Program

Canadian Consensus Development Conference on SURVEILLANCE & SCREENING FOR AROs (Antimicrobial-Resistant Organisms)

June 18 - 20, 2014
The Hyatt Regency, Calgary, Alberta

Jury Members

Jury Chair Tom Marrie
Bill Albritton
Helen Branswell
Andre Corriveau
Barb Farlow
David Heymann
Steven Lewis
Pat Piaskowski
Jennifer Rodgers
John Spika
Howard Waldner

Expert Speakers

Liz Bryce
Barry Cookson
Julian Davies
Serge Desnoyers
Michael Edmond
Dan Gregson
Anthony Harris
Susan Huang
John Jernigan
Joel Kettner
Mark Loeb
Yves Longtin
Allison McGeer
Scott McEwen
Kim Neudorf
Lindsay Nicolle
Howard Njoo
David Patrick
Eli Perencevich
Trish Perl
Pilar Ramon-Pardo
Andrew Simor
Jim Talbot
Henri Verbrugh
Bob Weinstein

Sponsored by Alberta Government

Organized by IHE INSTITUTE OF HEALTH ECONOMICS ALBERTA CANADA

OVERVIEW OF THE CONFERENCE

The 3-day Canadian Consensus Development Conference on Surveillance & Screening for AROs (Antimicrobial-Resistant Organisms), will be held in Calgary, Alberta from June 18–20, 2014. It is the first event of its kind in Canada to look at issues in the field of AROs.

This conference will be of interest to clinicians, policy-makers, managers, researchers, and students with an interest in AROs. It will address issues in public health, infectious diseases, laboratory medicine, and related fields.

The Consensus Conference model is an exciting format, geared to creating maximum impact on real-world clinical policy and practice. Leading experts from Canada, the US, UK and EU will address a wide range of issues, including:

- Overview – What are AROs? What burden do they impose on patients and the health system? Why does control of AROs vary so much?
- Surveillance – Why should we conduct surveillance? What outcomes do we want, and are we achieving them?
- Screening – What is appropriate screening for AROs in various settings? Should we screen for AROs – Pro versus Con.
- What factors can facilitate or hinder effective ARO control in practice? Organizational and cultural factors; Lab capacity.
- Ethical and policy implications – What are the impacts of screening on patients and others? Can screening do harm? What is the economic cost/benefit of screening? What can patients, the public, and health care professionals do to help?
- Research/Evidence – What are the most important gaps in our knowledge? How should we evaluate ARO screening in the future? What are the barriers to effective research and what strategies can address them?

On the final day of the conference, an expert Jury chaired by D. Tom Marrie, Dean of Medicine at Dalhousie, will release a Consensus Statement summarizing the evidence and making recommendations for policy and practice in Canada and other countries.

IHE's Consensus Development Conferences are adapted from the model created by the US National Institutes of Health (NIH) to increase the dissemination and impact of findings from research. Our conferences build on the success of the NIH model in the Canadian context, with a flexible organizational structure and a focus on broad policy issues, as well as clinical and scientific questions.

IHE has held five consensus conferences to date: Self-Monitoring in Diabetes; Low Birthweight; Depression in Adults; FASD Across the Lifespan; and Legal Issues of FASD. Consensus Statements and other documents, along with videotape of the proceedings, can be viewed on the IHE website:
http://www.ihe.ca/research/knowledge-transfer-initiatives/--consensus-development-conference-program/

ACCREDITATION

Maintenance of Certification

Attendance at this program entitles certified Canadian College of Health Leaders members (CHE / Fellow) to 6.5 Category II credits toward their maintenance of certification requirement.

This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of The Royal College of Physicians and Surgeons of Canada, and approved by the University of Calgary Office of Continuing Medical Education and Professional Development. Participants can claim up to a maximum of 12 hours study credits.

Message from Alberta's Chief Medical Officer of Health

On behalf of Alberta Health and the conference organizers, it is my great pleasure to welcome you to the Canadian Consensus Development Conference on Surveillance and Screening for AROs (Antimicrobial-Resistant Organisms).

This conference is an important initiative that responds to a critical challenge facing every health system throughout the world. I am proud that Alberta Health is sponsoring this conference, and I am delighted to be taking part.

Alberta Health is funding this conference to inform a new standard for surveillance and screening for AROs. We very consciously chose the conference format so we could share the discussion and findings widely, as this issue is a universal concern.

Most of all, I am grateful to the dozens of colleagues from Alberta and from North America and Europe who have willingly given their time and effort to make this conference happen. We have had tremendous leadership from the Scientific Committee, including colleagues from CDC in the United States and WHO/PAHO, as well as from the four Canadian organizations who offered to be Scientific Sponsors. And, we have been humbled by the response from the senior scientists and health system leaders we invited to serve on the Jury and to be expert presenters. The caliber of the Jury and the presenters speaks to the importance of this topic, and to the collegiality and shared dedication to patients that is at the heart of any health system.

Finally, I would like to thank each and every delegate at the conference - and welcome you to Calgary! I wish you the best and I hope the discussions during these next three days will help you and your colleagues respond to the challenge of AROs.

Sincerely,

James Talbot, PhD, MD, FRCPC
Chief Medical Officer of Health
Alberta Health

WHAT ARE AROs

"Antimicrobial resistant organisms" (AROs) refers to bacteria capable of causing human disease that are resistant to one or more classes of currently available antibiotics. This resistance is associated with treatment failure leading to significant disease, infection complications, prolonged hospital stay, and increased risk of death. In the United States, it is estimated that each year at least 2 million people acquire serious infections caused by AROs, and at least 23,000 people die annually as a direct result of these infections. Of particular concern in Canadian hospitals are AROs such as methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant Enterococcus (VRE), and multidrug-resistant Gram-negative bacteria, especially those with extended-spectrum β-lactamase (ESBL), and carbapenem-resistant Enterobacteriaceae (CRE). Active surveillance screening for MRSA, VRE, and ESBL is receiving greater attention for its potential value in identifying carriers of these pathogens to prevent further transmission.

- From the IHE Literature Review completed for the AROs conference.)

"Antimicrobial Resistance (AMR) is a public health problem of increasing magnitude and importance recognized by the United States (US) and the European Union (EU), as well as their partner countries. Resistance occurs naturally, but misuse and overuse is rapidly increasing the prevalence of hard-to-treat infections in both humans and animals. Recognizing that AMR is a growing and dangerous public health issue, the US and EU established a transatlantic taskforce on antimicrobial resistance (TATFAR) in 2009."

- From the 2014 TATFAR Progress Report

AMR is an increasingly serious threat to global public health that requires action across all government sectors and society.

AMR is present in all parts of the world. New resistance mechanisms emerge and spread globally threatening our ability to treat common infectious diseases, resulting in death and disability of individuals who until recently could continue a normal course of life.

WHO's 2014 report on global surveillance of antimicrobial resistance reveals that antibiotic resistance is no longer a prediction for the future; it is happening right now, across the world, and is putting at risk the ability to treat common infections in the community and hospitals. Without urgent, coordinated action, the world is heading towards a post-antibiotic era, in which common infections and minor injuries, which have been treatable for decades, can once again kill.

- From WHO Fact sheet N°194, updated April 2014

JURY CHAIR

Dr. Tom Marrie, Dean of Medicine,
Dalhousie University, Halifax, NS

Dr. Tom Marrie is a leading Canadian medical researcher, professor and clinician who returned to Dalhousie as the Dean of the Faculty of Medicine, September 1, 2009.

Originally from Newfoundland, Dr. Marrie graduated from the Dalhousie Medical School and joined the Faculty of Medicine in 1977. While at Dalhousie as a professor of medicine and microbiology, he established the Division of Infectious Diseases. More recently he was the Dean of the Faculty of Medicine and Dentistry at the University of Alberta. Under his leadership in Alberta, the Faculty engaged in a major capital expansion and developed an alternate funding plan for faculty. During this time, he maintained an active research program, focusing on community-acquired pneumonia.

Among other recognitions, Dr. Marrie has been honoured with a Lifetime Achievement Award by the Association of Medical Microbiology and Infectious Diseases of Canada; an Excellence in Leadership Award by the University of Alberta; an Eagle Feather award (Aboriginal MD Program, University of Alberta); a Master Clinician Lecturer Award by the Department of Medicine, Dalhousie University; and an honourary doctorate by the University of the Mediterranean, Marseille, France.

QUESTIONS

1. Overview:
a) What are AROs? What is their incidence and prevalence, in health care facilities and in the community? (Global, US, Canadian, and Alberta perspectives.) Why are they a problem, globally and in Canada – what burden do they impose on patients and the health system?
b) Where do AROs come from (genetics and evolution)? How big a factor is the use of antimicrobials, and what is the contribution from various settings (healthcare, home, agriculture)?
c) What is surveillance; what is screening? How are they related?
d) What can we learn from the experience of other jurisdictions (International, US, Canadian, and Alberta perspectives)? Why does control of AROs vary so much? – e.g., is mandatory public reporting of data on AROs helpful?

2. Surveillance:
a) Why should we conduct surveillance? What do we do based on the results? What outcomes do we want, and are we achieving them?
b) How should we conduct surveillance – what options are available? What are the key areas of focus for surveillance in public health?

3. Screening:
a) Should we screen for AROs? Pro versus Con.
Should we rely on horizontal measures only, i.e. general prevention measures with no screening? Should we rely on vertical measures, i.e. screen for multiple specific organisms? If we screen, what options should we use? – e.g., community vs. admission; acute care vs. continuing care; patient selection; methods. If we screen, what should we do with the results, and how should we evaluate a screening program?
b) Is there a role for decolonization, and if so, when, and how?
c) Why do screening practices vary so much between jurisdictions?

4. What factors can facilitate or hinder effective ARO control in practice?
a) Organizational and cultural factors (barriers and enablers)
b) Lab capacity – what is the burden of ARO testing on labs; is it appropriate/cost-effective relative to other demands on lab resources? Are there changes or new options available that could reduce the burden?

5. Ethical and policy implications:
a) What is appropriate screening for AROs in various settings? How do we evaluate screening, to determine when it is appropriate? What are the benefits and risks/costs for patients, and for the health system
b) What are the impacts of screening on patients, and on their family members and others?
Can screening do harm? Does it result in patients receiving reduced care due to "leperization" (stigma) and isolation?
Does it impact eligibility/placement in home care and continuing care?
Do patients have the right to refuse screening (or should they)?
c) What is the economic cost/benefit of screening from the point of view of the individual patient; health care providers; and the funder of the health care system? How do we evaluate/measure the economic value of screening?
d) What can patients, the public, and health care professionals do to help? Would more education re: appropriate use of antibiotics help reduce the incidence of AROs, and what would be the most effective strategy?

6. Research/Evidence:
a) What are the most important gaps in our knowledge about AROs and screening?
b) How should we evaluate ARO screening in practice in the future, and are there new approaches that would enable us to do that better?
c) What are the best types of studies and/or ongoing monitoring to help improve how we identify and manage AROs? Who should commission and fund them?
d) What are the barriers to effective research and what strategies can address them?

PROGRAM

Tuesday, June 17, 2014 (pre-conference day)

5:00 p.m. – 6:00 p.m.	**Reception for delegates, speakers, and Jury members**
6:00 p.m. – 9:00 p.m.	**Jury dinner (Jury members only)**
6:00 p.m. – 9:00 p.m.	**Speaker dinner (speakers only)**

Day 1: Wednesday, June 18, 2014

7:00 a.m. – 8:00 a.m.	**Continental Breakfast and Registration**
8:00 a.m. – 8:15 a.m.	**Opening Remarks** *John Conly, Chair, Scientific Committee; Jim Talbot, Chief Medical Officer of Health, Alberta Health, Edmonton*
8:15 a.m. – 9:45 a.m.	**Question 1: Overview** **a) What are AROs? What is their incidence and prevalence (in health care facilities and in the community)? (Global, US, Canadian, and Alberta perspectives) Why are they a problem, globally and in Canada – what burden do they impose on patients and the health system?** *Pilar Ramon-Pardo, WHO/PAHO, Washington* *Howard Njoo, PHAC, Ottawa* **b) Where do AROs come from (genetics and evolution)? How big a factor is the use of antimicrobials, and what is the contribution from various settings (healthcare, home, agriculture)?** *Julian Davies, University of British Columbia, Vancouver* *Scott McEwen, University of Guelph* **Questions and Answers**
9:45 a.m. – 10:00 a.m.	**Break**
10:00 a.m. – 11:15 a.m.	**Question 1 (continued)** **c) What is surveillance; what is screening? How are they related?** *Joel Kettner, International Centre for Infectious Diseases, Winnipeg*

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d) What can we learn from the experience of other jurisdictions? (International, US, Canadian, and Alberta perspectives) Why does control of AROs vary so much? – e.g., is mandatory public reporting of data on AROs helpful?
Andrew Simor, Sunnybrook, Toronto
Robert Weinstein, Cook County, Chicago

Questions and Answers

11:15 a.m. – 12:15 p.m. **Lunch**

12:15 p.m. – 1:00 p.m. **Question 2: Surveillance**

a) Why should we conduct surveillance? What do we do based on the results? What outcomes do we want, and are we achieving them?
Jim Talbot, Alberta Health, Edmonton

b) How should we conduct surveillance – what options are available? What are the key areas of focus for surveillance in public health?
David Patrick, University of British Columbia, Vancouver

Questions and Answers

1:00 p.m. – 2:40 p.m. **Question 3: Screening**

a) Should we screen for AROs? Pro versus Con. Should we rely on horizontal measures only, ie general prevention? Should we rely on vertical measures, ie screen for multiple specific organisms? If we screen, what options should we use? – eg, community vs admission; acute care vs. continuing care; patient selection; methods. If we screen, what should we do with the results, and how should we evaluate a screening program?
Michael Edmond, Virginia Commonwealth University, Richmond
Henri Verbrugh, Erasmus University Medical Centre, Rotterdam
Allison McGeer, Mount Sinai, Toronto

Questions and answers

2:40 p.m. – 3:00 p.m. **Break**

3:00 p.m. – 4:00 p.m. **Question 3 (Continued)**

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b) Is there a role for decolonization, and if so, when, and how?
Susan Huang, University of California Irvine

c) Why do screening practices vary so much between jurisdictions?
John Jernigan, Centers for Disease Control and Prevention, Atlanta

