ANTIMICROBIALS 2014
Final Program & Book of Abstracts
15th Annual Scientific Meeting
20th – 22nd February 2014

Australian Society for Antimicrobials
Melbourne Convention Centre, Melbourne, Australia
2 Clarendon St, South Wharf 3006
ANOTHER ZYOX VICTORY

PREScribING ZYVOx® (LiNEZOLID) REVIEW FULL APPROVED PRODUCT INFORMATION AVAILABLE AT WWW.PFIZER.COM.AU OR PROVIDED BY THE REPRESENTATIVE.

Minimum Product Information ZYVOx® (linezolid 2mg/mL, 600mg, 20mg/mL) injection, tablets, granules for oral suspension. Indications: Infections due to resistant organisms, including MRSA and VRE. No clinical activity against Gram-negative pathogens. Contraindications: Hypersensitivity; Monoamine oxidase inhibitors; Potential interactions producing elevations of blood pressure, Potential serotoninergic interactions. Precautions: Monitor blood in certain populations. Antibiotic associated pseudomembranous colitis. Reports of serotonin syndrome when co-administered with serotoninergic agents. Symptoms of visual impairment, monitor visual function. Convulsions (rare). Safety and effectiveness following 28 days not established. Gram-negative pathogens. Caution in patients with severe renal and hepatic insufficiency. Pregnancy. Category B3. Lactation. Discontinue. Interactions. Tyramine; serotoninergic agents; vasopressive/dopaminergic agents; rifampicin.* See full PI for details. Adverse Effects: Headache, candidiasis, taste perversion, GI disturbances. Peripheral and optic neuropathy. Lactic acidosis, angioedema, rash, myelosuppression, bullous skin disorders and serotonin syndrome (very rare). Abnormal haematology and liver function tests. See full PI for details. Dose and Administration: IV (30–120 min infusion) or oral b.i.d (with or without food). Adults and adolescents: CAP: nosocomial pneumonia: 600 mg IV 12 hourly or orally b.i.d for 10 to 14 days; SSTI: 400 mg to 600 mg orally b.i.d or 600 mg IV 12 hourly for 10 to 14 days; Enterococcal infections: 600 mg IV 12 hourly or orally b.i.d for 14 to 28 consecutive days. Children: Nosocomial pneumonia and SSTI: 10 mg/kg IV 8 hourly or orally t.d.s for 10 to 14 days. Enterococcal infections: 10 mg/kg IV 8 hourly or orally t.d.s for 14 to 28 days. Neonates: Refer to PI. See full PI for detailed dosing schedule. Pfizer Australia Pty Ltd, ABN 50 008 422 348, 8-42 Wharf Road, West Ryde, NSW 2114. Pfizer Medical Information 1800 675 229. The current product information is available at www.pfizer.com.au. *Please note change(s) in Product Information. ©Registered trademark. P2817/CMGZYV001912/10

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Anti-Infectives
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MELBOURNE CONVENTION CENTRE VENUE MAP

Entrance via Clarendon St entrance
2012 – 2014 ASA COMMITTEE

President  A/Prof. Thomas Gottlieb
Past President Elect  Prof. Graeme Nimmo
Vice President  Prof. Benjamin Howden
Secretary  Ms. Despina Kotsanas
Treasurer  Dr. Geoffrey Coombs

Committee  Dr. David Andresen
Dr. Minyon Avent
Clin/Prof. Keryn Christiansen
Prof. John Turnidge
Dr. David Kong

Newsletter Editor  Dr. Sharon Chen

SOCIAL PROGRAM

Howard Florey Reception

Thursday 20th February 2014

Time  1830 – 2000
Venue:  Clarendon Auditorium Foyer, Melbourne Convention Centre, Melbourne
Cost:  Included in the full paying delegate registration fee
Additional Tickets:  AUD 77.00 GST inclusive

Industry Reception

Friday 21st February 2014

Time:  1845 – 2015
Venue:  Clarendon Auditorium Foyer, Melbourne Convention Centre, Melbourne
Cost:  Included in the full paying delegate registration fee
Additional Tickets:  AUD 77.00 GST inclusive
REGISTRATION AND GENERAL INFORMATION

Venue
Melbourne Convention Centre, 2 Clarendon St South Wharf (Entrance via Clarendon Street)

Registration and Information Desk
The Registration Desk will be located in the Clarendon Auditorium Foyer (Level 2)
The Registration Desk will operate for the following hours during the meeting:
Thursday 20th February 2014
0700 – 1600
Friday 21st February 2014
0700 – 1600
Saturday 22nd February 2014
0700 - 1330

The full registration includes:
• Sessions on Thursday, Friday and Saturday
• Workshops
• Industry Symposia
• Final Program Book
• Meeting Satchel
• Lunches, Morning and Afternoon Teas
• Howard Florey and Industry Receptions

One day registration includes:
• Sessions on the day of registration
• Workshops (for Saturday registration)
• Industry Symposia on the day of registration
• Final Program Book
• Meeting Satchel
• Lunch, Morning and Afternoon Teas for that day
• Howard Florey Reception (for Thursday registration)
• Industry Reception (for Friday registration)

Workshop registration includes:
• Pharmacy Workshops, Saturday 22nd February 2014
• Final Program and Book of Abstracts
• Saturday Afternoon Tea

Pharmacy Workshop
The Pharmacy Workshop is a CPD event has been accredited for 3 hours of Group-1 CPD (or 3 CPD credits), suitable for inclusion in an individual pharmacist’s CPD plan. The program addresses pharmacist competency standards, including (National Competency Standards Framework for Pharmacists in Australia, 2010): 1.2, 1.5, 4.1, 4.2, 7.1, 7.2, 7.3, 8.1.

Meeting
• Main programme held in the Clarendon Auditorium (Level 2)
• Oral Proffered Breakout Sessions 2 & 3 held in Clarendon Rooms A and B (Level 5)
• Pharmacy Workshop held in Clarendon Rooms D & E (Level 2)
• Posters displayed in the Clarendon Auditorium Foyer (Level 2)

Speaker Preperation Room
Clarendon Room C (Level 2)
Speakers are requested to submit powerpoints before the proceeding session

Posters
Posters should be placed on the Poster Boards before 0900 on the day of the allocated session and removed after 1700 on that day

Poster Session 1
Thursday 20th February 2014
Authors in attendance: 1515 - 1600
Poster Session 2
Friday 21st February 2014
Authors in attendance: 1600 - 1645

Industry Symposia

Lunch

- Thursday 20th February 2014
  Pfizer Australia Lunch Symposium
  1245 - 1415
  Clarendon Auditorium (Level 2)

- Friday 21st February 2014
  Novartis Lunch Symposium
  1300 - 1430
  Clarendon Auditorium (Level 2)

- Saturday 22nd February 2014
  AstraZeneca Lunch Symposium
  1200 - 1330
  Clarendon Auditorium (Level 2)

Breakfast

- Thursday 20th February 2014
  bioMérieux Australia Breakfast Symposium
  0700 - 0845
  Clarendon Rooms A/B (Level 5)

- Thursday 20th February 2014
  Merck Sharp and Dohme Breakfast Symposium
  0700 – 0845
  Clarendon Rooms D/E (Level 2)

- Friday 21st February 2014
  BD Diagnostics Breakfast Symposium
  0700 - 0845
  Clarendon Rooms A/B (Level 5)

- Saturday 22nd February 2014
  Cepheid Breakfast Symposium
  0700 - 0845
  Clarendon Rooms A/B (Level 5)

Breakfast

- Saturday 22nd February 2014
  Specialised Therapeutics Breakfast Symposium
  0700 – 0845
  Clarendon Rooms D/E (Level 2)

Liability

The Organising Committee and or Meeting Organiser shall not be held liable for personal accidents or losses or damage to private property of registered delegates of the Meeting. Delegates should make their own arrangements with respect to personal insurance.

Mobile Phones

As a courtesy to speakers and other delegates, please ensure that all mobile phones and pagers are turned off or in a silent mode during all presentations.

Name Badges

Name badges will be given to all delegates upon registration. It is required that you wear your badge at all times, including social functions.

Taxation

A 10% tax on the purchase of goods and services (GST applies by Australian law)

Meeting Secretariat

To contact the Meeting Secretariat after the Meeting:
ASA 2014
c/- ICMS Pty Ltd
First Floor, 191 Riversdale Rd
Hawthorn
Victoria 3122

Telephone: 1300 792 466
Facsimile: +61 3 9818 7111
E-mail: antimicrobials2014@icms.com.au
Website www.antimicrobials2014.com
ASA 2014 FOUNDATION (SUSTAINING) MEMBERS

The following organisations are 2014 Foundation (Sustaining) Members of the Australian Society for Antimicrobials

PLATINUM

AstraZeneca
INFECTION
www.astrazeneca.com.au

Pfizer
anti infectives
www.pfizer.com.au

GOLD

NOVARTIS
www.novartis.com.au

caring and curing

SILVER

MSD
www.msd-australia.com.au

BRONZE

BD
www.bd.com

Helping all people live healthy lives

BIO MÉRIEUX
www.biomerieux.com.au

Cepheid
www.cepheid.com

Specialised Therapeutics
www.specialisedtherapeutics.com.au
2014 HOWARD FLOREY ORATION

The Howard Florey Oration is delivered each year during the Society’s annual scientific meeting and is presented by a Scientist who has made a significant contribution to a greater understanding of antimicrobials and their appropriate use.

The Australian Society for Antimicrobials would like to thank The Florey Institute of Neuroscience and Mental Health, University of Melbourne, for allowing the Society to use the Howard Florey name for what we believe is one of the prestigious scientific presentations on the Australian scientific meeting calendar.

The 2014 Howard Florey Oration will be presented by:

Professor Roger Nation

Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Australia

“My Polymyxin Life”

Date: Thursday 20th February 2014
Time: 1745 - 1830
Venue: Melbourne Convention Centre
Cost: Included in the full delegate registration fee

The Oration will be immediately followed by the Howard Florey Reception.

Roger Nation is Professor of Drug Disposition and Dynamics in the Monash Institute of Pharmaceutical Sciences. After completing his PhD at the University of Sydney in 1977, he undertook postdoctoral training at the University of Illinois at the Medical Center in Chicago, USA before being appointed as Assistant Professor in the same university. After his return to Australia, Roger has held a number of positions, the longest in duration being at the University of South Australia. Prior to moving to Monash University in 2001, he was Professor of Pharmacy in the School of Pharmaceutical, Molecular and Biomedical Sciences in Adelaide. He was also the inaugural Director of the Centre for Pharmaceutical Research at the University of South Australia. In 1993, Prof. Nation was Visiting Scientist in the Clinical Pharmacology Department, Glaxo Inc. Research Institute, Research Triangle Park in North Carolina.

His research focuses on optimisation of antimicrobial chemotherapy for management of infections caused by multidrug-resistant Gram-negative bacterial pathogens, notably Acinetobacter baumannii, Pseudomonas aeruginosa and Klebsiella pneumoniae. He is a member of an internationally well known team that is undertaking research on the pharmacokinetics and pharmacodynamics of the polymyxin antibiotics, colistin and polymyxin B, used against the above-mentioned Gram-negative bacteria. The team includes Professor Jian Li and other colleagues at Monash University, in particular, and also Professors John Turnidge (University of Adelaide) and David Paterson (University of Queensland) together with several other Australian and international collaborators. Roger’s research has been very well
supported by major international and national funding agencies, including the National Institutes of Health (NIH) and the Australian National Health and Medical Research Council (NHMRC). He has ~250 publications and an h-index of 42, and he is regularly invited to deliver lectures on his polymyxin research at international conferences.

He was Chair of the Organising Committee for the 1st International Conference on Polymyxins held in Prato, Italy in May of 2013. He is a member of the NIH/NIAID Colistin Working Group and of the recently constituted CLSI/EUCAST Joint Polymyxins Working Group to examine the current clinical breakpoints for the polymyxins. He acts/has acted as a consultant to a number of national and international pharmaceutical companies in relation to pre-clinical and clinical development of new drugs, the Australian Therapeutic Goods Administration and the World Health Organization. He is/has been a member of a number of editorial boards including Antimicrobial Agents and Chemotherapy and the Australian Medicines Handbook, and for several years he was Associate Editor of Current Drug Metabolism. He has served on NHMRC Grant Review Panels on several occasions. Recent awards include the Australian Pharmaceutical Science Association Medal for significant contributions to research.
PLENARY SPEAKERS

Dr Maiken Arendrup

Organisation: Statens Serum Institute, Denmark
Position: Head, Mycology Unit

Dr Maiken Cavling Arendrup obtained her medical degree from Copenhagen University, Denmark, in 1988, followed by a PhD degree on neutralizing antibodies and HIV infection in 1992. In 2001, she completed further training as a specialist in clinical microbiology and in 2012 she submitted her doctoral thesis on epidemiology and susceptibility of candidaemia.

Currently, Dr Arendrup is Head of the Mycology Unit at Statens Serum Institute, where she is responsible for the fungal laboratory, which receives 15,000 routine and reference samples per year for culture, susceptibility testing, antigen- and antibody-detection, and PCR as well as for the semi-national surveillance of invasive fungal infections. She has also been responsible for the supervision of several PhD students.

Dr Arendrup was a founder of the Nordic Society of Medical Mycology (NSMM) and has been president since the formation of the society in 2003. She is chair of the EUCAST Antifungal Susceptibility Testing Subcommittee Steering Committee, a member of ESCMID Scientific Affairs Subcommittee (SAS), of the advisory board for CLSI Antifungal Susceptibility Testing Subcommittee, on the editorial board for J Clinical Microbiology and an editor for Drug Resistance Updates. In 2005-9 and 2011-13 she has served as a European Confederation of Medical Mycology (ECMM) delegate on the executive organizing committee for TIMM-3 and 4, and as delegate for NSMM for the TIMM 6 in Copenhagen.

Dr Arendrup has authored more than 125 publications in international journals and as book chapters, including 23 since Jan 2012. She has received two research awards (Fritz Kauffman’s reward in 2003 and The Danish Society for Clinical Microbiology’s research award in 2010). Her main research interests include the epidemiology, susceptibility, breakpoint development and diagnostics of fungal infections.

Dr Jason Roberts

Organisation: Royal Brisbane and Women’s Hospital, Australia
Position: Pharmacist Consultant

Dr Jason Roberts is a NHMRC Career Development Fellow at The University of Queensland, Pharmacist Consultant at the Royal Brisbane and Women’s Hospital and Adjunct Professor with the Australian Centre for Health Services Innovation (AusHSI), Queensland University of Technology. He is a clinician-scientist with a strong interest in research and publication and his principal research theme is optimization of antibiotic dosing in the critically ill. He has also been invited to present his research at various national and international congresses and also serves on the Critical Review Panel for ATS/IDSA Guidelines of HAP, HCAP and VAP. He is a section Editor for International Journal of Antimicrobial Agents and an Associate Editor of the Journal or Pharmacy Practice and Research.
A/Professor Susan Huang

Organisation: University of California Irvine, United States of America

Position: Associate Professor Infectious Disease School of Medicine, Medical Director: Epidemiology and Infection Prevention

Dr. Huang’s research focuses on the clinical epidemiology of highly antibiotic-resistant organisms including estimating the risk for infection and assessing practical means for prevention. Dr. Huang’s work involves studying the risks of healthcare-associated transmission of methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococcus (VRE), including both short and long-term sequelae due to these pathogens within and beyond the hospital stay. Her scope of research also includes an evaluation of inter-facility spread and containment of these pathogens, including the intersection of preventative measures on hospital networks, affiliated nursing homes, and surrounding communities. She has evaluated several strategies to mitigate transmission and disease, including active surveillance and institution of contact precautions, enhanced environmental cleaning, and, most recently, a leading a large national cluster randomized trial of three ICU strategies to reduce MRSA infection.

Dr. Huang has also built a population laboratory in a large metropolitan county in Southern California (Orange County, CA). She has performed detailed data collection across all hospitals and nursing homes in this county, including extensive details on inter-facility patient sharing, infection control practices, and ICUs, non-ICUs, and nursing homes estimates of pathogen burden in this county. These detailed population data are the foundation for a dynamic transmission model of Orange County facilities and communities built through the NIH Models of Infectious Disease Agent Study (MIDAS) collaborative. This model will allow simulation of intervention strategies as well as prediction of future trends in transmission and disease burden for MRSA and other pathogens. Beyond MRSA, Dr. Huang is broadly interested in the measurement and prevention of healthcare associated infections. She has evaluated more efficient ways to look at relative hospital rankings using administrative data, and has balanced this with rigorous in depth assessments related to accuracy and completeness of reporting. She has specific interests in the use of automated hospital and claims data to assess pathogen clusters and surgical site infections.

In addition, Dr. Huang is addressing important concerns that widely used proxy measures may produce substantial errors in estimating the burden of these organisms. Moreover, traditional epidemiologic and statistical methods may not be ideally suited to measure infectious outcomes due to their non-independent nature. Her current work evaluates use of complex statistical techniques allow analysis of highly dependent, infectious outcomes in closed settings such as a hospital unit.

Finally, Dr. Huang’s work also includes the study of antibiotic resistance in Streptococcus pneumoniae, and how serotype distribution and antibiotic resistance have been impacted by the licensure of the heptavalent conjugated pneumococcal vaccine. She has recently characterized community level variables (e.g. population size, community antibiotic prescribing, poverty) that predict the prevalence of pneumococcal carriage and penicillin-resistance over and above individual risk factors such as age, daycare, and recent antibiotic use.

Dr. Huang’s intent is to apply epidemiologic, statistical, and mathematical modeling methods to impact the way we monitor and intervene in the spread of bacterial infectious diseases and promote a career studying the spread and containment of antimicrobial resistant pathogens in healthcare and community settings.
KEYNOTE SPEAKERS

Dr R Andrew Seaton

Organisation: Gartnavel General Hospital, NHS Greater Glasgow and Clyde

Position: Consultant in Infectious diseases and General (Internal) Medicine and Lead doctor, NHS GGC Antimicrobial Management Team

Dr Seaton graduated from Aberdeen University in 1989 and trained in General Medicine in Dundee. This was followed by a WHO funded Oxford university visiting clinical lecturer post in the University of Papua New Guinea (1993-1996) where he undertook clinical research in severe malaria and cryptococcal meningitis. Specialist training in infectious diseases and general medicine (Dundee) was completed in 1999. He has been a consultant physician and honorary senior lecturer in Infectious diseases and General Medicine in Glasgow since 2000. He established and leads the NHS Greater Glasgow and Clyde Health Board outpatient parenteral antimicrobial therapy service and the board’s Antimicrobial Management Team and chair the NHS GGC Antimicrobial Utilisation Committee. He is clinical lead on infection management within the Scottish Antimicrobial Prescribing Group and council member of the British Society of Antimicrobial Chemotherapy. He co-chairs the BSAC OPAT standing committee and previously co-chaired the BSAC OPAT standards group. He has over 90 peer reviewed publications and book chapters, has edited the book “problem solving in infection” and is a section editor of the international journal of antimicrobial agents.

Dr Steve Projan

Organisation: MedImmune

Position: Head of Infectious Diseases & Vaccines Innovative Medicines Unit (iMED)

Dr. Steve Projan is the Head of Infectious Diseases & Vaccines Innovative Medicines unit (iMED) at MedImmune, leading a cross-functional team dedicated to the therapeutic area strategy, prioritization and advancement of the company’s infectious disease and vaccine portfolio.

Dr. Projan joined MedImmune in 2010 as senior vice president of research and development and head of the Infectious Diseases & Vaccines iMED.

Prior to joining MedImmune, Dr. Projan served as vice president and global head of Infectious Diseases at Novartis. He previously spent 15 years at Wyeth in roles of increasing responsibility with his last post as vice president and head of Biological Technologies. During his time at Wyeth, Dr. Projan started the Biologics Discovery Group (covering all therapeutic areas) and initiated multiple collaborations and partnerships, most notably with Cambridge Antibody Technology (now a part of MedImmune/AZ). Prior to Dr. Projan’s work in the industry, he spent 14 years at the Public Health Research Institute and presently has over 110 publications to his credit.

Dr. Projan received a bachelor of science from the Massachusetts Institute of Technology and masters of arts and philosophy in biological sciences and a doctorate in molecular genetics from Columbia University.
Dr Michael Dunne

Organisation: bioMérieux, North America

In addition to his appointment at bioMérieux, Dr Dunne is Professor Emeritus, Pathology and Immunology at Washington University School of Medicine in St. Louis, Missouri, and Adjunct Professor of Paediatrics at Duke University School of Medicine in Durham, North Carolina.

Dr Dunne is a Senior Editor for the Journal of Clinical Microbiology, has published over 150 peer reviewed journals, and has presented at over 100 national and international meetings. His areas of research include molecular approaches to rapid diagnosis in clinical and diagnostic microbiology.

Prior to his appointment at bioMérieux Dr Dunne was the Medical Director, Barnes-Jewish Hospital Clinical Microbiology Laboratory, St. Louis and Professor of Pathology and Immunology, Molecular Microbiology, Medicine, and Paediatrics at Washington University School of Medicine.

During his professional life Dr Dunne has received many honours and awards and is a Fellow of the Canadian College of Microbiologists, the 2010 TREK Diagnostic ABMM/ABMLI Professional Recognition Award Laureate for the American Society for Microbiology, and a Fellow for the Infectious Diseases Society of America (IDSA).

Dr Yun F (Wayne) Wang

Organisation: Emory University School of Medicine, North America

Dr. Yun F. (Wayne) Wang is Associate Professor of Pathology and Laboratory Medicine at Emory University School of Medicine in Atlanta, Georgia. He has been the Director of Microbiology, Immunology, and Molecular Diagnostics at Grady Memorial Hospital, the largest public hospital in southeast of United States since 2000.

Dr. Wang earned his medical degree from Shanghai Medical College of Fudan University in Shanghai (China) and his Ph.D. in Medical Microbiology from Medical College of Ohio in Toledo. After finishing postgraduate trainings from New York Blood Center (New York) and University of Rochester Medical Center, he worked as Chief of Microbiology at the Bronx-Lebanon Hospital Center in New York for four years. He then spent a year in Molecular Pathology at Mount Sinai Medical Center in New York before moving to Atlanta in 2000.

Dr. Wang has been responsible for rapid and cost effective laboratory diagnosis of infectious diseases at Grady for twelve years. As the faculty member for Emory Medical Microbiology Fellowship and pathology resident program, Dr. Wang has been involved in teaching pathology residents and fellows during clinical rotation in Microbiology at Grady. Dr. Wang’s research interests are in antimicrobial resistance, HIV, and tuberculosis (TB).

Dr. Wang is a member of American Society for Microbiology (ASM), the Association for Molecular Pathology (AMP), and Infectious Disease Society of America (IDSA). He has been the member of Emory Medical Care Foundation Research Committee since 2005. He was the Georgia Area Director for Southeastern Association of Clinical Microbiology (SEACM) in 2009. He was the Division Chair for the Clinical and Diagnostic Immunology Division of ASM in 2010. He later served as the Division Advisor and the Chair of Selection Committee for the American Academy of Microbiology Abbott Lab Award in Clinical Immunology in 2011. He was the session co-convener and speaker for the ASM General Meetings in 2010 and 2011, the member of Center for Disease Control (CDC) working groups such as the guideline for biosafety laboratory competency and the guideline on prevention of perinatal Group B Strep Disease. He is the current member of Georgia TB Task Force.

Dr. Wang has been the editorial board member for Journal of Clinical Microbiology (JCM) for eight years (2004-2012) and for Journal of Clinical Virology (JCV) for two years (2011-2012). Dr. Wang is currently the associate editor for the JCV, section editor for Journal of Global Antimicrobial Resistance, and editorial board for Diagnostic Microbiology & Infectious Disease (DMID).
SCIENTIFIC PROGRAM

Thursday 20th February 2014

0700 - 0845  bioMérieux Industry Breakfast Symposium (Clarendon Rooms A/B)
             Merck Sharp and Dohme Industry Breakfast (Clarendon Rooms D/E)

0900 – 0915  Presentations of ASA Awards (Clarendon Auditorium)
             Thomas Gottlieb.  ASA President

0915 – 1015  Plenary 1 (Clarendon Auditorium)
             Chair: Thomas Gottlieb. Concord Hospital, New South Wales
             Resistance Amplification by Cross Transmission: What can we do?
             Susan Huang.  University of California Irvine, USA

1015 – 1045  Morning Tea (Clarendon Auditorium Foyer)
              Poster Session 1

1045 – 1245  Symposium 1 (Clarendon Auditorium)
              Chair: Iain Gosbell. University of Western Sydney, New South Wales

Clostridium difficile – Still very Difficult

  Epidemiology: Where the Wild things are?
  Tom Riley. University of Western Australia, Western Australia

  Hypervirulence or Just Hype?
  Allen Cheng. The Alfred, Victoria

  Infection Control Issues
  Rhonda Stuart. Monash Medical Centre, Victoria

  Establishing a Faecal Matter Transplant Unit
  Patrick Charles. Austin Health, Victoria

1245 – 1415  Pfizer Industry Lunch Symposium (Clarendon Auditorium)

1415 – 1515  Keynote Lecture 1 (Clarendon Auditorium)
              Chair: Keryn Christiansen. Royal Perth Hospital, Western Australia

              Bacteria ARE More Promiscuous than Humans: So what are we
              going to do about it?
              Steve Projan. MedImmune, USA

              Keynote Lecture 2 (Clarendon Auditorium)
              Chair: Keryn Christiansen. Royal Perth Hospital, Western Australia
The Lab’s Increasing Arsenal of Tools to Battle Antibiotic Resistance
Wayne Wang. Emory University, USA

1515 – 1600
Afternoon Tea (Clarendon Auditorium Foyer)
Poster Session 1 (Authors in Attendance)

1600 – 1730
Symposium 2 (Clarendon Auditorium)
Chair: Roger Nation. Monash University, Victoria
Therapeutic Drug Monitoring – Peaks and Troughs in the Real World
β-lactam TDM in Clinical Practice
Jason Roberts. Royal Brisbane and Women’s Hospital, Queensland
Aminoglycoside Dosing – Current Controversies
Evan Begg. University of Otago, New Zealand
Practical Challenges
John Turnidge. Women’s and Children’s Hospital @ SA Pathology, South Australia

1745 - 1830
Howard Florey Oration (Clarendon Auditorium)
Chair: John Turnidge. Women’s and Children’s Hospital @ SA Pathology, South Australia
My Polymyxin Life
Roger Nation. Monash University, Victoria

1830 – 2000
Howard Florey Reception (Clarendon Auditorium Foyer)

Friday 21st February 2014

0700 - 0845
BD Breakfast Symposium (Clarendon Rooms A/B)

0900 – 1000
Plenary 2 (Clarendon Auditorium)
Chair: John Turnidge. Women’s and Children’s Hospital @ SA Pathology, South Australia
Epidemiology and Susceptibility Testing of Fungal Infections
Maiken Arendrup. Statens Serum Institute, Denmark

1000 – 1100
Keynote Lecture 3 (Clarendon Auditorium)
Chair: Peter Collignon. The Canberra Hospital, Australian Capital Territory
Targeted versus Universal Decolonization to Prevent ICU Infection
Susan Huang, University of California Irvine, USA
Keynote Lecture 4 (Clarendon Auditorium)
Chair: Peter Collignon. The Canberra Hospital, Australian Capital Territory

BSAC Outpatient Parenteral Antimicrobial Therapy Guidelines
Andrew Seaton. Gartnavel General Hospital, Glasgow, United Kingdom

1100 – 1130
Morning Tea (Clarendon Auditorium Foyer)
Poster Session 2

1130 - 1300
Symposium 3 (Clarendon Auditorium)
Chair: David Looke. Princess Alexandra Hospital, Queensland

Investing in Fungal Futures

Australian Perspective: Antifungal Susceptibility
Sarah Kidd. Women’s and Children’s Hospital @ SA Pathology, South Australia

Non-Culture Based Diagnostics in Mycology
Catriona Halliday. Westmead Hospital, New South Wales

Treatment of Candidaemia
Maiken Arendrup, Statens Serum Institute, Denmark

1300 – 1430
Novartis Industry Lunch Symposium (Clarendon Auditorium)

1430 - 1600
Proffered Paper Session 1 (Clarendon Auditorium)
Chair: Natasha Holmes. Austin Health, Victoria

Proffered Paper Session 2 (Clarendon Room A)
Chair: Kirsty Buising. The University of Melbourne, Victoria

Proffered Paper Session 3 (Clarendon Room B)
Chair: Suman Adhikari, St George Hospital, New South Wales

1600 – 1645
Afternoon Tea (Clarendon Auditorium Foyer)
Poster Session 2 (Authors in Attendance)

1645 - 1815
Symposium 4 (Clarendon Auditorium)
Chair: Paul Johnson. Austin Health, Victoria

MDR – Many Different Responses

Modelling a Response to MDR
Emma McBryde. The Royal Melbourne Hospital, Victoria
Antibiotics in Agriculture – Is there an Ethics Dilemma?  
Peter Collignon. The Canberra Hospital, Australian Capital Territory

How can Whole Genome Sequencing Enhance our Understanding – Information Overload?  
Ben Howden. Austin Health, Victoria

1815 – 1845  
Annual General Meeting (Clarendon Auditorium)

1845 – 2015  
Industry Reception (Clarendon Auditorium Foyer)

Saturday 22nd February 2014

0700 - 0845  
Cepheid Breakfast Symposium (Clarendon Rooms A/B)  
Specialised Therapeutics (Clarendon Rooms D/E)

0900 – 1000  
Plenary 3 (Clarendon Auditorium)  
Chair: Steve Chambers, University of Otago, New Zealand

Antibiotic Dosing in ICU: Moving Towards Individualised Therapy  
Jason Roberts. Royal Brisbane and Women’s Hospital, Queensland

1000 – 1030  
Morning Tea (Clarendon Auditorium Foyer)

1030 - 1200  
Symposium 5 (Clarendon Auditorium)  
Chair: David Paterson. University of Queensland, Queensland

Bug Time Stories

*Streptococcus pneumoniae*: The Attributable Disease Burden due to Resistance  
Susan Huang. University of California Iirvine, USA

Staphylococcal Bacteraemia: New Knowledge on Optimum Treatment  
Natasha Holmes. Austin Health, Victoria

Multi Resistance Plasmids in Enterobacteriaceae  
Sally Partridge. The University of Sydney, New South Wales

1200 - 1330  
AstraZeneca Industry Lunch Symposium (Clarendon Auditorium)

1330 – 1400  
Keynote Lecture 4 (Clarendon Auditorium)  
Chair: Ben Howden. Austin Health, Victoria

Dead Mycobacteria do tell Tales  
Michael Dunne. BioMérieux, USA
1400 - 1500 Proffered Paper Session 4 (Clarendon Auditorium)
Chair: Sue Ballard. Austin Health, Victoria

1330 - 1500 Pharmacy Workshop 1 (Clarendon Auditorium D/E)
Chair: Duncan McKenzie. Royal Hobart Hospital, Tasmania

TDM in Practice

Evolving Trends in Vancomycin and Beta-lactam TDM
Evan Begg, University of Otago, New Zealand

