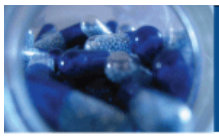

Ontario Antimicrobial Stewardship Project

Consensus Conference on Priority Interventions for Ontario Hospitals

Final Report

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Panacea Canada Inc
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Contents

Acknowledgement

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Panacea Canada Inc. was commissioned to facilitate the two-day conference and to author a report summarizing the proceedings, based on the work of the project team and ISMP Canada.

Executive Summary

This Consensus Conference of the Ontario Antimicrobial Stewardship Project was spearheaded by the Institute for Safe Medication Practices Canada (ISMP Canada) and funded by the Ontario Ministry of Health and Long-Term Care and the Ontario Agency for Health Protection and Promotion. The conference built on the results of ISMP Canada's survey of Ontario hospitals to determine the current state of hospital-based antimicrobial stewardship practices in Ontario. Expert speakers and conference delegates focused on identifying priority interventions and considerations in their successful implementation.

There was broad consensus that the Ontario Antimicrobial Stewardship Project should proceed to a pilot phase that considers the following priority interventions in its design. These interventions are not listed in any particular order:

- Implementation of Antimicrobial Stewardship Programs at the hospital level
- Antimicrobial Stewardship Activities Scorecard
- Prospective audit with intervention and feedback at an individual patient and prescriber level
- Education/training needed to build Antimicrobial Stewardship capacity
- Data collection and feedback at an institutional or program level
- Tailoring antimicrobial therapy including de-escalation, streamlining and IV to PO switches.

Participants agreed that antimicrobial stewardship interventions are needed at local, regional and provincial levels, and that hospitals should implement antimicrobial stewardship programs rather than committees, or a hodge-podge of interventions. Policy to guide these programs is needed at local, regional and provincial levels.

There was agreement that community antimicrobial use has a direct influence on antimicrobial use in hospitals, and that stewardship programs need to be designed to take this into account.

There was consensus that dedicated human resources are needed to guide implementation at local, regional and provincial levels. These would include administrative and clinical champions, content experts and core contact people. To support and sustain the programs, human resource planning must also take into account the local and regional availability of an appropriate mix of expertise, including infectious diseases physicians and pharmacists.

Participants pointed to the critical need for effective, accessible and ongoing education and training. This includes education to raise and maintain awareness across institutions, regions and the province. It also includes training to assure core knowledge required for effective antimicrobial stewardship. There was consensus here on the need for ongoing credentialing and certification to assure quality and sustainability.

Timely access to high quality data is critical to effective stewardship programs and requires effective Information technology support at local levels. At a provincial and regional level, a central data repository would assist in implementation, measurement and evaluation. It would also support the uptake and sustainability of the program.

Measurement was highlighted as a key component of antimicrobial stewardship programs, along with adequate staff with expertise to assess, interpret and summarise the data. Individual institutions need to define baseline performance and measure progress against predetermined criteria. Measuring the province-

wide impact of antimicrobial stewardship was also highlighted. There was agreement that antimicrobial use measurement needs to become a priority. A consensus group should be established to examine how best to measure and report antimicrobial use in Ontario. There was also agreement that development and implementation of an antimicrobial stewardship scorecard would be valuable in assessing overall progress in individual hospitals, regions and the province. Criteria for measurement and evaluation should be developed from literature standards. Participants agreed on the value of hospital comparisons to aggregate data and there was discussion around whether reporting of performance through the scorecard should be on a mandatory or volunteer basis.

There was also agreement that implementing antimicrobial stewardship programs and initiatives is a change management process. Expertise in change management at local, regional and provincial levels would facilitate effective program implementation.

Participants agreed on the need for a template business case to enhance local uptake as well as a comprehensive marketing strategy to support the implementation of antimicrobial stewardship programs and initiatives. Participants identified key stakeholders and suggested a number of messages and strategies to support uptake of these programs.

In order to build sustainable programs, early interventions have to be successful and demonstrate substantial impact. Sustainability also hinges on effective ongoing communication of results and long-term program funding of dedicated resources.

Key Messages

Key messages from the consensus conference included the following:

1. Antimicrobial Stewardship Programs are first and foremost patient safety and quality of care initiatives.

2. Antimicrobial Stewardship programs and interventions are needed at provincial, regional and local levels.

3. Antimicrobial Stewardship Programs should be an Accreditation Canada requirement.

4. Ontario has a responsibility to contribute to solutions to antimicrobial resistance, which has been indentified as the World Health Organization's number three patient safety challenge.