Questions and Answers

4.00 p.m. **End of day 1**

4:00 p.m. – 5:00 p.m. **Reception**

Day 2: Thursday, June 19, 2014

8:00 a.m. – 8:45 a.m. **Continental Breakfast and Registration**

8:45 a.m. – 9:45 a.m. **Question 4: What factors can facilitate or hinder effective ARO control in practice?**

a) Organizational and cultural factors (barriers and enablers)
Liz Bryce

b) Lab capacity – what is the burden of ARO testing on labs; is it appropriate/cost-effective relative to other demands on lab resources? Are there changes or new options available that could reduce the burden?
Dan Gregson, Calgary Lab Services

Questions and Answers

9:45 a.m. – 10:00 a.m. **Break**

10:00 a.m. – 12:00 p.m. **Question 5: Ethical and policy implications**

a) What is *appropriate* screening for AROs in various settings?
Lindsay Nicolle, University of Manitoba, Winnipeg

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b) What are the impacts of screening on patients, and on their family members and others? – eg, can screening do harm? Does it result in patients receiving reduced care due to "leperization" (stigma) and isolation? Does it impact eligibility/placement in home care and continuing care? Do patients have the right to refuse screening (or should they)?
Anthony Harris, University of Maryland, Baltimore

c) What is the economic cost/benefit of screening from the point of view of the individual patient; health care providers; and the funder of the health care system? How do we evaluate/measure the economic value of screening?
Barry Cookson, London School of Hygiene & Tropical Medicine, London

d) What can patients, the public, and health care providers do to help? Would more education re: appropriate use of antibiotics help reduce the incidence of AROs, and what would be the most effective strategy? What is the appropriate role of health care providers in ensuring responsible stewardship of antimicrobials?
Kim Neudorf, Patients for Patient Safety Canada
Yves Longtin, Laval University

Questions and Answers

12:00 p.m – 1:00 p.m. **Lunch**

1:00 p.m – 2:40 p.m. **Question 6: Research/evidence**

a) Ongoing scientific gaps for facilitating policy in healthcare
Trish Perl, Johns Hopkins, Baltimore

b) Outlining a Framework for ARO Screening/Surveillance Studies
Eli Perencevich, University of Iowa, Des Moines

c) Designing Interventional Studies for Evaluation of ARO Control Strategies
Mark Loeb, McMaster University, Hamilton

d) How CIHR is Addressing Antimicrobial Resistance, Nationally and Internationally
Serge Desnoyers, CIHR (III), Quebec City

Questions and Answers

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2:40 p.m. – 3:00 p.m.	**Break**
3:00 p.m. – 4:00 p.m.	**Open Discussion**
4:00 p.m.	**End of Day 2**

Day 3: Friday, June 20, 2014

8:00 a.m. – 9:00 a.m.	**Continental Breakfast and Registration**
9:00 a.m. – 9:30 a.m.	**Reading of the draft Consensus Statement**
9:30 a.m. – 10.30 a.m.	**Open discussion and comments on the statement**
10:30 a.m. – 11:00 a.m.	**Break**
11:00 a.m. – 11:15 a.m.	**Jury Chair Final Comments**
11:15 a.m. – 11:30 a.m.	**Closing Remarks**
11:30 a.m.	**End of the Conference**
11:30 a.m.	**News conference/Media availability**

THE JURY

CHAIR - Tom Marrie, MD

Dean, Faculty of Medicine, Dalhousie University

Dr. Tom Marrie is a leading Canadian medical researcher, professor and clinician who returned to Dalhousie as the Dean of the Faculty of Medicine, September 1, 2009. Originally from Newfoundland, Dr. Marrie graduated from the Dalhousie Medical School and joined the Faculty of Medicine in 1977. While at Dalhousie as a professor of medicine and microbiology, he established the Division of Infectious Diseases. More recently he was the Dean of the Faculty of Medicine and Dentistry at the University of Alberta. Under his leadership in Alberta, the Faculty engaged in a major capital expansion with the construction of two health research buildings. He also developed an alternate funding plan that offered a new method to support faculty, enabling greater academic activity and more innovative patient care. During this time, he maintained an active research program, focusing on community-acquired pneumonia. Among other recognitions, Dr. Marrie has been honoured with a Lifetime Achievement Award by the Association of Medical Microbiology and Infectious Diseases of Canada; an Excellence in Leadership Award by the University of Alberta; an Eagle Feather award (Aboriginal MD Program, University of Alberta) a Master Clinician Lecturer Award by the Department of Medicine, Dalhousie University; and an honourary doctorate by the University of the Mediterranean, Marseille France.

Bill Albritton, MD

Professor and former Dean of Medicine, University of Saskatchewan

William Albritton is Professor of Pediatrics and former Dean of the College of Medicine at the University of Saskatchewan. He has practiced pediatric infectious diseases since 1976 and general pediatrics since 1994. He has special interests in frequent infections and immune deficiency states, including HIV/AIDS. In addition, he has special clinical interests in providing general pediatric care to children with special needs, development delay, and a wide variety of clinical conditions in early infancy. Dr. Albritton's current research interests are in the evaluation of healthcare delivery systems for the underserved and a variety of interests in medical education, including admissions policies, and undergraduate and graduate curricula, especially in areas related to social accountability and professionalism.

Helen Branswell

Medical Reporter, Canadian Press

Helen Branswell is the Medical Reporter for The Canadian Press. In more than 30 years as a journalist, she has covered a range of beats in bureaus across Canada and in Europe, assuming CP's medical reporting job in 2000. Based in Toronto, she covered that city's SARS outbreak in 2003, discovering in the process an affinity for infectious diseases reporting. She reports on a range of health issues, but specializes in infectious diseases like bird flu, polio and the new Middle Eastern Respiratory Syndrome virus, or MERS. She is especially interested in zoonoses, animal diseases that spill over into the human population. She received a 2004 Knight Public Health Journalism Fellowship at the Centers for Disease Control and Prevention in Atlanta, where she spent three months working with scientists in the hospital infections and influenza branches. She was a 2011 Nieman Global Health Fellow at Harvard University, where her work focused on polio eradication. In August 2013, Wired Magazine named her in its 101 Signals segment on essential blogs, Twitter feeds and Tumblrs to follow.

THE JURY

André Corriveau, MD, MBA

Chief Public Health Officer, NWT and outgoing Chair, Canadian Public Health Network

Dr. André Corriveau was appointed as the Chief Public Health Officer for the Northwest Territories in June 2012. His responsibilities include health promotion, disease surveillance, communicable disease control, chronic disease prevention, environmental health, and aboriginal health. From March 2009 to June 2012, Dr. Corriveau served as the Chief Medical Officer of Health (CMOH) for the province of Alberta. Dr. Corriveau served as the Provincial/ Territorial Co-Chair of the Pan-Canadian Public Health Network from 2010 to 2013. He is currently Chairperson of the Advisory Council of the Canadian Institute of Health Information's Population Health Initiative, as well as a member of the Council of Chief Medical Officers of Health and of the Advisory Board for the National Collaborating Centre for Determinants of Health. From 1998 to March 2009, Dr. Corriveau served as the Chief Medical Officer of Health for the Northwest Territories. Dr. Corriveau received his degree in medicine from McGill University in 1981 and completed a residency in community medicine as well as a Master in Business Administration at Laval University in 1986. Prior to moving to the Northwest Territories in 1994, Dr. Corriveau also worked in Nova Scotia and in Nunavik (Northern Quebec).

Barb Farlow

Patients for Patient Safety Canada (Canadian Patient Safety Institute)

Educated as a mechanical engineer, Barb Farlow has been advocating for improvements in health care for 8 years, since the death of her daughter Annie. She is a founding member of Patients for Patient Safety Canada, and was the first honorary patient perspective board member of the International Society for Quality in Healthcare. Barb speaks at health conferences, medical and nursing schools and has published numerous papers in peer-reviewed medical journals. She is passionate about patient centred care, bioethics and transparent policy development.

David Heymann, CBE

Professor of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine; Head and Senior Fellow, Chatham House Centre on Global Health Security (London)

Professor David L. Heymann is currently Professor of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine; Head of the Centre on Global Health Security at Chatham House, London; and Chairman of Public Health England, UK. Previously he was the World Health Organization's Assistant Director-General for Health Security and Environment, and Representative of the Director-General for polio eradication. From 1998 to 2003 he was Executive Director of the WHO Communicable Diseases Cluster during which he headed the global response to SARS, and prior to that was Director for the WHO Programme on Emerging and other Communicable Diseases. Earlier experiences at WHO included Chief of Research Activities in the WHO Global Programme on AIDS. Before joining WHO, Prof. Heymann worked for 13 years as a medical epidemiologist in sub-Saharan Africa on assignment from the US Centers for Disease Control and Prevention (CDC) where he participated in the first and second outbreaks of Ebola Hemorrhagic Fever, and supported ministries of health in research aimed at better control of malaria, measles, tuberculosis and other infectious diseases. Prior to joining CDC Prof. Heymann worked in India for two years as a medical epidemiologist in the WHO Smallpox Eradication Programme. He is an elected fellow of the Institute of Medicine of the National Academies (United States) and the Academy of Medical Sciences (United Kingdom), and has been awarded several public health awards that have provided funding for the establishment of an on-going mentorship programme at the International Association of Public Health Institutes (IANPHI). In 2009 Prof. Heymann was appointed an honorary Commander of the Most Excellent Order of the British Empire (CBE) for service to global public health.

THE JURY

Steven Lewis, MA

Health Policy Consultant, Saskatoon, Saskatchewan

Steven Lewis is a health policy and research consultant based in Saskatoon, and Adjunct Professor of Health Policy at Simon Fraser University. Prior to resuming a full-time consulting practice he headed a health research granting agency and spent 7 years as CEO of the Health Services Utilization and Research Commission in Saskatchewan. He has served on various boards and committees, including the Governing Council of the Canadian Institutes of Health Research, the Saskatchewan Health Quality Council, the Health Council of Canada, and the editorial boards of several journals, including Open Medicine. He writes frequently on improving quality, equity, and performance in health care, and is the moderator of the M.A.S.H. blog – Meaningful Analogies in Sports and Health.

Pat Piaskowski, RN

Network Coordinator, Public Health Ontario Northwestern Ontario Infection Control Network (NWOICN); Editor-in-Chief, Canadian Journal of Infection Control

Pat Piaskowski has been the Network Coordinator for the NWOICN since 2005. Prior to assuming this position she was the Infection Control Coordinator at Thunder Bay Regional Health Sciences Centre for over 9 years. Her previous roles include responsibility for quality improvement and infection control programs in long term care facilities for over 10 years. She has maintained certification in infection control (CIC) since 1990 and completed an Honours Bachelor of Science in Nursing (HBScN) at Lakehead University, Thunder Bay, Ontario in 1993. Pat has served as Board member (1991-1998) and President (1997) of Community and Hospital Infection Control Association (CHICA)-Canada (now Infection Prevention and Control – Canada). Since 2003 she has been the Editor in Chief of the Canadian Journal of Infection Control (CJIC). She has served on numerous local, provincial and national committees and task forces and is a founding member of the previous International Infection Control Council from 1998-2008. She has been a long time member of CHICA-Northwestern Ontario. Pat is co-author of the Infection Control Toolkit on Strategies for Pandemics and Disasters (2002), Infection Control Toolkit: Infection Control in Emergencies and Disasters (2007), ESBL Toolkit (2006) and Gram Negative Resistance Toolkit (2012) and other articles published in the CJIC. In 2011, she was named CHICA Champion of Infection Control and in 2013 was awarded Honourary membership in CHICA-Canada. She was a previous member of the infection prevention and control sub-committee of the Provincial Infectious Diseases Advisory Committee (PIDAC) in Ontario (2004-2013). She has presented at various local, provincial, national and international infection control conferences and seminars. She is currently a board member for the Nursing Leadership Network (NLN)-Ontario.

Jennifer Rodgers, BSc, MSW, MSc

Patient Safety Improvement Lead, Canadian Patient Safety Institute

Jennifer Rodgers is a Patient Safety Improvement Lead at CPSI with a main focus on providing project management support to the National Surgical Safety Strategy. Jennifer has over 20 years of experience in healthcare with 10 years of leadership experience in two large Ontario community hospitals in a director role with responsibility for patient safety, quality, risk management and special projects. Jennifer has a passion for patient safety and based on her education and experience, she understands the challenges and opportunities from all perspectives within the healthcare system. Jennifer holds a Masters degree in Social Work from Wilfrid Laurier University as well as a Masters degree in Health Sciences from the University of Toronto.

THE JURY

John Spika, MD

Director General, Centre for Immunization and Respiratory Infectious Diseases, Public Health Agency of Canada

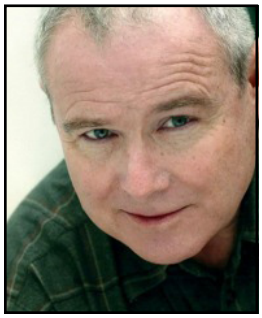
Dr. Spika is a specialist in Paediatric Infectious Diseases, who has worked in public health for over 30 years, including time at the US Centers for Disease Control and Prevention (CDC), Health Canada/ Public Health Agency of Canada, and the World Health Organization Regional Office for Europe. He is a graduate of the US CDC Epidemic Intelligence Service program. He has published over 90 articles and book chapters on subjects related to immunization, host defence and foodborne and respiratory diseases. He is currently the Director General, Centre for Immunization and Respiratory Infectious Diseases, Public Health Agency of Canada.

Howard Waldner, CHE, MBA, ICD.D

Principal, Caledonia Solutions

Howard Waldner is the Principal of Caledonia Solutions, Canada, Inc., a B.C. based strategic consulting company formed in 2013. He has had a distinguished career in senior health leadership, spanning over 35 years, working in both Canada and the UK. Most recently, he spent almost a decade as President and Chief Executive Officer of Vancouver Island Health Authority in British Columbia, Canada. VIHA is Canada's 4th largest health care region, with an annual operating budget in excess of $2 billion. VIHA was recognized as one of Canada's top 100 employers for 5 successive years from 2008 to 2013. Howard was Adjunct Professor in the Faculty of Medicine at the University of British Columbia from 2006 to 2013, and prior to that, Adjunct Associate Professor with the Faculty of Medicine at the University of Calgary from 1999 to 2005. Howard was recently recognized by the Canadian College of Health Leaders by receiving the 2013 Canadian National Award for Innovation in Health-Care Leadership in Canada. Prior to joining VIHA, he was the Executive Vice-President and Chief Operating Officer for the former Calgary Health Region from 1999 until 2004. Before moving to Calgary in 1999, he held a number of senior leadership roles within the Scottish National Health Service, most recently as CEO of Dundee University Teaching Hospitals NHS Trust. He received his Executive MBA from the University of Glasgow, Scotland, and is an active member of the Canadian College of Health Service Executives, and a Fellow of the United Kingdom Institute of Health Care Managers. He is also a Certified Member of the Canadian Institute of Corporate Directors. He has served on several "for-profit" and "non-profit" Boards including the British Columbia Academic Health Council, the Canadian Institute for Health Information, the United Way Campaign Cabinet, Carewest, and the Greater Victoria Coalition to end Homelessness. Currently he serves as an independent Director of the board of Strata Health, a successful Calgary based health technology company, and is a Partner with Prioritize Software, a dynamic Vancouver based information management solutions company.