TDM in Action with Focus on Antifungals
Joe Whitehouse, Flinders Medical Centre, South Australia

Continuous β-lactam Infusions in Practice: Changing the System
Suman Adhikari, St George Hospital, New South Wales

1500 - 1515 Afternoon Tea (Clarendon Auditorium Foyer)

1515 - 1645 Symposium 6 (Clarendon Auditorium)
Chair: Graeme Nimmo. Queensland Pathology, Queensland

MALDI-TOF Mark 2 – Resistance Detection
MALDI-TOF MS Resistance Detection
Markus Kostrzewa. Bruker, Germany

Where does MALDI-TOF Excel in the Clinical Laboratory?
Michael Dunne. BioMérieux, USA

1515 - 1645 Pharmacy Workshop 2 (Clarendon Auditorium D/E)
Chair: Sharmila Khumra. Monash University, Victoria

Antimicrobials and Adjunctive Therapies: Controversies and Evidence

Should we be using Selective Digestive Decontamination on ICU patients?
Joshua Davis. Royal Darwin Hospital, Northern Territory

Attitude and Approach to Requests for Antibiotic use in non-ID settings
Kirsty Buising. The University of Melbourne, Victoria

Antimicrobial Use in Respiratory Infections
Tom Kotsimbos. The Alfred, Victoria
ORAL PROFFERED PAPERS

Friday 21st February 2014

1430 - 1600 Proffered Paper Session 1 (Clarendon Auditorium, Level 2)
Chair: Natasha Holmes. Austin Health, Victoria

PP1
1430 - 1445
Vancomycin-resistant Enterococcus faecium sequence type 796, the new trans-Tasman epidemic clone
A Mahony, Austin Health, Victoria, Australia

PP2
1445 - 1500
Using comparative genomics to understand the evolution of Methicillin-Resistant
Staphylococcus aureus Sequence Type 239 in Australia
S Baines, University of Melbourne, Victoria, Australia

PP3
1500 - 1515
MRSA inside the household: Longitudinal analyses from the Community-Onset
Staphylococcus aureus Household Cohort (COSAHC) Study
C Bennett, Deakin University, Victoria, Australia

PP4
1515 - 1530
Genomics of persistent Staphylococcus aureus infection
W Gao, Austin Health, Victoria, Australia

PP5
1530 - 1545
A low background rate of fluoroquinolone resistance amongst Escherichia coli may
protect against ST131 and the H30 sub-clone in Australia and New Zealand
B Rogers, The University of Queensland, Queensland, Australia

PP6
1545 – 1600
Preliminary results of the first national survey of antimicrobial resistance in
Escherichia coli and coagulase-positive Staphylococcus spp. isolated from clinical
infections in animals
S Abraham, University of Adelaide, South Australia, Australia

20 15TH ANNUAL SCIENTIFIC MEETING
ORAL PROFFERED PAPERS

Friday 21st February 2014

1430 – 1600 Proffered Paper Session 2 (Clarendon Room A, Level 5)
Chair: Kirsty Buising, The University of Melbourne, Victoria

PP7
1430 - 1445
Pilot study of pharmacokinetic and pharmacodynamic assessment of monotherapy versus combination therapy for the management of Gram negative bacteraemia
M Avent, The University of Queensland, Queensland, Australia

PP8
1445 - 1500
Assessing the impact of strategies to improve peri-operative antibiotic surgical prophylaxis
C Chen, Victorian Infectious Diseases Service, Victoria, Australia

PP9
1500 - 1515
Surgical antimicrobial prophylaxis in a university teaching hospital: A retrospective study investigating use
J Fox, University of Sydney, New South Wales, Australia

PP10
1515 - 1530
INITIAT-E.D: The impact of appropriate timing for INITIation of anti-infective therapy in patients presenting to the Emergency Department
A Wisdom, Flinders Medical Centre, South Australia, Australia

PP11
1530 - 1545
The use of palivizumab for prevention of respiratory syncytial virus (RSV) in a regional hospital in Australia
L Abdel-Malek, Deakin University, Victoria, Australia

PP12
1545 – 1600
Trimethoprim-sulfamethoxazole oral desensitisation – Experience with a novel rapid protocol
S Wang, Princess Alexandra Hospital, Queensland, Australia
ORAL PROFFERED PAPERS

Friday 21st February 2014

1430 – 1600 Proffered Paper Session 3 (Clarendon Room B, Level 5)
Chair: Suman Adhikari, St George Hospital, New South Wales

PP13
1430 - 1445
Antimicrobial stewardship...taking standard action
D Carter, Australian Commission on Safety and Quality in Health Care, New South Wales, Australia

PP14
1445 - 1500
Perceptions about antibiotic resistance and antimicrobial stewardship initiatives in residential aged care facilities
D Friedman, Barwon Health, Victoria, Australia

PP15
1500 - 1515
Antimicrobial stewardship rounds: Ten years on – do they still listen to our advice?
M Rawlins, Royal Perth Hospital, Western Australia, Australia

PP16
1515 - 1530
Implementation of an antimicrobial stewardship tool to optimise vancomycin dosing at Launceston General Hospital
S Herd, Launceston General Hospital, Tasmania, Australia

PP17
1530 - 1545
Optimising management of bacteraemia through antimicrobial stewardship
M Sehu, Princess Alexandra Hospital, Queensland, Australia

PP18
1545 – 1600
Antifungal stewardship in a haematology transplant unit
C Keighley, Royal Prince Alfred Hospital, New South Wales, Australia
ORAL PROFFERED PAPERS

Saturday 22\textsuperscript{nd} February 2014
1400 - 1500 Proffered Paper Session 4 (Clarendon Auditorium, Level 2)
Chair: Sue Ballard. Austin Health, Victoria

PP19
1400 – 1415
Which isolates do we need to send for van A/B PCR? A comparison of Vitek\textsuperscript{®}2 susceptibility results against vanA/van B gene PCR to detect vancomycin-resistant enterococci (VRE)
N Sherry, Dorevitch Pathology, Victoria, Australia

PP20
1415 – 1430
Rapid time to results for Carba NP test from early culture growth associated with improved sensitivity for detection of carbapenemase producers among carbapenem non-susceptible Gram-negative bacilli
L Lee, Monash Health, Victoria, Australia

PP21
1430 – 1445
Phenotypic detection of carbapenemase producing Gram negative bacilli: Which Method is Better?
J Montgomery, Austin Health, Victoria, Australia

PP22
1445 – 1500
Xpert MRSA/SA Blood Culture assay is a rapid and robust diagnostic tool in Staphylococcus aureus bacteremia
M Menon, Pathology North Hunter, New South Wales, Australia
PO1.1. Carba-NP followed by real-time PCR for rapid identification of endemic IMP-4 type carbapenemases in Western Australia
N Goire, PathWest Laboratory Medicine WA, Queen Elizabeth II Medical Centre, Western Australia, Australia

PO1.2. Comparison of carbapenem MICs using different methods for KPC-producing Escherichia coli and Klebsiella pneumoniae isolates
F Hurren, Austin Health, Victoria, Australia

PO1.3. Accuracy of susceptibility test methods for detection of meropenem resistance in Gram negative bacilli
F Hurren, Austin Health, Victoria, Australia

PO1.4. Detection of Extended-Spectrum Beta-Lactamases (ESBLs) produced by Acinetobacter baumannii at local hospitals in Saudi Arabia
E Alyamani, King Abdulaziz City for Science and Technology, Riyadh, Saudi Arabia

PO1.5. Comparative evaluation of broth microdilution and Etest for antimicrobial susceptibility testing of Nocardia species
T Best, PathWest Laboratory Medicine WA, Queen Elizabeth II Medical Centre, Western Australia, Australia

PO1.6. B-lactam testing of Staphylococcus lugdunensis using the Vitek2 AST-P612 Card
C McCullough, PathWest Laboratory Medicine WA, Royal Perth Hospital, Western Australia, Australia

PO1.7. Characterisation of multidrug resistant Staphylococcus epidermidis isolated from clinical infections
P Szczurek, Austin Health, Victoria, Australia

PO1.8. Reducing the cost of MRSA screening by combining rapid phenotypic and genotypic methodologies
J Ellem, Westmead Hospital, New South Wales, Australia
PO1.9.  
Evaluation of rapid susceptibility testing on blood cultures using the Alfred60/AST Device  
L Thomas, Westmead Hospital, New South Wales, Australia

PO1.10.  
Evaluation of Bruker MALDITOF MS at The Royal Melbourne Hospital Microbiology Department  
R Bernhard, Melbourne Health, Victoria, Australia

PO1.11.  
An assessment of reproducibility of MALDI-TOF  
E Grabsch, Austin Health, Victoria, Australia

PO1.12.  
MALDI-TOF and susceptibility testing direct from positive blood culture broth compared to testing from 6 Hour and overnight sub-cultures  
G Ganino, Austin Health, Victoria, Australia

PO1.13.  
Use of MALDI TOF MS to identify Australian C. difficile strains  
B Toh, Royal Brisbane and Women’s Hospital, Queensland, Australia

PO1.14.  
A two year study of symptomatic Clostridium difficile infection (CDI): Rapid diagnosis and early isolation prevents case to case transmission  
N Engelhard, PathWest Laboratory Medicine WA, Fremantle Hospital, Western Australia, Australia

PO1.15.  
Helicobacter culture and sensitivity results of 8690 gastric biopsies from 2009 to 2013 from NSW  
C Pitman, SDS Pathology, New South Wales, Australia

PO1.16.  
Carbapenemase-producing bacteria identified in New Zealand  
R Woodhouse, Institute of Environmental Science and Research, Porirua, New Zealand

PO1.17.  
Prevalence of plasmid mediated fluoroquinolone resistance determinants among blood culture isolates of ESBL-E. coli and ESBL-K. pneumonia in the Auckland region 2009-2011  
J Freeman, Auckland District Health Board, Auckland, New Zealand

PO1.18.  
Increasing emergence of IMP-4 producing Enterobacteriaceae throughout Queensland hospitals  
H. Sidjabat, The University of Queensland Centre for Clinical Research, Queensland, Australia
J Bell, SA Pathology (Women’s and Children’s Hospital), South Australia, Australia

PO1.20. Azithromycin minimum inhibitory concentrations against Salmonella species, including S. typhi & S. paratyphi A
M Leung, PathWest Laboratory Medicine WA, Queen Elizabeth II Medical Centre, Western Australia, Australia

PO1.21. Are BLNAR H. influenzae more invasive?
S Tristram, University of Tasmania, Tasmania, Australia

PO1.22. The role of inter-species recombination of the ftsl gene on the dissemination of altered penicillin-binding protein 3 mediated resistance in Haemophilus influenzae and Haemophilus haemolyticus
E Witherden, University of Tasmania, Tasmania, Australia

PO1.23. Teicoplanin non-susceptible coagulase-negative staphylococci in a large Australia Health-Care network: Implications for treatment with vancomycin
D Kotsanas, Monash Health, Victoria, Australia

PO1.24. Staphylococcus aureus ST398 detected in pigs in Australia
M Groves, The University of Queensland, Queensland, Australia

PO1.25. Ceftaroline Resistance amongst Multidrug-Resistant MRSA Clinical Isolates
I Abbott, Alfred Hospital, Victoria, Australia

G Coombs, Australian Collaborating Centre for Enterococcus and Staphylococcus Species (ACCESS) Typing and Research, School of Biomedical Sciences, Curtin University, Western Australia, Australia

PO1.27. The 2012 Australian Group on Antimicrobial Resistance (AGAR) Community-Onset Staphylococcus aureus Ceftaroline Susceptibility Surveillance Programme
G Coombs, Australian Collaborating Centre for Enterococcus and Staphylococcus Species (ACCESS) Typing and Research, School of Biomedical Sciences, Curtin University, Western Australia, Australia
PO1.28. 
The Molecular Epidemiology of Enterococcal Bacteraemia: Results from the AGAR Australian Enterococcal Sepsis Outcome Programme
G Coombs, Australian Collaborating Centre for Enterococcus and Staphylococcus Species (ACCESS) Typing and Research, School of Biomedical Sciences, Curtin University, Western Australia, Australia
POSTER PROFFERED PAPERS SESSION 2

Friday 21\textsuperscript{st} February 2014

1600 - 1645 Authors in Attendance
Clarendon Auditorium Foyer, Level 2

PO2.1.
Rates of surface contamination in the rooms and bathrooms of patients with ESBL-producing \textit{E. coli} and \textit{K. pneumoniae}: A comparison between species
J Freeman, Auckland District Health Board, Auckland, New Zealand

PO2.2.
Relative prevalence of non-albicans \textit{Candida} species in patients with vulvovaginal candidiasis
N Adler, Deakin University, Victoria, Australia

PO2.3.
The post-antifungal effect of polyene antifungal agents and its impact on adhesion attributes of oral \textit{Candida dubliniensis} isolates
A Ellepola, Kuwait University, Kuwait

PO2.4.
\textit{Mycobacterium chelonae} osteomyelitis: A unique Australian experience
D Tong, Northern Beaches Health Service, New South Wales, Australia

PO2.5.
Vertebral osteomyelitis – Treatment and outcomes
L Somerville, Nepean Hospital, New South Wales, Australia

PO2.6.
At the end of the line: Effective salvage of a CVC in a haemodialysis patient utilising a novel antibiotic lock
D Breslin, Cairns Hospital, Queensland, Australia

PO2.7.
Continuous infusion flucloxacillin for outpatient parenteral antimicrobial therapy, are buffered solutions necessary?
S Unwin, Princess Alexandra Hospital, Queensland, Australia

PO2.8.
Peri-operative antimicrobial prophylaxis: challenges abound!
D Tong, Northern Beaches Health Service, New South Wales, Australia

PO2.9.
An approach to the treatment of antibiotic resistant Gram negative infections
C Radkowski, The Alfred Hospital, Victoria, Australia
PO2.10. Compounds isolated from medicinal plants reverse drug resistance by inhibition of drug efflux pumps
H Venter, University of South Australia, South Australia, Australia

PO2.11. Can clinical vignettes predict the outcome of a point prevalence study?
M Avent, Mater Health Services, Queensland, Australia

PO2.12. The National Antimicrobial Prescribing Survey – Two Years On
R James, The University of Melbourne, Victoria, Australia

PO2.13. Anti-pseudomonal antibiotic prescribing practices: a tale of two Australian district hospitals
D Tong, Northern Beaches Health Service, New South Wales, Australia

PO2.14. Withdrawn

PO2.15. Cefotaxime and ceftriaxone use in Concord Hospital Emergency Department
V Menon, Concord General Repatriation Hospital, New South Wales, Australia

PO2.16. Fluoroquinolone and third and fourth generation cephalosporin usage in Australian tertiary hospitals
V McNeil, SA Department for Health & Ageing, South Australia, Australia

PO2.17. Exploring a new method for conducting volume-based surveillance of parenteral antibiotic Use in paediatric settings
A Williams, University of South Australia, South Australia, Australia

PO2.18. Funnel plots and risk adjustment of antimicrobial utilisation data
L Davis, Centre for Healthcare Related Infection Surveillance and Prevention & Tuberculosis Control, Queensland, Australia

PO2.19. Attitudes and perceptions of junior medical staff toward a ward-based therapeutic drug monitoring service for aminoglycosides
C Phillips, Flinders Medical Centre, South Australia, Australia

PO2.20. Improving vancomycin monitoring and safety in hospital-in-the-home
S Gibson, Eastern Health, Victoria, Australia
PO2.21. Development and implementation of an Antimicrobial Stewardship (AMS) Procedure, meeting the clinical needs of the stakeholders
U Lorenzen, Women’s and Children’s Hospital, South Australia, Australia

PO2.22. Sustained outcomes following implementation of an antimicrobial stewardship program
K Cairns, The Alfred Hospital, Victoria, Australia

PO2.23. It’s a matter of attitude! An antimicrobial stewardship survey among visiting specialists, nurses and pharmacists
M Cotta, University of Melbourne, Victoria, Australia

PO2.24. Challenges to implementing antimicrobial stewardship in the private healthcare sector – Some potential solutions
C Lo, Cabrini Health, Victoria, Australia

PO2.25. Antimicrobial prescribing in private hospitals: Assessing appropriateness via periodic point prevalence surveys
M Cotta, University of Melbourne, Victoria, Australia

PO2.26. Improving antimicrobial use in community acquired pneumonia with the introduction of a clinical pathway
T Patterson, Logan Hospital, Queensland, Australia

PO2.27. Investigation and management of Community-Acquired Pneumonia in a regional teaching hospital in Australia
N Adler, Deakin University, Victoria, Australia

PO2.28. Old dogma, new tricks: Gentamicin stewardship in an orthopaedic unit
S Bond, Wollongong Hospital, New South Wales, Australia

PO2.29. Withdrawn

PO2.30. Pharmacokinetics of ampicillin/sulbactam in critically ill patients at risk of Acinetobacter baumannii Infections
A Syamhanin, The University of Queensland, Queensland, Australia.
Treatment options for VRE bacteraemia: is there enough evidence to guide clinical decisions?

Spiros Miyakis, Wollongong Hospital, New South Wales, Australia

Dr Spiros Miyakis is an Associate Professor with the Graduate School of Medicine, University of Wollongong, a Staff Specialist in Medicine and Infectious Diseases at The Wollongong Hospital and Shellharbour Hospital, NSW, Australia, and an affiliated researcher at the Illawarra Health and Medical Research Institute (IHMRI).

He did his PhD in Molecular Genetics (1997-2000; Univ. of Crete, Greece and Visiting Researcher at the Univ. of Liverpool, UK), followed by training in General Internal Medicine (Greece 2000-2004) and Infectious Diseases (Australia 2005-2008). He has been a Visiting Research Associate at the Antimicrobial Resistance Laboratory of the Division of Infectious Diseases at the Beth Israel Deaconess Medical Centre, Harvard Medical School, Boston, USA (2009-2011) and prior to his current position he was a lecturer at the Aristotle University of Thessaloniki, Greece.

In parallel to his clinician and teaching duties, his main research focus is antimicrobial drug resistance and the molecular mechanisms that underlie microbial adaptation to antibiotics. He has also a particular interest in Medical Education and in Biostatistics. He has authored more than 50 peer-reviewed publications in English-language journals, encompassing a broad spectrum of Medical disciplines (Infectious Diseases and Clinical Microbiology, Rheumatology, Haematology and Oncology, Laboratory Medicine, Immunology, and the Antiphospholipid Syndrome). His work has been cited more than 1800 times (as per May 2013) and he has served as a peer-reviewer for more than 25 international journals.
Measuring OPAT outcomes and the Role of Daptomycin

Andrew Seaton. Gartnavel General Hospital, Glasgow, United Kingdom

Dr Seaton is a consultant in infectious diseases and General (internal) medicine in NHS greater Glasgow and Clyde and a senior lecturer at Glasgow University. He trained in Aberdeen and Dundee and was clinical lecturer in the University of Papua New Guinea (1994-1996), where he undertook research in severe malaria and Cryptococcosis. He established and leads the Greater Glasgow and Clyde health board outpatient parenteral antimicrobial therapy (OPAT) service, the Antimicrobial Management Team and the multi-site ID consult service for a population of 1.2 million. He leads on infection management within the Scottish Antimicrobial Prescribing Group, is a council member of the British Society of Antimicrobial Chemotherapy (BSAC), He is also co-chair of the BSAC OPAT standing committee and co-chaired the OPAT standards committee which produced the UK’s OPAT Good Practice Recommendations in 2012.

Dr Seaton is an editor for the international journal of antimicrobial chemotherapy, co-edited “problem solving in infection” and has published more than 100 peer reviewed papers in the field of infection, including 28 which relate to OPAT. He coordinates the annual RCP Edinburgh ID Symposium and has also organised a number of ID-related symposia for the RCP Glasgow, Society of Acute Medicine and BSAC in the UK. He has spoken at many national and international conferences, mainly on the subjects of OPAT and antimicrobial stewardship. His areas of interest include outcome evaluation in OPAT, antimicrobial stewardship and infection service design and development.

The use of Daptomycin in severe S. aureus Sepsis

Tony Korman. Monash University, Melbourne, Australia

Tony Korman is Director of Infectious Diseases and Microbiology at Monash Health, Victoria.
Changing paradigms for the prevention and treatment of Infectious Diseases: back to the future or déjà vu?

Steve Projan. Senior Vice President, R&D Infectious Diseases & Vaccines iMED Head

Dr. Steve Projan is the Head of Infectious Diseases & Vaccines Innovative Medicines unit (iMED) at MedImmune, leading a cross-functional team dedicated to the therapeutic area strategy, prioritization and advancement of the company’s infectious disease and vaccine portfolio.

Dr. Projan joined MedImmune in 2010 as senior vice president of research and development and head of the Infectious Diseases & Vaccines iMED.

Prior to joining MedImmune, Dr. Projan served as vice president and global head of Infectious Diseases at Novartis. He previously spent 15 years at Wyeth in roles of increasing responsibility with his last post as vice president and head of Biological Technologies. During his time at Wyeth, Dr. Projan started the Biologics Discovery Group (covering all therapeutic areas) and initiated multiple collaborations and partnerships, most notably with Cambridge Antibody Technology (now a part of MedImmune/AZ). Prior to Dr. Projan’s work in the industry, he spent 14 years at the Public Health Research Institute and presently has over 110 publications to his credit.

Dr. Projan received a bachelor of science from the Massachusetts Institute of Technology and masters of arts and philosophy in biological sciences and a doctorate in molecular genetics from Columbia University.
INDUSTRY BREAKFAST SESSIONS

Thursday 20\textsuperscript{th} February 2014
bioMérieux
0700 - 0845
Clarendon Rooms A/B, Level 5

Next generation antibiotic susceptibility testing

Michael Dunne Jr, Executive Director of Research and Development bioMérieux, North America

Antimicrobial resistance has emerged as one of the most-significant health care problems of the new millennium, and the clinical microbiology laboratory plays a central role in optimising the therapeutic management of patients with infection. Dr Dunne will be exploring the potential value of innovative methods for antimicrobial susceptibility testing of microorganisms that could provide valuable alternatives to existing methodologies in the near future. He will also provide some insight into next generation sequencing as a means of predicting antimicrobial resistance.

In addition to his appointment at bioMérieux, Dr Dunne is Professor Emeritus, Pathology and Immunology at Washington University School of Medicine in St. Louis, Missouri, and Adjunct Professor of Paediatrics at Duke University School of Medicine in Durham, North Carolina.

Dr Dunne is a Senior Editor for the Journal of Clinical Microbiology, has published over 150 peer reviewed journals, and has presented at over 100 national and international meetings. His areas of research include molecular approaches to rapid diagnosis in clinical and diagnostic microbiology.

Prior to his appointment at bioMérieux Dr Dunne was the Medical Director, Barnes-Jewish Hospital Clinical Microbiology Laboratory, St. Louis and Professor of Pathology and Immunology, Molecular Microbiology, Medicine, and Paediatrics at Washington University School of Medicine.

During his professional life Dr Dunne has received many honours and awards and is a Fellow of the Canadian College of Microbiologists, the 2010 TREK Diagnostic ABMM/ABMLI Professional Recognition Award Laureate for the American Society for Microbiology, and a Fellow for the Infectious Diseases Society of America (IDSA).
The role of antimicrobial stewardship & strategies for appropriate therapy

David P. Nicolau. Center for Anti-Infective Research & Development, Hartford Hospital, Connecticut, USA

Dr. David Nicolau is the Director of the Center for Anti-Infective Research and Development at Hartford Hospital in Hartford, Connecticut.

After graduating from Northeastern University, he completed a residency in hospital pharmacy at Boston University Medical Center. After receiving his PharmD from the Medical University of South Carolina, Dr. Nicolau completed a residency in adult internal medicine at the university’s affiliated hospital and a fellowship in Infectious Diseases at Hartford Hospital.

David Nicolau’s research activities involve a wide range of preclinical drug development studies to assess the in vitro potency, in vivo efficacy and toxicity profiles of novel compounds. He has been a principal investigator for Phase I – IV studies, as well as Investigational New Drug applications. Dr Nicolau is also widely recognized for his efforts focusing on the development of antimicrobial utilization strategies to improve outcomes and reduce the cost of care in the infected patient.

David Nicolau’s investigations are reported in over 500 publications, 300 abstracts and 1,000 local, national or international presentations.
Selection of blood culture media matters - how blood culture media facilitates antibiotic decision making: one institute's experience

Glen Hansen. Hennepin County Medical Centre, USA

Dr. Glen Hansen is the Director of Clinical Microbiology and Molecular Diagnostics at Hennepin County Medical Centre. Glen obtained his Ph.D. in Microbiology and Immunology at Royal University Hospital and the University of Saskatchewan in Saskatoon Canada. He has formal fellowship training in molecular diagnostics at New York University and New York Public Health Research Institute (PHRI) and in clinical microbiology from the University of Washington in Seattle, Washington. He is the former director of clinical microbiology and molecular diagnostics reference testing services at Peace Health Laboratories. He holds academic professorship positions in the departments of Pathology and Laboratory Medicine and Medicine (infectious diseases) and the University of Minnesota School of Medicine.

Dr. Hansen is an active member of the American Society for Microbiology (ASM) the Academy of Clinical Laboratory Physicians and Scientists (ACLPS), and the Association for Molecular Pathology (AMP), the Pan American Society for Clinical Virology, the Infectious Disease Society of North America (IDSA) and the Association of Medical Microbiology and Infectious Diseases of Canada (AMMI) and is also a guideline author for the Canadian Expert guidelines for diagnosis and treatment of intra-abdominal and surgical site infections.
Meet the Xpert® - What's New in 2014

Fred Tenover. Senior Director for Scientific Affairs, Cepheid, USA.

Dr. Tenover is the Vice President, Scientific Affairs at Cepheid, Consulting Professor of Pathology at Stanford University School of Medicine, and Adjunct Professor of Epidemiology at Emory University. He received his doctoral degree in Medical Microbiology from the University of Rochester and was a Postdoctoral Fellow in Clinical Microbiology and Public Health at the University of Washington in Seattle. He served as Chief of Molecular Biology and Associate Chief of Microbiology at the Seattle Veterans Affairs Medical Center and was a faculty member of the Department of Laboratory Medicine at the University of Washington. In 1990, he joined the Centers for Disease Control and Prevention in Atlanta where he worked for 18 years as Associate Director for Laboratory Science in the Division of Healthcare Quality Promotion and then as Director of the Office of Antimicrobial Resistance before leaving in 2008 to join Cepheid in California. Dr. Tenover is a Diplomate of the American Board of Medical Microbiology and a Fellow of both the American Academy of Microbiology and the Infectious Disease Society of America. He has been an author of over 300 peer-reviewed journal articles, 44 book chapters, and has edited 9 books, including Molecular Microbiology: Diagnostic Principles and Practices.
Saturday 22\textsuperscript{nd} February 2014  
Specialised Therapeutics  
0700 - 0845  
Clarendon Rooms C/D, Level 2  

Clostridium difficile - the latest hospital scourge: risk-based management strategies with fidaxomicin”

Yoav Golan from Tufts Medical Centre, Boston USA

Dr. Golan is an attending physician at the Division of Geographic Medicine and Infectious Diseases at Tufts Medical Centre, Boston and an Associate Professor of Medicine at Tufts University School of Medicine. Dr. Golan is a graduate of the Hadassah School of Medicine at the Hebrew University in Jerusalem, Israel. He completed a medicine residency and Infectious Diseases fellowship at the Tel Aviv Sourasky Medical Center, followed by a transplant ID fellowship and masters in statistics and modelling at Tufts University School of Medicine. His research focuses on hospital-acquired infections with emphasis on patient risk stratification and development of early culture-independent treatment strategies. Over the past five years, Dr. Golan’s research has focused on C. difficile infections. He is particularly interested in recurrent disease and the effectiveness and affordability of new treatment strategies when stratified by patients’ risk of recurrence. Dr. Golan has been involved in the development of fidaxomicin and surotomycin as well as non-antibiotic therapies for C. difficile, including immunotherapies and germination inhibition strategies. He is the author of numerous manuscripts and several book chapters.
2014 ASA TRAVEL AWARDS

PP4: Genomics of Persistent *Staphylococcus aureus* Infection

**Wei Gao**¹,², Nick Tobias³, Simon Gladman⁴, Torsten Seemann³, Timothy P. Stinear²,³, and Benjamin P. Howden¹,²,³

¹Austin Centre for Infection Research, Austin Hospital, VIC,
²Department of Microbiology, Monash University, VIC,
³Department of Microbiology and Immunology, University of Melbourne, VIC,

PP21: Phenotypic Detection of Carbapenemase Producing Gram Negative Bacilli: Which Method is Better?

**Janet Montgomery**, Frances Hurren & Jenny Wang

*Microbiology Department, Austin Pathology, Austin Health, Victoria, Australia*

PO1.18: Increasing Emergence of IMP-4 Producing Enterobacteriaceae Throughout Queensland Hospitals

**Hanna Sidjabat**¹, N. Townell², N. George², M. Caffery², J. Douglas², G. R. Nimmo², V. Vaska¹, D.L. Paterson¹,²

¹The University of Queensland Centre for Clinical Research
²Pathology Queensland

PO1.22: The Role of Inter-species Recombination of the *ftsI* Gene on the Dissemination of Altered Penicillin-binding Protein 3 Mediated Resistance in *Haemophilus influenzae* and *Haemophilus haemolyticus*.

**Elizabeth Witherden**¹, M.P. Bajanca-Lavado², S. Tristram¹ and A. Nunes²

¹ School of Human Life Sciences, University of Tasmania, Launceston, Tasmania, Australia
² Department of Infectious Disease, National Institute of Health, Lisbon, Portugal

2014 BIOMÉRIEUX IDENTIFYING RESISTANCE TRAVEL AWARD

This is awarded to an individual on the basis of a proffered paper (oral or poster) presented during the ASA Annual Scientific Meeting dealing with the identification of antimicrobial resistance in a routine clinical setting. The applicant must be a financial member of the ASA. The Award is restricted to ASA Members residing in Australia or New Zealand. The Award Committee will take into account the quality and originality of the paper.

The Award consists of A$1,000 cash prize, a commemorative plaque, and the provisions of flights, accommodation and registration for the recipient to attend Antimicrobials 2014. The Award Committee will consist of three ASA Committee Members

The bioMérieux ASA award winner will be announced prior to the commencement of Symposium 6 on Saturday 22nd February 2014
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ABSTRACTS

PP1
Vancomycin-resistant Enterococcus faecium sequence type 796, the new trans-Tasman epidemic clone.

A. A. Mahony1,2, E. A. Grabsch3, S. A. Ballard1, J. Wang3, S. Xie3, S. A. Roberts4, R. L. Stuart5, N. Bak6, T. P. Stinear7 and P. D. Johnson1,2,7

1 Austin Centre for Infection Research (ACIR), Infectious Diseases Department, Austin Health, Melbourne, Victoria, Australia
2 Department of Medicine, University of Melbourne, Melbourne, Victoria, Australia
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Objectives: In 2012 we first identified a new strain of vanB vancomycin-resistant Enterococcus faecium (VREfm) causing bloodstream infections, through routine pulsed-field gel electrophoresis (PFGE) of all such isolates at one institution. Typing via single nucleotide polymorphism (SNP) high-resolution melting (HRM) showed this strain to be melt type (MelT) 184. We now aimed to collaborate with interested local, interstate and international institutions facing outbreaks of VREfm, to determine whether this new strain is emerging widely as a dominant clone.