5. Dedicated and sustained resources will be required to implement Antimicrobial Stewardship Programs at all levels in Ontario, including human resources, information technology, education and training, measurement capability and a comprehensive marketing strategy.

6. There are networks, resources and sources of expertise in Ontario that can support the effective implementation of Antimicrobial Stewardship Programs.

7. In addition to improving patient safety and quality of care, Antimicrobial Stewardship Programs are cost effective across the health care system.

Recommendations

Recommendations are summarized below, according to stakeholder group:

Ontario Agency for Health Protection and Promotion

1. Collaborate with Ontario MOHLTC to fund the pilot antimicrobial stewardship project in Ontario, for completion in 2011.
2. Collaborate with Ontario MOHLTC to allocate long-term program funding of dedicated resources including human resources, information technology, education and training, measurement capability and a comprehensive marketing strategy.
3. Collaborate with ISMP Canada to establish a consensus group on measurement and reporting of antimicrobial use in Ontario.
4. Develop Policy to guide Antimicrobial Stewardship in Ontario.
5. Collaborate with ISMP Canada and Ontario MOHLTC to develop a central data repository that would assist in implementation, measurement and evaluation of Antimicrobial Stewardship Programs across Ontario.

Ontario Ministry of Health and Long-Term Care

1. Collaborate with OAHPP to fund the pilot antimicrobial stewardship project in Ontario for completion in 2011.
2. Collaborate with OAHPP to allocate long-term program funding of dedicated resources including human resources, information technology, education and training, measurement capability and a comprehensive marketing strategy.
3. Develop Policy to guide Antimicrobial Stewardship in Ontario.
4. Collaborate with ISMP Canada and OAHPP to develop a central data repository that would assist in implementation, measurement and evaluation of Antimicrobial Stewardship Programs across Ontario, as well as uptake and sustainability of the program.
5. Facilitate health human resource planning to take into account the local and regional availability of an appropriate mix of expertise, including infectious diseases physicians and pharmacists, pharmacists familiar with the monitoring and measuring of antimicrobial use, information technology personnel, administrative and clinical champions, content experts and core contact people.
6. Facilitate the implementation of an antimicrobial stewardship scorecard to assess overall progress in individual hospitals, regions and the province.
7. Advocate for the inclusion of Antimicrobial Stewardship Programs in Accreditation Canada standards.
8. Engage expertise in change management to facilitate implementation of Antimicrobial Stewardship Programs at local, regional and provincial levels.
9. Implement a comprehensive marketing strategy to support uptake of Antimicrobial Stewardship Programs across Ontario.
10. Facilitate the implementation of province-wide IT standards to support the measurement of Antimicrobial Stewardship Programs.
11. Facilitate the development of education and training programs as described in these Proceedings.
12. Facilitate the development of tools for regions and hospitals as described in these Proceedings.

Local Health Integration Networks

1. Allocate funding to facilitate development of regional Antimicrobial Stewardship Programs.
2. Develop policy to guide Antimicrobial Stewardship Programs at regional levels.
3. Identify and support local and regional champions.
4. Ensure that community antimicrobial use is included in regional Antimicrobial Stewardship Programs.
5. Ensure that regional human resource planning takes into account the local and regional availability of an appropriate mix of expertise, including infectious diseases physicians and pharmacists, pharmacists familiar with the monitoring and measuring of antimicrobial use, information technology personnel, administrative and clinical champions, content experts and core contact people. Also needed is support for training and education so that it doesn't compromise existing services.
6. Collaborate in the development of a central data repository that would assist in implementation, measurement and evaluation as well as the uptake and sustainability of the program.
7. Support the implementation of an antimicrobial stewardship scorecard to assess overall progress in individual hospitals, regions and the province.
8. Engage expertise in change management at the regional level to support the uptake of Antimicrobial Stewardship Programs.
9. Facilitate the availability of template business cases to enhance local uptake.
10. Implement a comprehensive marketing strategy to support the implementation of Antimicrobial Stewardship Programs and initiatives.
11. Facilitate effective ongoing communication of results within the region and with provincial counterparts.
12. Support the development of Provincial IT standards to support Antimicrobial Stewardship Programs.
13. Facilitate networking within the region to share strategies, tools and results.
14. Support regional educational initiatives as described in these Proceedings.
13. Support the development and facilitate availability of tools for regions and hospitals as described in these Proceedings.