THE MODERATOR



Fred Keating - Moderator

In September 2013 Fred Keating served as Master of Ceremonies at the IHE International Symposium for the Prevention of FASD. While Fred is not a health care worker, scientist or economist himself, his knack for making complex information accessible to audiences and guiding the progress and process of national and international conferences compelled IHE to MC this conference as well. He has hosted special events involving Olympic champions, world-class scientists and technologists, and various combinations of North America's most influential politicians, sports heroes, academics and performing artists.

Fred's Edmonton-based high definition video production company (Lindisfarne Productions) has produced many award-winning programs for clients such as the Discovery Channel, PBS, National Geographic, BBC, CBC, the History Channel and others. As a performer, Fred has had recurring roles in TV series such as Jake and the Kid, DaVinci's Inquest, The Killing, and the soon-to-be-released Fox TV series Gracepoint as well as APTN's Blackstone.

SPEAKERS & ABSTRACTS

Dr. Elizabeth Bryce, BSc, MD, FRCPC

Regional Medical Director for Infection Control, Vancouver Coastal Health; Clinical Professor, University of British Columbia (UBC)

Dr. Elizabeth Bryce is the Regional Medical Director for Infection Control at Vancouver Coastal Health Acute and has been involved in the field of infection prevention and control for the last 20 years. She is dually qualified in Medical Microbiology and Internal Medicine and is a Clinical Professor at the University of British Columbia. She is a past co-chair of the Canadian Nosocomial infection surveillance Program and the current co-chair of the Provincial Infection Control Network of British Columbia. Dr. Bryce is one of the founding members of the UBC Certificate in Infection Control as well as several on-line educational modules on this topic.
D. Bryce is the Regional Medical Director for Infection Control at Vancouver Coastal Health Acute. Elizabeth is a member of the Pandemic Influenza Guidelines Committee for Respiratory Protection for the Public Health Agency of Canada and a reviewer for Infection Control Guidelines for this same organization. She is a co-chair of the Canadian Nosocomial Infection Surveillance Program as well as a co-chair for the Provincial Infection Control Network of British Columbia. Dr. Bryce is one of the founding members of the UBC Certificate in Infection Control program. She and colleagues have also developed an on-line basic infection control module for healthcare professionals that has been used province-wide as well as being adopted by the Pan-American Health Organization for use in South America.

Abstract: What factors can facilitate or hinder effective ARO control in practice?
a) Organizational and cultural factors (barriers and enablers)

Background: Healthcare is a complex ecosystem and implementing any large-scale change must consider the pattern of complex relations between the organization, the environment, and the individuals within the system. This is true for successful ARO control which involves timely a) identification of high risk patients; b) performance of appropriate screening cultures; c) receipt of results; and d) appropriate application of Contact Precautions. Individual factors affecting ARO control include perception/beliefs/knowledge regarding the importance of ARO control, workload, and internal prioritization of tasks. These factors affect compliance with asking the relevant screening questions consistently of patients, completing the necessary forms (paper or electronic) which signal the need for screening cultures; taking the appropriate cultures correctly and expeditiously and - upon receiving results - taking the initiative to institute Contact Precautions and isolation/ cohorting. Organizational factors influencing compliance with effective ARO control include bed capacity and bed flow, institutional priorities, staffing allocation, the workplace setting, conflicting procedures/policies, and budgetary constraints. Environmental factors affecting ability to comply with ARO control include the availability or robustness of information technology (e.g. electronic risk assessment tools, reminders, checklists, toolkits, training modules), internal communication systems (particularly with housekeeping) and importantly, the number and availability of isolation rooms. Unfortunately ARO control measures currently rely primarily on individual compliance by healthcare workers rather than on the more reliable environmental or organizational controls.

Results: A major environmental barrier to compliance with ARO control is the lack of isolation beds with Canadian hospitals operating routinely at or above 100% capacity in facilities with limited single rooms. Priorities for bed flow and patient access (oganizational factors) that often conflict with infection prevention goals compound the situation. Robust Information Technology systems (environmental factors) to support control efforts do exist but competing priorities and funding constraints have curtailed their use. Inability to link the various information systems further compromises the ability to integrate communications. The last few years has seen recognition of the importance of patient safety both by society and healthcare. This has resulted in many positive organizational changes such as raising the profile of infection prevention and the need for accountability at all organizational levels. Sustainment and continued positive change will require embedding environmental, organizational, and individual factors so they become the culture norm.

Conclusions: The current Canadian situation with strains on bed capacity, increasing workload, and inadequate Information Technology resources are significant barriers to ARO control. Measures that focus or rely primarily on individual behaviour for compliance require a high level of institutional effort and are difficult to sustain. Policies that focus on improved environmental controls and oganizational safety climate require a long-term investment but have the greatest opportunity for success.

SPEAKERS & ABSTRACTS

Barry Cookson, BDS, MBBS, MSc, HonDipHIC, FRSPH, FRCP, FFPH, FRCPath

Professor, University College and London School of Hygiene and Tropical Medicine; Consultant, World Health Organization (WHO) and European Centre for Disease Control (ECDC)

Barry Cookson is medically and dentally qualified, a medical microbiologist and was Director of the Laboratory of Healthcare Associated Infection (HCAI) in the Microbiological Services Colindale of the Health Protection Agency for over 22 years. He retired in June 2012 to become a Professor at University College where he teaches and holds research grants. He also holds a professorship at the London School of Hygiene and Tropical Medicine. He is Chair of the Diploma in Hospital Infection Control Examination Committee and organised the HCAI Foundation Course at Colindale since 1990. He is a Care Quality Commission Associate and very active nationally and internationally in related research and multi-disciplinary approaches to improving infection control and antibiotic prescribing practices. He has over 300 publications and attracted grants to the value of over £15m. He was until 2012 an advisor to the Department of Health Committee on antimicrobial resistance and HCAI and has chaired their sub-groups on occupational health issues with MRSA in veterinary workers and another on competencies required for antimicrobial prescribing. He is an ECDC and WHO consultant and, until 2011, was a member of the UK Veterinary Products Committee. His current projects and interests include European Performance Indicators in Long Term Care Facilities ("HALT 1 and 2"), Clostridium difficile in England (community and hospital costings), isolation ward strategies, costeffectiveness of MRSA screening in England, Training of ICTs in Europe (TRICE 1 and Implementation Strategy projects), ESCMID Antibiotic-resistant Gram negative rod guidelines and an ECDC MRSA systematic review. He is also the external consultant to an EU project writing an infection control manual for Kazakhstan and has advised their Ministry of health on HCAI and Antimicrobial Stewardship.

Abstract: What is the economic cost/benefit of screening from the point of view of the individual patient; health care providers; and the funder of the health care system? How do we evaluate/measure the economic value of screening?

Backgrounds: WHO and ECDC mentioned healthcare associated infections (HAI) in strategies to reduce the global burden of antimicrobial resistance (AMR) and important roles for antimicrobial stewardship and infection prevention and control. A recent Global burden of disease assessment highlighted a lack of a standardised/harmonised methodology. This is particularly evident for the HAI/AMR burden, making advice on the economic costs/benefits problematic.

Methods: Mixed methods including; reflections on our own studies and the literature reviewed with others e.g. in various guideline groups, modelling, the context of healthcare delivery, ways in which national costs/benefits are assessed. How relevant is culture when one addresses cost benefit and utility? What other countries have a similar culture to Canada: are their experiences and costings more relevant?

Results/Discussion: Others at the meeting will present the evidence for screening and how it informs the interventions used (e.g. isolation measures, decolonisation/suppression) and also the laboratory costings approaches to screening. Few have attempted to approach HAIs/AMR from the point of view of the individual patient. In some countries patient advocacy groups are very influential. The major costs of HAI/AMR are in extending the length of hospital stay and these are of major concern to providers/ funders of healthcare systems, as they impact on their ability to reduce waiting times for treatment, often a "hot" political issue. Review of the literature shows a lack of a joined-up approach regarding assessing the costings of HAI and related issues of AMR e.g. methods differ, detail of costs vectors gathered are lacking. The context of healthcare delivery also can vary between countries (e.g. private and/or public funding, the hospitals/units involved, patient case mix, MRSA type and prevalence). Canada would need to analyse its own situation and reflect carefully.

I will present the most detailed approach yet progressed for analysing the cost-effectiveness of screening for MRSA, which we have just completed in England. Mandatory universal screening had been introduced and we were funded to assess it. The approach we used included an audit of English hospitals and entering their data into a sophisticated model which we had developed. We have analysed six screening strategies including no screening, universal, risk factor-based, and screening of high-risk specialties and explored a range of MRSA prevalence. The current strategy is not cost effective using the NICE

recommendations for Cost/QALY (£30K/QALY). A consultation is underway to help agree the best way forward. There are issues, for example, with the practicalities of risk based screening and the pressures for a zero-tolerance approach to HAI.

Conclusions/Policy: There are many issues relating to the way in which cost/benefits of screening have been performed. It has been most studied for MRS and I present an approach that the jury could consider. The model the jury uses to determine policy also needs to be considered.

Recommendations: In view of the many deficiencies in the current literature, the jury should ensure that an approach to costings is included in the research

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Julian Davies, BSc, PhD, FRS

Professor Emeritus, Research Team Leader, Department of Microbiology and Immunology, UBC

Julian Davies (JD) obtained his BSc (1953) and PhD (1956) in Chemistry at Nottingham University. After three years of postdoctoral training at Columbia University (NY) and the University of Wisconsin, he accepted a Lecturership in Chemistry at the University of Manchester Institute of Technology in 1959. In 1962 JD quit chemistry and joined the laboratory of Bernard Davis (Harvard Medical School) to study the mode of action of streptomycin and then teamed up with Luigi Gorini and Walter Gilbert to identify aminoglycoside-induced miscoding. Later, he went to work with H. Gobind Khorana to study the molecular nature of antibiotic-induced mistranslation. In 1965, an NIH fellowship permitted him to work with Francois Jacob (Pasteur Institute) to genetically map the regulatory genes of the E.coli lac operon. In 1967 he was appointed to the Biochemistry faculty at the University of Wisconsin and worked on antibiotic mode of action, the origins and evolution of antibiotic resistance and the use of resistance genes as selective markers in transformation. Taking a sabbatical in Geneva in 1975 he co-discovered transposable antibiotic resistance. Later, he developed gene transfer processes between bacteria and eukaryotic cells. In 1980, JD left academia to Biogen as Research Director, eventually becoming President. He left in 1985 to become a laboratory director at the Institut Pasteur (Paris), studying a variety of topics including antibiotic resistance, antibiotic production, mechanisms of bacterial and fungal pathogenicity, and horizontal gene transfer in microbes. JD became Professor and Head of the Department of Microbiology and Immunology at the University of British Columbia in 1992. He founded TerraGen Diversity, one of the first environmental DN metagenome-based Biotech companies in 1996 (subsequently acquired by Cubist Pharmaceuticals). JD served as the President of the American Society of Microbiology from 1999-2000 and President of the International Union of Microbiological Societies in 2003. He is a Fellow of the Royal Societies of London and Canada, and has received several other awards, including the Lifetime Achievement Award from the American Society of Microbiology. He chaired the External Scientific Board of the NIH Human Microbiome Project from 2009-2012. As a Professor Emeritus at UBC he maintains a research lab and teaches in assorted courses. His research focuses on studies of antibiotic mode of action, bacterial cell signaling, antibiotic resistance mechanisms and their suppression, antibiotic discovery and the biology of lichens.

Abstract: Can anything be done to prevent antibiotic resistance development?

Antibiotic resistance predates the therapeutic use of antibiotics by millions of years. The conclusion is that antibiotics will never escape the development of resistance development. However, strictly-controlled, rational and prudent use of antibiotics could delay this process and intelligent chemistry combined with the genomic manipulation of producing strains should furnish an unlimited source of novel antimicrobial agents. Unfortunately the cost will be high.

SPEAKERS & ABSTRACTS

Serge Desnoyers, PhD

Assistant Director, Canadian Institutes of Health Research-Institute of Infection and Immunity

Dr. Serge Desnoyers completed his post-secondary education in Canada, where he obtained a B.Sc. and an M. Sc. in Biology from Université de Sherbrooke, and a PhD in Endocrinology-Physiology from Université Laval (Québec). Following a four-year postdoctoral position at Cold Spring Harbor Laboratory (New York, USA) in molecular genetics, Dr. Desnoyers moved back to Canada for a position at the CHUL Research Centre in Quebec City. After a successful career as an independent investigator for over 10 years, he joined CIHR in February 2010 and is currently the Assistant Director for CIHR Institute of Infection and Immunity where he manages the host Institute, and participates in the elaboration of research initiatives. The Institute of Infection and Immunity (III) supports research and helps to build research capacity in the areas of infectious disease and the body's immune system. Through the Institute's programs, researchers address a wide range of health concerns related to infection and immunity including disease mechanisms, disease prevention and treatment, and health promotion through public policy. Antibiotic resistance (AMR) has been a strategic research priority for III since the beginning, appearing in three consecutive Strategic Plans, including the most recent 2013-18 Plan. Since 2001, III has led a number of initiatives with a focus on AMR, such as the Safe Food and Water Initiative, and the Novel Alternatives to Antibiotics Initiative. III also partnered in 2010 with the UK MRC in the joint support of two large consortia focused on the translation and implementation of AMR research into clinically relevant interventions. More recently Canada, through CIHR-III, became the co-lead of the Joint Programming Initiative on Antimicrobial Resistance (JPIAMR).

Abstract: How CIHR is Addressing Antimicrobial Resistance, Nationally and Internationally?

Background: Antimicrobial resistance (AMR) is recognized internationally as an emerging health crisis that threatens to undermine our ability to control bacterial infections. The complacency generated by the success of antibiotics has led to their widespread overuse and misuse, accelerating the generation of multi-drug resistance. Once known mainly to researchers, resistant microbes like methicillin-resistant staphylococcus aureus (MRSA), vancomycin-resistant Enterococcus (VRE), and Clostridium difficile have entered the public consciousness, and pose a serious health threat. If the spread of antimicrobial resistance is not checked, and if new methods for treating bacterial infections are not found, we face returning to a pre-antibiotic-like era.