Methods: VREfm outbreaks – predominantly colonisation but also occasional clinical infections – were investigated at four tertiary hospitals throughout 2013. Outbreaks were identified microbiologically on routine patient screening via rectal swab plated onto chromogenic agar, then contact tracing of newly colonised patients, and epidemiologically by clustering according to date and hospital location of VREfm identification. Outbreak isolates were typed by HRM; the earliest MelT 184 clinical isolate also underwent multilocus sequence typing (MLST).

Results: All outbreaks were vanB-containing VREfm. One outbreak occurred in each of an adult Intensive Care Unit, a neonatal Intensive Care Unit, and a geriatric Medical unit; the fourth institution had persistent VREfm transmission in several high-risk patient areas (eg Liver Transplant unit). The first three outbreaks included VREfm MelT 184, some exclusively. The fourth institution’s VRE colonisation problem was found to be approximately 50% due to MelT 184. An epidemiological link was found between the Auckland index case and Victoria, with the patient having been transferred from a Melbourne hospital. Outbreaks occurred despite generally high rates of hand hygiene compliance across the institutions. MLST showed the outbreak strain to be a new sequence type (ST), designated ST796.

Conclusion: MelT 184 / ST796 has caused several outbreaks of VREfm across Australia and New Zealand in 2013, and appears to have become endemic in at least one institution. Whole genome sequencing of the strain is underway and may give insights into its emergence as the new VREfm. Novel strategies for control of VREfm transmission in this context may be required.
Using Comparative Genomics to Understand the Evolution of Methicillin-Resistant Staphylococcus aureus Sequence Type 239 in Australia


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Objectives: A small number of clones are responsible for the majority of hospital-associated methicillin-resistant Staphylococcus aureus (MRSA) infections globally. One such clone is the multi-locus sequence type (ST) 239; a multidrug-resistant, hybrid clone of MRSA that has dominated the global hospital environment since it was first reported in the 1970s. Whilst recent phylogenetic research has begun to shed light on the population structure of ST239 there is still much that is unknown about how it has evolved, particularly here in Australia; a geographically distinct region where this clone has predominated in the hospital environment for nearly 40 years.

Methods: To explore the evolution of ST239 MRSA in Australia whole genome sequencing and phenotypic analysis was performed on 88 ST239 strains isolated in three Australian states between 1980 and 2012. The genome sequences of 36 ST239 strains from a large international collection were also included. Bayesian phylogenetic inference was used to establish a tree-based model for the population structure of ST239 based on these 124 genomes. A pan-genome was generated to explore variation in the genomic content amongst Australian ST239 strains. Their phenotypic evolution was examined by analysing changes in antimicrobial phenotypes, growth characteristics and virulence capability over time.

Results: The phylogenetic model showed the concurrent but independent evolution of two ST239 sub-clones in Australia. These two sub-clones are not the previously identified epidemic sub-clones Aus-2 and Aus-3 EMRSA, as confirmed by the pan-genome, but represent a larger underlying genomic divergence of the ST239 clone. Whilst one sub-clone appears to be the original ST239 clone isolated in Australia in the 1970s, the other represents a re-introduction of ST239 in the state of Victoria. This sub-clone is phylogenetically closely related to Asian strains included in this study. The phenotypic evolution of Australian ST239 MRSA appears to be one of decreasing susceptibility to the glycopeptides and daptomycin but also a loss of activity in a global virulence regulatory system not consistently associated with agr mutations.

Conclusion: Here we reveal the concurrent evolution of two clades of ST239 in Australia over the past 30 years, both leading to enhanced antimicrobial resistance and attenuated virulence.
MRSA inside the household: Longitudinal analyses from the Community-Onset Staphylococcus aureus Household Cohort (COSAHC) Study.

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Objectives: To further our understanding of S. aureus epidemiology in the community, and MRSA in particular, we describe:

1) prevalence and dissemination of S. aureus strains in 291 households with community-onset infections; and

2) changes to nasal colonisation for the index patient and their household contacts over 2 years.

Methods: 291 patients with community-onset S. aureus infections were identified via specimens from a community-based pathology service (Oct 2008-Dec 2010). All MRSA and a frequency-matched random subset of methicillin sensitive S. aureus (MSSA) were followed. Patients and household (HH) contacts provided nose and axilla swabs (a subset of 92 also provided throat and groin) and detailed demographic information, medical history, exposure history including occupation, sporting activities, pets, and HH interactions. All isolates were characterised using PFGE, MLST, spa, and pvl.

Results: 729 people from 291 households participated (156 initial MSSA infections, 135 MRSA). S. aureus carriage was common (64% of index cases colonised in nose and/or axilla, and 46% of HH contacts). S. aureus nasal carriage for the total sample was 47% (10% MRSA, 37% MSSA). MRSA nasal colonisation rates diminish over the two year follow-up for most strains, however some persisted in the index and contacts (WA-MRSA1 [ST1], EMRSA15 [ST22]). Despite the high prevalence in clinical isolates, WSSP (ST30) and Queensland (ST93) clones were generally absent from nose swabs collected from these households.

Conclusions: We found high colonisation rates in the nose and/or axilla for S. aureus (53%) and for MRSA (12%) but the patterns of HH colonisation are complex and variable. Some strains persist in households for up to two years whilst others were not found to ever colonise the index or contacts over the follow-up period. As the strains that do not persist tend to be the pvl positive community MRSA strains, differences in persistence and penetration in the household can guide patient and contact management.
Persistent *Staphylococcus aureus* infection is a well recognized, difficult to treat condition, however the molecular basis for persistence is not understood. We have previously investigated a pair of clinical *S. aureus* isolates obtained from a patient before and after a protracted persistent infection. We showed that the day-115 isolate had a reduced growth rate, resistance to innate immune factors, and a chronically active stringent response. Here, we have undertaken a more detailed investigation by phenotypic and/or genomic characterization of 47 blood stream isolates obtained from 23 positive blood culture specimens and one spinal aspirate over the 115 day infection.

All isolates underwent detailed antibiotic susceptibility testing, growth characterization, and measurement of delta hemolysin expression (an indication of quorum sensing activity) and 15 isolates were sequenced using the Illumina MiSeq platform. The genome sequences of the first (JKD6210) and last (JKD6229) clinical isolates were fully assembled, annotated, and validated using Optical Mapping.

There were 29 hVISA/VISA and 16 VSSA isolates. All the hVISA/VISA isolates had a growth defect, and most isolates produced delta hemolysin. The hVISA/VSSA phenotype emerged at day 45. Interestingly there were mixed populations of VSSA and hVISA in some blood cultures. Comparative genomic analysis by read mapping and SNP detection identified unique transient mutations and selected conserved mutations associated with antimicrobial resistance or innate immune evasion. Read-mapping also revealed substantial and varied chromosome duplications up to 98kb in antibiotic resistant sub-clones of *S. aureus*. Such chromosome flux has not been previously described in *S. aureus*, and was experimentally confirmed by genome closure and optical mapping. Intriguingly, the chromosome duplications coincided with the reduction in vancomycin susceptibility.

This study highlights several adaptive strategies employed by *S. aureus* to persist in the face of antimicrobial therapy within the milieu of the host to cause persistent infection, and the power of thorough genomic comparisons to uncover clinically significant mutations in addition to SNPs.

*ASA Travel Award*
A low background rate of fluoroquinolone resistance amongst *Escherichia coli* may protect against ST131 and the H30 sub-clone in Australia and New Zealand.

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**Background:** The clonal structure of *Escherichia coli* causing extra-intestinal infections includes the world-wide pandemic clone Sequence Type 131 (ST131) and other uropathogenic sequence types. Although a dominant ST131 sub-clone, characterised by fluoroquinolone resistance and a polymorphism of the FimH peptide sequence (H30) has recently been identified, drivers of the spread of ST131 and other uropathogenic clones have been incompletely defined. The uniquely low rates of fluoroquinolone resistance amongst *E. coli* in Australia and New Zealand may offer insight into these drivers, not apparent in other regions.

**Methods:** We combined molecular epidemiologic analysis with clinical data from 182 patients enrolled in a case-control study of community onset third generation cephalosporin resistant *E. coli* (3GCR-EC) in Australia and New Zealand. Genomic analysis included antimicrobial resistance mechanisms, clonality by DiversiLab (rep-PCR), multilocus sequence typing (MLST) and sub-typing of ST131 by identification of polymorphisms in the fimH gene.

**Results:** The clonal structure of third generation cephalosporin susceptible and 3GCR-EC differed markedly. Susceptible isolates contained six MLST clusters (median=7 isolates/cluster). In contrast, 3GCR-EC contained only three clusters including a very-large cluster comprising 40 ST131 isolates. In total 80% (37/46) of ST131 isolates were the H30 sub-clone. All were fluoroquinolone resistant and primarily associated with CTX-M harbouring 3GCR-EC (35/37, 95%). Whole-population estimates (adjusted for the overall prevalence of 3GCR-EC in the community) indicates that ST131 comprises 8% of all community onset *E. coli* isolated in our study-population, with the H30 sub-clone less prevalent than other ST131 subtypes (3.5% H30 vs. 4.5% other ST131 sub-clones). Other uropathogenic clonal groups such as ST95 and ST73 *E. coli* were more frequent (14% and 13% prevalence respectively).

**Conclusion:** In our region 3GCR-EC is dominated by ST131 and the H30 sub-clone, whilst it is infrequent in third generation susceptible *E. coli*. On a population basis, ST131 and the H30 sub-clone in particular, are surprisingly infrequent compared to data from other regions. We hypothesise that our region’s low background rate of fluoroquinolone resistant *E. coli* may have afforded protection from broader dissemination of this pathogenic clone and sub-clone.
PP6

Preliminary results of the first national survey of antimicrobial resistance in *Escherichia coli* and coagulase-positive *Staphylococcus* spp. isolated from clinical infections in animals

Sam Abraham, Hui San Wong and Darren J Trott

**Objective:** Australia currently has no national network of surveillance for monitoring antimicrobial resistance in animals. The aim of the study is to establish baseline susceptibility data for *Escherichia coli* and coagulase-positive staphylococci identified as cause of infection from all veterinary diagnostic laboratories in Australia from Jan-December 2013.

**Methods:** The *E. coli* (n= up to 1500) and coagulase-positive staphylococci (n= up to 1500) were collected from veterinary diagnostic laboratories (n=22) across Australia. All isolates were subjected to CLSI disc diffusion susceptibility testing for 16-18 antimicrobials of importance to veterinary and public health. This abstract reports the preliminary results of the study from *E. coli* (companion n=371 and livestock n=117), *S. pseudintermedius* (companion n=180) and *S. aureus* (companion n=73 and livestock n=41).

**Results:** *E. coli* from companion animal demonstrated absence of resistance to carbapenems and amikacin. Resistance was identified most frequently identified to ampicillin (30%), cephalothin (16.4%) and tetracycline (14.5%). However resistance to ciprofloxacin (8%), cefovecin (9%), ceftiofur (9.1%) and ceftazidime (7.5%) also were observed. All livestock associated *E. coli* were sensitive to critical antimicrobials such as carbapenems, fluoroquinolones and amikacin. These isolates were frequently resistant to tetracycline (70%), trimethoprim/sulfamethoxazole (53%) and ampicillin (52%). Only three isolates demonstrated resistance to ceftiofur.

A total of 12.5% of *S aureus* isolates from companion animals demonstrated resistance to oxacillin and cefoxitin indicating they are likely to be methicillin-resistant. The *S. aureus* isolates also demonstrated resistance to penicillin (78.1%), tetracycline (28.1%), gentamicin (9.4%), azithromycin (3.1%) and ciprofloxacin (3.1%). The resistance profiling of *S. aureus* from livestock (bovine mastitis) revealed that these isolates are sensitive to all antimicrobials with the exception of penicillin (19.5%).

The antimicrobial resistance profiling of *S. pseudintermedius* revealed that 10% of the isolates were resistant to oxacillin indicating that they are likely to be methicillin-resistant. In addition, resistance to penicillin (81%), tetracycline (18%), azithromycin (11%), gentamycin (9%), clindamycin (11%), trimethoprim-sulfamethoxazole (9.2%) and ciprofloxacin (6%) was also observed. Majority of the oxacillin resistant isolates were also resistant to clindamycin, trimethoprim-sulfamethoxazole, azithromycin, gentamicin and ciprofloxacin.

**Conclusion:** This study shows the absence of resistance to carbapenems in *E. coli* isolates from animals. Rates of resistance to fluoroquinolones and third generation cephalosporins resistance among companion animal *E. coli* isolates is on par with equivalent surveillance in human pathogenic *E. coli*. Emerging methicillin resistance in coagulase positive staphylococci from companion animals is of concern to animal welfare due to limited antimicrobial therapy options. This ongoing study will provide the first Australia-wide data on antimicrobial resistance in *E. coli* and coagulase positive staphylococcus isolates from animal infections for evaluating the public health impact of veterinary use of antimicrobials.
Pilot study of pharmacokinetic and pharmacodynamic assessment of monotherapy versus combination therapy for the management of gram negative bacteraemia

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⁷ Chemical Pathology, Pathology Queensland, Clinical and Statewide Services Division, Queensland Health, Herston, QLD, Australia

Background: Infections associated with gram-negative bacteraemia can be associated with high morbidity and mortality. Substantial controversy exists about whether combination therapy as opposed to monotherapy results in better clinical outcomes.

Aim: To describe pharmacodynamic target attainment with β-lactam monotherapy or combination therapy with a β-lactam and fluoroquinolone or aminoglycoside in patients with gram-negative bacteraemia.

Methods: Of the 101 patients that were identified as having gram-negative bacteraemia during the study period, 37 patients gave consent to participate in the study. Patients were monitored daily for infective signs and symptoms, risk factors for infection and clinical outcomes. Blood cultures, susceptibility results, serial antibiotic and procalcitonin (PCT) concentrations were documented. Patients were retrospectively evaluated according to their therapy which was determined by the treating clinician: monotherapy (β-lactam), combination (β-lactam/fluoroquinolone and ≥ 2 aminoglycoside doses) or sequential therapy (β-lactam and at least one dose of fluoroquinolone or aminoglycoside). The primary outcome was time (in hours) to resolution of systemic inflammatory response syndrome (SIRS) from initiation of antibiotic therapy.

Results: The treatment groups did not differ based on age, sex, race and Charlson Comorbidity Index. The patients who received sequential and combination therapy appeared to have a faster time to sterilisation of blood cultures (table 1). 83 – 100 % of patients on β-lactams or fluoroquinolones obtained pharmacodynamic targets whereas only 40 % of patients on gentamicin reached the pharmacodynamic target.

Conclusions: β-lactams and fluoroquinolones obtained pharmacodynamic targets most consistently in our cohort of gram negative bacteraemias. Although only 40 % of patients on gentamicin in combination therapy obtained the pharmacodynamic target, this could be attributed to lack of optimisation of the doses.
Table 1: Resolution of infection

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Monotherapy</th>
<th>Combination Therapy</th>
<th>Sequential Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>37</td>
<td>9</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Median time to sterilisation of blood cultures (HH:MM)</td>
<td>44:02</td>
<td>59:00</td>
<td>42:50</td>
<td>39:51</td>
</tr>
<tr>
<td>PCT value decreased by 80% of baseline [n (%)]</td>
<td>18</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>(46%)</td>
<td>(44%)</td>
<td>(54%)</td>
<td>(47%)</td>
<td></td>
</tr>
<tr>
<td>Resolution of SIRS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total [n (%)]</td>
<td>20</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>(54%)</td>
<td>(67%)</td>
<td>(46%)</td>
<td>(53%)</td>
<td></td>
</tr>
<tr>
<td>Haematology patients [n (%)]</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>(19%)</td>
<td>(22%)</td>
<td>(31%)</td>
<td>(7%)</td>
<td></td>
</tr>
<tr>
<td>Non-haematology patients [n (%)]</td>
<td>13</td>
<td>4</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>(35%)</td>
<td>(44%)</td>
<td>(15%)</td>
<td>(47%)</td>
<td></td>
</tr>
<tr>
<td>All of the above criteria met [n (%)]</td>
<td>13</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>(35%)</td>
<td>(44%)</td>
<td>(38%)</td>
<td>(27%)</td>
<td></td>
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</tbody>
</table>
PP8

Assessing the impact of strategies to improve peri-operative antibiotic surgical prophylaxis

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Objectives: To assess the impact of strategies to improve the prescribing, administration and documentation of peri-operative antibiotic surgical prophylaxis at a metropolitan teaching hospital.

Methods: A baseline point prevalence audit was conducted in September 2012 of all patients admitted under surgical units who underwent surgery during their admission. Outcome measures included the types of procedures, antibiotic choice, concordance with hospital guidelines, duration of antibiotic therapy and documentation of antibiotic administration times.

The intervention strategy involved extensive liaison with the surgical units and anaesthetics department, a collaborative review and simplification of the hospital surgical prophylaxis guidelines and changes to the surgical anaesthetic chart to improve documentation. Because of lack of consensus, antibiotic prophylaxis for cardiothoracic surgery patients was not included in these guidelines and these procedures were excluded from the assessment of concordance.

A repeat audit was conducted in September 2013, 9 months after the intervention to determine if improvements had been made.

Results: In the baseline audit, 121 procedures (111 non-cardiothoracic) were analysed compared with 116 (97 non-cardiothoracic) in the post-intervention audit. The proportion of patients who received peri-operative antibiotics was similar across both groups (87% vs 89%).

Whilst the concordance of antibiotic choice with hospital guidelines remained similar (75% vs 77%), there were substantial improvements in dose concordance (60% vs 85%) and proportion of patients receiving an appropriate repeat dose of antibiotic for prolonged procedures (27% vs 61%).

An increase in the documentation of timing of antibiotics prior to first incision was also observed (3% vs 45%). However in the post-intervention audit, only 27% of all antibiotics could be determined as having been administered within an appropriate time period (compared with 3% in the baseline audit).

A 5% increase in the duration of post-operative prophylaxis administered for greater than 48hours was also observed (6% vs 11%).

Conclusion: Whilst substantial progress was made in the appropriate dosing and documentation of antibiotics, there remain several areas which require ongoing improvement, particularly timing of antibiotics prior to first incision and overall antibiotic choice. There was also an observed tendency towards longer duration of antibiotics in the post-operative period. Further audit and feedback interventions are planned to allow for continual process improvement.
Surgical antimicrobial prophylaxis in a university teaching hospital: A retrospective study investigating use

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² Concord Repatriation General Hospital, Sydney, NSW, Australia

Surgical site infection (SSI) remains one of the leading causes of nosocomial infection; with surgical antimicrobial prophylaxis (SAP) one of the most effective approaches to reducing SSI. Despite national and specialty endorsed guidelines, there is great variability in antimicrobial use.

Objectives: The primary objective of this study was to evaluate the extent of SAP guideline concordance with Australian Therapeutic Guidelines: Antibiotic v.14. (TG)

Methods: A retrospective, observational study was conducted at a 550-bed university teaching hospital in Sydney, Australia. Consecutive medical records for elective orthopaedic (n=230), colorectal (n=49) and vascular patients (n=45) were reviewed. SAP concordance regarding antimicrobial agent (including indication and dose), administration time (including intra-operative re-dosing) and duration was assessed as either concordant, partially-concordant or discordant; with categorisation involving consensus agreement by the researchers. Partially-concordant cases were those in which SAP differed to some extent from the TG but the variance was deemed acceptable or was part of an established unit practice that did not differ markedly from established guidelines.

Results: This study included 324 patients, with varying sample sizes across criterion. Indication (patients indicated to receive SAP) and route of administration achieved 100% concordance. A TG concordant antimicrobial agent was administered to 24.7% of patients (7.5% partially-concordant, 67.8% discordant). A concordant dose was given to 69.0% of patients (4.0% partially-concordant, 27.1% discordant), with all discordant cases being due to underdosing in relation to body weight. SAP administration time was concordant for 31.7% of patients (48.8% partially-concordant, 19.5% discordant), with the high proportion of partially-concordant cases indicating an area of vagueness within in TG. 51 patients qualified for intra-operative re-dosing, however 13.7% failed to receive a second dose. Concordant duration of prophylaxis was seen in 26.6% of cases, with 54.5% exceeding 24 hours and 18.9% exceeding 48 hours. 84.9% of all discordant cases were among orthopaedic patients.

Conclusion: This study supported international trends of sub-optimal concordance with SAP guidelines across a variety of surgical specialties. Antimicrobial stewardship is currently in the spotlight as a means of improving antimicrobial use and controlling resistance. These results provide strong impetus for multi-disciplinary efforts to optimise surgical prophylaxis, particularly with respect to duration and antimicrobial agent. Options and directions for healthcare system SAP change will be discussed.

References


INITIAT-E.D: The Impact of appropriate timing for INITIation of anti-infective therapy in patients presenting to the Emergency Department

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Objectives: Although sepsis is recognised to be associated with high mortality and morbidity, mortality rates remain high and the importance of acute management is often underestimated. The timing and appropriateness of antimicrobial agents is often used as a key performance indicator for sepsis management. In practice there are few existing studies that support this recommendation. This study aimed to provide an antibiotic treatment profile of all septic patients presenting to the Emergency Department (ED) and to determine the impact of delayed therapy on patient outcomes.

Methods: A retrospective observational study was undertaken to identify patients presenting to the ED with sepsis. Patients were stratified as having either uncomplicated or severe sepsis depending on laboratory and observational findings at presentation. An analysis of outcomes associated with delay to initial antibiotics was performed on patient sub groups of sepsis severity and admission to the Intensive and Critical Care Unit (ICCU).

Results: The median time to initial antibiotics was 229 minutes for uncomplicated sepsis and 168 minutes for severe sepsis. The in-hospital mortality rate was 28.6%. This differed significantly between uncomplicated sepsis and severe sepsis (16.8% vs 38.7%; p<0.001). There was no significant association between delay in antibiotics and initial antibiotic administration for uncomplicated sepsis and non-ICCU severe sepsis. Severe sepsis patients admitted to ICCU had a significant difference in mortality when antibiotics were administered within 3 hours (mortality 23.3% vs 57.1%; p=0.009). The time from triage to medical officer review accounted for 15% of delay whilst the remaining 85% was attributed to subsequent prescribing and administration processes. Patients who were not prescribed a ‘stat’ initial dose of antibiotics experienced a significantly increased delay to initial antibiotics (581.5mins vs 179.5mins; p<0.001).

Conclusions: All patients experienced delay to initial antibiotic administration; however a direct relationship with mortality was demonstrated only in ICCU patients with severe sepsis. Interventions are required to improve the diagnosis and risk stratification of septic patients and overcome various specific barriers present in the ED. This will enable clinicians to more appropriately assess the acutely unwell septic patient and initiate treatment to decrease the high mortality rates associated with severe sepsis.
The use of palivizumab for prevention of respiratory syncytial virus (RSV) in a regional hospital in Australia

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Objectives: To audit the use of palivizumab for prevention of RSV in high-risk infants according to local regional guidelines (Table 1).

Methods: Patients prescribed palivizumab were identified by pharmacy dispensing records from January 1st 2006 until July 22nd 2013. Patients admitted to hospital between January 1st 2006 and June 30th 2013 with a principal or additional diagnosis RSV infection were identified by a coding report. Data extracted from medical records included; gestational age at birth, circumstances of birth and birthing complications, the use of artificial ventilation including type and duration, the use and duration of home oxygen, the presence of neonatal chronic lung disease, cyanotic heart disease and other comorbidities, age at initial treatment, month of the year treatment commenced, the number of doses administered and laboratory evidence of RSV infection. Data extracted was compared to local eligibility criteria (Table 1).

Results: A total of 49 patients were immunised and 23 patients (47%) met local eligibility criteria. 18 met criteria one, 4 met criteria two and one met both criteria. 23 patients (47%) who were immunised did not meet eligibility criteria, and three patients (6%) were undeterminable due to incomplete documentation.

There were 121 admissions among 116 patients due to RSV. Two patients were excluded as they had adult onset RSV. Of 114 patients, 108 (93%) were ineligible for palivizumab immunisation and eligibility was undetermined for four patients (3%). Two admitted patients (2%) met eligibility criteria and did not receive palivizumab and two patients (2%) received palivizumab but did not meet eligibility criteria.

Conclusion: This review of the use of palivizumab has revealed poor adherence to local guidelines. Local criteria are more limited when compared with other Australian and international guidelines. Existing guidelines show wide variation in inclusion criteria, due to the high cost of immunisation, inconsistency of cost-benefit studies and emerging evidence regarding use of palivizumab in other populations. Given these uncertainties, the authors suggest alteration of local eligibility criteria and use of a committee to assess palivizumab use on a case-by-case basis.

Table 1: Local eligibility criteria for use of palivizumab

<table>
<thead>
<tr>
<th>Criteria 1 (Four components)</th>
<th>Babies less than 32 weeks gestation, with chronic lung disease requiring more than 80 days of oxygen and 3 weeks on an artificial ventilator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria 2</td>
<td>Babies with severe cyanotic chronic heart disease that are deemed extremely high risk of death</td>
</tr>
</tbody>
</table>
Trimethoprim-sulfamethoxazole oral desensitisation – Experience with a novel rapid protocol

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2 University of Queensland, Brisbane, QLD, Australia

Objectives: Trimethoprim-sulfamethoxazole (SXT) is widely accepted as the agent of choice for prophylaxis and treatment of Pneumocystis jirovecii pneumonia (PJP). Selected patients with hypersensitivity reactions to sulfonamide antimicrobials may tolerate the agent after an inpatient desensitisation schedule however conventional protocols typically last several days. A novel rapid protocol devised to limit length of stay was introduced at Princess Alexandra Hospital (PAH) and subsequently audited to ascertain the safety and efficacy of this approach.

Methods: A rapid 18-dose, 15 minute interval oral SXT desensitization protocol was implemented at PAH in 2010 in a collaborative approach by infectious diseases, immunology and pharmacy. Patients undertaking this schedule between 2010 and 2013 were prospectively identified and retrospectively audited by means of chart review. Data was collected to evaluate process logistics, appropriateness of patient selection, tolerability and success of the new regimen.

Results: Thirty-four patients undertook the rapid oral SXT protocol as part of their existing inpatient stay or by specific admission for desensitisation. Protocol SXT doses were manufactured on the day by a pair of pharmacists experienced in extemporaneous compounding. All SXT was indicated for prophylaxis (94%) or treatment (6%) of PJP with the majority of patients (79%) being immunosuppressed following renal transplantation. Prior hypersensitivity reactions were categorised as Type I (59%), rash (26%) and unclear (12%) with the main precipitating agents being identified as a sulfonamide antibiotic (44%) or a ‘sulfur’ drug (44%). All 34 patients (100%) completed the rapid dosing schedule and continued to maintenance therapy. Five patients (15%) had documented mild reactions, some of whom required paracetamol, metoclopramide or loratidine.

Conclusion: Successful SXT desensitisation protocols rely on collaboration with Infectious Diseases, Immunology and Pharmacy departments. There are inherent difficulties in ascertaining an accurate history of sulfonamide antibiotic hypersensitivity which has implications when assessing both the safety and efficacy of any desensitisation regimen. In our experience, a rapid 18-dose oral SXT desensitisation protocol has so far been safe and effective at PAH and represents a useful method to allow patients with a prior history of such intolerances to successfully undertake prophylaxis or treatment with this important agent.
Antimicrobial Stewardship...taking Standard action

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Objectives: To review progress and learnings from the national implementation of Criterion 3.14 - Antimicrobial Stewardship (AMS), as part of the National Safety and Quality Health Service (NSQHS) Standards

Methods: AMS programs have been developed in response to an urgent need to address antimicrobial resistance. They are considered a key safety and quality strategy to prevent the emergence of antimicrobial resistance. The NSQHS Standards were developed to drive implementation of safety and quality strategies within health service organisations. AMS is included within the Standards under Standard 3, and is a key requirement for health service organisations implementing these. Activities and resources to support implementation include guides and workbooks, an advice line service and workshops in major cities in all jurisdictions. Review has incorporated analysis of feedback forms and discussion points from 20 workshops and a review of AMS related queries received via the advice line service during 2013.

Results: Over 300 participants from a range of health care settings have currently attended workshops and provided feedback. AMS was rated as one of the three most useful topics in the workshops, and identified as one of the most difficult aspects of implementing Standard 3. Common challenges in implementing AMS included gaining executive support, clinician engagement, and having necessary resources to undertake essential stewardship activities such as audit and feedback. There was little variation between jurisdictions or settings. Advice line queries received for AMS were commonly from day procedure services. Similar to workshop feedback, advice line queries focussed on clinician engagement and questions regarding relevance of AMS to day procedure practice.

Conclusions: This review provides insight into challenges associated with implementation of AMS; these were similar across jurisdictions and settings. This learning has implications for national program work as well as front line executive and clinical leaders. Executive leadership and clinician engagement is recognised as essential to effective implementation of AMS yet these have been frequently cited challenges. While progress has been made with 148 organisations currently meeting accreditation requirements for AMS, our experience suggests there is still work to be done to engage key stakeholders in this patient safety strategy.
PP14
Perceptions about Antibiotic Resistance and Antimicrobial Stewardship initiatives in Residential Aged Care Facilities

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⁷Department of Infectious Diseases, Barwon Health, Geelong, Victoria, Australia
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⁹Department of Infectious Diseases, Alfred Health, Melbourne, Victoria, Australia
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¹¹Department of Microbiology, Monash University, Melbourne, Victoria, Australia
†Joint senior authors

Objectives: To explore the perceptions, knowledge and attitudes of key healthcare providers towards antibiotic resistance and the need for antimicrobial stewardship (AMS) in residential aged care facilities (RACFs).

Methods: This study was undertaken in high-level care RACFs affiliated with four major public healthcare networks in Victoria, and was conducted between December 2012 and July 2013. Semi-structured interviews and focus groups were carried out with key RACF healthcare providers until saturation of themes was achieved. Participants were recruited using purposive and snowball sampling, and the framework approach was applied for data analysis.

Results: A total of 40 nurses, 15 general practitioners (GPs) and 6 pharmacists from 12 RACFs were recruited for participation. Four major themes emerged from the interviews and focus groups: perceptions of antibiotic resistance, attitude to and understanding of AMS, perceived barriers to and facilitators of AMS implementation, and feasible AMS interventions. Knowledge about multidrug-resistant (MDR) organisms was generally limited to methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE), few participants were aware about MDR Gram-negative organisms. Antibiotic resistance was mainly perceived as an issue for infection control rather than impacting antibiotic prescribing decisions. Likewise, awareness of AMS as a concept was lacking among participants, especially among nursing staff. All key stakeholders were supportive of AMS implementation in RACFs; however, several barriers related to workload and logistical issues were raised. A range of practical AMS interventions were recommended, with nursing-based education, aged-care specific antibiotic guidelines and routine antibiotic surveillance deemed both most useful and most urgently needed.