ISMP Canada

1. Collaborate with provincial and regional stakeholders to develop and disseminate tool kits that include program start-up kits, a central website for sharing data, tools, strategies, frequently asked questions, educational modules and data collection modules.
2. Collaborate with OAHPP and Ontario MOHLTC to establish a consensus group on measurement and reporting of antimicrobial use in Ontario.
3. Collaborate with OAHPP and Ontario MOHLTC to develop a central data repository that would assist in implementation, measurement and evaluation of Antimicrobial Stewardship Programs across Ontario.
4. Develop an antimicrobial stewardship scorecard to be used in assessing overall progress in individual hospitals, regions and the province.
5. Advocate for the inclusion of Antimicrobial Stewardship Programs in Accreditation Canada Standards.
6. Collaborate with provincial and regional stakeholders to facilitate the effective ongoing communication of results .

7. Collaborate with provincial and regional stakeholders to facilitate the development and growth of Communities of Practice in Antimicrobial stewardship.

Associations

Canadian Society of Hospital Pharmacists, Ontario Hospital Association, Canadian Committee on Antibiotic Resistance, Association of Medical Microbiology and Infectious Disease Canada, Provincial Infectious Disease Advisory Committee, Community and Hospital Infection Control Association

1. Include antimicrobial stewardship in upcoming educational events.
2. Work with provincial and regional stakeholders to develop policy to guide Antimicrobial Stewardship Programs.
3. Work with provincial and regional stakeholders to develop and implement ongoing education and training as described in these Proceedings.
4. Advocate for the inclusion of Antimicrobial Stewardship Programs in Accreditation Canada Standards.
5. Develop and support Communities of Practice in Antimicrobial Stewardship Programs.
6. Work with provincial and regional stakeholders to develop a central repository for tools, strategies and results.
7. Work with provincial and regional stakeholders to develop and disseminate tool kits that include program start-up kits, a central website for sharing data, tools, strategies, frequently asked questions, educational modules and data collection modules.

Hospitals

1. Develop hospital policy to guide the antimicrobial stewardship program.
2. Identify administrative and clinical champions.
3. Establish an Antimicrobial Stewardship Program starting with a business case submitted by Pharmacy and/or Infectious Diseases Services.
4. Allocate long-term program funding of dedicated resources including human resources, information technology, education and training, measurement capability and a comprehensive marketing strategy.
5. Allocate funding for human resources that include administrative and clinical champions, content experts and an appropriate mix of expertise, including infectious disease physicians and pharmacists, pharmacists familiar with the monitoring and measuring of antimicrobial use, and information technology personnel.
6. Allocate funding for education and training so that it doesn't compromise existing services.
7. Allocate Information technology supports described in these proceedings.
8. Contribute to a central data repository that will assist in implementation, measurement and evaluation of Antimicrobial Stewardship Programs as well as their uptake and sustainability.
9. Advocate for the inclusion of Antimicrobial Stewardship Programs in Accreditation Canada Standards.
10. Include expertise in change management in the development and implementation of the hospital's Antimicrobial Stewardship Program.
11. Implement a comprehensive marketing strategy to support the implementation of Antimicrobial Stewardship Programs and initiatives using strategies included in these Proceedings.
12. Ensure effective ongoing communication of results with internal and external stakeholders.
13. Participate in regional, provincial and national Communities of Practice.

14. Advocate for Provincial IT Standards to support Antimicrobial Stewardship Programs.
15. Participate in regional and provincial education programs as described in these Proceedings.

Universities

1. Add the teaching of the basic principles of prudent antimicrobial use to curricula in health sciences faculties, together with the basics of antimicrobial drug pharmacology and prescribing.
2. Undertake research on how to measure antimicrobial use and facilitate benchmarking of antibiotic use among hospitals.
3. Undertake research to better understand the relationship between antimicrobial use and resistance, and the interaction between infection control and antimicrobial stewardship.