Results/Key Data: When the Science Ministers of the G8 countries met in London in June 2013, they had to deal with their top global challenge, namely AMR in medicine. They have committed to a series of statements regarding: the efficacy of existing antimicrobial agents, preventing theemergence of AMR through the development of rapid diagnostics; supporting the development of new diagnostics to improve the early and accurate identification of antimicrobial resistant infections to improve treatment efficacy; and supporting theoretical and applied research to better understanthe origin, spread, evolution, and development of resistance in microorganism. Antimicrobial resistance has been a research priority of the CIHR Institute of Infection and Immunity (III) since its inception, and a number of strategic research initiatives have been launched to address this global health problem by promoting and supporting research related to mechanisms and processes that impact the emergence and spread of resistance. For example, CIHR-III spearheaded the Safe Food and Water initiative, which lead to the creation of the Canadian Research Coalition for Safe Food and Water. The goal of this coalition was to build a national, coordinated research agenda in the area of microbial contamination of food and water and antimicrobial resistance in the food chain. The Novel Alternatives to Antibiotics (NAA) initiative, which included a focus on areas such as phage therapy and probiotics in which Canada had little or no research capacity, was designed to augment the existing research funding available through the CIHR open competitions by attracting applications focused on novel approaches to antibiotic resistance. Lastly, the Canada/UK Joint Health Research Program on Antibiotic Resistance was created to promote the development of multi-national basic and translational research collaborations in the area of AMR. As many countries are now ramping up their strategies to combat antibiotic resistance and international partnerships are emerging to promote value-added collaborations in a multifaceted, multidisciplinary approach to the problem, this joint program is a perfect example. Recently, CIHR-III established a partnership with the European Joint Programming Initiative on AMR (JPIAMR), which will enhance the impact of research by aligning and building upon existing national programs and identifying common goals that would benefit from joint action.

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Conclusions/Recommendations: Several aspects of AMR need to be addressed. Lack of awareness would benefit from educational outreach to the media, public and government. The need to better utilize public and private sector partnerships (PPPs), which could be accomplished by building on successful PPPs, and by intensifying collaboration with industry. There should also be an increase in financial investment for new research into fundamental mechanisms of AMR, to monitor the impact of AMR on the health care system, to assess health services readiness to respond, and to accelerate through research the development of new drugs, new vaccines, and new technologies.

Michael B. Edmond, MD, MPH, MPA

Professor, Virginia Commonwealth University; Hospital Epidemiologist, Virginia Commonwealth University Health System

Dr. Edmond is the Richard P. Wenzel Professor of Internal Medicine in the Division of Infectious Diseases at Virginia Commonwealth University. He also holds a faculty appointment in the Department of Epidemiology and Community Health and serves as the Hospital Epidemiologist for the VCU Health System. He is a graduate of the West Virginia University School of Medicine (MD), the University of Pittsburgh Graduate School of Public Health (MPH), and the Virginia Commonwealth University School of Government and Public Affairs (MPA). He was a resident and chief resident in Internal Medicine at West Virginia University Hospitals. He then completed a fellowship in Infectious Diseases at the University of Pittsburgh Medical Center and a fellowship in Hospital Epidemiology at the University of Iowa College of Medicine. Dr. Edmond's areas of research focus on the epidemiology of healthcare-associated infections and the public policy implications of infection control. He has published 350 papers, abstracts and book chapters, and co-writes a blog entitled Controversies in Hospital Infection Prevention. Over the past few years, Dr. Edmond has been named to Richmond Magazine's Top Doctors, America's Top Doctors, US News and World Report's Top Doctors, Our Health Richmond Magazine's Best Bedside Manner Award, and Health Leaders Magazine's 20 People Who Make Healthcare Better.

Abstract: Should We Screen for AROs?

Background: Optimal methods for the control of AROs remain inconclusive. Over the past decade, there has been a push for active detection and isolation (ADI) to control AROs in the hospital setting. However, most studies supporting this approach are single-center, observational, nonrandomized, before-and-after evaluations that cannot establish causality.

Policy Recommendations: Active detection and isolation for the control of endemic pathogens should not be pursued. Rather, hospitals should primarily focus on population-based, horizontal infection prevention strategies which have the capacity to reduce infections due to all organisms transmitted via direct or indirect contact.

Rationale:

1. There are no convincing experimental data that the ADI approach is effective for organisms that are highly endemic in hospitals. Cluster randomized controlled trials in the ICU setting have shown no advantage of ADI to comparator approaches.
2. Screening programs incur high resource utilization. The cost of an ADI program includes the direct costs (laboratory costs, disposable personal protective equipment), opportunity cost (tracking of patients and ensuring isolation), as well as others (disposal of consumable plastics and their impact on the environment).
3. Even if ADI programs could demonstrate perfect results (i.e., no nosocomial transmission of the targeted pathogens), they have no impact on organisms not included in the screening program (i.e., they are unipotent and lack a future orientation).
4. Contact precautions impede patient care. They have been demonstrated to reduce visits by doctors and nurses, impose existential burden on patients (increased anxiety and depression, reduced satisfaction), and are associated with supportive care failures. Moreover, contact precautions reduce patient throughput.
5. Contact precautions pose a unique ethical issue in that the benefit of the intervention does not accrue to the patients who bear its burden.

SPEAKERS & ABSTRACTS

Dan Gregson, MD, FRCPC

Associate Professor, University of Calgary; Clinical Section Chief, Medical Microbiology, Calgary Laboratory Services; Infectious Diseases Consultant, Calgary, Alberta Health Services

Dr. Gregson trained in Medicine at the University of Toronto, graduating in 1983 after which he did specialty training in Internal Medicine and Medical Microbiology and Sub-specialty training in Infectious Disease in Toronto. Subsequently, Dr. Gregson worked in Medical Microbiology and Infectious Diseases in London, Ontario for 10 years before moving to Calgary in 2000. He has been Clinical Section Chief in Medical Microbiology in Calgary for 7 years.

Abstract: What factors can facilitate or hinder effective ARO control in practice?

Laboratory Factors Affecting ARO Control.

Background: Infection Control Programs generally request screening cultures as part of the bundle to prevent Healthcare transmission of antibiotic resistant organisms. The laboratory costs and the sensitivity of the method are generally not considered when strategies are implemented. A review of the relative sensitivities of various ARO screening methods was done using literature review and program costs were calculated based on current Alberta reagent and labor prices.

Results: The sensitivity of laboratory screening for ARO's varies with the number of patient sites sampled, the use of broth enrichment prior to culture, the culture medium used, and the ARO being screened for. Organisms such as vancomycin-resistant enterococci, have detection rates as low a 50% on a single rectal sample. Single site sampling for methicillin-resistant Staphylococcus aureus has a sensitivity of 80%. Sampling multiple sites with broth enrichment is required for methicillin-resistant Staphylococcus aureus to reach a detection rate of 95%. Detection rates for CRE vary according to the genetic mechanism of production. Use of commercial nucleic acid amplification methods cost 5 –10 the cost of culture-based methods and have not been consistently shown to reduce transmission events. The cost of a screening program will vary with the required sensitivity of the method implemented in addition to the number of patients being screened. Decision tree analysis of all of the options is required to make rational decisions and these need to be re-evaluated as the prevalence of the ARO changes.

Conclusions: Costs per case identified increase incrementally as methods to increase sensitivity of detection are implemented, and increase logarithmically as the prevalence of ARO colonization decreases. Screening programs need to alter their strategy based on these factors. Infection control programs need to set lower limits on the prevalence at which screening should be implemented, and the upper limit at which screening no longer cost effective. More expensive, rapid methods have generally not been shown to improve outcomes. Budgeting for laboratory screening for ARO's should be tied directly to Infection Control programs to ensure optimal utilization of health care resources.

SPEAKERS & ABSTRACTS

Anthony Harris, MD, MPH

Professor, Epidemiology and Public Health, University of Maryland; Acting Medical Director of Infection Control University of Maryland Medical Center

Dr. Harris is an infectious disease physician and epidemiologist whose research interests include emerging pathogens, antimicrobial-resistant bacteria, hospital epidemiology/infection control, epidemiologic methods in infectious diseases and medical informatics. He has published over 135 papers. He has current or has had funding from the NIH, CDC and AHRQ to study antibiotic resistance and hospital epidemiology. He has numerous publications involving the pros and cons of active surveillance and contact precautions.

Abstract

Background: Contact Precautions are a recommended method for preventing patient-to-patient transmission of multiple drug-resistant organisms. However, in the last decade, concerns have arisen about the possible adverse events associated with contact precautions. In my presentation, I will review the literature on the potential adverse events of contact precautions with a focus on the acute care hospital setting. I will also address patient choice regarding active surveillance culturing.

Results: Initial studies led to public health concerns that contact precautions lead to decreased healthcare worker visits, increased anxiety, increased depression and an increase in other adverse events. More recent higher quality observational studies demonstrate that patients who are on contact precautions have more pre-existing conditions that lead to this anxiety and depression and that contact precautions themselves do not increase anxiety or depression. A recent large randomized trial showed that adverse events were not increased for patients on universal contact precautions. This same randomized trial did confirm that patients on universal contact precautions are seen less often by healthcare workers. The literature is sub-optimal to assess the impact of contact precautions on family members. Patients being placed on contact precautions have been demonstrated to have a negative impact on bed flow into long-term care facilities and rehabilitation facilities but this could be improved.

Conclusions: My personal opinions based on my review of the literature are that: Patients should have the right to refuse active surveillance culturing (as with any test). The potential adverse events associated with contact precautions have been dramatically overstated. The science indicates that contact precautions do not cause increased anxiety or depression. Contact precautions do not clearly lead to an increase in adverse events. They do lead to a decrease in healthcare worker visits the effect of which, at this point in time is not clear. I believe that any negative effects of contact precautions can be overcome with more thoughtful implementation that includes patient education about need for contact precautions.

SPEAKERS & ABSTRACTS

Susan Huang, MD, MPH

Associate Professor, University of California; Medical Director of Epidemiology and Infection Prevention at UC Irvine Health

Susan Huang, MD MPH is an Associate Professor in the Division of Infectious Diseases and Health Policy Research Institute at the University of California Irvine School of Medicine, and the Medical Director of Epidemiology and Infection Prevention at UC Irvine Health. She received her MD degree from Johns Hopkins University School of Medicine and her MPH degree from Harvard School of Public Health. Her clinical epidemiologic research has focused on healthcare-associated infections – identifying the population burden, risk factors for acquisition and disease sequelae, and preventative strategies for containment. Dr. Huang is currently the lead investigator of three randomized clinical trials on MRSA disease prevention. She also serves as a member of the Healthcare Infection Control Practices Advisory Committee (HICPAC), a 14-member federal advisory committee that develops guidelines on infection control and prevention in healthcare settings.

Abstract: Is there a role for decolonization, and if so, when, and how?

Background: Measures for preventing AROs have largely focused on reducing new acquisition by preventing transmission. However, these measures do not prevent the high risk of infection among the rising number of patients who already carry AROs. Decolonization has the benefit of both reducing transmission from current carriers and preventing later infection.

Results: Several quasi-experimental studies over the past decade have demonstrated the safety and effectiveness of decolonization strategies to reduce ARO transmission and environmental contamination in the ICU setting, particularly due to MRSA and VRE. Recently, several large cluster-randomized ICU trials have shown significant reductions in ARO transmission and central line associated bloodstream infections with daily chlorhexidine bathing, and large reductions in MRSA clinical cultures and all-pathogen bloodstream infections with daily chlorhexidine bathing plus short course mupirocin to reduce both total body surface burden and the nasal reservoir of S. aureus (both MRSA and MSSA). Attention to the nasal reservoir of S. aureus is important as it has been found to be the #1 pathogen for healthcare-associated infections due to devices and surgeries. In addition, other randomized clinical trials have demonstrated significant reductions in S. aureus surgical site infections when similar chlorhexidine and mupirocin regimens are used to decolonize inpatient carriers prior to surgery or outpatient carriers prior to cardiac and possibly orthopedic surgery.

Discussion: Body surface and nasal decolonization is a simple and highly effective strategy to reduce the risk of infection in high risk settings and among high risk patients. Targeted decolonization has been shown to reduce the risk of later infection in S. aureus carriers under select settings, such as before surgery. In contrast, universal decolonization has been shown to be more effective than targeted decolonization in adult ICUs and universal decolonization in both adult and pediatric ICUs reduces AROs and bloodstream infections. Clinical trials are needed to understand whether decolonization is beneficial in other high risk settings such as the neonatal ICU, bone marrow transplant/oncology units, and post-acute care settings.

Conclusions/ Policy Recommendations: Universal decolonization with both chlorhexidine and mupirocin should be adopted in ICU settings to reduce all cause bloodstream infection, and to reduce MRSA clinical cultures. Alternatively, universal decolonization with chlorhexidine alone could be adopted to reduce central line associated bloodstream infection and ARO transmission, but may not be as effective against MRSA/MSSA compared to decolonization with chlorhexidine plus mupirocin to address the nasal reservoir. Decolonization with both chlorhexidine and mupirocin in high risk inpatient S. aureus carriers select outpatient S. aureus carriers prior to surgery should be adopted to reduce surgical site infections.

SPEAKERS & ABSTRACTS

John Jernigan, MD, MS

Director, Office of Prevention Research and Evaluation, Centers for Disease Control and Prevention (CDC); Clinical Associate Professor, Emory University School of Medicine, Division of Infectious Diseases

John A. Jernigan, M.D., M.S. is currently Director of the Office of Prevention Research and Evaluation, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention (CDC), and Clinical Associate Professor of Medicine at the Emory University School of Medicine, Division of Infectious Diseases. He attended medical school at Vanderbilt University, where he also completed his internship and residency in Internal Medicine, and served as Chief Medical Resident. Following his residency, he spent a year practicing medicine in East Africa, then returned to the United States to complete his fellowship in Infectious Diseases at the University of Virginia, where he also earned a Masters Degree in Epidemiology. He joined the faculty of Emory University in 1994, and became Hospital Epidemiologist at Emory University Hospital in 1995. In Spring 2000, he joined the Division of Healthcare Quality Promotion at the CDC, but maintains his faculty appointment in the Emory Division of Infectious Diseases. He has served on the Board of Directors for both the Association for Professionals in Infection Control and Epidemiology (APIC) and the Society for Healthcare Epidemiology of America (SHEA), was named the SHEA Investigator awardee in 2005, and served as president of SHEA in 2013. His editorial activities have included service on the Editorial Board of Infection Control and Hospital Epidemiology and Hospital Epidemiology Section Editor for Current Infectious Disease Reports. He has authored/coauthored numerous peer-reviewed publications and textbook chapters dealing with the epidemiology of healthcare-associated infections and antimicrobial resistance, and has a particular interest in the epidemiology of drug-resistant Staphylococcus aureus.