Conclusions: Concern about the clinical impact of antibiotic resistance was generally lacking in the RACFs that were studied. Importantly, information gathered about feasibility, barriers and facilitators of various AMS interventions will provide important insights to guide development of AMS programs in the Australian RACF setting.
Antimicrobial Stewardship Rounds: Ten years on – do they still listen to our advice?

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Objectives: To compare the adherence to advice provided on antimicrobial stewardship rounds on inception of the Antimicrobial Stewardship Programme (ASP) at Royal Perth Hospital (RPH) with that provided more recently on the service.

Methods: A post-prescribing stewardship round has been in place since the RPH ASP was initiated in 2004. Patients receiving approval for restricted antimicrobials are entered into the Restricted Antimicrobials Database. Brief clinical details along with a suggested review date are provided. Patients are then reviewed on the stewardship round by the Infectious Diseases (ID) pharmacist and Clinical Microbiologist/ID physician or Advanced trainee and recommendations are made with regard to their antimicrobial therapy. The adherence to advice was measured after medical notes review. Cost savings per patient were calculated based on antibiotic acquisition costs and estimated reduced length of stay. Results for 2004 and 2005 were compared with data from 2011 to 2013.

Results: The percentage acceptance of advice provided on ASP Rounds is summarised below (see table). A high level of adherence to advice has been maintained through the duration of the ASP to date. Despite the fall in price with the end of patent life of some broad antimicrobials, and an increase in the cost of some narrow spectrum agents, significant cost savings continue to be generated from the ASP Rounds.

Table: Percentage adherence to advice and cost savings provided on ASP Round by year

<table>
<thead>
<tr>
<th>Advice % adherence</th>
<th>2004</th>
<th>2005</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice</td>
<td>93.8</td>
<td>88.9</td>
<td>92.4</td>
<td>91.3</td>
<td>94.5</td>
</tr>
<tr>
<td>Dose</td>
<td>95.6</td>
<td>91</td>
<td>93.6</td>
<td>91.7</td>
<td>95.4</td>
</tr>
<tr>
<td>ID consult</td>
<td>58.5</td>
<td>80.5</td>
<td>88.6</td>
<td>64</td>
<td>75.9</td>
</tr>
<tr>
<td>PO switch</td>
<td>95.5</td>
<td>92</td>
<td>91.6</td>
<td>98.3</td>
<td>91</td>
</tr>
<tr>
<td>Order tests</td>
<td>84.9</td>
<td>72.6</td>
<td>70.1</td>
<td>50</td>
<td>75.9</td>
</tr>
<tr>
<td>Duration</td>
<td>74.7</td>
<td>63.8</td>
<td>72.2</td>
<td>69.6</td>
<td>71.2</td>
</tr>
<tr>
<td>Total</td>
<td>89.0</td>
<td>85.5</td>
<td>87.6</td>
<td>83.0</td>
<td>88.7</td>
</tr>
<tr>
<td>Saving/pt ($)</td>
<td>$122.44</td>
<td>$216.64</td>
<td>$199.09</td>
<td>N/A</td>
<td>$181.42</td>
</tr>
</tbody>
</table>

Conclusion: ASP Rounds continue to be well accepted at RPH and significant cost savings have been maintained.
Implementation of an Antimicrobial Stewardship Tool to Optimise Vancomycin Dosing at Launceston General Hospital

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Objectives: To audit initial dose and attainment of target vancomycin trough levels at 72 hours in all adult patients prescribed vancomycin at LGH during a 6 month period.

To develop an electronic tool to assist prescribers with appropriate vancomycin dosing.

Methods: We identified all inpatients prescribed vancomycin from 1 January - 30 June 2013. Medical records and pathology results were reviewed to determine key patient factors, initial starting doses of vancomycin and results from therapeutic drug monitoring.

Exclusion criteria: stat doses, <72hrs therapy, patients receiving renal replacement therapy and continuous vancomycin infusions.

Results: 89 patients were identified, 43 were included and 46 were excluded. 49% were given a loading dose. Almost half (42%) were prescribed an initial vancomycin dose of 1g despite a wide range of recorded weights. Only 21% achieved target vancomycin trough levels of 15-20mg/L by 72 hours of therapy. Furthermore, dosing was occurring throughout the day and night, determined by the timing of the first dose. Serum level monitoring was poorly coordinated with dosing times.

The LGH Antimicrobial Stewardship Team (LAST) developed a vancomycin dosing calculator using MS® Excel, to calculate the loading dose and subsequent maintenance doses based on TG Antibiotic (2010) and the IDSA Vancomycin Guidelines (2009).

The prescriber inputs patient age, weight, gender and serum creatinine, and the calculator returns a weight based loading dose which is time adjusted to allow the calculated maintenance doses to be administered at 08:00 and 20:00 hours for twice daily dosing. Timing of the first trough level is also recommended (Figure 1).

Conclusion: The LAST adult vancomycin dose calculator was launched on the hospital intranet during Antibiotic Awareness Week 2013. A comprehensive education package was produced to train medical, pharmacy and nursing staff in the use of the tool with the standardised administration times.

A follow up audit will be carried out in early 2014.
PP17

Optimising Management of Bacteraemia through Antimicrobial Stewardship

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Background: Sepsis from blood stream infections results in significant morbidity and mortality. Keys to optimising management of blood stream infections include initial time to antibiotics, appropriate empiric choice of antibiotics, early appropriate IV to oral switch and subsequent early safe discharge from hospital. There is evidence in the literature that management of blood stream infections can be a cost effective part of an Antimicrobial Stewardship Program.

Objective: The aim was to evaluate appropriateness of empiric therapy, average duration of antibiotic therapy and the associated costs on health care delivery with an AMS Program versus a similar time period in the previous year where there was no formal AMS Program in place. As part of the AMS program, Metro South Prescribing Guidelines and Formulary Restrictions were launched in November 2012. Intern and Registrar Orientation Programs in late January / early February 2013 as well as in August 2013 included education on the availability of the Prescribing Guidelines and Formulary Restrictions.

Methods: Formal bacteraemia management rounds were commenced in June-July 2013 as part of the AMS Program. This consisted of following up all positive blood cultures to ensure appropriate choice of antibiotics and to recommend early IV to oral switch where appropriate.

Retrospective chart reviews were done for the time period between June-July 2012 and June-July 2013. Paediatric patients and isolates that were deemed to be contaminants were excluded. A total of 33 patients were included for June-July 2012 and 39 patients for June-July 2013.

Results: Empiric antibiotic usage has improved from 15% to 38% between the two time periods. The average cost of antimicrobials used during this period had reduced by about 24%, from $90 to $68. There was also earlier switching from IV to oral antibiotics. What was not expected was the reduction on the length of stay from 15 days to 10 days, resulting in considerable cost savings.

Conclusion: Bacteraemia rounds is a cost effective part of our AMS Program.
Antifungal stewardship in a haematology transplant unit

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2 The University of Sydney, Sydney, NSW, Australia

Objectives: Invasive fungal infections (IFIs) are a significant cause of morbidity and mortality in haematology patients. Due to deficiencies in diagnostic strategies and poor outcomes with delayed therapy, many units have implemented antifungal prophylaxis in high risk hematology patients. We sought to characterise our antifungal stewardship program in a unit that predominantly uses itraconazole for prophylaxis.

Methods: We identified all patients between January 2004 and December 2012 who received a restricted antifungal (captured through pharmacy dispensing data) which include all second generation azoles, echinocandins or amphotericin. To identify the reasons for use, the medical records were reviewed with IFIs categorised using standard EORTC/MSG definitions. Antifungal usage and ward activity was determined using WHO daily defined doses (DDD) and bed occupied days (BOD) respectively.

Results: During the period, up to 78% of courses of prophylaxis (usage 3089 DDD/year) was used in acute myelogenous leukaemia and allogeneic stem cell transplant patients (average 2755 BOD/year). The remaining prescriptions were for non-traditional risk groups. Empiric antifungal therapy (EAFT) and definitive treatment (DT) represented 21% of total antifungal usage in 4.3% of the total hematology inpatient population. A restricted antifungal was commenced in 169 episodes for a suspected invasive fungal infection. Of these 53 (31%) episodes had an alternative diagnosis, 48 (28%) had a possible IFIs and 71 (41%) had probable or definite IFIs. Duration of EAFT varied widely from 18 to 60 days with more than half of patients receiving antifungal therapy for >10 days post-resolution of neutropaenia and after diagnostic investigations. Conversely, DT durations were suboptimal (<60 days) in 30% of patients with an IFI.

Conclusions: In a busy transplant hematology unit the majority of all antifungal usage was appropriate. Further improvements are possible to optimise the complexities of antifungal usage and should be aimed at post agent initiation steps. This data has informed further strategies that could improve antifungal stewardship within current resources and should focus on duration/cessation of EAFT and DT.
Which isolates do we need to send for van A/B PCR? A comparison of Vitek®2 susceptibility results against van A/van B gene PCR to detect vancomycin-resistant enterococci (VRE)

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Objectives: To assess the reliability of Vitek®2 (VT2) antimicrobial susceptibility testing (AST) results to predict the presence of VRE in clinical and screening isolates in comparison to a reference van A/B gene PCR method.

Methods: In our laboratory, we routinely perform van A/B PCR on enterococci from blood cultures and sterile sites (any vancomycin MIC), other clinical isolates from hospital patients with VT2 vancomycin MIC >= 1, enterococci growing on chromogenic VRE medium, and others at discretion of the clinical microbiologist. Two PCR kits were used, the Roche Lightcycler® VRE Detection assay and the Ausdiagnostics Gram positive 12 assay.

We conducted a retrospective audit of all enterococci with van A/B PCR results from 1/1/13 to 30/9/13, and compared them with VT2 AST results (software version 06.01).

Results: 682 van A/B PCRs were performed, 171 excluded due to insufficient data.

Of 511 isolates with complete data, 385 (75%) were E. faecium and 124 (25%) were E. faecalis. 50% were screening specimens, and 50% were clinical specimens (77 blood cultures, 107 urine cultures, 71 wound cultures/sterile sites).

17 isolates (3.3%) had van A detected (all E. faecium), 329 (64.4%) had van B detected (319 E. faecium, 9 E. faecalis, 1 not speciated), 4 (0.8%) had both van A and B detected (all E. faecium), and 161 (31.5%) were van gene negative.

VT2 AST results correlated with van A/B PCR results for 503/511 (98.4%) of isolates. Major errors occurred with van B detection at low vancomycin MICs (4 at MIC <=0.5ug/ml, 6 at MIC=1ug/ml, van B detected in 8.1% of isolates with VT vancomycin MIC <=1ug/ml). One other major error occurred (teicoplanin MIC >= 32ug/ml, no van genes detected), and 4 minor errors resulting in incorrect Van phenotype by VT2.

Conclusions: Overall, VT2 AST results correlated well with van A/B gene PCR results, although the prevalence of van B genes in E. faecium was underestimated. In our population, this confirms the need for further testing of all significant E. faecium isolates (for clinical or infection control purposes), regardless of VT2 vancomycin MIC.
PP20
Rapid time to results for Carba NP test from early culture growth associated with improved sensitivity for detection of carbapenemase producers among Carbapenem non-susceptible gram-negative bacilli

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Objectives: The worldwide emergence of carbapenem-resistant organisms has been associated with the increased use of carbapenems. The early detection of these organisms is imperative for appropriate patient management, infection control and antimicrobial stewardship. Routine laboratory detection techniques and gold standard PCR methods are time consuming. The recently described Carba NP test allows for phenotypic detection of carbapenemase producing organisms (CPO) and requires 18-24 hours of incubation. The aim of this study is to determine the optimal conditions for the Carba NP test which would allow for the most rapid detection of CPO.

Methods: One hundred and twenty seven organisms suspected of harbouring a carbapenemase were inoculated onto horse blood agar(HBA), MacConkey agar(MAC) and ChromID® CARBA agar, then incubated in air and 5% CO₂. The Carba NP test was performed in triplicate on separate days in a blinded fashion on every isolate from each of the media after 5 hours and 18-24 hours of incubation and 2-3 weeks of storage at 4°C. Carba NP results were compared with PCR results.

Results: Of the 34 CPO(bla IMP, bla KPC, bla NDM, bla OXA, bla VIM) 26 were positive by Carba NP from 5 hour old isolates from HBA, MAC and ChromID® CARBA a (sensitivity 76%, specificity 100%, p<0.0001). From the 18-24 hour cultures, 24 CPO were positive from HBA; neither NDM isolates were positive, 19 and 26 CPO were Carba NP positive from MAC and ChromID® CARBA respectively. OXA-23-like/OXA-51-like, OXA 23 and OXA 24 producers were Carba NP negative regardless of culture age or media. None of the non-carbapenemase producing organisms were positive by the Carba NP test.

Conclusions: The Carba NP test is a rapid, inexpensive, and highly specific test for the presence of CPO. Testing from MAC is unreliable. In our study, with the exception of OXA-producing A. baumanii complex organisms, the Carba NP test was able to detect 100% of CPOs from 5 hour old cultures resulting in increased test sensitivity compared to testing 18-24 hour old cultures. This improved turnaround time would mean that the Carba NP can be incorporated into a single day’s workflow and facilitate timely patient care and infection control.

Summary table of Carba NP test positive results for carbapenemase producing organisms

<table>
<thead>
<tr>
<th>Media</th>
<th>Duration of culture incubation (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>HBA</td>
<td>26/34</td>
</tr>
<tr>
<td>MAC</td>
<td>26/34</td>
</tr>
<tr>
<td>ChromID® CARBA</td>
<td>26/34</td>
</tr>
</tbody>
</table>
PP21
Phenotypic detection of carbapenemase producing Gram negative bacilli: Which method is better?

*Janet Montgomery, Frances Hurren & Jenny Wang

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Objective: Carbapenem resistance in Gram negative bacilli (CGNB) is increasingly reported worldwide. They cause therapeutic failures and rapid laboratory detection is of major importance. The study compared phenotypic tests, for accurate and rapid screening methods, for detection of these enzymes in clinically significant isolates.

Method: 105 isolates recovered from storage, 66 were Enterobacteriaceae, 9 Acinetobacter baumannii and 30 Pseudomonas aeruginosa. Fifty two were PCR positive for IMP, VIM, KPC, NDM, OXA-23-like (8), OXA-24-like (1), OXA-48-like (1) or OXA-51-like (1) genes. The PCR positive organisms were: IMP K. pneumoniae (6), S. marcescens (5), C. freundii (3), E. coli (2), E. cloacae (2) and Ps. aeruginosa (2); VIM were P. aeruginosa (3) and one Pr. mirabilis KPC’s were K. pneumoniae (11) and 1 E. coli; NDM’s were K. pneumoniae (2), one E. coli and one M. morganii; The one AIM was Ps. aeruginosa OXA-23 A. baumannii (8), OXA-24 A. baumannii, OXA-51 was E. coli. The phenotypic screens studied were Carba NP test (CNP), Modified Hodge Test (MHT), Metallo-ß-lactamase screen using EDTA (MBL) and the chromogenic agars chromID ESBL (ESBL), chromID Carba (CARBA) and brilliance CRE (CRE). OXA-like organisms had CNP test modified with heavier inoculum.

Results: The results are shown in the table. The modified CNP test did not improve detection of OXA-like.

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Number</th>
<th>CNP (Excluding OXA)</th>
<th>MHT</th>
<th>MBL</th>
<th>ESBL</th>
<th>CARBA</th>
<th>CRE</th>
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</thead>
<tbody>
<tr>
<td>OXA</td>
<td>11</td>
<td>0</td>
<td>7</td>
<td>-</td>
<td>11</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>KPC</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>-</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>NDM</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>IMP</td>
<td>20</td>
<td>19</td>
<td>19</td>
<td>17</td>
<td>9</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>VIM</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>AIM</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total PCR positive</td>
<td>52</td>
<td>39/52</td>
<td>39/41</td>
<td>36/52</td>
<td>16/29</td>
<td>51/52</td>
<td>43/52</td>
</tr>
<tr>
<td>Total PCR negative</td>
<td>53</td>
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<td>7</td>
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<td>PPV</td>
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</tr>
<tr>
<td>NPV</td>
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<td>80.3</td>
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<td>85.5</td>
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</tbody>
</table>
Conclusion: CGNB detected by PCR were not comprehensive in this study. The chromID ESBL detected most isolates but had poor specificity. CNP had excellent specificity but poorer sensitivity, was improved when OXA-like CGNB were excluded from analysis. In a routine laboratory where PCR is not readily available no one phenotypic method will detect all CGNB. An acceptable screen would include the chromID ESBL and CNP. Awareness of local susceptibility patterns will also aid in detection of these organisms and the requirement for further testing.

* ASA Travel Award
Xpert MRSA/SA Blood Culture assay is a rapid and robust diagnostic tool in Staphylococcus aureus bacteremia

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Objectives: Staphylococcus aureus bacteremia (SAB) is a significant cause of morbidity and mortality in hospitalised patients. The clinical outcome of patients with SAB is dependent on several factors, however rapid administration of appropriate anti-staphylococcal antibiotic therapy is vital. This relies on rapid identification of microorganisms and availability of susceptibility results. We evaluated the Xpert MRSA/SA BC assay to identify Staphylococcus aureus (SA) and methicillin-resistant Staphylococcus aureus (MRSA) in blood culture (BC) broth rapidly.

Methods: The Xpert MRSA/SA BC assay is a qualitative, in vitro diagnostic test that detects staphylococcal protein A (spa), gene for methicillin resistance (mecA) and the staphylococcal cassette chromosome mec (SCC mec) inserted into the SA chromosomal attB site directly from the BC broth. We performed 74 assays on non-duplicate BC broth specimens during office hours that had clustered Gram positive cocci on Gram staining. 4 were spiked cultures from stored isolates and 2 were hip joint aspirates in BC bottles. Of the 74 SA specimens, 69 had been directly identified from BC broth as SA by MALDI-TOF by a rapid method.

Results: The Xpert MRSA/SA assay correctly identified 74/74 of the SA (100%), 13/13 (100%) of MRSA. 1 mixed culture of SA and CNS was identified as a SA. Mixed cultures with SA/MRSA or CNS/MRSA were not present in our study. Compared to using traditional microbiology methods which took up to 18-36 hours, results were available within 4 hours in 75% of cases. A patient who had MSSA by phenotypic tests was identified to carry the mecA gene by the assay and this was confirmed by next generation sequencing.

Conclusion: Our study highlights the utility and efficacy of Xpert MRSA/SA BC assay in the rapid identification and susceptibility testing of SAB. We also identified patients who were not deemed at risk for SA/MRSA infections based on their risk factor profile who have benefited from this test. Early de-escalation of empirical Vancomycin therapy was an added benefit in patients who were identified to have MSSA bacteremia. This is a significant improvement in the provision of early, directed therapy for SAB.
PO1.1.
Carba-NP followed by real-time PCR for rapid identification of endemic IMP-4 type carbapenemases in Western Australia

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Objectives: Carbapenemases have emerged as a major health-care challenge. Rapid identification of carbapenemase production is crucial to implementing effective infection control measures. IMP4 carbapenemases are endemic in Western Australia, accounting for 77% of all carbapenemase producing Enterobacteriaceae (CPE) since 2009. Identification of IMP4 production via phenotypic antibiograms can be challenging as these CPE exhibit minimum inhibitory concentrations below the resistance threshold. We compared the performance of two selective agar media, the carbaNP test and a real-time PCR for identification of IMP4 production.

Methods: A total of 43 isolates, previously identified as IMP carbapenemase producers, were inoculated on Brilliance™ CRE Agar (Oxoid) and ESBL ChromID 43481 Agar (Biomerieux), assayed using the newly described Carba-NP test, and subjected to an in house real-time IMP4 specific PCR. Twenty isolates harbouring a range of other carbapenemase types, including IMP7, were also tested by the IMP4 PCR to ascertain the specificity of this assay.

Results: Eight out of the 43 IMP4 CPE isolates failed to grow on either or both of the screening agar media, while all 43 isolates were carbaNP and IMP4 PCR positive. Ten IMP4 PCR positive isolates were sequenced to confirm their genotype. The 20 non-IMP4 isolates were negative in the IMP4-PCR assay.

Conclusion: Identification of highly transmissible resistance mechanisms like carbapenemase production in a health-care setting has significant infection control implications. Rapid screening for carbapenemases by carbaNP followed by IMP4 specific PCR can ensure rapid screening and identification of IMP4 harbouring CPE known to be endemic in the Western Australian population.
**PO1.2.**

**Comparison of carbapenem MICs using different methods for KPC-producing *Escherichia coli* and *Klebsiella pneumoniae* isolates**

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**Objectives:** This study was undertaken to compare Etest, Vitek 2 and disk diffusion with the gold standard broth microdilution (BMD) for the accurate detection of meropenem resistance. This followed discordant MIC values for a clinical isolate in our laboratory using Vitek 2, Etest and disk diffusion methods. We also looked at the effect on meropenem MIC following repeated subculturing and freeze/thaw cycles on isolates containing bla\textsubscript{KPC}.

**Methods:** Nine *K. pneumoniae*, nine *E. coli* isolates from a patient with KPC producing organisms and quality control strains were tested by BMD, Etest (Biomerieux Inc), Vitek 2 AST-N246 (Biomerieux Inc) and disk diffusion (Oxoid). BMD was performed according to CLSI standards using cation adjusted Muller-Hinton broth. The BMD MIC test range was 0.125 μg/ml to 32 μg/ml. *Pseudomonas aeruginosa* ATCC 27853 was used as the quality control strain for BMD and *E. coli* ATCC 25922 was used for Etest and disk quality control. All isolates were tested using an in-house multiplex PCR for the following resistance genes bla\textsubscript{KPC}, bla\textsubscript{IMP}, bla\textsubscript{NDM}, bla\textsubscript{VIM} and bla\textsubscript{OXA-48}.

**Results:** Results were interpreted in accordance with 2013 CLSI guidelines and represented in the table below.

<table>
<thead>
<tr>
<th>Testing method</th>
<th>Susceptible</th>
<th>Intermediate</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMD</td>
<td>5 (27.8)</td>
<td>2 (11.1)</td>
<td>11 (61.1)</td>
</tr>
<tr>
<td>Vitek 2</td>
<td>4 (22.2)</td>
<td>0 (0.0)</td>
<td>14 (77.8)</td>
</tr>
<tr>
<td>Etest Meropenem</td>
<td>13 (72.2)</td>
<td>3 (16.8)</td>
<td>2 (11.1)</td>
</tr>
<tr>
<td>Etest Ertapenem</td>
<td>5 (27.8)</td>
<td>7 (38.9)</td>
<td>6 (33.3)</td>
</tr>
<tr>
<td>Disk Meropenem</td>
<td>4 (22.2)</td>
<td>6 (33.3)</td>
<td>8 (44.4)</td>
</tr>
<tr>
<td>Disk Ertapenem</td>
<td>4 (44.4)</td>
<td>1 (5.6)</td>
<td>13 (72.2)</td>
</tr>
</tbody>
</table>

In a comparison of Vitek 2 results and BMD, results for susceptible and non-susceptible organisms agreed for 94.4% of isolates. In a comparison of MICs between meropenem Etest and BMD, Etest results agreed with BMD results for only 50% of isolates. Similar results were observed when comparing meropenem disk diffusion with BMD. Significantly improved agreement was observed when comparing ertapenem Etest and disk with BMD and PCR, 94.4% and 100% respectively.

The effect of repeated subculture and subsequent freeze/thaw cycles on the KPC positive isolates did not alter the BMD MICs, all isolates produced results within a two-fold dilution of the original results observed.

**Conclusions:** The use of Vitek 2 demonstrated the greatest agreement with BMD. In this study a significant variation in meropenem MICs by Etest (0.125 μg/ml to 16 μg/ml) was observed among the KPC-producing isolates. The stability of the meropenem MIC was demonstrated following repeated subculture and subsequent freeze/thaw cycles. Although this study was limited, focusing on isolates from a single patient, it highlighted the imperative to understand the limitations of the various methods available for determining the meropenem MIC values of these organisms.
PO1.3. Accuracy of susceptibility test methods for detection of meropenem resistance in Gram negative bacilli

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Objective: One of the most important activities in a clinical microbiology laboratory is antimicrobial susceptibility testing. The increasing isolation of multi-drug resistant Gram-Negative Bacilli has lead to the increasing use of carbapenems for therapy. This study compared a number of routine methods for the detection of meropenem resistance in clinical isolates of Gram-Negative Bacilli.

Method: Of 105 isolates recovered from -80°C storage, 66 were Enterobacteriaceae, 9 Acinetobacter baumannii and 30 Pseudomonas aeruginosa. Fifty two were PCR positive for IMP, VIM, NDM, OXA-23-like, OXA-24-like, OXA-48-like or OXA-51-like. The PCR positive organisms were: IMP K. pneumoniae (6), S. marcescens (5), C. freundii (3), E. coli (2), E. cloacae (2) and Ps. aeruginosa (2); VIM were P. aeruginosa (3) and one Pr. mirabilis; KPC’s were K. pneumoniae (11) and 1 E. coli. NDM’s were K. pneumoniae (2), one E. coli and one M. morganii; OXA-23 A. baumannii (8); OXA-24 A. baumannii, OXA-51 was E. coli.

Micro Broth Dilution (MBD), Vitek-2 AST-N247 (V2), Phoenix NMIC-203; Etest (ET) and Disc (D) methods of phenotypic meropenem susceptibility testing were compared with the gold standard MBD. Results were interpreted according Clinical Laboratory Standards Institute M100 S23 2013 performance standards.

Results: Results are listed in the following table. Compared with MBD, there were 10 very major errors using Phoenix and three with Etest. None occurred with V2 or disc methods. Minor errors occurred with one Phoenix, four Vitek, 3 Etest and 6 disc test results.

<table>
<thead>
<tr>
<th>Susceptible isolates N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme</td>
</tr>
<tr>
<td>OXA</td>
</tr>
<tr>
<td>KPC</td>
</tr>
<tr>
<td>NDM</td>
</tr>
<tr>
<td>IMP</td>
</tr>
<tr>
<td>VIM</td>
</tr>
<tr>
<td>AIM</td>
</tr>
<tr>
<td>PCR positive</td>
</tr>
<tr>
<td>PCR negative</td>
</tr>
</tbody>
</table>

Conclusion: Ten carbapenemase-producing GNB’s tested susceptible to meropenem using the gold standard MBD. More Very Major Errors occurred with Phoenix than with the other methods, while disc testing produced more Minor Errors than other methods. Phenotype was concordant with genotype of detected genes in 81% MBD, 90% V2, 62% Phoenix, 83% Etest and 91% of disc. While the enzymes detected by PCR in this study were not comprehensive for all CGNB, it is important to be aware that regardless of the method used CGNB can test susceptible, with further testing required.
PO1.4.
Detection of extended-spectrum Beta-lactamases (ESBLs) produced by *Acinetobacter baumannii* at local hospitals in Saudi Arabia

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*Acinetobacter* spp. especially *Acinetobacter baumannii* are common opportunistic pathogens in immunocompromised patients and currently cause major nosocomial infections in intensive care unit patients.

**Objectives:** In this study, we detected and characterized the nature of ESBL producers *Acinetobacter baumannii* by the phenotypic and genotypic techniques.

**Methods:** Extended-Spectrum Beta-Lactamases (ESBLs) in *Acinetobacter baumannii* were characterized by Vitek-2 system and real time PCR. A total of fifty isolates of *A. baumannii* were collected from Makkah holy city hospitals during pilgrimage journey where thousands of multinational visitors are admitted during a two week period. All microbiological samples were subjected to ESBL screening phenotypically and genotypically. The antibiotic susceptibility of *A. baumannii* isolates were determined by Vitek-2 system. Antimicrobial agents tested by Vitek 2 system included the expanded-spectrum (or third-generation) cephalosporins (eg, cefotaxime, ceftriaxone, ceftazidime) and monobactams (eg, aztreonam). Reported ESBL results were taken further to genotyping confirmation by real time PCR.

**Results:** Our data have indicated a high prevalence of *Acinetobacter baumannii* ESBL producers among all isolates. The genes that were reported in *Acinetobacter baumannii* isolates are the TEM, SHV and CTX-M.

**Conclusions:** The genotypic method has a higher specificity and sensitivity due to the detection of specific resistance genes in compare to the phenotypic method, and is suggested to be used concurrently with phenotypic for better detection and characterization ESBL producing strains of *Acinetobacter baumannii*. 
PO1.5.
Comparative evaluation of Broth Microdilution and Etest for Antimicrobial Susceptibility Testing of Nocardia species

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Objectives: In 2003 the CLSI published an approved standard for susceptibility testing of mycobacteria, Nocardia, and other aerobic actinomycetes, which specifies the broth microdilution (BM) method as the recommended procedure for susceptibility testing of aerobic actinomycetes. The aim of this study was to compare previously tested Etest results with the CLSI recommended method of BM on Nocardia in likelihood of adopting this method for future practice.

Methods: A total of 26 Nocardia isolates representing eight species previously identified by 16s rRNA sequence analysis were included in this study. The isolates were tested against ciprofloxacin, moxifloxacin, amikacin, cotrimoxazole and imipenem. The isolates were inoculated into BM RAPMYCOI (trek diagnostics) as per the manufacture’s instructions. The minimum inhibitory concentrations (MIC) were interpreted at 48 hours. Organisms exhibiting poor growth were incubated for additional 24 to 48 hours. The MIC was defined as the lowest concentration of antimicrobial agent to inhibit visible growth, with the exception of cotrimoxazole, where 80% inhibition was used as per CLSI guidelines. These results were compared to the expected antimicrobial susceptibility pattern (EASP) published by CLSI.

Results: All 26 isolates showed susceptibility to cotrimoxazole with both methods. Imipenem demonstrated expected results with all isolates. With the exception of *N. farcinca*, all isolates tested as expected to ciprofloxacin with both methods. All but two *N. transvalensis* complex isolates tested susceptible to amikacin by both methods, which is in agreement with CLSI EASP. Ceftriaxone demonstrated greatest discrepancy between the two methods. Only *N. brasilliensis* susceptibility patterns to minocycline have been described in the EASP, with both methods demonstrating discrepant results for this organism. There are no published EASPs for Nocardia susceptibility to moxifloxacin, however when compared, both methods produced dissimilar results.

Conclusion: When compared to the CLSI EASP, BM and Etest showed 100% correlation for cotrimoxazole, amikacin and imipenem. Major discrepancies were observed for moxifloxacin, ciprofloxacin ceftriaxone and minocycline between the two methods. The results from this study suggest that BM results marginally correlated better to CLSI EASP.
PO1.6.  
B-lactam Testing of *Staphylococcus lugdunensis* using the Vitek2 AST-P612 Card 

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**Objective:** To compare the performance of the Vitek2 penicillin MIC, oxacillin MIC and cefoxitin screen with CLSI penicillin and cefoxitin disc diffusion, β-lactamase detection and *mecA* PCR for clinical isolates of *Staphylococcus lugdunensis*. 

**Method:** From 1998-2009, 109 clinical isolates of *S. lugdunensis* were collected in Perth, Western Australia. Isolates were identified using Bruker MALDI Biotyper™. Susceptibility testing was performed by Vitek2 Compact (AST-P612). Penicillin (P10 IU) and cefoxitin (FOX30μg) disc testing was performed by Kirby-Bauer method and interpreted using CLSI M100-S23 guidelines. β-lactamase testing was performed using nitrocefin (cefinase™) discs. *mecA, nuc* and *pvl* gene detection was performed by multiplex PCR. 