Introduction

The Ontario Ministry of Health and Long-Term Care (MOHLTC) and the Ontario Agency for Health Protection and Promotion (OAHPP) have requested the Institute for Safe Medication Practices Canada (ISMP Canada) to lead a multi-phase antimicrobial stewardship project. The Ontario Antimicrobial Stewardship Project seeks to identify antimicrobial stewardship efforts already underway in hospitals across the province, to identify those activities that have been successful, to identify priority interventions to improve antimicrobial utilization at the institutional level, and to develop and pilot a "best of breed" antimicrobial stewardship program for implementation in Ontario hospitals. In the first phase of this project, ISMP Canada surveyed Ontario hospitals to determine the current state of hospital-based antimicrobial stewardship practices in Ontario. The results of the survey were reported at this consensus conference, and helped to guide the discussions throughout.

This Consensus Conference on Priority Interventions for Ontario Hospitals was designed to share experiences and strategies of other provincial and international programs related to antimicrobial stewardship. Over the course of the one and a half day conference, expert speakers and conference participants worked together to build consensus on the priorities for antimicrobial stewardship initiatives in Ontario healthcare facilities.

This report summarises the key messages and areas of consensus identified by conference participants, including the priority interventions, considerations in implementing them and other recommendations for project success.

DAY ONE – JUNE 16, 2009

Expert Speaker Presentations

The consensus conference was guided by a series of expert presentations intended to ground discussions in national and international experiences and best practices in Antimicrobial Stewardship initiatives. Speakers and Presentations included the following:

· Antimicrobial Stewardship – Why We are All Here	Dr. Ronald Polk, Virginia Commonwealth University, USA
· Ontario Antimicrobial Stewardship Project Survey Findings: Highlights	Dr. Allison McGeer, Mount Sinai Hospital, Toronto
· Impact of a Reduction in the Use of High-Risk Antibiotics on the Course of an Epidemic of *Clostridium difficile*-Associated Disease	Dr. Louis Valiquette, Department of Microbiology and Infectious Diseases, Faculty of Medicine and Health Science, Université de Sherbrooke, Sherbrooke, Québec
· Antimicrobial Stewardship Programs	Dr. Robert Owens Jr., Maine Medical Center, USA
· Antimicrobial Stewardship Programs: The Netherlands	Dr. Inge C. Gyssens, Nijmegen Institute for Infection, Inflammation, and Immunity (N4i), Radboud University Medical Centre Nijmegen, The Netherlands
· Project: Antimicrobial Stewardship Program International History, Structures, Results, Follow-up	Univ.Prof.Dkfm.Dr. Roland Gareis, Roland Gareis Consulting, Austria
· Partners for Appropriate Anti-infective Therapy (PAACT) – Does Community Experience Apply to a Hospital Setting?	Dr. John Stewart, Family Practitioner Port Perry, Ontario
· The Knowledge-to-Action Cycle: A Road Map for Knowledge Translation	Dr. Samir Gupta, Li Ka Shing Knowledge Institute of St. Michael's Hospital, University of Toronto, Toronto, Ontario *(Presented in Dr. Gupta's absence by David U)*

Focus Group Session One: Priority Interventions for Ontario

Following is a synthesis of focus group deliberations.

Participants worked in six focus groups to identify potential interventions for implementation in Ontario Hospitals. The following interventions were among those considered and discussed by the groups:

1. Implementation of Antimicrobial stewardship team/program
2. Prospective audit with intervention and feedback
3. Retrospective audit and feedback
4. Drug use reviews/evaluations
5. Formulary restriction and preauthorization
6. Automatic stop orders
7. Education
8. Antimicrobial handbook
9. Academic detailing
10. Policies restricting non-academic detailing
11. Guidelines and clinical pathways
12. Antimicrobial order forms
13. Computerized order sets
14. Specific criteria for use of combination therapy
15. Streamlining or de-escalating therapy
16. Dose optimization
17. Parenteral to oral conversion
18. Automatic drug substitution policies
19. Guided therapy in computerized physician order entry systems (e.g., based on disease states, patient laboratory results, etc.); Clinical decision support
20. Implementation of antibiograms
21. Restricted microbiology susceptibility reporting from microbiology laboratories
22. Computer-aided screening of microbiology data for negative culture results
23. Implementation of ISMP Canada evidence-based summaries for short course antimicrobial therapy for selected disease states/indications
24. Implementation of a 'scorecard' for antimicrobial stewardship
25. Others?

Based on the Ontario survey findings, speakers' presentations, evidence-based guidelines and the list of possible interventions, focus groups identified the priority antimicrobial stewardship interventions for Ontario hospitals. In making their recommendations, groups considered and discussed the following three questions:

1. Which interventions would have the highest yield or highest impact?
2. Which interventions would be the most practical, feasible and cost-effective?
3. Based on the interventions you identified in the previous 2 questions, please prioritize the top five interventions that you think Ontario hospitals should implement in the next year?