Abstract: Why Do Screening Practices Vary Across Jurisdictions?

An often used component of antimicrobial resistance control strategies is screening patients for carriage of multi-drug resistant organisms (MDROs) to guide targeted interventions. This approach is utilized with great heterogeneity across health jurisdictions at the local, regional, national, and international levels. Factors contributing to the variability include debate about the effectiveness of screening-based strategies, their resource intensity, and a range of contextual factors that influence decisions regarding their use.

There are two major approaches to preventing infections caused by antimicrobial resistant organisms in the healthcare setting: 1) interventions designed to prevent infections caused by any organism (whether an MDRO or not) already carried by the patient, and 2) preventing transmission of MDROs from carriers to non-carriers who may be at risk for infection. Most healthcare epidemiologists agree that both are important, but there is widespread disagreement on the optimal strategy for preventing transmission of MDROs. Epidemiologic evidence clearly suggests that direct or indirect transmission of MDROs in healthcare settings is common in settings that employ Standard Precautions (e.g. standard hand hygiene practice, etc.). This suggests that either standard IC practice is not sufficient to completely interrupt transmission, or that standard practices are insufficiently implemented in most settings. Some feel strongly that the response should be to improve implementation of standard precautions and focus on infection-specific interventions (e.g. interventions designed to prevent central line-associated bloodstream infections caused by any organism, not just MDROs), while others suggest additional precautions are necessary to reliably interrupt MDRO transmission. For those favoring taking additional precautions to prevent transmission, the choices include: 1) applying extra measures to all patients (or to defined populations of patients that are easy to define and identify without laboratory-based screening), or 2) applying extra measures to only those patients who are MDRO carriers. The latter approach most often requires laboratory-based screening, and triggers the use of additional infection control supplies, person time, hospital space, waste production, and other logistical requirements. Hence, screening-based approaches can be very resource intensive.

Given the resource intensity of screening-based approaches, there has been a demand to clearly quantify effectiveness in order that clear cut cost-benefit-based decisions can be made. While circumstantial evidence and a strong theoretical case can be made that optimal MDRO control requires more than the use of standard precautions, at least in certain settings, clear-cut evidence of cost-benefit from rigorously controlled studies has been difficult to produce. (It should be noted that the same can be said of strategies relying on standard precautions alone). There are a myriad of reasons for this, in part due

to methodological limitations of the existing studies that stem from the major logistical complexities of controlled studies of population-based interventions and outcomes in the healthcare setting.

In presence of such uncertainty, those responsible for controlling antimicrobial resistance in healthcare facilities must weigh the theoretical/circumstantial evidence for benefit against certain contextual factors. For example, the prevalence of the MDRO in question may be important. In settings where prevalenceis high, it may be more practical and effective to use screening-based strategies in comparison to settings where the targeted MDRO is highly endemic either in healthcare facilities or in the community. The clinical consequences of the MDRO in question is also important to consider; if effective treatment options are limited for a certain MDRO and infection results in high morbidity/mortality, more aggressive action may be warranted. The characteristics of the patient population needs to be considered as well; some populations may be particularly susceptible to morbidity/mortality to MDROS (e.g. ICU or oncology patients) and warrant additional efforts to prevent MDRO transmission. Differences in the context account for much of the variability in use of screening-based prevention practices.

Summary: Decisions on whether or not to use screening-based practice for MDRO control are complex, and must take into account multiple contextual factors such as resource availability, prevalence of the pathogen, consequence of infection by the pathogen, population at risk, and weighing the theoretical rationale for screening-based approaches against limitations in the existing evidence base. Such complexity does not lend itself to a "one size fits all" approach, and therefore there is wide variability of practice across jurisdictions.

SPEAKERS & ABSTRACTS

Joel Kettner, MD, MSc, FRCSC, FRCPC

Scientific Lead, National Collaborating Centre for Infectious Diseases, International Centre for Infectious Diseases

Dr. Kettner was raised in the north end of Winnipeg and obtained his medical degree at the University of Manitoba, graduating in 1976. He obtained his general surgery specialty certificate in 1984 (University of Manitoba), his Masters of Science in Epidemiology at the University of London School of Hygiene and Topical Medicine in 1986, and his Community Medicine (now called Public Health and Preventive Medicine) specialty certificate in 1991 (University of Manitoba). For the next two decades, he worked at the University of Manitoba's Faculty of Medicine and for the Province of Manitoba, where he first served as a Regional Medical Officer of Health in northern, rural and urban settings, followed by twelve years as Manitoba's Chief Medical Officer of Health and, after the new Public Health Act, Chief Public Health Officer until 2012. In November, 2012, Kettner joined the International Centre for Infectious Diseases as its medical director and scientific lead for the National Collaborating Centre for Infectious Diseases. In addition, he is director of the Master of Public Health program at the University of Manitoba, a visiting professor of the University of Winnipeg Master's in Development Practice program, and a freelance consultant. He is president of the Public Health Physicians of Canada and a director of the Canadian Public Health Association.

Abstract: What is surveillance; what is screening? How are they related?

Background: The terms surveillance and screening have distinct meanings, but are often used interchangeably, resulting in confusion.

Methods: A non-systematic review of the etymology and definitions of surveillance and screening, as well as the components of such programs, was used to prepare this presentation.

Results: Surveillance is the systematic observation and monitoring of current events and trends for the purpose of estimating burden of illness in the present and future and can be used to guide short-term and long-term decision-making about interventions and to guide evaluation. Screening is systematic testing of individuals to detect the presence of a condition before it is manifested by symptoms in the belief that earlier detection and subsequent intervention is of net benefit for the individual patient and/or others.

Discussion: Surveillance and screening programs share some common goals and methods; however, they have different objectives and processes. In considering and evaluating the implementation of surveillance and/or screening, therefore, it seems important to be clear about their similarities and differences.

Conclusions/Policy Recommendations: Clear, standard definitions and frameworks should be used for surveillance and screening in general - and more specifically for programs such as those for the prevention and control of antimicrobial resistant organisms. Consistent use of such standardized terms and frameworks should improve communication and facilitate knowledge translation with respect to the effectiveness, efficiency, and equity of surveillance and screening programs and activities.

SPEAKERS & ABSTRACTS

Mark Loeb, BSc, MSc, MD, FRCPC

Professor, Department of Pathology and Molecular Medicine; Joint Member, Department of Clinical Epidemiology and Biostatistics; Medical Director, Infection Control, Hamilton Health Sciences, McMaster University

Dr. Loeb is a Professor in the Departments of Pathology and Molecular Medicine and Clinical Epidemiology and Biostatistics at McMaster University. He graduated from McGill Medical School and completed fellowships in Internal Medicine, Infectious Diseases and Medical Microbiology at the University of Toronto and McMaster University, and an MSc in Clinical Epidemiology at McMaster. He holds the Michael G. DeGroote Chair in Infectious Diseases Research. Dr. Loeb has published 220 peer reviewed papers and 12 book chapters. He has been PI on CIHR funded epidemiological studies and clinical trials on antibiotic use and antimicrobial resistance in residents of long-term care facilities.

Abstract

Various types of interventions that have been assessed for reducing the spread of antimicrobial resistance. Limitations of observational studies will be briefly discussed followed by a focus on cluster randomized controlled trials. A strong justification for these trials as the interventional studies of choice will be made. The presentation will review design and analysis aspects of cluster randomized trials and will outline strengths and limitations of this design.

SPEAKERS & ABSTRACTS

Yves Longtin, MD, FRCPC

Chair, Infection Prevention and Control Unit, Montreal Jewish General Hospital – SMBD; Associate Professor of Medicine, McGill University

Dr. Yves Longtin obtained his MD from Sherbrooke University and completed his training in Infectious Diseases and Microbiology at Laval University in 2005. Thereafter, Dr. Longtin pursued a fellowship in Infection Control at the Geneva University Hospitals (HUG), Switzerland, from 2006 to 2009. Dr. Longtin practiced Infectious Diseases / Microbiology with a special interest in Infection Control at Centre Hospitalier Universitaire de Québec (CHUL) and the Institut Universitaire de Cardiologie et de Pneumologie de Québec (IUCPQ) from 2009 to 2013. He is the chair of the Infection Prevention and Control Unit of the Jewish General Hospital in Montreal since April 2013. He is also a consultant to the World Health Organization for the Save Lives: Clean Your Hands Global Initiative. Dr. Longtin's research interests include patient involvement in quality improvement, hand hygiene and Clostridium difficile infections.

Abstract:
(1)What can patients, the public, and health care professionals do to help?
(2)Would more education of the public and patients re: appropriate use of antibiotics help reduce the incidence of AROs, and what would be the most effective strategy?

Background: Evidence suggests that the spread of antibiotic resistant organisms (ARO) can be reduced by judicious use of antimicrobials. Some experts argue that patients and the public can help control the spread of ARO.

Methods: Review of the scientific literature (pubmed, Ovid, CINHAL) and review of the grey literature for relevant studies and information

Results:
Question 5d (1): Patients and the public could help prevent the spread of ARO in numerous ways. They could help prevent the spread of ARO by promoting good hygiene practices in the community and in hospitals (such as cough etiquette and hand hygiene).[1, 2] In addition, patients could be invited to mention any recent hospitalization abroad. They can also be involved in the auditing of the quality of care (such as auditing hand hygiene practices of healthcare workers) that will ultimately help decrease the spread of ARO.[3] Also, as numerous patient-related factors represent barriers to implementation of guidelines on antibiotic use, patients should be involved in the creation of such documents. This will help foresee potential lapses before their publication, and will likely improve uptake and dissemination.[4]

Question 5d (2): There is widespread misunderstanding from the public on how to use antimicrobials responsibly. This may lead to patients pressuring physicians to be prescribed antimicrobials even when they are not indicated.[5] Improving patient and public education regarding proper antibiotic use and ARO is thus likely to be essential to the control of the spread of these pathogens. There is moderate evidence that patient and public education programs can decrease antibiotic use and the spread of ARO. There is evidence that education campaigns can induce more prudent use of antimicrobials,[6] and can lead to a significant decrease in antimicrobial use.[7] A systematic review concludes that mass media can be effective to improve health-services utilization.[8] However, the optimal method remains to be identified, as no study has compared different initiatives in terms of effectiveness or cost-effectiveness. Many publications are quasi-experimental single-center studies with a small number of study subjects.[4, 9]

Content of education programs: The learning objectives of educational campaigns are numerous. Educating about prudent antimicrobial use and the need to avoid overuse of antimicrobials is important, as is the need to correct misunderstandings about the need for antimicrobials in some clinical settings. It is also essential to highlight the correlation between antimicrobial use and emergence and spread of resistance,[4] and to reinforce the notion that antimicrobials can have harmful effects such as C. difficile infections and candidiasis.[4]

Education channels: Numerous channels can be used to educate patients and the public including mass media, web-based professional education and teaching by key stakeholders. As individuals have higher awareness when exposed to more than one intervention, use of a combination of interventions using multiple channels may be required to obtain a maximum impact.[6, 10] Healthcare professionals may need to be trained to become good teachers. This may require modification of

medical training curriculum and production of toolkits to help them manage public demand for antibiotics.[11, 12] However, there is limited evidence regarding the cost-effectiveness of such program.

Conclusions/ Policy recommendations:

- Despite its strong theoretical basis, few studies have assessed the effectiveness of public education programs to decrease inappropriate antibiotic use and limit the spread of ARO;
- Patient involvement in preventing the spread of ARO could be useful, but the effect is not fully documented;
- Public and patient education could be useful to change the social norms, which are important determinants of behavior;
- Successful interventions will likely require targeting both the public, patients and healthcare workers through numerous concomitant channels and media;
- Involving the public, patients and healthcare workers will require additional resources, and cost-effectiveness studies have never been performed;

Scott McEwen, DVM, DVSc, Dip ACVP

Professor, Ontario Veterinary College, University of Guelph

Dr. Scott McEwen obtained his DVM and Doctor of Veterinary Science degrees from the University of Guelph. He is currently a Professor in the Department of Population Medicine, Ontario Veterinary College. His research focuses on the epidemiology of foodborne infections in food animal populations, particularly E. coli and antibiotic resistant organisms, but also Salmonella and other pathogens. He has extensive experience in conducting epidemiological studies in cattle, poultry, swine and other food animal species and has also participated in a number of studies of zoonotic infections in companion animals and in humans, including antimicrobial resistance in commensal and pathogenic bacteria. His research on antimicrobial resistant bacteria, Salmonella and E. coli O157:H7 and related organisms focuses on the distribution of fecal shedding in animals, and risk factors for infection in animals and humans. He also studies the determinants of selection and assessment of human health risks from antimicrobial use in animals. Since 1986 he has supervised over 50 MSc and PhD students. He is author or co-author of over 200 publications in refereed scientific journals and has delivered invited research presentations in eleven countries. He consults on food safety, antibiotic resistance, epidemiology and other veterinary public health matters with a number of governmental and non-governmental organizations at the provincial, national and international levels, notably various food animal industry groups, the Canadian Committee on Antibiotic Resistance (CCAR) the Alliance for the Prudent Use of Antibiotics (APUA), the Public Health Agency of Canada, Health Canada, the United States Food and Drug Administration, the Centers for Disease Control and the World Health Organization (WHO). He chaired Health Canada's Advisory Committee on Animal Uses of Antimicrobials and Impact on Resistance and Human Health. He also chaired numerous international antibiotic resistance committees, including the World Health Organization's evaluation of the termination of the use of antimicrobial growth promoters in Denmark, the FAO/OIE/WHO Expert Workshop on Non-human Antimicrobial Usage and Antimicrobial Resistance: Scientific Assessment and the Joint FAO/WHO/OIE Expert Meeting on Critically Important Antimicrobials. He is currently a member of the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance Surveillance (AGISAR) and chairs its antibiotic usage monitoring subcommittee.