**Results:** All isolates were cefoxitin susceptible by disc diffusion (Range: 26mm-37mm), Vitek2 cefoxitin screen negative and lacked the *mecA, nuc* and *pvl* genes. 12/109 (11%) isolates had a Vitek2 oxacillin MIC ≥4mg/L (Resistant). 31/109 (28%) isolates were penicillin resistant by disc diffusion (Range: 10mm-25mm), β-lactamase positive and had a Vitek2 penicillin MIC of ≥0.5mg/L (Resistant). 69/109 (72%) isolates were penicillin susceptible by disc diffusion (Range: 33mm-47mm) and β-lactamase negative. Of these, 63 (91%) had a Vitek2 penicillin MIC in the susceptible range (MIC ≤ 0.03-0.125 mg/L). 6/109 (6%) isolates were penicillin susceptible by disc diffusion (Range: 36-46 mm) but had a Vitek2 penicillin MIC of 0.25mg/L (Resistant). 

**Conclusions:** In this study, a Vitek2 oxacillin MIC of ≥4mg/L did not indicate the presence of *mecA* in *S. lugdunensis*. The Vitek2 cefoxitin screen reliably predicted the absence of *mecA*. A Vitek2 penicillin MIC of ≥0.5mg/L reliably predicted penicillin resistance. A Vitek2 penicillin MIC of 0.25mg/L did not correlate with penicillin resistance. A β-lactamase test is recommended to confirm the penicillin result. A Vitek2 penicillin MIC of ≤ 0.125mg/L reliably predicted penicillin susceptibility, however, more isolates require testing to determine if β-lactamase testing of these isolates is necessary.
PO1.7.
Characterisation of Multidrug Resistant *Staphylococcus epidermidis* isolated from clinical infections

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\(^2\)Department of Microbiology & Immunology, University of Melbourne, Victoria

**Objectives:** *Staphylococcus epidermidis* is an important cause of nosocomial infections, and while it is less pathogenic than *Staphylococcus aureus*, the tendency for multi-drug resistance can make treatment difficult. At Austin Health, an 800 bed teaching hospital in Melbourne, a multi-drug resistant *S. epidermidis* (MDRSE, including rifampicin and fusidic acid resistance) was isolated from the cerebrospinal fluid of a patient with a post-neurosurgical intracranial infection who was failing treatment with vancomycin. Additional cases of MDRSE were also isolated from unrelated patients. Given the previous association between rifampicin resistance and heterogeneous vancomycin-intermediate *S. aureus* (hVISA), we wondered if the MDRSE also had reduced susceptibility to vancomycin. The aims of this project were to determine if a clonal outbreak of MDRSE has been occurring at Austin Health, and if the rifampicin resistant strains are also more glycopeptide resistant.

**Methods:** The Austin Microbiology laboratory database was queried for all rifampicin and fusidic acid resistant *S. epidermidis* (MDRSE) isolates from blood cultures or sterile sites. Detailed susceptibility testing using Vitek 2, glycopeptide macromethod Etest, vancomycin population analysis profile (PAP), and pulsed field gel electrophoresis (PFGE) for clonality testing were performed on isolates from 2007 and 2012-2013. In addition to this, less resistant isolates were included as a comparator group.

**Results:** There were 26 MDRSE isolated in 2007 and 41 in 2012-2013. A subset of those which caused clinically significant infections were selected for additional testing and a number of non-MDRSE were also included as controls. There was significant variability in the antibiograms and comparison of MDRSE to non-MDRSE demonstrated no difference in glycopeptide susceptibility, however many isolates demonstrated PAP AUC ratios in the hVISA range. PFGE demonstrated that MDRSE strains were polyclonal; however some strains isolated in 2012-2013 were also present in 2007.

**Conclusion:** MDRSE has been present in our institution since at least 2007. The apparent outbreak of MDRSE at Austin Health was in fact polyclonal, and while these strains have vancomycin PAPs that would be consistent with hVISA in *S. aureus*, rifampicin and fusidic acid resistance did not appear to predict higher glycopeptide resistance.
Reducing the cost of MRSA screening by combining rapid phenotypic and genotypic methodologies

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Phenotypic methods for MRSA screening are typically relatively inexpensive but can be time consuming and protracted. Increased sensitivity can be achieved with the use of a selective enrichment broth pre culture, but this can extend time to result. Molecular methods are typically rapid, instrument-based, less labour intensive but tend to be more expensive than phenotypic methods.

The Alfred 60 is an automated broth culture system that is capable of detecting low levels of organism within 6.5 h. Typical positive cultures signal from 2 h, but a negative will take 6.5 h to result. A large part of screening is in clearing negative results as much as detecting positives. In patient populations with MRSA incidence of 10% or less, there is an advantage in low cost negative screening strategies as well as rapid detection of positive MRSA specimens.

We assessed the application of the Alfred 60 to MRSA screening, and compared it with our standard method of molecular screening using the BD Max (Becton Dickinson). All samples used in the comparison were also cultured onto agar plates as the “gold” standard and tested using the BD Max MRSA kit. Positive Alfred 60 screens were subcultured to determine the MRSA status of the specimens.

Clinical screening specimens were collected as liquid swabs and divided after vortexing, for testing as follows: Alfred 60 (500 μL), direct culture (200 μL) and BD Max MRSA (50 μL).

Initial results indicate that approximately 51% of samples processed through the Alfred 60 tested were positive for methicillin resistance. Of these, approximately 22% were confirmed as MRSA. Results are to be finalised and will be discussed in detail.
PO1.9.  
**Evaluation of rapid susceptibility testing on blood cultures using the Alfred60/AST Device**

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Centre for Infectious Diseases and Microbiology Laboratory Services, ICPMR, Westmead Hospital, Westmead, New South Wales, Australia.

**Introduction:** Early targeted antibiotic therapy in sepsis management impacts favorably on patient outcomes and reduces healthcare costs. The Alfred60/AST automated instrument (Alifax, Italy) provides customised macrobroth antimicrobial susceptibility testing (AST) directly from blood culture broths with results available in 4-6 hours. We evaluated the ability of this instrument to perform AST directly from positive blood culture bottles containing Gram-negative bacilli (GNB).

**Method:** The Alfred60/AST system was first challenged with “spiked” blood culture bottles containing 21 known multi-antibiotic-resistant Gram-negative bacilli (GNB). A CLSI GNB antibiotic panel (containing ampicillin, ceftriaxone, gentamicin, and meropenem) was used. Forty-seven routine clinical blood cultures flagging the presence of “GNB” were then tested with the same panel.

Results for GNB were compared with the Phoenix (BD) susceptibility system (from cultures). A very major error was if the Alfred60/AST labeled an isolate as sensitive to an antibiotic when the reference method reported it as resistant, and a major error was defined when results were noted “vice versa”. A minor error was defined as one method reporting “intermediate susceptibility” to an antibiotic when the other method labeled it as sensitive or resistant.

**Results:** All 21 “spiked” samples and 43/47 of the routine clinical blood cultures (91.5%) achieved results using the Alfred60/AST (Table 1). For “spiked samples, of the 84 antibiotics tested, 7/84 (8.3%) gave major/very major major errors whilst for clinical samples, of 72 antibiotics tested there were 4/172 (2.3%) major/very major errors.

Table 1:

<table>
<thead>
<tr>
<th></th>
<th>Insufficient growth (primary vial)</th>
<th>Very Major error (VME)</th>
<th>Major error (ME)</th>
<th>Minor error</th>
<th>Errors/Antibiotics tested</th>
<th>Concordance with Phoenix/disc diffusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiked GNB¹ (21)</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7/84 (8.3%)</td>
<td>91.7%</td>
</tr>
<tr>
<td>Clinical GNB² (47)</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>4/172 (2.3%)</td>
<td>97.7%</td>
</tr>
</tbody>
</table>

¹ Spiked GNB: VME ceftriaxone (2) gentamicin (1), ME gentamicin (1) meropenem (3)
² Clinical GNB: VME ceftriaxone (1) ME gentamicin (3)

**Conclusion:** Although only small numbers of samples were tested, the application of direct AST analysis from blood culture bottles appears useful, providing susceptibility results earlier than conventional methods. Susceptibility results are promising, however, with 4 very major errors with potential clinical consequences requires further evaluation.
PO1.10.
Evaluation of Bruker MALDITOF MS at The Royal Melbourne Hospital Microbiology Department

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_Melbourne Health, Microbiology Department Parkville, VIC_

**Objectives:** To evaluate identification of clinical isolates using Bruker Matrix Assisted Laser Desorption Ionisation Time of Flight Mass Spectrometry (MALDI-TOF MS) and compare this with previously established methods. These included phenotypic methods and for more difficult organisms, 16S RNA sequencing.

**Method:** A total of 730 clinical isolates were identified using previously established methods and the MALDITOF MS. Of these, 569 were common pathogens isolated in the laboratory.

16S RNA sequencing analysis or other phenotypic methods were used to resolve discordant results.

109 ATCC strains of various bacteria and yeasts were identified via the MALDI-TOF MS.

**Results:** For the 730 isolates tested, there was 97% agreement between the previous identification methods and the MALDITOF MS.

For the 569 commonly isolated pathogens there was 99% agreement.

There were 9 isolates for which the MALDITOF gave no reliable identification (ID):

- Six were identified to the genus level using 16S RNA sequencing: *Clostridium sp* (1), *Actinomyces sp* (1), *Leptotrichia sp* (1), *Fusobacterium sp* (1), *Paenibacillus sp* (2).

- Three were identified to the species level by 16S RNA sequencing: *Micrococcus flavus* (1), *Odoribacter splanchnicus* and *Propionibacterium propionicum*.

There were 9 discrepant results; for 8 of these 16S RNA sequencing agreed with the MALDI-TOF identification.

Two isolates gave no peaks with the MALDITOF:

- One was identified as *Corynebacterium tuberculostearicum* by 16S RNA sequencing and the other as *Cryptococcus neoformans* by phenotypic methods.

Ninety-six percent of the ATCC strains were identified correctly to species level and 4% were identified to genus level using MALDI-TOF MS.

**Conclusion:** The data shows that MALDITOF MS compared favourably with methods that have been used previously for the identification of bacteria and common *Candida species.*
PO1.11. An assessment of reproducibility of MALDI-TOF


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Objective: We evaluated the performance of matrix-assisted laser desorption ionisation time of flight mass spectrometry (MALDI-TOF) to repeatably identify 5 ATCC isolates when tested by four different key operators (KOs) in the same run and different runs. Secondly we assessed all the laboratory staff (LS) who perform MALDI-TOF, for competency in testing a blinded set of the same isolates.

Methods: MALDI-TOF was performed on the Vitek MS (BioMerieux). The identification confidence level (CL) was defined as > 90% for an acceptable result. KOs tested Staphylococcus aureus ATCC 25923, Escherichia coli ATCC 25922, Pseudomonas aeruginosa ATCC 27853, Enterococcus faecalis ATCC 52199 and Candida albicans ATCC 14053, on four different occasions, each time inoculating the organism 20 times without formic acid (direct method [DT]) and 20 times with formic acid (FA). The other LS processed the same 5 organisms (unidentified) by DT and FA.

Results: Overall key operators performed 1200 (960 bacteria, 240 yeast) tests by DT, and similarly 1200 FA tests. Re-acquisition was repeated once if the calibration control or the test failed acquisition.

60 target slides were processed by the 4 KOs. 173/180 (96.1%) calibration target cells passed assessment, and 6/7 that failed passed the re-acquisition. After re-acquisition 280/1200 (23.3%; bacteria: 44 [3.7%]; yeast: 236 [19.7%]) by DT and only 21/1200 (1.8%; bacteria: 15 [1.3%]; yeast: 6 [0.5%]) tests by FA failed due to bad spectrum/insufficient peaks or failed calibration (n=16). Failures included two E.coli ATCC 25922 (identified as Citrobacter youngae [76.4%]; and E.coli [74.4%]) and one Pseudomonas ATCC 27853 (not differentiated from Acinetobacter junii 50% vs 49.5%), and 3 tests on C.albicans ATCC 14053 failed due to low CL (25-50%). Fifteen additional LS performed 225 (180 bacteria, 45 yeast) DT and similarly 225 FA tests. Overall identification rate for bacteria was 91.1 -100% by DT, and 95.6 -100% by FA. C.albicans ATCC 14053 could only be reliably identified by FA, and the overall rate was 82.2%.

Conclusion: In this evaluation MALDI-TOF performed well, repeatability and reliably identifying bacterial isolates by DT and FA method, and could also reliably identify C.albicans ATCC 14053 provided FA method was used.
PO1.12.
MALDI-TOF and susceptibility testing direct from positive blood culture broth compared to testing from 6 Hour and overnight sub-cultures

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Objective: Recently the matrix-assisted laser desorption ionisation time of flight mass spectrometry (MALDITOF) has been introduced in microbiology diagnostic laboratories for rapid identification of organisms. We evaluated the performance of MALDI-TOF and Vitek -2 for the identification and susceptibility testing of organisms testing direct from positive blood culture (using gel/saponin method) and from 6 h subcultures.

Methods: Positive blood cultures were Gram stained and subcultured as per a standard protocol. In addition, 6 ml of the broth was transferred to a gel vacutainer tube, and 1% saponin was added for 15 minutes before centrifugation, and washing with sterile deionised water (for Gram positive isolates and heavily blood stained deposits). MALDI-TOF and antibiotic susceptibility were performed on broths (with positive smears indicating a single organism) using MALDI-TOF MS and Vitek 2 systems (AST-N or AST-P cards). Results for direct or 6 h testing were compared to results for MALDI-TOF and Vitek-2 from 18-24 h subcultures.

Results: Overall, 117 (68 Gram-negative, 49 Gram-positive) isolates were tested directly from positive blood culture by MALDI-TOF MS. 56/68(82.3%) Gram-negative and 33/49(67.3%) Gram-positive isolates were correctly identified to species level. A total of 54 isolates were tested directly for antibiotic susceptibility Vitek-2. 35/44 (79.5%) Gram-negative and 6/10 (60%) Gram-positive isolates had the same (no interpretation differences) susceptibility pattern as the overnight culture result. 103 isolates where tested after 6 h subculture incubation. 56/58 (96.6%) Gram-negative and 36/45 (80.0%) Gram-positive isolates were correctly identified to the species level. 65 isolates had susceptibility testing performed after 6 h sub-culture incubation and 40/45 (88.9%) Gram-negative isolates and 18/20 (90.0%) Gram-positive isolates gave the correct susceptibility pattern compared to overnight culture test results.

Conclusion: Although 6 h testing gave higher rates of correct identification and susceptibility testing of blood culture isolates, both direct and 6 hour methods especially for Gram-negative isolates have the potential to improve patient management and clinical outcomes.
**PO1.13.**

**Use of MALDI TOF MS to identify Australian *C. difficile* strains**

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**Objectives:** Identification of *Clostridium difficile* hypervirulent strains using MALDI-TOF MS

**Methods:** Reference strains of hypervirulent ribotypes 027, 078, 244 and 251 as well as non hypervirulent strains were used to assemble a reference library of consensus spectra for various ribotypes of *Clostridium difficile*.

Using VITEK MS DS-Target slides (bioMérieux, Marcy l’etoile, France) for direct smear application of colonies of *Clostridium difficile*. MALDI-TOF MS was carried out on an AXIMA Assurance (Shimadzu, Queensland, Australia). Spectra were imported into the SARAMIS software for analysis and creation of consensus spectra. An isolate consensus was assembled by retaining only masses that occur in a minimum of two of four spots scanned for each isolate. Ribotype consensi were assembled by only retaining masses that appear in 100% of all isolates for that ribotype.

**Results:** Eighty five isolates of *Clostridium difficile* of the following ribotypes were studied: 002 (n=19), 014 (n=15), 244 (n=12), 078 (n=9), 027 (n=7), 056 (n=6), 251 (n=6), AI-37 (n=5), 043 (n=3), and 070 (n=3). Indicative masses (fig.1) for ribotypes 043, 027, 078 and 251 were observed from the consensus spectra. Ribotype 078 had a unique mass pattern that differs from other strains at the two mass points of 3547 and 7094 Daltons. No consensus could be derived for ribotype 014 due to high variability.

**Conclusion:** Using MALDI-TOF MS we have devised a method of detecting hypervirulent *Clostridium difficile* strains prevalent in Australia, using unique masses. MALDI – TOF MS may prove to be a useful tool for the detection and identification of *Clostridium difficile*.

Both human and animal strains of *Clostridium difficile* have been observed to go through microevolution over short time frames due to antibiotic or host selection pressure, as well as geographical separation. The variability of ribotype 014 may be linked to its high prevalence and wide spread around the globe. It had previously been shown in MALDI - TOF that isolates of the same ribotype may vary in strains from different geographical origins. The distinctiveness of ribotype 078 may be the result of its origin as an animal associated strain.
A 2-year study of symptomatic Clostridium difficile infection (CDI): Rapid diagnosis and early isolation prevents case to case transmission.

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Objectives: To identify whether clusters of symptomatic CDI occur in a 350-bed tertiary hospital where CDAD patients are isolated immediately after being identified, and if there are high risk wards.

Methods: An observational study of inpatients with symptomatic CDI detected between October 2011 and October 2013 was undertaken. Diarrhoeal specimens were tested with a 2-step algorithm (glutamate dehydrogenase test (Wampole®) and C. difficile GeneXpert (Cepheid)). The location of the patients and the origin of their infection (hospital acquired (HA) if occurring after 48 hours of admission, community acquired (CA) before that), were recorded. A limited number of environmental swabs were also collected. Strains isolated on chromagar (chromID™ C. difficile, bioMérieux) were ribotyped.

Results: Of 262 cases of symptomatic CDI, 150 were HA. Ribotyping of 147 HA strains showed 44 different types across the hospital. There were no obvious clusters, although there were 9 cases of one type, QX076, between January and September 2013, mainly on one rehabilitation ward. Type QX150 was the only type isolated from the environment and was found on four different wards. It was isolated from three patients, one of whom was on a contaminated ward. The most common ribotype was the UK 014/020 group which was isolated from patients on all wards. This group accounted for a quarter of both HA strains and CA strains. Fifteen ribotypes were only isolated from CA cases, 30 only from HA cases and 14 were shared. The haematology/ oncology and geriatric wards had the most cases and a wide variety of ribotypes.

Conclusion: With rapid diagnosis and early isolation of patients with symptomatic CDI, secondary cases were unusual. HA and CA infections were associated with a wide variety of ribotypes. The significance of the environment in acquisition needs further investigation.
PO1.15.
Helicobacter culture and sensitivity results of 8690 gastric biopsies from 2009 to 2013 from NSW.

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¹ SDS Pathology
² NICTA
³ Laverty Pathology

Rates of isolation of Helicobacter pylori from the gastric biopsies will be presented. Comparison with histology will also be tabled. Sensitivity results of over 1700 biopsy samples will be presented. Correlation of sensitivity profiles with age, gender and geographical distribution will be presented.
PO1.16. Carbapenemase-producing bacteria identified in New Zealand

R. Woodhouse and H. Heffernan

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**Objective:** To describe the prevalence, types and origins of carbapenemase-producing bacteria identified in New Zealand (NZ) since 2009.

**Methods:** All diagnostic medical laboratories in NZ refer possible carbapenemase-producing bacteria to the Antibiotic Reference Laboratory at ESR for confirmation. The modified Hodge test and inhibitor-based tests are used to screen isolates for carbapenemases. PCR and sequencing are used to detect and identify the genes for metallo-β-lactamases (IMP, VIM, NDM, GIM, SIM and SPM), *Klebsiella pneumoniae* carbapenemase (KPC), and OXA-48-like carbapenemase.

**Results:** Carbapenemase-producing bacteria were first identified in NZ in 2009. There has been a trend of an increasing number of isolates identified each year since then, with a total of 34 isolates identified to the end of November 2013. The most frequent type of carbapenemase identified was NDM (13 isolates), followed by VIM (11), KPC (4), OXA-48-like (4) and IMP (2). NDM and OXA-48-like have been found in several Enterobacteriaceae species, whereas IMP and VIM have been found exclusively in *Pseudomonas aeruginosa* and KPC exclusively in *K. pneumoniae*. Sixteen isolates were from clinical samples, 17 from screening sites, and the site was not reported for 1 isolate. Among the patients for whom recent overseas travel history was available, the majority (26 of 30) had travelled overseas, with 21 of these 26 patients reported to have been hospitalised or received healthcare overseas. The four patients who had not recently travelled overseas all had *P. aeruginosa* with VIM-2 carbapenemase.

**Conclusion:** The occurrence of carbapenemase-producing organisms in NZ has increased in the last 5 years, and a range of classes and types have been identified. Many are associated with overseas travel and healthcare. However, the small number of isolates from patients with no travel history indicate that there may be some local transmission of carbapenemase-producing organisms or genes.
PO1.17.
Prevalence of plasmid mediated fluoroquinolone resistance determinants among blood culture isolates of ESBL-E. coli and ESBL-K. pneumoniae in the Auckland Region 2009-2011

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³Department of Clinical Microbiology Waitemata District Health Board, Auckland, New Zealand

Objective: To determine the prevalence of plasmid mediated fluoroquinolone resistance determinants (PMQR) among blood culture isolates of ESBL-producing Escherichia coli and Klebsiella pneumoniae in the region of Auckland, New Zealand

Methods: Between Jan 2009 and December 2011, non-duplicate blood culture isolates of ESBL-E. coli and ESBL-K. pneumoniae were collected across all three public hospitals in the Auckland region. PCR and sequencing was performed for aac(6’)-Ib-cr, qnrA, qnrB and qnrS, ESBL genes and 025-ST131. PFGE was performed and MLST was reserved for clusters consisting of ≥ 10 isolates. Susceptibility testing was performed according to CLSI 2009 recommendations. Statistical testing was performed using the Fisher’s exact test.

Results: 176 of 206 isolates were available for the study (85%; 81 K. pneumoniae, 95 E. coli). 38% of E. coli were ST131 while 51% of K. pneumoniae belonged to 3 different STs. The predominant ESBLs were CTX-M-15 (73%) followed by CTX-M-14 (17%). Overall 69% had at least one PMQR. 58% were positive for aac(6’)-Ib-cr and 43% were positive for qnrB; with 0.6% and 1.1% positive for qnrA and qnrS respectively. Both aac(6’)-Ib-cr and qnrB in combination were present in 37% (K. pneumoniae 68% versus E. coli 10%; p<0.0001) whereas aac(6’)-Ib-cr alone was present in 20% (K. pneumoniae 7% versus E. coli 32%; p<0.0001) and qnrB alone was present in 6% (K. pneumoniae 12% versus E. coli 1%; p=0.003). Significant linkages were found between aac(6’)-Ib-cr and qnrB; blaCTX-M-15; K. pneumoniae in general and K. pneumoniae clonal groups (Table 1). ST131 E. coli were no more likely to carry PMQR than non ST131 E. coli (54% versus 60% respectively; p=0.67).

9% of isolates with at least one PMQR tested susceptible to ciprofloxacin using CLSI criteria (K. pneumoniae 15% versus E. coli 3%; p=0.007).

Conclusions: Both aac(6’)-Ib-cr and qnrB are highly prevalent among ESBL positive blood culture isolates in the Auckland region. aac(6’)-Ib-cr is typically found alone in ESBL-E. coli and in combination with qnrB in ESBL-K. pneumoniae. Despite the high prevalence of PMQR, approximately 10% of PMQR positive isolates appeared fluoroquinolone susceptible, suggesting that caution may be indicated when fluoroquinolones are being considered in this setting.

Table 1. Exploration of linkages between aac(6’)-Ib-cr and other variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>aac(6’)-Ib-cr positive (%)</th>
<th>aac(6’)-Ib-cr negative (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>blaCTX-M-15 Positive</td>
<td>100/102 (98)</td>
<td>28/74 (38)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>qnrB positive</td>
<td>65/102 (64)</td>
<td>11/74 (15)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ESBL-K. pneumoniae</td>
<td>61/102 (60)</td>
<td>20/74 (27)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Clonal groups of ESBL-K. pneumoniae</td>
<td>38/102 (37)</td>
<td>3/74 (4)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
PO1.18.
*Increasing emergence of IMP-4 producing Enterobacteriaceae throughout Queensland hospitals*

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**Objectives:** Carbapenemase producing Gram-negative bacteria is causing increasing threat in the treatment of infections associated with multidrug-resistant bacteria. IMP has been reported as the predominant enzyme causing carbapenem resistance in Enterobacteriaceae in Australia. Here, we study the molecular epidemiology of IMP producing Enterobacteriaceae from Queensland, including the molecular characterisation of the $\text{bla}_{\text{IMP}}$-carrying plasmids.

**Methods:** Thirty two IMP producing Enterobacteriaceae were collected between 2009 and 2013 from Queensland public hospitals. The species of the isolates were $E.\ \text{cloacae}$ ($n=19$), $E.\ \text{asburiae}$ ($n=2$), $K.\ \text{pneumoniae}$ ($n=3$), $E.\ \text{coli}$ ($n=3$), $E.\ \text{hermannii}$ ($n=1$), $S.\ \text{marcescens}$ ($n=1$), $C.\ \text{freundii}$ ($n=1$), $C.\ \text{koseri}$ ($n=1$) and $P.\ \text{mirabilis}$ ($n=1$). The clonality of $\text{Enterobacter}$ spp was determined by rep-PCR. PCR and sequencing of the $\beta$-lactam and aminoglycoside resistance genes were also performed to characterise the antibiotic resistance mechanisms. Plasmids carrying $\text{bla}_{\text{IMP}}$ were analysed for the replicon types and transferability of the plasmids.

**Results:** The majority of IMP producers used in this study were isolated in 2013 and 2012, i.e. 22 and 7 isolates, respectively. This shows a significant increase of CRE prevalence over the past year. There was no predominant clone amongst $\text{Enterobacter}$ spp. The two $E.\ \text{asburiae}$ were identical. Two pairs of identical $E.\ \text{cloacae}$ were determined on the basis of rep-PCR. The pairs of identical strains were isolated within a similar period suggesting possible person-to-person spread of these strains. The $\text{bla}_{\text{IMP}}$ variant was $\text{bla}_{\text{IMP-4}}$. Other $\beta$-lactamase genes, i.e. $\text{bla}_{\text{TEM}}$, $\text{bla}_{\text{SHV}}$, $\text{bla}_{\text{CTX-M}}$ and $\text{bla}_{\text{CMY-2}}$ were present in 90%, 47%, 6% and 6% of isolates, respectively. Aminoglycoside resistance was common amongst IMP producers and was primarily due to $\text{aac-6'-Ib}$ (81%). In the majority of isolates, the $\text{bla}_{\text{IMP-4}}$ was located on IncH12 plasmid. The $\text{bla}_{\text{IMP}}$-carrying plasmids were transferrable by transformation and conjugation.

**Conclusion:** The commonality of IncH12 plasmids carrying $\text{bla}_{\text{IMP-4}}$ suggests horizontal transfer of plasmids between strains of Enterobacteriaceae. The increasing rate of IMP-4 producers especially in $E.\ \text{cloacae}$ over the past two years demonstrates that $E.\ \text{cloacae}$ has becoming a major source of carbapenemase resistance in the clinical setting. Phenotypic and genotypic testing for the presence of carbapenemase producing Enterobacteriaceae is recommended in routine diagnostic laboratory.

*ASA Travel Award*
PO1.19.
The Australian Group on Antimicrobial Resistance Report from the Community-Onset Gram-Negative Surveillance Program 2012

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Objectives: The Australian Group on Antimicrobial Resistance (AGAR) conducted a multi-centre survey of E. coli, Klebsiella spp. and Enterobacter spp. isolated from non-hospitalised patients with urinary tract infections, including those presenting emergency departments, outpatient departments or to community practitioners. The objectives were to determine the proportions of resistance to the main therapeutic agents; the extent of co-resistance and multi-resistance; and to detect emerging resistance to newer last-line agents such as carbapenems. Isolates were examined by molecular techniques for the presence of known resistance genes.

Methods: MICs were determined by commercially available Vitek® 2 cards (AST-N246, bioMérieux). E. coli or Klebsiella spp. with ESBL phenotype (ceftriaxone and/or ceftazidime MIC > 1mg/L) or possible plasmid-borne AmpC β-lactamases (cefoxitin MIC > 8 mg/L) and Enterobacter species with cefepime MIC >1 mg/L were referred to a central laboratory for molecular characterisation of their resistance genes (TEM, SHV, CTX-M types, and plasmid-borne AmpC). Isolates with ciprofloxacin MIC > 0.25 mg/L were examined for presence of plasmid-mediated quinolone resistance (PMQR) All referred isolates were also screened for the presence of carbapenemase genes, and all referred E. coli were screened for the O25b-ST131 clone and phylo-groups determined.

Results: Twenty-nine diagnostic laboratories throughout Australia contributed 2,026 E. coli, 539 Klebsiella spp., and 239 Enterobacter spp. Although the incidence of ESBL phenotypes in this population remains low for both E. coli (5.0%) and Klebsiella spp. (5.5%), CTX-M types were found in over 70% of E. coli with ESBL phenotype. Only 16/32 (50%) of E. coli with cefoxitin MIC > 16 mg/L contained plasmid-borne AmpC; CMY-2 (n=13), CMY-32 (n=1), DHA (n=2). Ciprofloxacin-resistance (MIC ≥ 4 mg/L) remains low however a significant increase among E. coli was observed since 2008 (4.1% to 6.5%). Of ESBL-producing E. coli, ciprofloxacin resistance was found in 51.8% and gentamicin resistance in 30.1%. One E. cloacae with a meropenem MIC > 16 mg/L contained blaIMP-4 was detected from a patient attending an outpatient clinic. No 16S rRNA ribosomal methylases were detected. Resistance to four or more drug classes was seen among 7.6% of E. coli and 5% of Klebsiella spp. Of 244 E. coli isolates received for molecular characterisation, 83% belonged to phylo-group B2 or D. All strains confirmed as O25b-ST131 (n=55) belonged to phylo-group B2.

Conclusions: The emergence of CTX-M producing E. coli and Klebsiella spp. and gentamicin- and ciprofloxacin-resistant E. coli are now presenting in or from the community.
PO1.20.
Azithromycin minimum inhibitory concentrations against Salmonella species, including S. typhi & S. paratyphi A

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Background: Resistance to fluoroquinolones in India & South-East Asia necessitates azithromycin [AZT] as recommended initial therapy for para/typhoid fever (and other Salmonella species when therapy is indicated). However, there are no internationally accepted susceptibility testing criteria or breakpoints for AZT against Salmonella species, neither from CLSI nor EUCAST. CDS has a calibrated method using AZT breakpoint of 16mg/L for Salmonella species isolated from blood cultures.

As AZT is primarily an intracellular active agent, a Minimum Inhibitory Concentration [MIC] determined for serum levels may not correlate with intracellular levels or clinical outcomes.

Objectives: Determine AZT MIC for a large number of Salmonella species, compare results with CDS interpretation and determine if the proposed AZT breakpoint of 16mg/L is valid.

