5 to 14 days. The duration of therapy should be guided by the severity, site of infection, and the patient's clinical response. Hepatic Insufficiency: In patients with severe hepatic impairment (Child Pugh C), the dose of Tygacil should be reduced to 25mg every 12 hours following the 100mg initial dose. Patients with severe hepatic impairment (Child Pugh C) should be treated with caution and monitored for treatment response. Renal Insufficiency: No dosage adjustment is necessary in patients with renal impairment or patient undergoing haemodialysis. Elderly patients: No dosage adjustment is necessary in elderly patients. Paediatric population: The safety and efficacy of Tygacil in children below 18 years have not yet been established. Contraindications: Hypersensitivity to the active substance or to any of the excipients. Patients hypersensitive to tetracycline class antibiotics may be hypersensitive to tigecycline. Special Warnings and Precautions: In clinical studies in cSSSI, cIAI, diabetic foot infections, nosocomial pneumonia and studies in resistant pathogens, a numerically higher mortality rate among Tygacil treated patients has been observed as compared to the comparator treatment. The causes of these findings remain unknown, but poorer efficacy and safety than the study comparators cannot be ruled out. In clinical trials in cIAI patients, impaired healing of the surgical wound has been associated with superinfection. A patient developing impaired healing should be monitored for the detection of superinfection. Patients who develop super-infections, in particular nosocomial pneumonia, appear to be associated with poorer outcomes. Patients should be closely monitored for the development of super-infection. The use of Tygacil in non-approved indications is not recommended. Anaphylaxis/anaphylactoid reactions, potentially life-threatening, have been reported with tigecycline. Cases of liver injury with a predominantly cholestatic pattern have been reported in patients receiving tigecycline treatment, including some cases of hepatic failure with a fatal outcome. Glycylcycline class antibiotics are structurally similar to tetracycline class antibiotics and may have similar adverse event profiles. Acute pancreatitis, which can be serious, has occurred in association with tigecycline treatment. Combination antibacterial therapy should be considered in patients with clinically apparent intestinal perforation or patients with incipient sepsis or septic shock. In case of severe, persistent diarrhoea, the possibility of antibiotic-induced, life threatening pseudomembranous colitis must be taken into consideration. Experience in the use of tigecycline for treatment of infections in patients with severe underlying diseases is limited. Drug Interactions: See SmPC. Pregnancy and Lactation: Tigecycline should not be used during pregnancy or lactation unless clearly necessary. Side Effects: Very common: Nausea, vomiting, diarrhoea. Common: Pneumonia, abscess, infections, prolonged activated partial thromboplastin time (aPTT), prolonged prothrombin time (PT), hypoglycaemia, dizziness, phlebitis, abdominal pain, dyspepsia, anorexia, elevated aspartate aminotransferase (AST), elevated alanine aminotransferase (ALT), hyperbilirubinaemia, pruritus, rash, headache, impaired healing, elevated amylase, increased blood urea nitrogen (BUN). Overdose: Intravenous administration of tigecycline at a single dose of 300mg over 60 minutes resulted in an increased incidence of nausea and vomiting. Presentation: 5ml clear glass vials with snap-off aluminium crimp seal. Tygacil is distributed in a ten vial tray pack. Legal Category: POM Basic NHS Price: 10 Vials £323.10 MA Number: EU/1/06/336/001 Marketing Authorisation Holder: Pfizer Limited, Ramsgate Road, Sandwich, Kent, CT13 9NJ, United Kingdom.

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Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard. Adverse events should also be reported to Pfizer Medical Information on 01304 616161
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