Abstract: Antimicrobial Drug Use in Animals as a Driver of Resistance

Antimicrobials are used widely in veterinary medicine, food animal production and aquaculture. Most drug classes used in humans are also used in animals. Some are administered on an individual animal basis, but administration to entire groups, herds or flocks of animals is common. General indications for group treatment include therapy, disease prophylaxis and growth promotion / feed efficiency. Antimicrobial use is a major driver of resistance, but animal production practices also contribute to spread of resistant bacteria and their genes between animals, herds and countries. Animals are a source of resistance for humans, either directly from animals, or much more importantly, through indirect transmission by various environmental routes, especially food. Available evidence suggests that the most important contribution of antimicrobial use

in animals to resistance problems in humans is selection and spread of resistance in enteric pathogens, such as Salmonella spp, Campylobacter jejuni and Escherichia coli. Resistance is also a problem in some important bacterial infections of animals (e.g. E. coli in pigs and poultry, Staphylococcus intermedius in pets), however, resistance is not perceived to be as big a threat to animal health as it is to human health. In the veterinary and animal production communities, antimicrobial resistance is thought to be mainly a public health problem. Consequently, ARO screening is rare to non-existent in animals and efforts to control resistance in animals are mainly focused on human health protection. Scientists have for decades been trying to better characterize the human health implications of antimicrobial use in animals, but major progress is made difficult by the diverse and complex ecological nature of bacteria / animal / environment / human interactions. Direct measurement of human health risk has not been possible, so indirect risk assessment methods have been adapted from environmental health and used to map and quantify risk pathways and health consequences in humans. These efforts have been seriously hampered by limited understanding of the dynamics of resistance selection and spread through the varied and complex environmental pathways from animals to humans (e.g. food, water, soil, pets). Targeted research can address specific knowledge gaps, but improved surveillance is the most efficient and useful way of advancing knowledge on resistance selection and spread at regional and national levels, and surveillance is needed to support better antimicrobial use policy, and assess effectiveness of interventions. Antimicrobial resistance, particularly from non-human sources, is an ecological phenomenon, requiring ecological approaches to research, risk assessment and risk management. Underpinning each of these approaches is surveillance of antimicrobial use and antimicrobial resistance at the local, regional, national and international levels. The Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) is vital for assessing and addressing enteric bacteria resistance concerns at the animal / food / human interface, and should be strengthened and expanded in order to more comprehensively monitor antimicrobial use in animals, and address resistance in a wider range of bacteria and environmental settings.

Conclusions/Policy Recommendations: Integrated surveillance of antimicrobial use and resistance in animals, food, environment and humans is essential and should be enhanced and strengthened in Canada at provincial and national levels and coordinated with international partners. Surveillance of resistance in veterinary pathogens is needed to better understand the impact of resistance on animal health in the expectation that this will provide more motivation in the veterinary and farming community to reduce antimicrobial use. ARO screening is rarely if ever used in animals. Containing the spread of enteric pathogens to humans through food and water is already the focus of intensive efforts, some of which involve types of screening (e.g. E. coli testing to monitor effectiveness of food safety and water disinfection measures). Given the experience of controlling these enteric other important infections in animals and their subsequent spread to humans, ARO-specific screening would in future likely only be warranted if vital international trade implications and / or potentially catastrophic animal or human health consequences were at stake. This possibility should be incorporated into contingency planning.

SPEAKERS & ABSTRACTS

Allison McGeer, MD, FRCPC

Microbiologist & Infectious Disease Consultant; Director of Infection Control; Director, Infectious Diseases Epidemiology Research Program, Mount Sinai Hospital and Professor, Laboratory Medicine and Pathobiology and Public Health Sciences, University of Toronto

Dr. McGeer trained in internal medicine and infectious diseases at the University of Toronto, then completed a fellowship in hospital epidemiology at Yale New Haven Hospital in 1989/90 before returning to Mount Sinai Hospital. Her research interests are in the prevention of infection in health care institutions and control of antimicrobial resistance.

Abstract

Background: Antibiotic resistance imposes a significant and increasing burden in Canada, both in terms of patient morbidity and mortality, and medical care costs. Hospitals are a particular focus for antibiotic resistance because of the highly susceptible populations they serve, the infection risk associated with medical/surgical interventions, the frequent need for antibiotic use, and the potential for person-to-person spread of bacteria. All Canadian hospitals have multi-faceted programs for the prevention of infection which include measures to prevent transmission of microbes from person to person within the hospital. Despite our infection control programs, it is clear that person-to-person spread of antimicrobial resistant organisms (AROs) continues in all hospitals in Canada.

The recognition of the burden of illness associated with AROs and the failure of general infection prevention programs to prevent transmission of these organisms has led hospitals to create specific ARO transmission control programs. All hospitals in Canada have at least one of these programs.

In an ideal world, all medical interventions, including prevention programs, would be assessed for their cost-effectiveness in extending patient survival/quality of life, and implemented based on WHO recommendations for cost-effectiveness (expressed as $/QALY or DALY). In addition, we would have specific evidence to inform us about the relative cost-effectiveness of general and organisms specific infection prevention programs. Our continuing disagreement on the relative value of specific ARO control programs stems largely from an absence of data regarding cost-effectiveness. This absence of data occurs because hospitals are part of regional healthcare systems, which are the best unit of analysis in studies comparing control programs, because control programs are multifaceted themselves and thus difficult to standardize and compare, because general and specific programs overlap, and because being multifaceted (or "bundled") is essential: the value of each individual component is small, but the combination may be highly effective.

The components of ARO transmission control programs comprise: hand hygiene, education, screening patients, screening staff, use of additional precautions, use of private rooms, environmental and equipment decontamination, patient and staff cohorting, antimicrobial stewardship, and program evaluation. In this context "screening" refers to laboratory testing that is done to identify patients (or, less commonly, workers) who are colonized but not infected with an ARO.

Screening patients for AROs might be considered for one of two purposes: to evaluate a transmission control program, or to reduce transmission as part of an ARO control program. This presentation will focus only on the latter goal.

Methods/Results: This talk will consider the conditions in which screening may be of value in ARO control programs.

Potentially relevant conditions include: the proportion of the hospital organism reservoir which colonized patients comprise, the relative risk of transmission from colonized as compared to infected patients, the relative effectiveness of standard and additional precautions or standard and private accommodation in preventing transmission from colonized patients, the performance characteristics of available screening programs, and the costs, benefits and adverse consequences of the identification of colonized patients.

Conclusions/Policy Recommendations: Screening to identify patients colonized by an ARO is one common component of ARO transmission control programs. In some circumstances, screening appears to have been essential to the success of transmission control programs. However, it is often difficult to separate the relative value of different components of control programs, and most are measured against imperfect standard programs.

SPEAKERS & ABSTRACTS

Kim Neudorf, RN, BSN, MEd

Patients for Patient Safety Champion (PFPS), Canadian Patient Safety Institute

Kim has been a member of Patients for Patient Safety Canada since 2009. She became a Patient for Patient Safety Champion after her mother was harmed by the health care system. She believes in the importance of the patient voice to help shape safer health care systems and is interested in seeing the highest standard possible practiced at the patient's bedside. Kim was a nurse educator in Saskatchewan for 25 years and maintains her designation as a registered nurse. She has published and presented papers that focus on students and patient safety, and co-presented several times with her mother describing their health care experience.

Abstract

Background: The public is at the heart of the deliberations on antimicrobial resistant organisms (AROs). They can contribute to the joint effort to reduce the prevalence of AROs and improve the patient experience.

Methods: Evidence has been drawn from the literature, review of infection control policies, consumer websites, patients' anecdotal stories and opinions, and correspondence with patient advocates.

Results: There is conflicting evidence describing the definitive benefits of active screening and isolation to reduce healthcare associated infection. However, several best practice guidelines and the patient advocacy groups recommend this approach.

There is a dearth of research that investigates the acceptability of screening to the patient. Patients are largely tolerant of screening and surveillance protocols and accept that carrier identification may be beneficial for their personal healthcare and the safety of others. However, communication about their carriage status and explanations of the causes and consequences is not made clear to the patient.

Through the eyes of patients and families, inconsistencies in infection control practices are noticed. These inconsistencies are evident from research to point of care.

The public is aware of "superbugs," but lack depth in understanding the relationship between antibiotic use and the development AROs, and are generally unaware of the impact antibiotic resistance may have on them personally or on society. The public holds varying beliefs about health and illness--interested primarily in cure and relief of symptoms, but also wanting more information and more involvement in their health care. They have varying beliefs about when an antibiotic is required and the associated responsibilities with its use.

Patient engagement in healthcare leads to safer care and better outcomes. Shared decision making processes, inclusive of decision aids, help to increase confidence and assist patients and caregivers to self-manage common illnesses and use antibiotics appropriately. Involving patients in quality improvement initiatives contributes to improved care processes and patient satisfaction.

Discussion: Screening is a commonly practiced, albeit inconsistent, secondary prevention measure. There is inconsistency in research results, policy, and practice leaving the public vulnerable. When infection prevention measures are substandard, the value of screening becomes questionable. Primary prevention strategies that engage the public in the cautious use of antibiotics have the potential to circumvent the prevalence of AROs.

Conclusions/Policy Recommendations: Screening and isolation are common practices adopted to protect the public. Patient engagement and shared decision making are ethical imperatives at the center of managing this growing public health problem. To improve patient safety and the patient experience and help control AROs in hospitals and communities the following recommended interventions are offered:

1) Improve patient-provider communication
   - Shared decision making-Involve, Inform.
   - Develop health literacy for self-management of common viral illnesses.

2) Involve the public/patient from research to point of care in
   - primary prevention strategies using a community-based multimodal approach to encourage appropriate antibiotic use.
   - quality improvement initiatives to reconcile inconsistencies in infection control and improve the patient experience and make it easy for people to do things right.

SPEAKERS & ABSTRACTS

Lindsay Nicolle, BSc, BSc(med), MD, FRCPC

Professor, Department of Internal Medicine and Medical Microbiology, University of Manitoba

Dr. Lindsay Nicolle is Professor of Internal Medicine and Medical Microbiology at the University of Manitoba and a Consultant in Adult Infectious Diseases at the Health Sciences Centre and Winnipeg Regional Health Authority. She is a past Chair of the Department of Internal Medicine at the University of Manitoba and has contributed to many national and international committees including past chair of the Health Canada Nosocomial Infections Steering Committee from 1994 to 2005, past President of the Canadian Infectious Diseases Society, member of the Board for the Community and Hospital Infection Control Association and the Canadian Society for Clinical Investigation, chair of the Long Term Care Committee and Annual Meeting Planning Committee and secretary of the Society of Health Care Epidemiology of America, and member of the American Society of Microbiology ICAAC Program Planning Committee. She presently chairs the Expert Advisory Committee on Blood Regulation of Health Canada, and is a member of the Canadian Drug Expert Committee. She was the Editor-in-chief of the Canadian Journal of Infectious Diseases and Medical Microbiology for 20 years.
Dr. Nicolle's research interests have been in urinary tract infection, hospital acquired infections, antimicrobial resistance, and infections in the elderly and she has published extensively in these fields. She has contributed to the development of many national and international consensus documents and practice guidelines addressing aspects of infectious diseases and infection control.

Abstract: What Is *Appropriate* Screening For AROs In Various Settings?

ARO screening policies in acute care settings need to address varying circumstances, as well as substantial differences in patient populations. Outbreaks may occur with strains which are more effectively transmitted or have greater morbidity. In the context of an ARO outbreak investigation, screening of potentially colonized or infected patients is an essential component of the response at several levels, including describing the extent of the outbreak, clarifying risk associations, and monitoring the effectiveness of control interventions.

ARO screening and the interventions prompted by a positive screening test may interfere with patient care while providing no benefits. Forpsychiatric in-patient populations the prevalence of AROs appears low and attributable morbidity has not been described in this setting. Barrier interventions may obstruct patient care goals through restricting socialization and limiting participation in group therapy. As behavioral management is problematic for many of these patients, implementation of patient restrictions is disruptive to patient and staff. Patients on rehabilitation units may have a high prevalence of AROs, but new acquisition of AROs by patients on these wards has been reported to be infrequent in limited studies. ARO restrictions may interfere with rehabilitation goals of care. Rehabilitation patients at risk of ARO infection are readily identified by characteristics including the presence of invasive devices, being bedbound, and having pressure ulcers. Practices to limit ARO infection can likely be targeted to identifiable high risk patients. Observations from the VA MRSA initiative report decreased MRSA infections, but not transmission, in acute care spinal cord injury units, but the contribution of ARO screening to outcomes in this program remains unclear.

Long term acute care units provide care to patients who require extended hospitalization following acute illness. In the US, these are often free-standing facilities while in Canada patients may be resident on dedicated wards of acute or long term care facilities. The use of invasive devices and device-associated infection rates in these patients approach those observed in ICU populations, and the ARO prevalence exceeds that observed for most acute care populations. Optimal screening approaches need to consider admission to these facilities, facility stay, and readmissions to an acute care facility. However, the intensity of exposure and high prevalence of risk suggests approaches similar to ICU patients are appropriate to evaluate.

Screening programs should be feasible and beneficial. ARO restrictions in some populations may interfere with patient care leading to a more prolonged length of stay and, potentially, increasing overall prevalence of AROs in a facility. A high standard of routine practices in all acute care facilities, together with continued documentation of evidence of harm (i.e. infections) and effective antimicrobial stewardship should be goals for management.

SPEAKERS & ABSTRACTS

Howard Njoo, MD, MHSc

Director General, Centre for Communicable Diseases & Infection Control, Public Health Agency of Canada (PHAC)

Dr. Howard Njoo is the Director General of the Centre for Communicable Diseases and Infection Control at the Public Health Agency of Canada. In his career as a public health physician, Dr. Njoo has worked in all three levels of government. Previously, he worked at the Public Health Branch of the Ontario Ministry of Health and as the Associate Medical Officer of Health for the City of Toronto Department of Public Health. Dr. Njoo joined the federal government in 1996 as the Director of Tuberculosis Prevention and Control at Health Canada and subsequently worked in a variety of positions, in both chronic and infectious diseases as well as emergency preparedness and response. Dr. Njoo earned his medical degree and a Masters in Health Science, specializing in community health and epidemiology, from the University of Toronto, and has a fellowship in the Royal College of Physicians and Surgeons of Canada in community medicine. Dr. Njoo is a Consultant Physician at the Ottawa Hospital Tuberculosis Clinic, is an Assistant Professor, Department of Medicine, Division of Infectious Diseases, and has an adjunct appointment in the Department of Epidemiology and Community Medicine at the University of Ottawa.

Abstract: Pan-Canadian Response Required to Address Antimicrobial Resistance

Antimicrobial resistance (AMR) is considered a serious and growing global public health threat as it undermines our collective ability to fight infectious diseases. The issue is complex and cuts across a range of jurisdictions, sectors and stakeholders — e.g. all levels of government, the health and agricultural sectors, private industry and the general public. Therefore, in both Canada and around the world, addressing AMR is seen as a shared responsibility.