Methods: PathWest Enteric Laboratory receives all suspected Salmonella isolates in Western Australia for confirmation of identification and characterisation. Approximately 200 Salmonella isolates, including S. typhi and S. paratyphi A strains, were randomly selected from storage, subcultured then lawn inoculated to Sensitest agar for CDS (15 microgram AZT disc) and Mueller-Hinton agar for AZT Etest MIC. After 18-24 hours incubation, the annular radius of inhibition to the AZT disc was measured by callipers and the Etest MIC manually read.

Results: There was excellent correlation between the CDS and Etest results for 187/188 non-paratyphi A Salmonella strains with correlating AZT interpretations for CDS and Etest, and maximal MIC $\leq$ 8mg/L. One S. typhimurium strain tested AZT susceptible by CDS but Etest MIC = 64-128mg/L. All 10 S. paratyphi A strains tested resistant to AZT by CDS but Etest MICs = 4-8 mg/L. Limited clinical information from these 11 isolates did not reveal evidence of clinical treatment failure but no patient was treated exclusively with AZT.

Conclusion: Results suggest an AZT breakpoint at 16mg/L for Salmonella species may be conservative. Further work is needed as S. paratyphi A CDS interpretation did not correlate with Etest MIC results. S typhi results were incomplete at time of abstract preparation. Clinical response to AZT treatment for Salmonella with MIC >8mg/L needs to better ascertained before any firm recommendations can be made.
PO1.21.
Are BLNAR H. influenzae more invasive?
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University of Tasmania, Launceston, Tasmania, Australia

Objectives: Non-typeable H. influenzae (NTHi) are common respiratory pathogens and there is increasing evidence that some isolates invade and persist within human respiratory epithelial cells. This may be associated with chronic infection or persistent disease despite antibiotic therapy. A single study (Okabe, 2010) reported that isolates with B-lactamase negative ampicillin resistant (BLNAR) phenotype associated with altered penicillin binding protein 3 (PBP3) are more invasive than ampicillin susceptible isolates with normal PBP3, but this has not been verified. Since the prevalence of BLNAR strains is increasing, enhanced virulence in addition to increased antibiotic resistance would be a concern. The objective of the study was to determine if isolates of NTHi with altered PBP3 are more invasive than isolates with normal PBP3.

Methods: 20 isolates of NTHi with altered PBP3 (N526K substitution) and 20 with normal PBP3 were tested for the ability to invade human bronchial epithelial cells (BEAS-2B) in an in vitro assay. The BEAS-2B cells were challenged with a standardized inoculum of each isolate and after 4 hours, extracellular bacteria were killed with gentamicin and intracellular bacteria enumerated. Each isolate was tested in triplicate, with each of the 3 tests done on different days. Invasiveness was recorded as a percentage of the challenge inoculum. Subsequently, 3 isolates with normal PBP3 were transformed with PCR amplified ftsI gene from reference BLNAR strains, to generate recombinant derivatives with artificially generated altered PBP3 and tested for invasiveness as above.

Results: The invasiveness of the isolates was highly variable, with those with altered PBP3 ranging from 0.02% to 34.9% and 10/20 being >1%, whereas isolates with normal PBP3 ranged from < 0.01% to 13.7% and 4/20 being >1%. Overall, isolates with altered PBP3 were statistically more invasive than those with normal PBP3 (p < 0.001, Mann-Whitney test). However, when strains with normal PBP3 had altered PBP3 introduced by recombinant techniques, the invasiveness did NOT increase.

Conclusion: Isolates with altered PBP3 appear to be more invasive than strains with normal PBP3, but this does not appear to be due to the actual presence of altered PBP3. The mechanism of increased invasiveness remains to be elucidated.
The role of inter-species recombination of the *ftsI* gene on the dissemination of altered penicillin-binding protein 3 mediated resistance in *Haemophilus influenzae* and *Haemophilus haemolyticus*.

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**Objectives:** To screen the *ftsI* gene sequences obtained from clinical isolates of non-typeable *Haemophilus influenzae* (NTHi), and normal flora isolates of *Haemophilus haemolyticus* for the presence of mosaic *ftsI* gene structures, and to evaluate the role inter-species recombination of the *ftsI* gene has on the formation of resistant *ftsI* genes and the subsequent dissemination of β-lactamase-negative ampicillin-resistance in *Haemophilus* species.

**Methods:** The *ftsI* genes of 100 *Haemophilus* isolates comprising genetically defined β-lactamase-negative ampicillin-susceptible (gBLNAS) and β-lactamase-negative ampicillin-resistant (gBLNAR) isolates of NTHi (n=50) and *H. haemolyticus* (n=50) were analysed in this study. Both the flanking regions and full-length *ftsI* gene sequences of all study isolates were screened for mosaic structures using *H. influenzae* Rd and *H. haemolyticus* ATCC 33390 as reference parental sequences, and bioinformatics was performed for recombination analysis using SimPlot.

**Results:** Of the 100 clinical isolates analysed 33% (33/100) harboured mosaic *ftsI* gene structures containing distinct *ftsI* gene fragments similar to both reference parental sequences. The inter-species recombination events were exclusively encountered in the *ftsI* gene of gBLNAR isolates of both NTHi (Figure 1) and *H. haemolyticus*, and were always associated with the formation of a mosaic fragment at the 3'-end of the *ftsI* gene. There was no evidence supporting the horizontal gene transfer (HGT) involving the entire *ftsI* gene among the clinical isolates in vivo.

**Conclusion:** We provide evidence for the HGT and inter-species recombination of the *ftsI* gene among gBLNAR isolates of NTHi and *H. haemolyticus* in a clinical setting, highlighting the importance recombination of the *ftsI* gene has on the emergence of altered PBP3s and BLNAR-mediated resistance.

**Figure 1.** Mosaic *ftsI* gene structures identified in clinical NTHi isolates.

Schematic representation of the divergence in the *ftsI* gene of NTHi study isolates compared to the *ftsI* reference sequence of *H. influenzae* Rd. Solid black lines, denote the position of the nucleotides that differ from the corresponding nucleotide in the reference *H. influenzae* sequence; Crossover schematics, show the proportion of the *ftsI* gene most similar to reference sequences; Solid grey shading, most similar to *H. influenzae* Rd sequence; Hashed grey shading, most similar to *H. haemolyticus* ATCC 33390; Solid black shading, crossover location.

* ASA Travel Award
P01.23.  
Teicoplanin non-susceptible coagulase-negative staphylococci in a large Australia Health-Care network: Implications for treatment with vancomycin

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Objectives: Coagulase-negative staphylococci (CoNS) are relatively low in virulence but some are increasingly recognized as agents of clinically significant infections. The major risk factor for CoNS infections is the implanted biomedical device and its ability to form a biofilm. CoNS are the second most common cause of prosthetic valve endocarditis and a frequent pathogen in deep-seated prosthetic implant infections. Treatment of CoNS infections is challenging owing to antimicrobial resistance. Glycopeptides are the drug of choice for treatment of methicillin-resistant CoNS infections but resistance to Teicoplanin appears to develop earlier than to vancomycin. Moreover, vancomycin hetero-resistant sub-populations have been identified within teicoplanin non-susceptible CoNS. Our aim was to analyse the susceptibility profile of CoNS in our health care network with emphasis on teicoplanin non-susceptibility and its relationship to vancomycin.

Methods: All CoNS with susceptibility results recovered at Monash Health from 2010-2012 were analysed as two groups; teicoplanin susceptible (Teico-S) and non–susceptible (Teico-NS). Analysis included results of other antistaphylococcal antibiotic susceptibilities, sample type (invasive, non-invasive), species, patient location (intensive care unit (ICU) vs non-ICU and repeat positive cultures from same patient and site.

Results: Of the 1510 CoNS with susceptibility results 109 (7.2\%) were non-susceptible to teicoplanin. There was no significant trend in Teico-NS from 2010-2012. Teico-NS group was associated with non-susceptible to $\geq$ 3 antistaphylococcal-antibiotics compared to Teico-S group. Teico-NS group was associated with non-susceptibility to vancomycin compared to Teico-S group but it was not significantly associated with daptomycin-NS. Table 1. Teico-NS CoNS were detected more frequently from invasive samples compared to non-invasive samples ($p<0.001$). \textit{S. epidermidis} was the most common species recovered from both groups and was more likely to be Teico-NS. ICU patients had considerably higher number of Teico-NS isolates compared to ward patients ($p<0.001$). Amongst patients who had repeat cultures with CoNS >14 days apart: 22.7\% (5/22) had a rise in teicoplanin MIC while it was 5.3\% (3/57) in the $\leq$ 14 day group.

Conclusion: Teicoplanin non-susceptibility is associated with multi-resistance to $\geq$3 antistaphylococcal-antibiotics. The majority of Teico-NS isolates were \textit{S.epidermidis} and Teico-NS was statistically more likely to be from invasive samples or from a patient in ICUs.

Table 1: Antibiogram for CoNS by teicoplanin group from 2010-2012

<table>
<thead>
<tr>
<th>Antibiotics tested</th>
<th>Teico-NS group (n=109)</th>
<th>Teico-S group (n=1401)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>Oxacillin</td>
<td>98</td>
<td>90.7</td>
<td>982</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>37</td>
<td>34.3</td>
<td>70</td>
</tr>
<tr>
<td>Fusidic acid</td>
<td>81</td>
<td>75.0</td>
<td>346</td>
</tr>
<tr>
<td>Daptomycin</td>
<td>3</td>
<td>3.7</td>
<td>43</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>4</td>
<td>3.7</td>
<td>1</td>
</tr>
<tr>
<td>Non-susceptible to $\geq$ 3 antibiotics*</td>
<td>43</td>
<td>39.8</td>
<td>62</td>
</tr>
</tbody>
</table>

* Oxacillin, Rifampicin, Fusidic Acid, Vancomycin
PO1.24. Staphylococcus aureus ST398 detected in pigs in Australia

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⁷ Department of Microbiology and Infectious Diseases, PathWest Laboratory Medicine - WA, Royal Perth Hospital, Perth, Western Australia, Australia

Objective: To determine if methicillin-resistant Staphylococcus aureus (MRSA) is present in Australian pigs and investigate the molecular epidemiology of recovered isolates.

Methods: Nasal swab samples were collected from 324 pigs in six discrete herds. Samples were pooled, enriched and analysed by PCR for markers indicative of MRSA colonisation. PCR-positive pools were retrospectively analysed for MRSA using selective enrichment and isolation procedures. Isolates were typed by multilocus sequence typing (MLST), spa, SCCmec, dru and binary typing, and underwent antimicrobial susceptibility testing.

Results: MRSA was detected in 0.9% (n=3) of 324 sampled pigs, all from one herd. In addition, a single methicillin-susceptible S. aureus (MSSA) isolate was recovered from a second herd. All isolates were characterised as multilocus sequence type (ST) 398. ST398 MRSA isolates harboured the type V SCCmec element, spa t1184 or the single base variant t11373, dru type dt11v or the variant dt11ck, belonged to binary type 21072, and were resistant to all tested β-lactams, erythromycin, clindamycin and trimethoprim-sulfamethoxazole. The ST398 MSSA isolate belonged to the related spa t6606 and binary type 4928 and was resistant to penicillin, ampicillin, erythromycin, clindamycin and quinupristin-dalfopristin.

Conclusions: This study represents the first report of S. aureus ST398 in food-producing animals in Australia. Our findings reveal the isolates have a molecular epidemiological link with S. aureus ST398 isolated in Europe, suggesting S. aureus ST398 colonisation of pigs in Australia has resulted from an exotic incursion. Microbiological tools developed in this study will be valuable for better defining the epidemiology of LA-MRSA in Australia.
PO1.25
Ceftaroline resistance amongst multidrug-resistant MRSA clinical isolates

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Objectives: To determine the rate of ceftaroline resistance amongst clinical MRSA isolates, both multidrug-resistant and non multidrug-resistant phenotypes, isolated from all sites.

Methods: Non-duplicate, clinical MRSA isolates were collected from patients treated at a tertiary-care metropolitan hospital over two time periods, July to December 2010 and August to November 2013. All isolates were assessed for ceftaroline and vancomycin susceptibility by Etest (bioMérieux). Isolates from 2010 were thawed from frozen and sub-cultured twice before testing. Isolates from 2013 were collected and tested in real time. Ceftaroline and vancomycin Etests were set up, incubated and read as per manufacturer’s guidelines. Two scientists independently recorded the MIC results, and any discrepancies were referred to a third scientist.

Results: 421 non-duplicate clinical MRSA isolates were identified for testing. 270-isolates were from 2010, and 151-isolates from 2013. Skin and soft tissue infections accounted for the majority (70.3%) of specimens. Overall, the ceftaroline resistance was 16.6% (see table). Among multidrug-resistant MRSA isolates (defined as resistance to ≥ 3 non-beta lactam antibiotics) resistance was 23.2%. This was significantly higher than the 4.1% resistance rate in non multidrug-resistant MRSA isolates (p-value < 0.001). Multidrug-resistant MRSA isolates from 2010 that typed as CC-239, had a higher resistance rate again, accounting for 46.4% (52 out of 112) of the isolates.

Conclusion: Ceftaroline resistance among multidrug-resistant MRSA isolates is significant and would preclude its empirical use in clinical infections prior to dedicated susceptibility testing.

<table>
<thead>
<tr>
<th>Antibiotic resistance</th>
<th>Total n = 421</th>
<th>2010a n = 270</th>
<th>2013b n = 151</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multidrug-resistant MRSA6</td>
<td>276</td>
<td>65.6%</td>
<td>190</td>
</tr>
<tr>
<td>Non multidrug-resistant MRSA</td>
<td>145</td>
<td>34.4%</td>
<td>80</td>
</tr>
<tr>
<td>Ceftaroline resistantd</td>
<td>70</td>
<td>16.6%</td>
<td>55</td>
</tr>
<tr>
<td>Reduced vancomycin susceptibilitye</td>
<td>232</td>
<td>55.1%</td>
<td>155</td>
</tr>
<tr>
<td>Multidrug-resistant MRSAc</td>
<td>n = 276</td>
<td>n = 190</td>
<td>n = 86</td>
</tr>
<tr>
<td>Ceftaroline resistanted</td>
<td>64</td>
<td>23.2%</td>
<td>54</td>
</tr>
<tr>
<td>Reduced vancomycin susceptibilitye</td>
<td>169</td>
<td>61.2%</td>
<td>120</td>
</tr>
<tr>
<td>Non multidrug-resistant MRSA</td>
<td>n = 145</td>
<td>n = 80</td>
<td>n = 65</td>
</tr>
<tr>
<td>Ceftaroline resistanted</td>
<td>6</td>
<td>4.1%</td>
<td>1</td>
</tr>
<tr>
<td>Reduced vancomycin susceptibilitye</td>
<td>64</td>
<td>43.8%</td>
<td>36</td>
</tr>
<tr>
<td>CC 239 multidrug-resistant MRSAc</td>
<td>n = 112</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftaroline resistanted</td>
<td>52</td>
<td>46.4%</td>
<td></td>
</tr>
<tr>
<td>Reduced vancomycin susceptibilitye</td>
<td>102</td>
<td>91.1%</td>
<td></td>
</tr>
</tbody>
</table>

a Collected from July to December, 2010
b Collected from August to November, 2013
c Multidrug-resistant MRSA defined as resistance to ≥ 3 non beta-lactam antibiotics, including ciprofloxacin, clindamycin, erythromycin, gentamicin, cotrimoxazole and tetracycline.
d Ceftaroline resistance defined as MIC ≥ 2.0
e Reduced vancomycin susceptibility defined as MIC ≥ 2.0 (only 3-isolates had MIC > 2.0)
In 2012, the Australian Group on Antimicrobial Resistance (AGAR) conducted a Community-Onset period-prevalence survey of clinical Staphylococcus aureus isolated from hospital outpatients and general practice patients including nursing homes, long term care facilities and hospice patients. Day surgery and dialysis patients were excluded. Twenty nine medical microbiology laboratories from each state and mainland territory participated. Isolates were tested by Vitek2® (AST-P612 card). Results were compared with previous AGAR community surveys. Nationally the proportion of S. aureus that were methicillin-resistant S. aureus (MRSA) has increased significantly from 11.5% in 2000 to 17.9% in 2012 (P<0.0001). Resistance to the non-β-lactam antimicrobials varied between regions. No resistance was detected for vancomycin, teicoplanin or linezolid. Resistance in the methicillin susceptible S. aureus was rare apart from erythromycin (12.8%) and absent for vancomycin, teicoplanin, linezolid and daptomycin. The proportion of MRSA characterised as healthcare-associated MRSA (HA-MRSA) was 28.9%. Three HA-MRSA clones were characterized with 72.9% and 26.4% of HA-MRSA classified as ST22-IV [2B] (EMRSA-15) and ST239-III [3A] (Aus-2/3 EMRSA) respectively. Multi-clonal community-associated MRSA (CA-MRSA) accounted for 12.5% of all S. aureus. Regional variation in resistance in MRSA was primarily due to the differential distribution of the two major HA-MRSA clones; ST239-III [3A] (Aus-2/3 EMRSA), which is resistant to multiple non-β-lactam antimicrobials, and ST22-IV [2B] (EMRSA-15) which is resistant to ciprofloxacin and typically erythromycin. Although the majority of CA-MRSA were non multiresistant, a significant expansion of Panton-Valentine leukocidin positive CA-MRSA clones has occurred nationally. The mean age of patients (31.7 years, 95%CI 28.9 – 34.5) with a PVL positive CA-MRSA infection was significantly lower (P<0.0001), than the mean age of patients with a PVL negative CA-MRSA infection (55.7 years, 95%CI 50.7 – 60.6). This shift in the molecular epidemiology of MRSA clones in the Australian community will potentially increase the number of young Australians with skin and soft tissue infections requiring hospitalisation.
PO1.27.
The 2012 Australian Group on Antimicrobial Resistance (AGAR) Community-Onset Staphylococcus aureus Ceftaroline Susceptibility Surveillance Programme

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Objective: Ceftaroline is a novel cephalosporin that has in vitro bactericidal activity against a broad range of pathogens. Due to its high affinity for penicillin binding protein 2a, ceftaroline is also active against methicillin-resistant Staphylococcus aureus (MRSA). The objectives of this study were to determine the activity of ceftaroline against a collection of methicillin-susceptible Staphylococcus aureus (MSSA) and MRSA isolated from community onset infections, and to compare the ceftaroline susceptibility of these isolates to a panel of commonly used antibiotics.

Methods: Study isolates included 1,102 MSSA and 499 MRSA collected in the 2012 Australian Group on Antimicrobial Resistance (AGAR) Community-Onset Staphylococcus aureus Susceptibility Surveillance Programme. The 499 MRSA were characterised by the Australian Collaborating Centre for Enterococcus and Staphylococcus Species (ACCESS) Typing and Research. Ceftaroline minimum inhibitory concentrations (MICs) were determined using Etest® strips. Susceptibility testing of the comparative antibiotics was performed using the Vitek2® AST-P612 Susceptibility Card.

Results: All MSSA isolates were inhibited at ceftaroline MIC values of \( \leq 1 \) mg/L (CLSI and EUCAST breakpoint). Their MIC values ranged from 0.047 to 0.5 mg/L (MIC\(_{50}\) 0.25 mg/L, MIC\(_{90}\) 0.25 mg/L). The ceftaroline MICs for the MRSA isolates ranged from 0.25 to 2.0 mg/L (MIC\(_{50}\) 0.5 mg/L, MIC\(_{90}\) 1.75 mg/L). Ceftaroline MICs of 2.0 or 1.5 were recorded for four Healthcare-Associated MRSA including one ST239-MRSA-III [3A] (Aus2/3 EMRSA), two ST22-MRSA-IV [2B] (EMRSA-15) and one ST5-MRSA-II [2A] (USA100) isolates. All Community-Associated MRSA were ceftaroline susceptible. Greater than 99% of S. aureus isolates were susceptible to vancomycin, teicoplanin, linezolid, daptomycin, rifampicin and ceftaroline.

Conclusion: Ceftaroline activity was preserved across MSSA and Community-Associated MRSA and most Healthcare-Associated MRSA. MICs ranged from 0.047 to 2.0 mg/L (MIC\(_{50}\) 0.25 mg/L, MIC\(_{90}\) 0.75 mg/L). Generally Healthcare-Associated MRSA were found to have slightly higher MICs than Community-Associated MRSA. Four Healthcare-Associated MRSA isolates exhibited an MIC value within one dilution above the susceptible breakpoints and would be considered non-susceptible using CLSI and EUCAST breakpoints.
Enterococci are a major cause of healthcare-associated infections and globally account for approximately 10% of all bacteraemias. In 2011 29 institutions across Australia participated in the Australian Enterococcal Sepsis Outcome Programme (AESOP). From the 1st January to 31st December 2011 1,079 unique episodes of bacteraemia were investigated of which 95.8% were either Enterococcus faecalis (61.0%) or E. faecium (34.8%). The majority of bacteraemias were healthcare-associated and approximately one third polymicrobial. 90.4% of E. faecium were ampicillin resistant. Ampicillin resistance was not detected in E. faecalis. Vancomycin non-susceptibility was reported in 0.6% and 36.5% of E. faecalis and E. faecium respectively. Unlike Europe and USA where vancomycin resistance in E. faecium is predominately due to the acquisition of the vanA operon, 98.4% of E. faecium isolates harbouring van genes carried the vanB operon. 16.1% of the vanB E. faecium had vancomycin MICs at or below the CLSI susceptible breakpoint. Although molecular typing identified 126 E. faecalis pulsed-field gel electrophoresis pulsotypes over 50% belonged to two pulsotypes, which were isolated across Australia. E. faecium consisted of 73 pulsotypes from which 43 multilocus sequence types were identified. Almost 90% of E. faecium were identified as CC17 clones of which approximately half were characterised as ST203, which was isolated Australia wide.

In conclusion the AESOP study has shown although polyclonal, enterococcal bacteraemias in Australia are frequently caused by ampicillin resistant vanB E. faecium. Further studies on the enterococcal genome will contribute to our understanding of the evolution of enterococci in the hospital environment.
PO2.1.
Rates of surface contamination in the rooms and bathrooms of patients with ESBL-producing *E. coli* and *K. pneumoniae*: A comparison between species

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Objective: Recent data suggest that transmission rates of ESBL-*Klebsiella pneumoniae* (ESBL-KP) tend to be higher in the hospital setting than ESBL-*Escherichia coli* (ESBL-EC). However, the importance of the hospital environment in transmission of these organisms is poorly understood. In view of this background, we sought to determine whether corresponding differences exist between the two species with respect to contamination rates of hospital surfaces. Secondly, we sought to identify key patient and organism factors that predispose to environmental contamination with these organisms.

Methods: We performed a prospective cohort study in which nine surfaces in the rooms and bathrooms of adult patients colonized or infected with ESBL-EC or ESBL-KP were systematically sampled. Sampling continued throughout the hospital stay. Data were also collected on patient characteristics that could potentially affect contamination rates. Environmental contamination was defined as recovery of an ESBL-producing organism (ESBL-E) matching the isolate from the source patient. Multivariate logistic regression was performed at the level of the patient visit using generalized estimating equations to identify key independent predictors of environmental contamination.

Results: 24 patients (11 with ESBL-KP, 11 ESBL-EC and 2 with both organisms) had 1104 swabs collected during 138 visits. The overall contamination rate was 3.4% (38/1104) and was significantly higher for ESBL-KP than ESBL-EC (5.4% versus 0.4%; p<0.0001). Toilet seats had the highest contamination rates (10/138; 7.2%) followed by call bells (7/138; 5.1%). No association was observed between contamination and prior cleaning (p=0.57). After multivariate analysis, environmental contamination was found to have a positive association with urinary catheters in the source patient (OR 6.12 [95% CI 1.23-30.37]; p=0.027); a negative association with carbapenem exposure (OR 0.06 [95% CI 0.01-0.61]; p=0.017) and a strong positive association with ESBL-KP in the source patient (OR 26.23 [95% CI 2.70-254.67]; p=0.005).

Conclusions: Independent predictors of environmental contamination include urinary catheters and ESBL-KP in the source patient. Environmental contamination with ESBL-E is inversely associated with carbapenem exposure. Hospital rooms and bathrooms of patients with ESBL-KP have substantially higher contamination rates than those with ESBL-EC. This finding may help explain the reportedly higher transmission rates for ESBL-KP compared to ESBL-EC in the hospital setting.
PO2.2. Relative prevalence of non-albicans Candida species in patients with vulvovaginal candidiasis

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Objective: Vulvovaginal candidiasis is an important cause of morbidity in women. Candida albicans species is the most common cause of vulvovaginal candidiasis. However, a change in epidemiological trends has been observed, demonstrating an increase in non-albicans species. Current epidemiological data on the relative prevalence of candida species involved in vulvovaginal candidiasis is scarce. The aim of this study was to assess the relative prevalence of non-albicans Candida species in patients with culture-positive vulvovaginal candidiasis in the Geelong region of Victoria.

Methods: Part 1: A retrospective data extraction of genital yeast isolates over the previous 5 years (January 2008 - December 2012), from St John of God Pathology in Geelong, to assess the relative prevalence of candida albicans vs. species isolations. All patient details were de-identified. Part 2: A prospective review of all genital Candida isolates over a 4 week period in August, 2013. The isolates were identified using Matrix-Assisted Laser Desorption/Ionization Time of Flight Mass Spectrometry (MALDITOF).

Results: Part 1: 10,949 yeast isolates were extracted. On average, 86.2% of the yeast isolates were C. albicans and 13.8% were non-albicans species.

Part 2: 101 genital yeast isolates were analysed using MALDITOF. 92 (91.1%) were identified as C. albicans, 8 (7.2%) were identified as C. glabrata and 1 (0.99%) was identified as C. lusitaniae.

Discussion This retrospective data extraction demonstrates that C. albicans is the most common (86.2%) aetiological agent responsible for vulvovaginal candidiasis; however, non-albicans species account for a considerable percentage (13.8%). While numerous authors report an increasing trend in non-albicans vulvovaginal candidiasis, this trend was not demonstrated in our study. Non-albicans Candida species are more likely than C. albicans to cause recurrent infections and occur more commonly in immunocompromised patients and patients with diabetes mellitus. These groups of patients have increased markedly in recent years. Non-albicans species, particularly C. glabrata, are commonly resistant to treatment with azoles. While vulvovaginal candidiasis is extraordinarily common, it is rare for species identification to be performed routinely in diagnostic laboratories. Further epidemiological research is required as the reported increase in non-albicans species and the increasing diversity of pathogenic agents may have implications for management.
PO2.3.
The post-antifungal effect of polyene antifungal agents and its impact on adhesion attributes of oral Candida dubliniensis isolates

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Objectives: The suppression of candidal growth that occur following limited exposure to antifungal agents has been described as the post-antifungal effect (PAFE). The PAFE have an impact on candidal pathogenicity. However there is no information on either the PAFE or its impact on adhesion traits of oral Candida dubliniensis isolates. Oral candidosis can be treated with polyene antifungals such as nystatin (NYS) and amphotericin B (AMP). Adhesion to buccal epithelial cells (BEC), germ tube (GT) formation and relative cell surface hydrophobicity (CSH) are all colonization attributes of candidal pathogenicity. Hence, the main objective of this study was to investigate the in vitro PAFE on 20 C. dubliniensis isolates following brief exposure to NYS and AMP. In addition, the impact of PAFE on adhesion to BEC, GT formation and relative CSH of C. dubliniensis isolates were also evaluated.

Methods: After determining the minimum inhibitory concentration (MIC) of NYS and AMP, C. dubliniensis isolates were exposed to sub-lethal concentrations of these drugs for 1 hour. Following this limited exposure, the drugs were removed and PAFE, adhesion to BEC, GT formation and relative CSH was determined by a previously described turbidometric method, adhesion assay, germ tube induction assay and biphasic aqueous-hydrocarbon assay, respectively.

Results: MIC (µg/ml) of C. dubliniensis isolates to NYS and AMP ranged from 0.09 to 0.78 and 0.002 to 0.125, respectively. The NYS and AMP induced mean PAFE (hours) on C. dubliniensis isolates was 2.17 and 2.21, respectively. Compared with the controls, exposure to NYS and AMP suppressed the ability of C. dubliniensis isolates to adhere BEC by a mean percentage reduction of approximately 74% (p <0.0001) for both drugs. Moreover, compared with the controls, exposure to both drugs almost completely inhibited GT formation with a mean percentage reduction of approximately 95% (p <0.0001). The mean percentage reduction in CSH following exposure to NYS and AMP was 34.81% and 33.09% (p <0.05), respectively.

Conclusions: Brief exposure of C. dubliniensis isolates to NYS and AMP would continue to wield an antifungal effect by suppressing growth as well as its adhesion attributes.

Acknowledgements: Work was supported by Kuwait University Research Grant No. DB 02/11.
PO2.4.  
*Mycobacterium chelonae* osteomyelitis: A unique Australian experience

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A 91 year old female was investigated for an erythematous and tender left foot. Significant medical history included atrial fibrillation, ischaemic heart disease, peripheral vascular disease, Type 2 diabetes mellitus, bronchiectasis, polymyalgia rheumatica and osteopenia. She had been admitted to hospital eight weeks prior, following a fall, with right foot cellulitis and subsequently diagnosed fifth metatarsal osteomyelitis, initially resulting in its amputation, then subsequently a right below-knee amputation. Since the right below-knee amputation, she had been on complete bed rest in hospital.

Magnetic resonance imaging confirmed osteomyelitis of the left distal fifth metatarsal and proximal fifth phalanx with fluid in the joint and a small abscess lateral to this. Empirical antimicrobial therapy using flucloxacillin was commenced. Two weeks after the initial complaint of the erythematous left foot, acid-fast bacilli were grown from expressed pus samples and blood cultures, later identified as *Mycobacterium chelonae* using high-performance liquid chromatography and polymerase chain reaction-based assay. Various antimycobacterial regimens were trialled before and after sensitivities were known. Treatment was complicated by an unknown source of infection, severe peripheral vascular disease, electrolyte imbalance, peripherally inserted central catheter infection, patient refusal for surgical intervention, persistent delirium, short supply of antibiotics, drug-drug interactions with existing medications and side effects.

Ultimately, the patient consented to surgery, resulting in amputation of the left fifth phalanx and a portion of the left fifth metatarsal. The antimycobacterial agents were ceased seven days post-operatively and the patient was discharged from hospital after a total length of stay of 113 days to a nursing home.

*Mycobacterium chelonae* is a rapidly growing mycobacterium which demonstrates multidrug resistance and typically requires a combination of intravenous and oral antimycobacterial agents and surgery for successful treatment. Osteomyelitis due to *Mycobacterium chelonae* is not well described in the literature, and we are not aware of any other published cases in Australia. Treatment remains largely guided by case reports, small retrospective reviews and in-vitro susceptibility patterns.
PO2.5.
Vertebral osteomyelitis – Treatment and outcomes

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Objectives: Vertebral osteomyelitis is an easily missed serious infection with potentially devastating consequences. Adverse outcomes include neurological sequelae and pain, in addition to consequences of sepsis. Possible prognostic factors include duration and extent of disease, type of organism and need for surgical intervention. We carried out a retrospective analysis of patients treated at our hospital with a diagnosis of vertebral osteomyelitis over the last 10 years.