Top Six Interventions

At the end of Day One, the project team reviewed focus group recommendations and proposed the following top six interventions, in no particular order, to be considered and further developed on Day Two:

1. Implement an Antimicrobial Stewardship Program
2. Antimicrobial Stewardship Activities Scorecard
3. Prospective audit with intervention and feedback at an individual patient and prescriber level
4. Education/training needed to build Antimicrobial Stewardship capacity
5. Data collection and feedback at an institutional or program level
6. Tailoring antimicrobial therapy including de-escalation, streamlining and IV to PO switches.

Obstacles to Implementation and Possible Solutions

In addition to identifying the highest priority interventions, focus groups identified major obstacles or challenges that Ontario hospitals will need to overcome as well as possible solutions. Following are the themes that emerged from their discussions.

Major Obstacles or Challenges	Possible Solutions
Human Resources · Numbers and training of physicians and pharmacists · Availability of infectious diseases physicians and pharmacists	· Develop and provide training/education to increase available human resources · Develop Communities of Practice (COP) · List serves for sharing tools · "Coaching teams" (IT and Infectious Diseases) · Increase stewardship education in professional schools · Offer stipend for infectious diseases physicians and pharmacists for involvement in Antimicrobial Stewardship
Information technology · Access to data and quality of available data · Interfaces across patient, laboratory and pharmacy information systems · Prospective and retrospective information is needed	· Standardize antimicrobial use reporting · Develop and share IT support for antimicrobial use · "Coaching teams" (IT and pharmacists with an expertise in monitoring and measuring antimicrobial use) · Analyse and share existing IT solutions · Establish provincial IT standards · Establish standardized provincial guidelines for measuring and reporting antimicrobial use
Financial Resources and Structure · Budget silos across institutions, regions and the province · Dedicated funding for start-up of antimicrobial stewardship programs	· Link to current provincial strategies, e.g., wait times · Re-invest cost savings in antimicrobial stewardship programs · MOHLTC/OAHPP to take coordinating/supportive role
Infrastructure across health care continuum · Interfaces among hospital, community and long-term care	· Develop Communities of Practice · List serves for sharing tools · Networking among hospitals to share resources
Administration · Buy in · Inclusion of Antimicrobial Stewardship in Strategic plan	· Link requirement for antimicrobial stewardship to Accreditation Canada Standards · Require public reporting of hospital scorecard results on Antimicrobial Stewardship · Developing and sharing sample business cases · Local relationship building among administration and professions · MOHLTC/OAHPP to take coordinating/supportive role
Pharmaceutical industry · Marketing and sales practices · Success in engineering prescribing behaviour change	· Work with Pharmaceutical manufacturers to move forward with antimicrobial stewardship initiatives
· Measurement · Lack of benchmarks	· Establish a consensus group on measuring and reporting antimicrobial use in Ontario · Antimicrobial stewardship scorecard

Considerations in Hospitals with Fewer Resources

Focus groups considered implementation of interventions in hospitals with fewer resources and proposed the following considerations.

Areas of Focus
- Start in focused areas/low hanging fruit
- Link to established best practices
- Measurement may be more difficult

Support for Effective IT

Resource Sharing
- Within the LHINs
  - Establish relationships among hospitals in LHINs, and specialties to help mentor/shepherd the process.
- Across Ontario: Central repository/provincial toolkit that hospitals can access
  - Outreach Infectious Diseases teams to assist hospitals with fewer resources/small centres

Distance technology
- Distance education and e-Learning
- Patient rounds via videoconference

DAY TWO – JUNE 17, 2009

Day Two Introduction

Dr. Kevin Katz, member of the Project Team, provided a summary of the findings from Day One and an overview of the agenda for Day Two. He summarized the Top Six Interventions that had been identified by the Project Team when they reviewed and assimilated focus session recommendations from Day One:

1. Implement an Antimicrobial Stewardship Program
2. Antimicrobial Stewardship Activities Scorecard
3. Prospective audit with intervention and feedback at the Individual patient/prescriber level
4. Education/training needed to build Antimicrobial Stewardship capacity
5. Data collection and feedback at the institutional/program level
6. Tailoring antimicrobial therapy including de-escalation, streamlining, IV to PO

Dr. Katz went on to introduce Day Two, which included a foundation presentation by Dr. Ronald Polk on the *Measurement of Antimicrobial Use: How to Get Started and Current Controversies,* followed by Focus Group Discussions to develop each of the top six interventions. A summative plenary discussion followed the focus session, to assimilate presentations and focus group work and define next steps for the Ontario Antimicrobial Stewardship Project.