Under the direction of the federal Minister of Health, the Public Health Agency of Canada, Health Canada, the Canadian Food Inspection Agency (CFIA) and the Canadian Institutes of Health Research undertake various activities which contribute to the overall goal of preventing, limiting and controlling the emergence and spread of antimicrobial resistance in humans, animals and food.

The Public Health Agency of Canada (the Agency) provides national leadership on the public health aspects of antimicrobial resistance. It works with both domestic and international partners in the areas of surveillance, laboratory reference services, management of infectious disease outbreaks, public awareness and the development of public health guidance. The Agency works with its public health counterparts in the provinces and territories through the Public Health Network Council and its Communicable and Infectious Diseases Steering Committee for coherent action to address AMR.

The Agency, supported by CFIA, leads two national surveillance systems to monitor trends in antimicrobial resistance and antimicrobial use in Canada: the Canadian Nosocomial Infection Surveillance Program (CNISP) and the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS). These systems monitor resistance in common hospital infections; community-related foodborne infections; and antibiotic use among humans as well as food-producing animals. Surveillance products assist in identifying trends and assessing the impact of policies and programs. These surveillance data also support decision making at provincial, territorial, and local levels and are valuable for front line practitioners to assist them in limiting the development and spread of antimicrobial-resistant organisms in their day to day practice.

Recognizing that public health is a shared responsibility, the Agency actively collaborates with its provincial and territorial counterparts as well as other key stakeholders to enhance its AMR surveillance activities, increasing access to integrated, timely and reliable surveillance data and information and providing up-to-date reference and analytical services that supports health authorities dealing with infectious disease and foodborne outbreaks.

Working with its partners, the Agency's future efforts to address AMR will be aimed at further strengthening surveillance, increasing the use and uptake of continuously updated guidance, building on previous public awareness campaigns to increase knowledge and behaviour change, and developing new diagnostic tools.

SPEAKERS & ABSTRACTS

David Patrick, MD, FRCPC, MHSc

Professor and Director, School of Population & Public Health, UBC; Medical Epidemiology Lead for AMR and the Do Bugs Need Drugs Project, British Columbia Centre for Disease Control (BCCDC)

Dr. David Patrick is an Infectious Disease Physician and Epidemiologist with posts as Professor and Director of the UBC School of Population and Public Health and as Medical Epidemiology Lead for Antimicrobial Resistance and the Do Bugs Need Drugs Project at the British Columbia Centre for Disease Control. His interest is in fostering interdisciplinary approaches to the control of infectious diseases in populations. Current expressions of this are found in efforts to track and control antimicrobial resistance and the establishment of efforts to understand the emergence and cause of new infectious diseases.

Abstract: How do we decide where to focus surveillance?

Background: Surveillance of antimicrobial resistance (AMR) and antibiotic use (AMU) are addressed to varying degrees internationally. Canada is now taking a fresh look at its own efforts.

Methods: We reviewed previous reports on surveillance, conducted a formal literature review, surveyed Canadian experts and produced a criterion-based evaluation of available systems. We report on existing gaps and provide a number of recommendations about the way forward.

Results: The most comprehensive systems (e.g. EARS-Net) combine the following:

- Population-based human AMU use metrics from communities and hospitals
- AMU metrics by commodity from animal agriculture
- AMR trends from a list of indicator organisms from community and hospital settings;
- Trends in rates of key nosocomial infections
- AMR trends from sampling within agriculture and retail food settings;
- Reference microbiology capabilities to characterize new strains;

In Canada we find some elements in place but many largely missing:

- AMU surveillance is improving thanks to CIPARS/IMS collaboration. Data on population based antibiotic use (over time, by province and by drug class) are becoming available.
- Similar data from the hospital sector has been largely missing, though efforts by CIPARS and CNISP may help to fill this gap over the next yea.
- There are comparatively few data available on AMU in agriculture or companion animal practice.
- AMR surveillance from hospitals benefits from CNIS output. The focus has been on illness or colonization event surveillance for a discrete list of strains (e.g. MRSA, VRE, C. difficile, ESBLs).
- There are ongoing discussions about the potential for broader isolate-based surveillance that would track trends in resistance for a large list of organisms.
- There is a fairly large gap in representative, population-based data on trends in resistance in community based infections. The data exist at laboratory level and there is much potential in the analysis of aggregated laboratory data.
- AMR surveillance in agriculture and companion animal practice has limited coverage. Exceptions include focused surveillance on a few enteric organisms.

Discussion Lead recommendations from our report include:

1. Establishing a nationally coordinated program of surveillance. PHAC cannot do this alone but can provide conceptual oversight, surveillance standardization and work toward a comprehensive national annual report.
2. Make sure that our strongest assets (CNISP/CIPARS, NML) have secure funding as the nucleus of future federal activity
3. Work with individual lab networks toward a system of susceptibility data warehousing or reporting that allows for much broader inference about the burden of illness at population level.
4. Work at hospital, health authority, provincial and national levels toward better hospital utilization data directly linked to stewardship programs
5. Integrate annual reports of findings in the human and agricultural sectors

6. Close the loop by funding research through CIHR and funding public and professional education programs to support more logical use of antibiotics.

Conclusions: Surveillance reports should be seen as information for action that must be produced and disseminated in a timely fashion. We will not fare well in reducing the burden of antimicrobial resistance if we cannot measure where we are.

Eli Perencevich, MD, MS

Professor, Internal Medicine – General Internal Medicine and Epidemiology, University of Iowa Carver College of Medicine

Dr. Eli Perencevich is a tenured Professor of Internal Medicine and Epidemiology at the University of Iowa Carver College of Medicine as well as the Director of the Center for Comprehensive Access & Delivery Research and Evaluation (CADRE) at the Iowa City VA Medical Center. He was recently named Senior Associate for Infection Control Studies for the VA Office of Public Health National Center for Occupational Health and Infection Control (COHIC). Dr. Perencevich is an infectious disease physician and epidemiologist with over 15 years experience studying the epidemiology and outcomes of hospital-acquired infections using mathematical models, large administrative databases and multicenter clinical trials. He has significant experience studying the comparative effectiveness of infectious disease treatment and prevention strategies and has received continuous funding through VA HSR&D since 2002. Recent funding includes a VA IIR studying the comparative effectiveness of methods for controlling MRSA and a VA IIR assessing optimal methods for tracking hand-hygiene compliance and feeding back hand-hygiene compliance to healthcare workers. Currently Dr. Perencevich is the Project Director and PI of a 10-site, VA-funded CREATE grant. He oversees all four projects under this grant, which each aim to examine a number of approaches to MRSA prevention and eradication within VA.

Abstract: Outlining a Framework of Antimicrobial Resistant Bacterial Surveillance Studies

Antimicrobial resistant bacterial infections have recently received significant attention. Despite work focused on elucidating the epidemiology and poor outcomes associated with such infections, success in hindering their emergence remains elusive. Importantly, the evidence base on which potential infection-prevention surveillance systems and programs must be built is limited because few of the necessary clinical studies have been completed. Conducting such studies is constrained by the perceived difficulty of completing the necessary studies and limited funding available for assessing prevention interventions.

To effectively protect patients, rigorous studies must determine the comparative effectiveness of competing surveillance and prevention interventions. Thus, scientists and public health officials need to recognize the strengths and limitations of the epidemiological study designs that could be used to answer these critical questions. Additionally, initial investments must be made to establish the infrastructure necessary to complete such studies efficiently and cost-effectively. This talk will (a) outline the infrastructure necessary to complete studies seeking to detect and prevent antimicrobial resistant bacterial infections and (b) discuss three complementary methods for comparative effectiveness research in infection prevention: cluster randomized trials, quasi-experimental studies, and mathematical models. Attention will be focused primarily on designing and supporting high-quality quasi-experimental studies.

SPEAKERS & ABSTRACTS

Trish Perl, MD, MSc

Senior Epidemiologist, John Hopkins Health System; Professor of Medicine, Johns Hopkins University

Dr. Perl is a Professor in the Departments of Medicine (Infectious Diseases) and Pathology at Johns Hopkins University School of Medicine in Baltimore, Maryland, and in the Department of Epidemiology at the Johns Hopkins Bloomberg School of Public Health. She is Senior Epidemiologist for The Johns Hopkins Medicine. Dr. Perl received her Bachelor of Arts and medical degree from the University of North Carolina at Chapel Hill and a Master of Science degree from McGill University in Montreal, Canada. She completed a residency in internal medicine and a fellowship in infectious diseases and clinical epidemiology at the University of Iowa in Iowa City, Iowa. She has extensive practical and research experience in the field of healthcare associated infections and resistant and epidemiologically significant organisms and is world renowned for her innovation and research in the field and the use of research knowledge in the healthcare setting. Dr. Perl is the former President of the Society of Hospital Epidemiologists of America (SHEA) and has served on advisory panels for the IOM, the CDC and WHO and been a consultant to the NIH and ARHQ. She was the Courage Fund Visiting Professor in 2008-10. An active researcher, Dr. Perl has been a principal and co-principal investigator multiple studies funded by the CDC, the Veteran's Affairs Administration over the years. She has authored or coauthored over 200 peer-reviewed articles. In addition, she has written multiple chapters and contributed to guidelines and policies relevant to healthcare associated infections at the institutional, state and federal level.

SPEAKERS & ABSTRACTS

Pilar Ramon-Pardo, MD, PhD

Regional Advisor, PAHO/WHO, Washington DC

Pilar Ramon-Pardo is the Regional Advisor on Clinical Management of Infectious Diseases and Antimicrobial Resistance Surveillance at the Pan American Health Organization (PAHO), WHO's Regional Office for the Americas. She holds a Ph.D. in Medicine from the Universidad Complutense, Madrid. She worked as clinical practitioner in a tertiary hospital for almost ten years. After, she moved to the public health arena working for HIV and TB programs in Africa, Asia and Latin America. Currently, she is responsible for planning, programming and implementing regional strategies to support countries to carry out and scale-up national responses, specifically in antimicrobial resistance surveillance and infection control.

Abstract: AROs, from a global perspective.

Background: Trends in antibiotic resistance and their consequences for health, welfare and the economy are rapidly changing. The foreseen decline in antibiotic effectiveness explains the needs for data to inform the global public health agenda about the magnitude and evolution of antibiotic resistance as a serious threat to human health and development. Opportunistic bacterial pathogens are the cause of the majority of community and hospital-acquired infections worldwide. This global report responds at the urgent need for data on the present situation and burden of antimicrobial resistance, particularly for bacteria causing common infections.

Methods: The report describes antibacterial resistance (ABR) surveillance from a global perspective, presents national or published data on resistance in seven defined bacteria of public health importance, includes systematic reviews of the evidence of the burden of resistance in five bacteria resistance combinations, and addresses where the gaps in knowledge and surveillance are. These seven bacteria (E. coli, K. pneumoniae, S. aureus, S pneumoniae, nontyphoidal Salmonella, Shigella species and N. gonorrhoeae) were chosen on the basis that they have great public health impact.

Results: 129 countries responded of which 114 returned at least some data on at least one of the 9 requested bacteria–antibacterial drug combinations. E. coli and K.pneumoniae have high levels of resistance to 3rd generation cephalosporins. High resistance to fluoroquionolones in E. coli is also reported from most parts of the world. Carbapenem resistance in K. pneumoniae has already spread to all parts of the world. S. aureus is a common colonizer of the skin. MRSA was initially a major concern in hospital-acquired infections, but is now also of growing concern in the community. In the community, reduced susceptibility to penicillin in S. pneumonia is reported from all parts of the world. Older and cheaper antibacterial medicines are no longer effective in treatment of gonorrhoea and 3rd generation cephalosporins are the last resort for treatment.

Discussion: There was a statistically significant increased risk for patients infected with a resistant strain to die from the infection in all but two combinations where there was not enough data. The additional risk to die was about 2-fold for infections with the resistant Gram-negative bacteria, and more than 50% higher for MRSA infections. For infections caused by E. coli resistant to fluoroquionolones, K. pneumoniae resistant to 3rd generation cephalosporins and S. aureus resistant to methicillin, there was also an increased risk for progresstion to septic shock and/or admission to intensive care unit. Excess costs were higher for infections caused by resistant strains. For E. coli, hospital costs were about 1.6-3 times higher in infections caused by strains resistant, as opposed to sensitive, to 3rd generation cephalosporins.

Conclusions/Policy Recommendations:

- High proportions of ABR to common treatments were reported in bacteria causing common infections in both healthcare settings and in the community in all parts of the world
- Antibacterial resistance has a negative effect on patient outcomes and increases health expenditures
- Treatment options for common infections are running out
- Despite limitations, the report demonstrates worldwide magnitude of ABR and gaps in surveillance

SPEAKERS & ABSTRACTS

Andrew Simor, MD, FRCPC

Chief, Department of Microbiology; Chief, Division of Infectious Diseases, Sunnybrook Health Sciences Centre; Senior Scientist, Sunnybrook Research Institute; Professor, Departments of Laboratory Medicine & Pathobiology and Medicine, University of Toronto

Dr. Simor graduated with a medical degree from the University of Toronto in 1976, and completed Royal College fellowship training in internal medicine, infectious diseases, and medical microbiology. He has worked at Sunnybrook Health Sciences Centre since 1993. Dr. Simor is recognized nationally and internationally as a leader in the field of hospital epidemiology. He has received research funding from peer-reviewed and industry-based granting agencies. He has published a large number of papers in scientific journals, and he is on the Editorial Board of the journal, Infection Control and Hospital Epidemiology, and is an Associate Editor for the Canadian Journal of Infectious Diseases and Medical Microbiology. His primary research interests include: antimicrobial resistance, hospital-acquired infections, and the application of molecular technologies to the diagnosis and management of infectious diseases. Dr. Simor has received several teaching award from the university, and in 2005 was selected to receive the Distinguished Service Award from the university's Department of Laboratory Medicine & Pathobiology. He has also received a CHICA-Canada Award of Merit for service in the advancement of infection prevention and control.

Abstract: Surveillance for Antibiotic Resistant Organisms in Canadian Hospitals

Background: Surveillance for antibiotic resistant organisms (AROs) in Canada may be done at the regional, provincial, or national level. This presentation reviews provincial and national surveillance initiatives that are in place for AROs in hospitalized patients in Canada.

Methods: Provincial and national surveillance programs for human AROs were reviewed.