Methods: Medical records of all patients diagnosed with vertebral osteomyelitis between 1 January 2003 and 31 August 2013 were reviewed. Diagnosis was based on clinical presentation, radiology and/or microbiological results. Details of treatment, particularly surgical intervention, antibiotics used and duration of therapy were noted. Data was analyzed to determine predisposing factors for adverse outcome, defined as death, neurological deficit or pain at end of treatment.

Results: There were 61 patients, 39 males, average age 58 years. The most frequent underlying risk was intravenous drug use followed by immunosuppressive therapy. The most common presenting symptom was back pain (60/61) while only 53% (31/61) had fever. A microbiological diagnosis was made by blood or tissue culture in 48/61 cases with methicillin sensitive staphylococcus aureus the most common pathogen in 33/61. Surgery was undertaken in 30/61 patients with the median time to surgery being 2 days post diagnosis (range: 0-20 days). Average duration of treatment was 40 weeks (1-93 days); flucloxacillin was the most common antibiotic used. There were 5 deaths, 15 had residual neurological deficits and 21 had ongoing pain at end of treatment; there were 3 relapses. Presence of neurological deficit at presentation was the only significant risk factor for an adverse outcome.

Conclusion: In patients presenting with back pain, vertebral osteomyelitis remains an important differential diagnosis to consider even in the absence of fever. Among our patients diagnosis was established most commonly by an MRI; microbiological diagnosis was achieved in 79% of patients. The only factor associated with neurological deficit at end of treatment was presence of neurological deficit at diagnosis.
Background: Catheter-related bacteremia (CRB), after formation of a biofilm, is a serious complication of central venous catheter (CVC) use in haemodialysis patients. The removal of CVC can be expensive and associated with significant morbidity and mortality. We have previously described an antibiotic lock procedure to target the biofilm to assist clinicians select episodes of CRB that can be treated successfully with CVC salvage. There is a paucity of available literature on suitable antibiotics that may be utilised with this technique. There is also concern on the affect of antibiotic lock solutions contributing to antimicrobial resistance and increased cost for haemodialysis patients.

Case History: A 61 year old female on haemodialysis 3 times a week via a right permacath, was receiving a gentamicin (GEN) lock as per unit protocol (antibiotic concentration 2.7mg/mL). The patient developed fevers and rigors during haemodialysis. She was determined to have an episode of CRB and potentially suitable for a CVC salvage. Blood cultures grew Achromobacter xylosoxidans resistant to GEN, sensitive to piperacillin-tazobactam (TAZ), and antibiotic locks were changed to TAZ as per unit protocol (antibiotic concentration 11.1/28mg/mL) along with a course of intravenous TAZ. Three months later she again developed clinical signs of CRB on haemodialysis. Blood cultures grew Achromobacter xylosoxidans sensitive to piperacillin-tazobactam (TAZ) and trimethoprim-sulfamethoxazole (TMP-SMX). Removal of the catheter was suggested, however microbiological opinion was sought and the poor biofilm penetration by TAZ was considered. A switch to a TMP-SMX antibiotic lock and concurrent oral TMP-SMX therapy was instituted. The TMP-SMX lock technique involved using a final antibiotic concentration of 13.3/66.6mg/mL. Ongoing treatment with this novel regime resulted in successful CRB treatment and salvage of the CVC. The catheter remained in situ and well functioning.

Conclusion: The use of TMP-SMX as an antibiotic-lock may provide an effective solution to treatment of CRB due to the effective penetration of biofilm on CVC. An added benefit of TMP-SMX is its relatively low cost and its minimal contribution to selective pressure. This case highlights the need for more research into the antibiotic lock options for contaminated CVC’s and that biofilm penetration is an important consideration when choosing antibiotic locking solutions.

P02.7. Continuous infusion flucloxacillin for outpatient parenteral antimicrobial therapy, are buffered solutions necessary?

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Objectives: Previous studies have demonstrated that unbuffered flucloxacillin solutions have poor stability at elevated temperatures. Flucloxacillin stability is pH dependent and can be overcome with the use of a phosphate buffer. Phosphate buffer is not commercially available and an alternative is required for wide-spread application in compounding pharmacies in Australia. The aim of this study was to investigate the use of a commercially available sodium citrate buffer to improve the stability of flucloxacillin infusions at elevated temperatures for application in the outpatient parenteral antimicrobial therapy setting.

Methods: Flucloxacillin 1g vials were reconstituted with either 5mL of water for injection or 5mL of sodium citrate 1% solution and added to 100mL sodium chloride 0.9% viaflex bags to achieve a final concentration of 4g/130mL, 8g/150mL and 12g/150mL. Triplicate infusion bags were manufactured at each concentration. Duplicate samples were taken immediately, after 7 days of refrigeration (3-5°C), and after a further 6, 12, 18 and 24 hours stored at 37°C. All samples were analysed by HPLC. If the lower end of the 95% confidence interval (CI) for the concentration remaining was above 90% at the end of the study period, the infusions were deemed sufficiently stable.

Results: After refrigeration for 7 days and 24 hours at 37°C the buffered infusions maintained a mean of 95.4% (95% CI 93.1 – 97.6) of the initial flucloxacillin concentration. The unbuffered infusions maintained a mean of only 72.2% (95% CI 63.4 – 81.0) of the initial flucloxacillin concentration. After approximately 12 hours at 37°C, the unbuffered infusions became increasingly yellow, and turbid with precipitate. The buffered infusions remained visually clear for the duration of the stability study.

Conclusion: Unbuffered flucloxacillin infusions degraded to an unsatisfactory extent with visible precipitation. Utilising sodium citrate in the compounding process resulted in clinically relevant improvements in stability with only a 5% loss (95% CI 2-7) after refrigeration for 7 days and subsequent 24 hours at 37°C. As a 12g flucloxacillin buffered infusion contains approximately 2mmol of sodium citrate no toxicity is expected.
PO2.8.
Peri-operative antimicrobial prophylaxis: challenges abound!

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**Objectives:** To review antimicrobial use in surgical prophylaxis and assess adherence to local consensus-based guidelines.

**Methods:** A prospective cohort review was undertaken across two Australian district hospitals in August 2013. Data were collected for 100 consecutive surgical admissions and included patient demographics, admission type, surgical procedure, microbiology, including development of surgical site infections, and antimicrobial prophylaxis regimens prescribed peri-operatively. Patients with obvious pre-existing infection(s) were excluded.

**Results:** There were a total of 48 emergency and 52 elective admissions. The procedures were classified as orthopaedic (43%), general surgery (39%), obstetrics and gynaecology (13%) and vascular (5%). Overall, 75% of patients were prescribed an antimicrobial regimen in the peri-operative phase for surgical prophylaxis that was not consistent with guidelines. In total, 38% of patients had one, 22% had two and 15% had three or more incidences of deviation from guidelines. Deviations were related to duration of prophylaxis (46%), timing of administration (30%), dose of antibiotic(s) (26%) and choice of antibiotic(s) (20%). There were no significant differences in the proportion of elective and emergency patients who were prescribed guideline-recommended antimicrobial prophylaxis. Antibiotics prescribed peri-operatively for obstetric procedures adhered to guidelines in 58% of cases, whilst adherence was significantly lower in orthopaedic (21%) and general surgical (18%) procedures. There were six documented cases of post-operative surgical site infections, all of whom had undergone general surgical procedures and were prescribed antimicrobial prophylaxis regimens inconsistent with guidelines.

**Conclusions:** This review highlights a range of issues related to antimicrobial use in surgical prophylaxis and identifies key interventions that can be adopted to minimise post-operative infection risk. The risk of developing a surgical site infection is significantly increased in general surgery when compared with other classes of procedures. Future directions might include a comprehensive systems based approach, such as review of care planning pathways in the pre-admission clinic, operating theatres and relevant surgical wards. The impact of deviations from guidelines on hospital length of stay is being investigated.
PO2.9.
An approach to the treatment of antibiotic resistant Gram negative infections

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Objective: The incidence of infections with antibiotic resistant bacteria is escalating. Pan-resistant and extremely drug resistant (XDR) Gram negative bacilli have started to emerge in the clinical setting. XDR’s have been defined in literature and suggested infection control interventions have been proposed but to date there are no guidelines on how treatment of XDR Gram negative bacilli should be approached. We reviewed our experience with three patients with pan-resistant Gram negative bacilli infections and outline strategies used for treatment with the aim of formulating an approach for future patients.

Case reports:
Patient A: 62 year old male with an enterocutaneous fistula infected with multi-resistant Enterobacter aerogenes where surgical correction was not deemed feasible. With limited antimicrobial choices available and a meropenem MIC at the susceptible breakpoint of 2 μg/mL, pharmacokinetic and pharmacodynamic properties were enhanced using 3 hour extended meropenem infusions. Treatment is currently ongoing and the patient is stable.

Patient B: 36 year old male Australian traveller transferred from a Thailand hospital with sepsis due to multi resistant Pseudomonas aeruginosa secondary to fasciotomy wounds. There was no surgically correctable focus. Following extended susceptibility testing, a combination of intravenous colistin and intermittent infusions of meropenem were used for treatment. However, despite optimised antibiotic dosing and organ support, the patient had worsening sepsis with persistent bacteraemia and passed away.

Patient C: 31 year old male with a bilateral sequential lung transplant for Cystic Fibrosis who developed a multi-resistant Burkholderia multivorans bacteraemia following identification on sputum and lung resection cultures. A combination of intravenous moxifloxacin, oral minocycline, extended meropenem infusions and continuous high dose ceftazidime infusions were used to combat this increasingly resistant organism. Despite this therapy, the patient remained septic and passed away.

Discussion: There is little evidence to guide the management of pan-resistant and XDR Gram negative bacilli. Where multi-resistant organisms are isolated, an approach is to (a) determine whether treatment is required (b) attempt non-antibiotic treatment (i.e. surgery) (c) request susceptibility testing for less commonly used antibiotics (d) determine whether PK/PD targets can be achieved in infected tissue (e) consider combinations of antibiotics that may exhibit in vitro synergy.
PO2.10. Compounds isolated from medicinal plants reverse drug resistance by inhibition of
drug efflux pumps

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Drug efflux pumps confer resistance upon bacteria to a wide range of antibiotics from
various classes. The expression of efflux pumps are also implicated in virulence and biofilm
formation. Moreover, organisms can only acquire resistance in the presence of active drug
efflux pumps. Therefore, efflux pump inhibitors (EPIs) are attractive compounds to reverse
multidrug-resistance and to prevent the development of resistance in clinically relevant
bacterial pathogens.

We investigated the potential of pure compounds isolated from plants to act as EPIs. In silico
screening was used to predict the bio-activity of plant compounds and to compare that with
the known EPI, phe-arg-b-naphthylamide (PAβN). Subsequently, promising products have
been tested for their ability to inhibit bacterial growth, to act as efflux pump substrates (EPSs)
or to act as EPIs. Plumbagin, NDGA and to a lesser degree shikonin, quercitin and mangiferin
acted as sensitizers of drug resistant bacteria to currently used antibiotics.

We demonstrated the feasibility of in silico screening to identify efflux pump inhibitors that
potentiate the action of antibiotics against drug-resistant strains and which might be potential
lead-compounds for a drug discovery program.
PO2.11. Can clinical vignettes predict the outcome of a point prevalence study?

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Background: Lack of knowledge about infectious diseases and antimicrobial therapy has contributed to inappropriate antimicrobial prescribing. Clinical vignettes have shown to predict clinician practices and to measure adherence to guidelines.

Aim: To describe if the appropriate selection of antibiotics, by clinicians using clinical vignettes, can predict adherence to guidelines as determined by a point prevalence study (PPS).

Methods: Standardised vignettes were developed based on case studies. The vignettes were adapted for the following practice areas; adult medicine, paediatrics and neonates. In addition, an awareness of antimicrobial stewardship was evaluated. Respondents answered the survey questions by selecting the most appropriate multiple choice answer using a voting system (TurningPoint®). During the same time period a point prevalence study for every inpatient was conducted in the areas that completed the vignettes. Appropriateness of antimicrobial prescribing for the PPS was determined by medical staff from the departments of Infectious Diseases and Clinical Microbiology.

Results: Forty five respondents participated in the TurningPoint® survey from the following areas: adults (n=17); paediatrics (n=16); neonates (n=12). In the PPS the following numbers of patients were reviewed: adults (n=117); paediatrics (n=118); neonates (n=66). Across all the areas 32 to 49 % patients were prescribed at least one antibiotic.

Summary of TurningPoint® survey and PPS results

<table>
<thead>
<tr>
<th>Practice Areas</th>
<th>Adults</th>
<th>Paediatrics</th>
<th>Neonates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of antimicrobial stewardship (AMS) (%) respondents</td>
<td>63</td>
<td>82</td>
<td>75</td>
</tr>
<tr>
<td>Identified education as an important intervention of AMS (%) respondents</td>
<td>29</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>Identified appropriate antibiotic(s) choices from clinical vignettes (%) respondents</td>
<td>25 to 56</td>
<td>62 to 100</td>
<td>70 to 90</td>
</tr>
<tr>
<td>PPS: antibiotics deemed appropriate (% antibiotics prescribed)</td>
<td>81</td>
<td>86</td>
<td>100</td>
</tr>
</tbody>
</table>

The respondents in the neonatal area were more likely to identify the most appropriate antibiotic choice from the vignettes. In the PPS the neonatal area also demonstrated the greatest percentage of antibiotics that were appropriately prescribed. Education as an AMS intervention received the highest rating in this practice area.

Conclusions: Although the results from clinical vignettes may not replace formal prescribing surveys, they provide insight into antimicrobial prescribing practices and assist with the development of target areas for future AMS activities including education of prescribers.
PO2.12.
The National Antimicrobial Prescribing Survey – Two years on

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Objective: Qualitative methods for assessing antimicrobial prescribing are not often used, mainly due to the time and resources required, coupled with the lack of tools and standardised methods. The aim was therefore to design an audit tool that was appropriate for use in all Australian hospitals, being practical, generalisable and facilitating easy data collection, including an assessment of the appropriateness of the prescription.

Methods: The tool was designed by a multidisciplinary group of researchers within Melbourne Health, comprising infectious diseases clinicians, clinical microbiologists and pharmacists. It focused on key performance indicators, avoided extraneous detail and was developed so that data fields could be interpreted consistently across all hospital settings and by various auditors. Emphasis was placed on the usefulness of data collected, time required for collection and entry and ease of use. An initial pilot study was conducted in 2011 across five states, the results of which were reported at the ASA conference in 2012. Following user feedback, the audit tool was redesigned and a second pilot study was performed in 2012 with participants from every state and territory. Following further user feedback and development of the audit tool, a dedicated online database was created to enable all hospitals to assess their own antimicrobial prescribing practices. To maintain consistency of the entered data, a list of definitions for each field was developed, as well as a guide to assist with the assessment of appropriateness. The survey was again performed in 2013 with national involvement, the results of which will be available shortly.

Results: Refer to Table 1.

Table 1: Summary of the 2011 and 2012 APS key data

<table>
<thead>
<tr>
<th>Indication documented</th>
<th>APS 2011 (n = 32 hospitals)</th>
<th>APS 2012 (n = 76 hospitals)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>median; range</td>
<td>average</td>
</tr>
<tr>
<td>Surgical prophylaxis &gt;24hours</td>
<td>Yes</td>
<td>78%</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>5%</td>
</tr>
<tr>
<td>Compliance with guidelines</td>
<td>Yes</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>None available</td>
<td>16%</td>
</tr>
<tr>
<td>Appropriate prescriptiona</td>
<td>Yes</td>
<td>61%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>Not assessable</td>
<td>12%</td>
</tr>
</tbody>
</table>

7 hospitals elected not to assess appropriateness for the APS 2012; n = 69 for this field

Conclusion: The monitoring and evaluation of antimicrobial use is an essential component of the new hospital accreditation criteria. From the feedback received, it is evident that a national survey on the quality of antimicrobial prescribing is achievable and desired. This carefully considered and constructed tool has been shown to be appropriate for use by different auditors in a wide range of hospital settings. This should allow all Australian hospitals to be involved in the qualitative auditing of their antimicrobial prescribing practices and become involved in national and potentially international benchmarking studies.
PO2.13. Anti-pseudomonal antibiotic prescribing practices: a tale of two Australian district hospitals

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Objectives: To review anti-pseudomonal antibiotic prescribing practices within the context of an established antimicrobial stewardship program.

Methods: A retrospective cohort review was undertaken across two Australian district hospitals. All physician requests submitted in 2012 on an electronic approval system for restricted anti-pseudomonal antibiotics were reviewed for antibiotic choice and formulation, indication for antibiotic, order status and decline reason where applicable.

Results: A total of 1618 requests were submitted for restricted antibiotic use. Of these, 700 (43%) were for anti-pseudomonal antibiotics, including 329 (20%) for fluoroquinolones, 205 (13%) for piperacillin/tazobactam, 94 (6%) for carbapenems and 72 (4%) for fourth-generation cephalosporins. There was no significant difference in the overall proportion of approved requests for anti-pseudomonal antibiotics (70%) and other restricted antibiotics (72%). Fluoroquinolones were the most frequently declined anti-pseudomonal antibiotics (44%), compared with carbapenems (20%), fourth-generation cephalosporins (18%) and piperacillin/tazobactam (17%). The most commonly prescribed fluoroquinolones included oral ciprofloxacin (46%), oral norfloxacin (33%) and intravenous ciprofloxacin (10%). Intravenous ciprofloxacin had the highest rate of decline (64%). The most common reason by far for declination of fluoroquinolone requests was inconsistency with established guidelines (80%), particularly for treatment of urinary tract infections and cellulitis. A positive downward trend in fluoroquinolone usage was observed across both sites during the year.

Conclusions: Anti-pseudomonal antibiotics account for a significant proportion of restricted antibiotic requests. While the majority of requests are approved for use by Infectious Diseases, fluoroquinolones are often declined in favour of other antibiotics, reflecting the importance of antimicrobial stewardship in encouraging adherence of antimicrobial prescribing to established guidelines.
PO2.15.
Cefotaxime and ceftriaxone use in Concord Hospital Emergency Department

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Objectives: To investigate the usage of ceftriaxone and cefotaxime, currently unrestricted, in the Emergency Department at CGRH, to ascertain prescribing patterns including the most common indications, prescribing groups, and appropriateness of use using the Therapeutic Guidelines. Cefotaxime is currently the main 3rd generation cephalosporin used in CGRH.

Method: An audit was performed over a 3 month period from 17/8/12-16/11/12. The data from each prescription was analysed retrospectively using the paper file, electronic medical records and pathology and radiology results.

Results:

<table>
<thead>
<tr>
<th>CEFOTAXIME n=66</th>
<th>CEFTRIAXONE n=36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage c/w TGL</td>
<td></td>
</tr>
<tr>
<td>Appropriate</td>
<td>47%</td>
</tr>
<tr>
<td>Inappropriate</td>
<td>53%</td>
</tr>
<tr>
<td>Appropriate</td>
<td>22.2%</td>
</tr>
<tr>
<td>Inappropriate</td>
<td>77.8%</td>
</tr>
<tr>
<td>n (%)</td>
<td>% appropriate</td>
</tr>
<tr>
<td>timing first dose</td>
<td></td>
</tr>
<tr>
<td>8pm-8am</td>
<td>44 (66.7%)</td>
</tr>
<tr>
<td>8am-8pm</td>
<td>22 (33.3%)</td>
</tr>
<tr>
<td>8pm-8am</td>
<td>14 (38.9%)</td>
</tr>
<tr>
<td>8am-8pm</td>
<td>22 (61.1%)</td>
</tr>
<tr>
<td>weekend vs weekday</td>
<td></td>
</tr>
<tr>
<td>weekday</td>
<td>13 (19.7%)</td>
</tr>
<tr>
<td>weekend</td>
<td>53 (80.3%)</td>
</tr>
<tr>
<td>weekday</td>
<td>10 (27.8%)</td>
</tr>
<tr>
<td>weekend</td>
<td>26 (72.2%)</td>
</tr>
<tr>
<td>prescribers</td>
<td></td>
</tr>
<tr>
<td>emergency staff¹</td>
<td>53 (80.3%)</td>
</tr>
<tr>
<td>emergency staff¹</td>
<td>34 (94.4%)</td>
</tr>
<tr>
<td>emergency staff¹</td>
<td>58.5%</td>
</tr>
<tr>
<td>emergency staff¹</td>
<td>23%</td>
</tr>
<tr>
<td>non-emergency Staff²</td>
<td>13 (19.7%)</td>
</tr>
<tr>
<td>non-emergency Staff²</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>non-emergency Staff²</td>
<td>0%</td>
</tr>
<tr>
<td>non-emergency Staff²</td>
<td>0%</td>
</tr>
<tr>
<td>indication</td>
<td></td>
</tr>
<tr>
<td>CAP</td>
<td>18 (27.3%)</td>
</tr>
<tr>
<td>appendicitis</td>
<td>6 (9.1%)</td>
</tr>
<tr>
<td>appendix</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>infective exacer-bation COPD</td>
<td>(7.6%)</td>
</tr>
<tr>
<td>meningitis</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>aspiration pneumonia</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>urosepsis</td>
<td>(6.1%)</td>
</tr>
<tr>
<td>possible type 1 penicillin allergy</td>
<td>(12.1%)</td>
</tr>
<tr>
<td>admission status</td>
<td></td>
</tr>
<tr>
<td>admitted</td>
<td>(92.4%)</td>
</tr>
<tr>
<td>discharged</td>
<td>(7.6%)</td>
</tr>
<tr>
<td>died</td>
<td>(0%)</td>
</tr>
<tr>
<td>died</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td>died</td>
<td>1 (100%)</td>
</tr>
</tbody>
</table>

¹emergency staff= emergency consultants/registrar/residents/interns
²non-emergency staff= medical/surgical team staff
These antibiotics were found to be mostly inappropriately prescribed, and particularly after hours. They were particularly inappropriately prescribed when non-emergency staff were the prescribers. Commonly respiratory and geriatric teams were authorising the prescribing by emergency staff. The most common indication for both antibiotics was CAP.

**Conclusion:** Antimicrobial Stewardship is needed, with a particular focus on after hours prescribing, respiratory and geriatric prescribing, and prescribing in penicillin allergy. Education targeting these areas could be provided to emergency staff with involvement of respiratory and geriatric units, using locally adapted guidelines.
PO2.16.
Fluoroquinolone and third & fourth generation cephalosporin usage in Australian tertiary hospitals.

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Objectives: The National Antimicrobial Utilisation Surveillance Program (NAUSP) has over nine years’ worth of usage data for all antibiotics and antibiotic classes. Fluoroquinolones and the third & fourth generation cephalosporins are antibiotic classes which have been associated with emergence of multi-resistant organisms and *Clostridium difficile*. Antimicrobial stewardship (AMS) initiatives have focussed on minimising inappropriate prescribing of these and other agents. This study aims to ascertain if surveillance data supports the premise that initiating AMS programs results in decreased use of these agents.

Method: NAUSP usage rates, in Defined Daily Dose per 1000 Occupied Bed Days, were examined for the fluoroquinolone and combined third and fourth generation cephalosporin classes over a nine-year period for A1-peered hospitals (AIHW categorization). Usage rates were converted to a percentage of total antibiotic usage rate and any changes in relative usage over the nine years identified. Australian data were also compared with those reported from Denmark (DANMAP). Data from a number of individual NAUSP contributor hospitals were subjected to the same analysis to ascertain if this surveillance technique detected effects of AMS program implementation.

Results: Aggregated fluoroquinolone usage in A1 hospitals increased from 5.7% in FY2004-05, reaching a maximum of 6.4% of total hospital usage in FY2007-08. Since then relative usage rates decreased steadily, and in FY2012-13 fluoroquinolones accounted for 4.5% of antibiotic usage. Interestingly, data from Denmark showed a similar trend of increasing relative usage up to 2009, then declining usage. Broad spectrum cephalosporins accounted for 5 – 6% of total antibiotic use in A1 hospitals in all years between 2004 and 2013 and no discernible trends in overall use were apparent. Usage rates of third generation cephalosporins in Denmark are much lower than in Australia.

When data were examined at the hospital level obvious trends occurred for both fluoroquinolones and broad spectrum cephalosporins in several hospitals known to have recently implemented AMS programs.

Conclusion: Over nine years of data collection, usage of fluoroquinolones, as a proportion of total use, increased then decreased from 2009. The timing aligns with national and international AMS activities gaining momentum. Data from individual hospitals support the premise that usage of fluoroquinolones and third and fourth generation cephalosporins has decreased with the introduction of AMS programs. The national picture is more complex for broad spectrum cephalosporins.
PO2.17. Exploring a New Method for Conducting Volume-based Surveillance of Parenteral Antibiotic Use in Paediatric Settings

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\textsuperscript{2} Infection Control Service, Communicable Disease Control Branch, SA Health, South Australia, Australia
\textsuperscript{3} SA Pharmacy, Women’s and Children’s Hospital, South Australia, Australia
\textsuperscript{4} Flinders University, South Australia, Australia
\textsuperscript{5} SA Pathology at Women’s and Children’s Hospital, South Australia, Australia

**Introduction:** The current method for conducting antimicrobial utilisation surveillance in Australian paediatric hospitals is an annual Point Prevalence Survey (PPS). While this provides valuable information, ideally it should be complemented with an automated method that monitors usage in an ongoing manner just like the National Antimicrobial Utilisation Surveillance Program (NAUSP) does in adults. In recent years “one vial per dose” policies have become standard in Australian hospitals. Consequently, the number of vials dispensed has become more closely aligned to the number of doses administered. Measuring vials dispensed potentially enables standardised volume-based surveillance.

**Objectives:** To develop, test and ascertain the feasibility of a new method for conducting volume-based surveillance of parenteral antibiotic use in one Australian paediatric hospital.

**Methods:** A nine week audit of parenteral inpatient antibiotic usage was conducted at the Women’s and Children’s Hospital. From this, the number of vials used per dose and the most commonly prescribed dosing frequency for each antibiotic was determined such that a paediatric appropriate surrogate of the Defined Daily Dose – the paediatric Daily Antibiotic Exposure (pDAE) could be developed. Simultaneously nine weeks of population level dispensing and occupancy data were collected and an exposure rate calculated using the pDAE. This rate was then compared to the true exposure rate (calculated from audit data). In addition, Pearson’s product-moment correlation coefficient was used to determine if the trends in usage were comparable between the audit data and population data. Finally, the new method was applied retrospectively over two years and assessed for its ability to detect changes in usage and general usefulness.

**Results:** The ability of the new method to predict exposure rates accurately varied between drugs. However the trends produced by the new method were reasonably accurate ($r>0.7$) in the majority of cases. When applied over two years the trends observed provided interesting and valuable information - Figure 1 provides one example.

**Conclusion:** The method explored in this study presents itself as a feasible method for conducting volume-based surveillance of parenteral antibiotic use in paediatric hospitals. This method could be expanded nationally, complementing PPSs and enabling the inclusion of paediatric usage data into NAUSP.

![Figure 1](image-url)  
**Figure 1.** Piperacillin with tazobactam and ticarcillin with clavulanic acid usage rates in the Women’s and Children’s Hospital paediatric wards between April 2011 and April 2013, showing the dramatic changes in usage which occurred when the piperacillin with tazobactam patent expired.
Funnel plots and risk adjustment of antimicrobial utilisation data

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² Infection Management Services, Princess Alexandra Hospital, Brisbane, Queensland, Australia
³ School of Population Health, University of Queensland, Herston, Queensland, Australia

Objectives: Valid comparisons between different facilities of antimicrobial utilisation requires risk adjustment for each facility’s case mix. Without individual patient data risk adjustment can be based on hospital’s services. A risk adjustment model has been used to monitor 2012 Queensland Health facilities antimicrobial utilisation data.

Methods: Data were obtained from the antimicrobial utilisation database (MedTRx) on five subclasses of antibiotics (carbapenems, fluoroquinolones, glycopeptides, third-generation cephalosporins and antipseudomonal penicillins combined with a betalactamase inhibitor (PBI) for 21 acute public hospitals from 2006 to 2012. Risk adjustment was based on eleven clinical services and a variable for hospitals from the tropical region. Protective and risk services were identified for these antibiotics using multivariable regression models. Funnel plots were used to display hospitals aggregated data incorporating predicted values from the risk adjusted model. The results for individual hospitals were evaluated in relation to the average of the risk-adjusted values. The observed-to-expected (O/E) ratio was used for displaying each hospital outcomes.

Results: There was higher than expected use of carbapenems in four facilities and of glycopeptides in three facilities. One facility had higher than expected use of PBI and another of third generation cephalosporins. Two facilities had lower than expected usage of fluoroquinolones and one facility had lower than expected use of fluoroquinolones.

Conclusion: The model predicted utilisation rates by hospital services and funnel plots are useful in identifying outliers. This process successfully identified increased or decreased antimicrobial utilisation. However it did not identify sustained utilisation trends or the appropriateness of that use, but it can be used as a signal for further investigation.
PO2.19.
Attitudes and perceptions of junior medical staff toward a ward-based therapeutic drug monitoring service for aminoglycosides

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2 School of Medicine, Flinders University, South Australia
3 NHMRC – Translating Research into Practice Fellow
4 School of Pharmacy and Medical Sciences, University of South Australia, South Australia
5 Department of Clinical Pharmacology, Flinders Medical Centre, South Australia

Objectives: Aminoglycosides are important agents for the treatment of Gram-negative infections. Recommendations for area under the concentration curve (AUC) monitoring of aminoglycosides are provided in the current Australian Therapeutic Guidelines and by the Department of Health in South Australia. In early 2012 a computerised AUC aminoglycoside therapeutic drug monitoring (TDM) and dosing service was implemented at Flinders Medical Centre (FMC), a tertiary referral metropolitan hospital. This service has been provided for 396 patients as of December 2013. Little is known about the attitudes and perceptions of medical staff regarding the contribution of the aminoglycoside TDM service to inpatient care.

Methods: An electronic survey was sent to all intern and resident medical staff registered with the Trainee Medical Office, FMC. The survey contained questions on demographics, awareness of the aminoglycoside TDM service, its impact on dosing, duration of therapy and minimising toxicity, and whether it increased their knowledge of TDM principles.

Results: From a total of 145 junior medical officers (JMOs) contacted, 49 (34%) responded (33 (67%) females, 16 (33%) males; 34 (69%) interns, 15 (31%) resident medical officers. In this cohort, 38 (78%) JMOs were aware of the aminoglycoside TDM service. Of those aware: a) 15 (39%) had used the service often, 20 (52%) occasionally and 3 (8%) never; b) 32 (84%) reported that the service had impacted favorably on dosing while 6 (16%) were not sure; c) 31 (82%) reported a favorable effect on minimising toxicity with 7 (18%) unsure; d) 20 (53%) reported a favorable impact on the duration of aminoglycoside therapy, whereas 12 (32%) were not sure and 6 (16%) reported no impact; and e) 30 (79%) reported the service had increased their knowledge of TDM principles.

Conclusion: A significant proportion of respondents were aware of the aminoglycoside TDM service and demonstrated positive attitudes towards its use for dose optimization and minimising toxicity. Moreover, the introduction of this service had a significant educational effect.
PO2.20.
Improving Vancomycin Monitoring and Safety in Hospital-in-the-Home

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² Menzies School of Health Research, Darwin, Northern Territory, Australia
³ Monash University, Clayton, Victoria, Australia

Objectives: To improve the management of vancomycin in hospital in the home (HITH) patients by reducing inappropriate therapeutic drug monitoring (TDM) through implementation of a vancomycin protocol.

Methods: The implemented protocol included information for clinicians on a defined vancomycin level target range, instructions on when to take levels (including default days of TDM for all patients), clearer communication pathways and responsibilities of the HITH team (doctors, nurses and pharmacists), and specific guidance on management of levels not within therapeutic range.

A review of all HITH patients who received 24 hour vancomycin infusion was conducted pre and post implementation of this protocol. All vancomycin levels taken during this period were included and assessed. Appropriateness of management was based on local guidelines, consistency with protocol, changes in renal function and other documented clinical factors.

Results (Preliminary): A total of 15 patients were identified, including 8 prior and 7 post implementation of the protocol (Table 1). A comparable number of vancomycin levels were taken, with a higher proportion being therapeutic post implementation, primarily due to a reduction in the number of sub-therapeutic levels. Management of vancomycin levels improved significantly, with 93% of levels managed appropriately post-implementation compared to 67% pre-implementation (p=0.002).

<table>
<thead>
<tr>
<th></th>
<th>Before implementation</th>
<th>After implementation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>8</td>
<td>7</td>
<td>NA</td>
</tr>
<tr>
<td>Mean Age (years)</td>
<td>74.5</td>
<td>67.7</td>
<td>NA</td>
</tr>
<tr>
<td>Male patients</td>
<td>3 (38%)</td>
<td>6 (86%)</td>
<td>NA</td>
</tr>
<tr>
<td>Vancomycin levels taken</td>
<td>49</td>
<td>45</td>
<td>NA</td>
</tr>
<tr>
<td>Vancomycin levels within range (17-25mg/L)</td>
<td>23 (47%)</td>
<td>29 (64%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Subtherapeutic levels (&lt;17mg/L)</td>
<td>15 (31%)</td>
<td>5 (11%)</td>
<td>0.021</td>
</tr>
<tr>
<td>Toxic levels (&gt;25mg/L)</td>
<td>11 (22%)</td>
<td>11 (24%)</td>
<td>0.819</td>
</tr>
<tr>
<td>No. levels appropriately managed (overall)</td>
<td>33 (67%)</td>
<td>42 (93%)</td>
<td>0.002</td>
</tr>
<tr>
<td>If sub-therapeutic, number appropriately managed</td>
<td>4 (27%)</td>
<td>5 (100%)</td>
<td>0.008</td>
</tr>
<tr>
<td>If toxic, number appropriately managed</td>
<td>8 (73%)</td>
<td>8 (73%)</td>
<td>1.000</td>
</tr>
<tr>
<td>No. appropriately managed for all out-of-range vancomycin levels</td>
<td>12 (46%)</td>
<td>13 (81%)</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Note: values are N (%) unless otherwise indicated. NA = not assessed

Conclusion: Implementation of the HITH vancomycin protocol has improved management of vancomycin levels, particularly the management of sub-therapeutic levels, and has resulted in a greater proportion of levels being within therapeutic range. Management of toxic levels remains sub-optimal and will require ongoing reinforcement of the protocol.
PO2.21.
Development and implementation of an Antimicrobial Stewardship (AMS) Procedure, meeting the clinical needs of the stakeholders

U. Lorenzen¹, A. Garg¹ and C. Cooper¹
¹ Women’s and Children’s Hospital (WCHN), Adelaide, South Australia

Background: The previous “Antimicrobial agents requiring Infectious Diseases Approval” procedure at WCHN consisted of an extensive list of restricted agents requiring approval from the infectious diseases team. The emphasis was on “policing” by pharmacy at the expense of point of care interventions. Compliance with the procedure was poor.

Objectives:
• To establish an AMS procedure with access to a broad range of strategies including antimicrobial formulary and restriction but also antimicrobial review, prescriber feedback and point-of-care interventions.
• To update the existing list of antimicrobial agents requiring Infectious Diseases approval classifying them into three lists;
  • Restricted - requiring AMS team approval - high risk of resistance, high cost or adverse clinical sequelae if used inappropriately
  • Monitored - preapproved for 72 hours for specific indications
  • Unrestricted
• To implement the above procedure across the organization and evaluate its uptake

Methods: An AMS team was established in 2011. The AMS procedure including an antimicrobial formulary was developed using “Antimicrobial Stewardship in Australian Hospitals 2011” as the primary reference. The procedure was reviewed and endorsed by clinical staff, key stakeholders and the hospital executive. Implementation of the procedure involved multiple strategies including group notifications across the organisation, education of pharmacy staff and communication with medical staff. Support was provided by AMS team to the pharmacists in managing the restricted and monitored anti-microbial agents. Evaluation of the procedure was conducted via a prospective audit by pharmacists over one week (September 2013). Pharmacists reported the use of monitored and restricted agents where adherence to the AMS procedure was incomplete. These instances were later compared to the number of AMS consults requested.

Results: The new AMS procedure was successfully implemented in January 2013. The post implementation audit showed that out of the 14 patients where the procedure was not followed 11 (78%) were later consulted by the AMS team. Agents most frequently causing AMS team consult were broad-spectrum betalactams and quinolones. No unapproved restricted agents were found to be used during the audit period. However, poor documentation in patients’ medical records and medication charts was observed.

Conclusion: The AMS procedure has been well accepted by the clinical teams at WCH. The AMS team plans to conduct a prospective audit of compliance every three months to enable ongoing evaluation and improvement of the AMS procedure.

Table of Home Teams involved with the referrals

<table>
<thead>
<tr>
<th>Home Team</th>
<th>Referrals</th>
<th>Reason for referral</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU</td>
<td>3</td>
<td>Unapproved usage of restricted agent and usage beyond 72 hours of monitored agent.</td>
</tr>
<tr>
<td>Pulmonary medicine</td>
<td>3</td>
<td>Usage of monitored agent outside preapproved indication.</td>
</tr>
<tr>
<td>Department of general medicine</td>
<td>5</td>
<td>Usage of monitored agent outside preapproved indication.</td>
</tr>
<tr>
<td>General surgery</td>
<td>3</td>
<td>Usage of a monitored agent, appropriated indication but used beyond 72 hours.</td>
</tr>
</tbody>
</table>
PO2.22.
Sustained outcomes following implementation of an antimicrobial stewardship program

K. A. Cairns 1, A. W. J. Jenney 1, J. S. Doyle 1,2, J. Trevillyan 1,2, M. Dooley 1,2, A. C. Cheng 1,2

1 The Alfred Hospital, Melbourne, Victoria, Australia
2 Monash University, Melbourne, Victoria, Australia

Background: An antimicrobial stewardship program, including implementation of a web-based antimicrobial approval system, medical and pharmacy post-prescription clinical rounds and appointment of a full time antimicrobial stewardship pharmacist was introduced at our institution in January 2011.

Objective: We aimed to evaluate broad spectrum antimicrobial prescribing trends 2½ years following stewardship implementation.

Methods: We compared antimicrobial prescribing (measured using defined daily doses per 1000 occupied bed days (DDD/1000 OBD)), of key restricted antimicrobial classes (including 3rd and 4th generations cephalosporins, fluoroquinolones, glycopeptides and extended spectrum penicillin/beta-lactamase inhibitor combinations) for non-intensive care (ICU) medical and surgical units prior to implementation of the antimicrobial stewardship program (2008 - 2010) and following implementation (Jan 2011 – June 2013). Rates were compared as a mean over each period, and using segmented Poisson regression for trends of change.

Results: From January 2011 to June 2013, 1892 recommendations were made in 1290 non-ICU patients. Overall restricted antimicrobial use has continued a downward trend following antimicrobial stewardship implementation (-0.4%/month, p=0.03). 3rd and 4th generation cephalosporins, key targets for antimicrobial stewardship intervention, have sustained the immediate reduction observed post stewardship implementation throughout the subsequent 2½ years. Previously observed downward trends for fluoroquinolones and glycopeptides have also been sustained over time. However, there was evidence of an ongoing trend to higher use of extended spectrum penicillin/beta-lactamase inhibitor combinations.

Conclusion: Ongoing antimicrobial stewardship efforts have resulted in the maintenance of antimicrobial prescribing patterns apparent in earlier published data. We feel that a key factor in sustained outcomes is the high visibility of the antimicrobial stewardship rounds, which respond to pharmacist notifications and provide feedback and education to junior medical staff.
PO2.23.
It’s a matter of attitude! an antimicrobial stewardship survey among visiting specialists, nurses and pharmacists

MO. Cotta¹,², MS. Robertson³, M. Tacey⁴, CL. Marshall¹,², KA. Thursky², KL. Buising¹,²

¹ Department of Medicine, University of Melbourne, Victoria, Australia
² Victorian Infectious Diseases Service, Royal Melbourne Hospital, Victoria, Australia
³ Epworth HealthCare, Victoria, Australia

Objectives: An effective hospital-wide antimicrobial stewardship (AMS) program requires engagement with all healthcare professionals involved in antimicrobial use. It is therefore useful to consider attitudes towards antimicrobial resistance, antimicrobial prescribing and proposed AMS interventions prior to program implementation.

Methods: A 26-item attitudinal survey was distributed to visiting specialists, nurses and pharmacists at a large (500 bed) private hospital in Melbourne. Survey questions utilised a “Yes/No” responses and a 7-point Likert scale ranging from “strongly agree” to “strongly disagree”. Descriptive analyses were performed and chi-squared tests conducted.

Results: There were a total of 331 respondents (80 physicians, 58 surgeons, 78 anaesthetists, 105 nurses and 10 pharmacists).

A larger proportion of respondents believed that antimicrobial resistance was a serious problem in other hospitals compared to their own (p<0.001). Fifty eight percent agreed that improving prescribing at the hospital would reduce antimicrobial resistance.

Eighty per cent of pharmacists believed there the majority of antimicrobial prescribed for general use and surgical prophylaxis in the hospital was not compliant with national prescribing guidelines (Figure 1). These proportions of surveyed pharmacists were significantly higher compared to the other professions (p=0.007 and p=0.019, respectively).

Figure 1: Estimation of 50% or greater non-compliance with Therapeutic Guidelines: Antibiotic (2010)

Twenty nine percent of respondents had previous exposure to AMS, with pharmacists and physicians more likely to have heard of AMS compared to surgeons, anaesthetists and nurses (p=0.016 and p<0.001 respectively).

Just 50.5% of respondents were willing to participate in proposed AMS interventions, but notably all surveyed pharmacists responded positively (p=0.002).

Conclusion: Pre-existing awareness of issues around AMS was low among respondents. This study highlights the challenge of making antimicrobial resistance a local issue and engaging staff prior to implementing change. In particular, nursing staff, surgeons and anaesthetists had low levels of awareness and should be targeted for education. Conversely, pharmacists represent likely proponents of any newly introduced stewardship program.
**PO2.24.**

**Challenges to Implementing Antimicrobial Stewardship in the Private Healthcare Sector – Some Potential Solutions**

A. Wilke¹, C. Lo¹ and M. O’Reilly¹,²  
¹ Cabrini Health, Melbourne, Victoria, Australia  
² Monash University, Melbourne, Victoria, Australia

**Objectives:** To implement Antimicrobial Stewardship (AMS) to meet the new National Safety and Quality Health Service (NSQHS) standard 3.14.

**Background:** It is well recognised that there are significant challenges to implementing AMS in health services. Establishing AMS in the private healthcare sector has additional complexities including managing the traditional autonomy of the prescribing private medical practitioners.

Cabrini is a 832 bed, private health service that provides acute, subacute, palliative care and aged-care. In 2013 we introduced Cabrini Antimicrobial Prescribing Support (CAPS) to provide Antimicrobial Stewardship across the health service. Cabrini successfully met the national standard in December 2013.

**Methods:** A literature review was undertaken to identify potential barriers and enablers. A multifaceted approach was undertaken utilizing the principles outlined in the literature, tailored to the private healthcare sector.

**Results:** With existing strong executive support which was critical to our success, the focus was on engagement of all key stakeholders including medical, pharmacy and nursing.

Strategies included:
- Positive branding as CAPS utilising the Cabrini Brand
- Establish AMS team with local practice leaders
- Concept of prescribing support in contrast to restrictive policies
- Inter-disciplinary approach – medical, pharmacist and nursing
- Targeted medical engagement
- Clinical pharmacists’ ownership of AMS
- Consistent message promoting *Therapeutic Guidelines*™
- Executive support for communication and projects
- Project work with individual units addressing local needs

**Conclusion:** Inter-disciplinary engagement is a key feature of success in AMS in the private sector. CAPS has targeted strategies to engage key stakeholders to implement AMS effectively and successfully.
PO2.25.
Antimicrobial prescribing in private hospitals: Assessing appropriateness via periodic point prevalence surveys

MO. Cotta¹,², MS. Robertson³, LM. Upjohn², CL. Marshall¹,², D. Liew¹, KL Buising¹,²
¹ Department of Medicine, University of Melbourne, Victoria, Australia
² Victorian Infectious Diseases Service, Royal Melbourne Hospital, Victoria, Australia
³ Epworth HealthCare, Victoria, Australia

Objectives: Assessing appropriateness of antimicrobial prescribing is an important step in delivering antimicrobial stewardship, however, most of this work has been undertaken in public hospitals. The aim of this prospective, multi-centre study was to measure antimicrobial use and to assess the appropriateness of antimicrobial prescribing in Australian private hospitals.

Methods: An Antimicrobial Prescribing Survey (APS) tool was administered quarterly as a periodic point prevalence survey at three large private hospitals during a 12 month period. A census was taken on each survey day, and all inpatients had their medication charts reviewed. Data were collected on any patient prescribed at least one antimicrobial. An infectious diseases (ID) physician and a specialist pharmacist assessed each prescription. ‘Appropriateness’ of therapy was evaluated based on details of the prescription, clinical indication, and concordance with Therapeutic Guidelines: Antibiotic.

| Total (n = 683) |  |
| Treatment prescriptions | n (%) | Range (%) |
| Treatment prescriptions assessed as appropriate | 549 (80.4) | (68.2 to 95.2) |
| Treatment prescriptions assessed as inappropriate | 99 (14.5) | (6.0 to 27.3) |
| Treatment prescriptions that could not be assessed | 35 (5.1) | (0.0 to 14.8) |

| Total (n = 471) |  |
| SAP prescriptions | n (%) | Range (%) |
| SAP prescriptions assessed as appropriate | 191 (40.6) | (23.5 to 100) |
| SAP prescriptions where indication was documented | 204 (43.3) | (8.3 to 100) |

Results: Thirteen point prevalence surveys were conducted during the study period. A total of 3472 inpatient charts were reviewed with 1125 (32.4%) inpatients prescribed 1444 antimicrobials. Sixty three percent of prescriptions had an indication documented. 47.3% of all prescriptions reviewed were for treatment with the respiratory tract and skin and soft tissue being the most common sites of infection. 32.6% of prescriptions were classified as surgical antibiotic prophylaxis (SAP) and more than half of these were for orthopaedic surgical cases. ‘Appropriateness’ for treatment and surgical prophylaxis was 80% and 41% respectively (Table 1). The main reason for a treatment prescription to be judged as ‘inappropriate’ was due to incorrect antimicrobial selection, whilst duration beyond 24 hours was the main reason for non-concordance among SAP prescriptions.

Conclusion: Antimicrobial use in large Australian private hospitals is comparable to the literature, with around a third of inpatients receiving antimicrobials at any one time. Results of this study can be used to target areas for improvement, with documentation of indication and SAP requiring initial attention.
PO2.26.
Improving antimicrobial use in community acquired pneumonia with the introduction of a clinical pathway

M. Sehu\textsuperscript{1,2}, T. Patterson\textsuperscript{2}, J. Ward\textsuperscript{2}, S. Michaletos\textsuperscript{3}, C. Fok\textsuperscript{3}

\textsuperscript{1} Princess Alexandra Hospital, Brisbane, QLD, Australia
\textsuperscript{2} Logan Hospital, Logan, QLD, Australia
\textsuperscript{3} University of Queensland, Brisbane, QLD, Australia

Objectives: A retrospective audit of antibiotic use in community acquired pneumonia (CAP) at Logan Hospital (LH) in 2011 revealed high rates of inappropriate prescribing. Of particular concern were the overuse of ceftriaxone in patients with no history of penicillin allergy, and the frequent and prolonged use of IV azithromycin in patients with non-severe disease. The use of a severity assessment tool to assist clinical decision making was also found to be low. In an effort to improve management of CAP and compliance with local prescribing guidelines, a clinical pathway was developed and implemented at LH and subsequently audited to assess its effectiveness as an intervention.

Methods: A fully integrated clinical pathway for the management of CAP in adult patients was developed in collaboration with medical, nursing, pharmacy and allied health staff at Logan Hospital. The 12 page pathway incorporates a severity assessment tool and a treatment algorithm based on local prescribing guidelines. Within the body of the pathway, which is designed to replace the patient progress notes, the tasks of each health professional are defined, optimised and sequenced. Following the implementation of the pathway in winter 2013, the management of CAP during the intervention period was audited retrospectively and the results compared to the baseline audit from winter 2011.

Results: Management of CAP during the winter period following the introduction of the clinical pathway was found to have improved compared to the same period in the winter of 2011. Use of a severity assessment tool increased from 1.5% (n=1) to 28% (n=20). Inappropriate use of ceftriaxone in patients with CAP presenting to emergency department without a penicillin allergy decreased from 39%(n=27) to 7% (n=5) of patients. The use of IV azithromycin in patients with non-severe disease also improved, from 47%(n=34) of patients to 6% (n=3). Despite the increased use of a severity assessment tool, there was no improvement in the number of patients with mild disease who were treated with IV antibiotics instead of oral.

Conclusion: A clinical pathway for the management of community acquired pneumonia is an effective intervention for improving the appropriateness of antimicrobial prescribing and adherence to local antimicrobial prescribing guidelines.
PO2.27. Investigation and management of Community-Acquired Pneumonia in a regional teaching hospital in Australia

NR. Adler\(^4\), HM Weber\(^1\), I Gunadasa\(^1\), AJ Hughes\(^2\), ND. Friedman\(^2\)

\(^1\) School of Medicine, Deakin University, Geelong, Victoria, Australia
\(^2\) Departments of General Medicine and Infectious Diseases, Barwon Health, Geelong, Victoria, Australia

**Objective:** Community-acquired pneumonia (CAP) is a significant cause of morbidity and mortality. National and hospital guidelines on the management of CAP are often poorly adhered to in clinical practice. The primary aim of our study was to assess the rate of compliance with antibiotic guidelines and to describe the various treatment regimens in patients with CAP. The second objective was to evaluate the volume of laboratory investigations ordered for patients with CAP.

**Methods:** A retrospective study of consecutively admitted patients under the Department of General Medicine at Geelong Hospital with a primary diagnosis of CAP over a 6-month period (January-June, 2012). The data collected included; patient demographics, length of hospital admission, CORB score parameters (confusion, oxygen saturation, respiratory rate, systolic blood pressure and diastolic blood pressure), chest x-ray findings consistent with diagnosis, initial and discharge antibiotic therapy and laboratory testing performed over the first 96 hours of admission. The basic laboratory panel was defined as FBE, UE+C, CRP, LFT.

**Results:** 162 patients were included. 24/162 (15%) had a CORB score greater than or equal to 2, indicative of severe pneumonia. However, greater than 50% of patients received broad-spectrum antibiotics. 20 different antibiotic regimens were used, including oral therapy only in 6% of patients. 160/162 patients had the basic laboratory panel performed on day 0, 143/162 had this repeated at least once between 24-96 hours. 7/162 patients had 2 or more sets ordered during day 0. 121/162 (75%) patients had blood cultures drawn on day 0. 40/121 (33%) patients had blood cultures repeated at least once, to a maximum of 5 times. 53% had urine cultures performed. 49/162 (30%) patients had sputum cultures performed, 15/49 (30%) had a positive sample; however, 31/49 cultured mixed oral flora.

**Discussion:** There is a wide variation of antimicrobial regimens prescribed for patients diagnosed with CAP. Many of these regimens are not consistent with national guidelines and are excessively broad in spectrum. Repeated and inappropriate laboratory testing in patients with CAP is not uncommon. Robust interventions are required to enhance uptake of evidence-based hospital guidelines regarding the investigation and management of patients with CAP.
Table 1. Initial antibiotic regimens prescribed for patients a primary diagnosis of community-acquired pneumonia during January-June 2012

<table>
<thead>
<tr>
<th>Initial antibiotic</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftriaxone + azithromycin</td>
<td>48</td>
<td>30</td>
</tr>
<tr>
<td>Benzylpenicillin + roxithromycin/doxycycline</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Ceftriaxone + doxycycline</td>
<td>31</td>
<td>19</td>
</tr>
<tr>
<td>Oral therapy only</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Ticarcillin/clavulanate or Piperacillin/tazobactam</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Benzylpenicillin + azithromycin</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Fluroquinolone (ciprofloxacin or moxifloxacin)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ceftriaxone + doxycycline + oral co-trimoxazole</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Benzylpenicillin</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ceftriaxone + metronidazole</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Clarithromycin + doxycycline</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ceftriaxone + azithromycin + benzylpenicillin</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ampicillin + doxycycline</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ceftriaxone + azithromycin + Ticarcillin/clavulanate or Piperacillin/tazobactam</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IV co-trimoxazole</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No antibiotics – palliative care</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>162</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
PO2.28.
Old dogma, new tricks: Gentamicin stewardship in an orthopaedic unit

S. Bond, S. Jansen and C. Boutlis

Wollongong Hospital, Wollongong, NSW, Australia

Objectives: Gentamicin has historically been used prior to insertion and removal of indwelling urinary catheters (IDCs) around elective joint replacement surgery to prevent Gram-negative infection; however, this indication is not recognised in the Therapeutic Guidelines and paradigms for safe use of gentamicin are shifting. The objective of this study was to reduce prescribing of gentamicin in orthopaedic surgery where it was not indicated according to the Therapeutic Guidelines.

Methods: The AMS team became aware of perioperative gentamicin use in 2011-12 during an audit of routine orthopaedic prophylaxis. The usage was measured and discussed with the surgeons. As concerns were expressed about the consequences of discontinuing this practice, a review of guidelines, literature and safety data was conducted. The results of this review were again discussed with the surgeons.

Results: 361 operations were initially reviewed: 155/361 (43%) patients received gentamicin prior to IDC insertion and 163/361 (45%) prior to IDC removal. Subsequent to presenting these data, an Australian paper on vestibular toxicity from gentamicin was published and the Victorian coroner made recommendations about gentamicin safety following the death of an elderly lady with kidney failure. Our literature review identified no guidelines to recommend gentamicin prophylaxis and only a very low risk of bacteraemia associated with IDC insertion/removal in patients with established bacteriuria. After discussion at the second meeting, general consensus was reached with the surgeons to discontinue this practice and a letter was issued from the Stewardship committee supporting the change. Subsequent rolling audits were commenced with weekly feedback to the Department Head of Orthopaedics. Follow up data from weekly audits showed that the use of gentamicin had reduced to zero.

Conclusion: Gentamicin is an effective Gram-negative antibiotic with a proven track record, but can cause oto- and nephrotoxicity. This intervention demonstrates that a collaborative approach can lead to the re-appraisal of an established practice. The use of regular rolling audits with immediacy of feedback may play a useful role in sustaining change.
PO2.30.
Pharmacokinetics of ampicillin/sulbactam in critically ill patients at risk of Acinetobacter baumannii Infections

Syamhanin Adnan 1,2, David L Paterson1,3, Jeffrey Lipman 2,4, Steve C Wallis 2, Jason A Roberts 2,4,5.

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2 Burns, Trauma and Critical Care Research Centre, The University of Queensland.
3 Department of Infectious Disease, Royal Brisbane & Women Hospital, Brisbane, Australia,
4 Department of Intensive Care, Royal Brisbane & Women Hospital, Brisbane, Australia,
5 Department of Pharmacy, Royal Brisbane & Women Hospital, Brisbane, Australia

Background: Ampicillin/sulbactam is b-lactam/b-lactamase inhibitor used for treatment of severe infections in critically ill patients. Dose recommendations vary from 4g – 12g/day, based on pharmacokinetics (PK) studies that did not include critically ill patients.

Objectives: The objective of this study is to describe pharmacokinetics of ampicillin/sulbactam, in critically ill patients at risk of Acinetobacter baumannii infections and compare the results with data from non critically ill patients.

Methods: This was a prospective pharmacokinetic study in critically ill patients who were at risk of A.baumannii infections, conducted in Intensive Care Unit (ICU) of Hospital Sungai Buloh, Malaysia. Nine patients were included. Drug dosing was at the discretion of the treating intensivist. Plasma and urine samples were collected over one dosing interval of antibiotic treatment. Samples collected were sent to Burns, Trauma and Critical Care Research Centre, The University of Queensland for bio-analysis. Data from non critically ill patients was obtained from the published literature.

Results: Nine patients, (7 male, 2 female) were recruited in this study with median age of 35 years old. The median (interquartile range) pharmacokinetic parameters estimates for ampicillin were as follows: area under concentration-time curve (AUC): 195.7 mg.h/L (78.1-490.5mg h/L), clearance (CL): 10.2 L/h (5.5-25.6L/h), volume of distribution (Vd): 0.5L/kg (0.3-0.6L/kg). For sulbactam, the pharmacokinetic parameters were as follows; AUC: 108.1 mg.h/L (43.8-430.0 mg.h/L), CL: 9.2 L/h (2.4-22.8 L/h), Vd: 0.4 L/kg (0.3-0.5 L/kg). CL was found to be 72% lower for ampicillin and 54% lower for ampicillin as compared to data from healthy volunteers. Likewise, Vd was found to be 50% larger for ampicillin and 60% larger for sulbactam.

Conclusion: A larger Vd in critically ill patients receiving ampicillin/sulbactam could lead to inadequate concentrations in the first days of therapy. The inter subject variability of CL is significant but not unexpected given the sickness severity of these critically ill patients. Since both drugs are eliminated renally, dose adjustment according to renal function is important to avoid under dosing as well as potential toxicity from high concentrations. Inadequate trough concentrations shown by some of the subjects, that did not exceed the MIC breakpoint for A. baumannii, and thus necessitates further analysis to determine optimal doses for critically ill patients.
ANTIMICROBIALS 2015

Brisbane Convention and Exhibition Centre
Thursday 26th – Saturday 28th February 2015

Plenary Speakers

Sara Cosgrove

Dr. Sara Cosgrove, MD, MS, is an Associate Professor of Medicine in the Division of Infectious Disease at Johns Hopkins University School of Medicine, and the program co-chair for the Antimicrobial Stewardship leader forum at the SHEA Spring 2012 Conference: Advancing Healthcare Epidemiology and Antimicrobial Stewardship. She serves as the Director of the Antimicrobial Stewardship Program and the Associate Hospital Epidemiologist at The Johns Hopkins Hospital in Baltimore, Maryland.

Dr. Cosgrove received her undergraduate degree from Columbia College in New York, New York, her medical degree from Baylor College of Medicine in Houston, Texas, and her Master of Science degree in epidemiology from Harvard School of Public Health in Boston, Massachusetts. She completed her postgraduate training in internal medicine at The Johns Hopkins Hospital and underwent subsequent training in infectious disease at Beth Israel Deaconess Medical Center in Boston.

Dr. Cosgrove’s research interests the epidemiology and outcomes of antimicrobial resistance, the development of tools and programs to promote the rational use of antimicrobials, and the prevention of hospital-acquired infections.

Jan Kluytmans

Professor Jan Kluytmans completed his medical training and specialization in Clinical Microbiology at Erasmus Medical University, Rotterdam, The Netherlands. The title of his PhD thesis in 1996, was: Nasal carriage of Staphylococcus aureus: the key to preventing staphylococcal disease.

His scientific career focuses on the epidemiology and control of nosocomial infections, with a special interest in Staphylococcus aureus, surgical site infections and catheter related infections. He discovered the concept of perioperative eradication of nasal carriage as an infection control measure. More recently his investigations have included the impact of agricultural antibiotic use on the development of resistance in animals, food items and humans.

He has been involved in many national and international guidelines on infection control, especially those dealing with the control of MRSA. Until 2013 he was the chair of the Dutch Working Party on Infection Control. Since November 2013 he is the chair of the Dutch Society of Medical Microbiology.

At present he is working in the Amphia Hospital in Breda/Oosterhout, St. Elisabeth Hospital and TweeSteden Hospital in Tilburg. Since 2006 he has also held the position as Professor of Medical Microbiology and Infection Control at the VU university medical center in Amsterdam.

He has more than 200 papers in peer-reviewed journals and has given more than 500 presentations and lectures.
Sally Roberts
Dr Sally Roberts is a graduate of the University of Auckland School of Medicine graduating in 1989. She is a Clinical Microbiologist and Infectious Diseases Physician at Auckland City Hospital and is the Clinical Head of Microbiology at LabPlus, Auckland District Health Board.

Dr Roberts has been on a number of New Zealand Ministry of Health working groups including the MRSA Guidelines Working Group (2002), Chair of the National Antenatal HIV Screening Implementation Advisory Group (2005 onwards), Pandemic Influenza Technical Advisory Group, and Tuberculosis Working Group. Since August 2011 she has been working with the Health Quality and Safety Commission as the Clinical Lead for the national Infection Prevention and Control programmes. She is also a member of the Ministry of Health Healthcare-associated infections Governance Group.

She maintains a keen interest in teaching trainees and research having published over 80 articles and book chapters.

Rubbo Oration
Benjamin Howden
A/Prof Benjamin Howden is an Infectious Diseases Physician, and Head of Microbiology at Austin Health. His research is focused on understanding the clinical impact and genetic determinants of antimicrobial resistance in gram-positive pathogens of humans, particularly Staphylococcus aureus. His work has helped determine how S. aureus evolves low-level vancomycin resistance, and what the impact of these changes are on host-pathogen interactions and clinical outcomes.

Proposed Programme

Plenary Sessions
- Multiple Prongs of Stewardship: Less is More – Debunking Stewardship Myths (Sarah Cosgrove)
- Resistance Links to Animals (Jan Kluytmans)
- Improving Care: Infection Prevention and Patient Safety (Sally Roberts)

Howard Florey Oration
- Vancomycin and Staphylococcus aureus - a complex relationship

Symposium Sessions
- Enterococi
- Surveillance Scorecard
- Alternative Perspectives on Antimicrobial Use
- Carbapenemases
- What to Report: How to Treat
- Smart Platforms

Workshops
- Pharmacy
First-line for S. aureus bloodstream infections^1

If infection focus is diagnosed as left-sided endocarditis after Cubicin has been commenced, consider instituting alternative antibacterial therapy
Zinforo is indicated for the treatment of patients with the following infections proven or strongly suspected to be caused by designated susceptible bacteria:

- Complicated skin and soft tissue infections
- Community-acquired pneumonia