Results: All provinces conduct surveillance for AROs, but the surveillance objectives, methods, protocols, and requirements for public reporting are highly variable. The data received by the provinces are generally not audited for accuracy, and the results are not risk-adjusted. There are a few national surveillance systems in place. The Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) focuses on surveillance in the agri-food sector, but also conducts surveillance of antibiotic resistance in human Salmonella isolates. The Canadian Antimicrobial Resistance Alliance (CARA) determines antimicrobial resistance profiles in human clinical isolates obtained from a limited convenience sample of participating hospitals, but has no corresponding clinical or epidemiologic information. The only national surveillance system that includes a large and fairly representative sample of hospitals, and is able to provide clinical/epidemiologic data corresponding to ARO isolates is the Canadian Nosocomial Infection Surveillance Program (CNISP). This program has been conducting surveillance for methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant Enterococcus (VRE), C. difficile infection, and carbapenem-resistant Enterobacteriaceae (CRE) in hospitalized patients since 1995. In 2012, the incidence of MRSA, VRE, and CRE per 1,000 admissions was 8.8, 7.5, and 0.2 respectively. Most of these patients were colonized with these AROs; only a small proportion was infected. The healthcare-associated C. difficile infection rate in 2012 was 4.8/1,000 admissions. Changes over time and regional variations in these ARO rates were observed.

Discussion/Conclusions: Provincial surveillance for AROs in Canada is currently fragmented, uncoordinated, and unable to provide results that can be aggregated or compared. CNISP is a collaborative network of hospitals, with good geographic representation across the country, working with the Public Health Agency of Canada (PHAC) and the National Microbiology Laboratory (NML) to provide accurate and comprehensive national ARO surveillance data, as well as regional surveillance results. CNISP also has the unique ability to link epidemiologic and laboratory databases. In the past decade, CNISP results have been used to "benchmark" hospital ARO rates, to alert healthcare facilities and government agencies about emerging ARO trends, and to influence changes in infection prevention and control practices.

SPEAKERS & ABSTRACTS

James Talbot, PhD, MD, FRCPC

Chief Medical Officer of Health, Alberta Health, Edmonton

On June 18, 2012, Dr. James Talbot was appointed Chief Medical Officer of Health (CMOH) for the province of Alberta. The CMOH acts on behalf of the Minister of Health to monitor the health of Albertans and to make recommendations to the Minister and Alberta Health Services on measures to protect and promote the health of the public and to prevent disease and injury. The CMOH plays a key role in advising on the need for legislation, policies and practices affecting public health. Prior to this appointment, Dr. Talbot served as Senior Provincial Medical Officer of Health for Alberta where his main responsibilities were in strategic planning and development of surveillance, health assessment and special projects. Dr. Talbot has a B.Sc. degree, PhD in biochemistry and an M.D. from the University of Toronto. He is a Royal College of Physicians and Surgeons specialist in medical microbiology, for which he received additional training at the University of California in San Diego. He has worked in public health since 1991, with posts as Director of the Provincial Laboratory for Northern Alberta, Chief Medical Officer for Nunavut and Associate Medical Officer of Health for Capital Health and Alberta Health Services since 2004. Dr. Talbot has most recently served as Medical Director for the Alberta Real-Time Surveillance Syndromic Surveillance Net, a surveillance system he helped create to monitor and act on emerging infections and injuries. Dr. Talbot is also an Associate Professor in the School of Public Health and the Faculty of Medicine at the University of Alberta.

Abstract: Why should we conduct surveillance

Background: Surveillance of antimicrobial resistance and antibiotic use is primarily of importance to Ministries of Health for planning and policy purposes. As antibiotic resistant organisms evolve surveillance is essential to; guide provincial strategies and operations of the health care system, increase prevention activities, minimize risk to citizens, and efficiently use health care resources.

Methods: A review of ministry of health activities, briefing notes and strategies relevant to antimicrobial resistance and use was conducted. We report on why we conduct surveillance, what we do with the results, and whether we are meeting our objectives.

Results: Surveillance main purpose is to guide actions. With antibiotic resistance, these actions include, detection and identification of antibiotic resistant organisms residing or being introduced into the province, detection of clusters or ongoing transmission, evaluating the success of prevention or control measures, determining conditions that may stimulate or decrease the development of antimicrobial resistance, providing quantitative estimates of the magnitude and impact of ARO's.

Discussion: Surveillance information is necessary to guide numerous provincial policies. These can and have included; hospital design and construction (how many hand washing sinks, where etc.), professional competence (adherence to infection control protocols), veterinary and physician standard of practice (overprescribing of antibiotics), emergency department and hospital screening (NDM-1 screening in patients who have been in or are being transferred from hospitals in countries known to be high incidence.) provincial and federal legislation and regulations (allowing antibiotics to be imported for personal use.), patient safety (increased length of stay, poorer outcomes), agricultural standards, regulations and practices, (international agreements forbidding antibiotic in products, use of antibiotics to prevent disease in intensive livestock operations, organic practices) and many others.

Conclusions: The surveillance conducted relative to infection prevention and control in acute care and continuing care settings (patient safety, reducing health care costs) is relatively comprehensive and responsive but would still benefit from increased standardization and innovation. However that related to reducing the creation of antibiotic resistance due to human and animal use of antibiotics (antibiotic stewardship) is still complicated, fragmented and conducted with fewer resources.

SPEAKERS & ABSTRACTS

Henri A. Verbrugh, MD, PhD, FIDSA

Professor and Chair, Department of Medical Microbiology and Infectious Diseases, Erasmus University Medical Center, Rotterdam, The Netherlands

Following his MD degree from Erasmus University, Dr. Henri Alexander Verbrugh was trained as a Clinical Microbiologist at and received his PhD degree from the University of Utrecht, The Netherlands. He subsequently spent two years as a NIH Fogarty International Fellow at the University of Minnesota, where he collaborated with Professor Paul Quie and Dr. Phil Peterson on the pathogenesis of Staphylococcus aureus infection. In 1993, he was appointed to his current position at the Erasmus University Medical Center, Rotterdam, The Netherlands, where he also became director of the fellowship program for medical microbiology. He has remained involved in research regarding staphylococci and staphylococcal infections with an emphasis on nosocomial infections and antimicrobial resistance. He (co)authored over 425 peer reviewed papers, contributed to books and supervised 50 PhD fellows during his tenure. In 1989, he instigated the Dutch national surveillance system for hospital-acquired infection (PREZIES). He was cofounder of the Dutch national Working Party on Infection Prevention (WIP) and the Dutch national Working Party on Antibiotic Policies (SWAB). For this work he received the 2008 Leadership Award from the Alliance for Prudent Use of Antibiotics (APUA). He also served as the first president of the Dutch Society of Medical Microbiology and represented the society at the European level (ESCMID and UEMS). He currently is a member of the Presidium of the Dutch Health Council that provides science-based advice to the Government on all major issues in health and health care, including issues pertaining to antimicrobial resistance emergence.

Abstract: Should we screen for AROs? Pro versus Con.

Backgrounds: AROs are moving targets that originate from a wide range of sources among human and animal populations and from environmental niches. AROs are transmitted world wide through various routes including food chains and business class air travel. Local expansion of clones of AROs is due to selection by exposure to antimicrobial agents under epidemic-permissive conditions. General preventive measures, including hand hygiene, alone are not sufficient. They clearly failed to prevent, let alone redress, the MRSA pandemic, active screening of populations and environments was needed for effective MRSA control (search & destroy policy). Without ARO screening most ARO trafficking in and out of the hospitals will remain undetected, only by clinical infection some AROs will show in diagnostic cultures.

Recommendations: ARO control should be conceptually dynamic and include general preventive action (classical hygiene) as well as targeted interventions, including screening. Screening for AROs is indicated to uncover and monitor sources and transmission routes not made evident by routine diagnostic cultures in human health, animal health or environmental care settings. ARO screening is also indicated to prevent unnoticed introduction of AROs in settings in need to remain free of ARO because they may cause serious infection in that setting (e.g. hospitals). ARO screening, either by phenotypic or by genotypic means, is rather costly and should yield actionable information, directly or indirectly. The (cost)-efficacy of ARO screening strategies critically depends on the effectiveness of the preventive measures taken when a carrier or niche of an ARO is detected. Currently, many countries, including the Netherlands, recommend selective screening of patients for MRSA, VRE, PNSP, MDR-Enterobacteriaceae, -Pseudomonas aeruginosa, -Acinetobacter baumanii and -Mycobacterium tuberculosis on the basis of patient risk profiling at the time of their admission to hospitals. ARO-suspected and ARO-positive patients are isolated. Profiling is based on locally identified risk factors. E.g., refugees immigrating into the Netherlands are screened for M.tuberculosis, a public health measure that has prevented (MDR-)tuberculosis from (re) gaining a foothold in the Netherlands. Risk profiles are updated as new information about ARO sources and transmission routes becomes available. Recently, employment as merchant fleet sailor has been added to the list of risk factors for MRS carriage. Likely, recent international travel to certain geographical areas of the world, including the Middle East and the Far East will be added to the risk list. Up to 80% of healthy travelers to that region of the world carry ESBL positive Gram-negative bacilli in their gut when they return home. Usually they report no exposure to medical facilities in the country they visited. Spontaneous loss of intestinal ESBL positive strains does occur but may take many months. Over 1 billion persons engage in international leisure travel each year, thus a sizable proportion of those admitted to hospital will have a history of international travel in the preceding year. In ARO outbreaks screening is also crucial for control, and usually needs to include patients, health care workers and environmental niches in contact with the index case.

SPEAKERS & ABSTRACTS

Bob Weinstein, MD

Chairman, Department of Medicine, Cook County Health and Hospitals System; Chief Operating Officer, Ruth M. Rothstein CORE Center for the Prevention, Care, and Research of Infectious Diseases; C. Anderson Hedberg MD Professor of Internal Medicine, Rush University Medical Center, Chicago

Dr. Weinstein is Chairman, Department of Medicine, Cook County Health and Hospitals System (formerly Cook County Hospital); Chief Operating Officer, Ruth M. Rothstein CORE Center for the Prevention, Care, and Research of Infectious Diseases; and the C. Anderson Hedberg MD Professor of Internal Medicine, Rush University Medical Center – all in Chicago IL USA. Dr. Weinstein attended Cornell University and Cornell University Medical College; was a medical house officer at Barnes Hospital; and trained in Infectious Diseases and Epidemiology in the CDC's EIS Program and at the University of Chicago. Dr. Weinstein's clinical and research interests focus on healthcare-acquired infections (particularly the epidemiology, costs, microbiome, and prevention of antimicrobial resistance and infections in intensive care units), rapid HIV testing, and healthcare costs and outcomes for patients with HIV/AIDS. Dr. Weinstein is a past-president of the Society for Healthcare Epidemiology of America (SHEA), a past-chair of the CDC's Healthcare Infection Control Practices Advisory Committee (HICPAC), and a past member of the IDSA Board of Directors. Dr. Weinstein currently serves on the CDC's National Center for Infectious Disease Board of Scientific Counselors and as Chair of that Board's Antimicrobial Resistance Working Group. He was a recipient of the National Association of Public Hospitals and Health Systems 1999 Clinical Research Award, the 2005 recipient of the SHEA Lectureship Award, and the 2008 recipient of the SHEA Mentor Award, and was honored with a Lifetime Achievement Award from the CDC in 2010, the Infectious Disease Society of America Walter Stamm Mentor Award in 2012, and the IDSA Joseph Smadel Named Lecture in 2014. Dr. Weinstein has published over 300 peer-reviewed scientific articles, over 50 book chapters, 2 books, and over 25 CDs and internet educational materials. And he is mostly a nice guy.

Abstract: What can we learn from other jurisdictions?

Background: The impact of public reporting on control of antibiotic resistant organisms (AROs) is key in light of dwindling antibiotic pipelines and increasing global ARO rates. Lessons to be learned from other jurisdictions include varying focus on AROs, types/uses of reporting, and practical experience with ARO-reporting. AROs of concern vary over time and space. For two-plus decades, gram positive bacteria – methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant Enterococci (VRE) and increasingly Clostridium difficile – have been great concerns. More recently, ARO gram-negative bacilli, including producers of extended-spectrum beta-lactamases (ESBLs), metallo-beta-lactamases, and carbapenem-modifying enzymes, have become concerns.

Results/Key Data: Like politics, all resistance is local; however, the globe is shrinking. In addition, there is a marked "resistance iceberg"; for every patient recognized to be ARO-colonized or infected, there are 3-10+ unrecognized carriers. The early spread of AROs often involves long-term care facilities, which in the 1990s were foci for spread of ESBL-containing Klebsiella and E. coli and in the 2000s for spread of VRE. Now, carbapenem-resistant Enterobacteriaceae (CRE) are spreading in long-term acute care hospitals (LTACHs), the nursing home equivalents of ICUs. In Chicago, surveys showed a nine-fold higher prevalence of CRE in LTACHs compared to acute care hospital ICUs. In LTACHs, CRE "colonization pressure" (number of patients colonized and sources of ARO transmission) has become a major variable affecting spread. Public reporting can focus on healthcare-associated infections (HAIs), e.g., bloodstream infections, AROs from clinical isolates, or AROs from active surveillance testing (AST). Reports can be used for trending rates (usually effective), for directing and evaluating interventions (usually effective), or for inter-facility comparisons (problematic/not recommended). In the USA, state-mandated reporting of HAIs has prompted improvements in local rates and provides national data for tracking HAIs and AROs. Reporting of MRSA is required in ~15 states; some of which have mandatory MRSA AST. A regional evaluation of the effectiveness of VRE AST and reporting almost two decades ago showed that when VRE colonization pressure was very low, rates could be further lowered by AST, reporting, and interventions. However, experience with regional mandates for MRSA AST has been less successful. Currently, ~18 states require CRE reporting to improve control; however, CRE resistance icebergs and colonization pressure may make reporting alone insufficient, and CRE controlmay require active interventions, such as chlorhexidine patient bathing. In considering public reporting, information needs vary by stakeholder, e.g., clinicians need phenotype data (antimicrobial susceptibilities) while infection control and public health also need genotype (resistance

mechanism) data. In Illinois, an XDRO (extremely ARO) registry was created to allow hospitals to electronically report and query patient-level CRE resistance.

Conclusions/Recommendations: All resistance is local but not for long. Public reporting of HAIs provides trending data and drives hospital-level improvement. Reporting surveillance culture data may be useful when directed at emerging pathogens, e.g., CRE in some locales, and is particularly useful depending on the ARO epidemiology, e.g., directed at long-term care epicenters. To be effective, reporting must be used in conjunction with interventions.

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