Focus Group Session Two: Implementing the Priority Interventions

Focus sessions discussed considerations and strategies for implementing the priority interventions in Ontario Hospitals. Each focus group was assigned one intervention for which they were asked to consider the following:

- Core elements
- Tools/information/data needed
- Minimum hospital resources required
- Resources that currently exist in Ontario that can be leveraged
- Strategies for marketing to the stakeholders
- Measuring the outcome of the intervention
- Strategies or tools needed to help ensure sustainability

Following is a summary of themes that emerged from discussions.

Antimicrobial Stewardship Program

The Antimicrobial Stewardship Program, whether at a local, regional or provincial level, provides the structure and process in which stewardship initiatives are implemented, measured, evaluated and improved. Participants agreed that hospitals should implement antimicrobial stewardship programs (rather than committees or a hodge-podge of interventions), and that the elements of the program should include:

- Champions: Expert content leaders (physicians and pharmacists) and hospital, regional and provincial leaders
- Dedicated program which includes the trained team members (Infectious Disease Physician and pharmacist) who have dedicated program time

Participants agreed that a template business case would be helpful to build consensus on the need for local implementation of stewardship programs. Elements of the case would include:

- Reference to guidelines, published reports, evidence of positive impacts
- Resources/individuals needed, roll-out, reporting structure, deliverables
- Two to three year scope for initial case
- Defined reporting structure, committee structure; report through the Pharmacy and Therapeutics Committee vs. office of patient safety
- Defined focus and core stewardship activities
- Positioned in the overall hospital strategy (mission statement)
- Linked to hospital priorities
- Mission statement for Antimicrobial Stewardship Program

Policy

Participants identified policy needed at institutional, regional and provincial levels as follows.

Hospital policy

- Clarity about goals and reporting structure
- Approval by Medical Advisory Committee
- Patient confidentiality
- Pre-defined interaction with Infectious Diseases consult service
- Defined patient population, e.g. Intensive Care Units, Areas where patients are sickest, most antibiotics are used
  - in small hospitals for surgical prophylaxis
  - policy or criteria for specific indications (e.g., urinary tract infections)

Regional, Provincial Policy

- Antimicrobial Stewardship Program scorecard reporting – public versus internal hospital reporting

Human Resources

Participants agreed that dedicated human resources are needed to guide implementation at local, regional and provincial levels. These would include administrative and clinical champions, content experts and core contact people. Also needed is support for training and education so that it doesn't compromise existing services. Human resource planning must also take into account the local and regional availability of an appropriate mix of expertise, including infectious disease physicians and pharmacists, pharmacists familiar with the monitoring and measuring of antimicrobial use, and information technology personnel.

Education and Training

Participants pointed to the critical need for effective and ongoing education and training. This includes education to raise and maintain awareness across institutions, regions and the province. It also includes training to assure core knowledge required for effective antimicrobial stewardship. Participants also agreed on the need for ongoing credentialing and certification, to assure quality and sustainability.

A common theme was the need to ensure that access to the education is free, and that there is ongoing support and updating. Specific educational approaches were suggested, including multidisciplinary, distance based mixed with face-to-face and ongoing mentoring.

Information Technology

Timely access to high quality data is critical to effective stewardship programs. The following information technology components are needed at an institution level:

- Data collection leader
- IT and administrative support to assist with data collection, compilation and reporting
- Pharmacy & microbiology/laboratory information system support
- Critical care information system; Intensive Care Unit ventilator-associated pneumonia, Clinical pneumonia index scoring
- Infection control data: antimicrobial-resistant organism data: Methicillin-resistant *Staphylococcus aureus*, Vancomycin-resistant *enterococci*, *Clostridium difficile*–associated disease
- Clinical decision support
- Hospital census data, e.g., numbers of patient-days, admissions, etc.
- Antimicrobial usage data and cost data (numerator) and patient-days (denominator)

At a provincial and regional level, a central data repository would assist in implementation, measurement and evaluation of antimicrobial use and antimicrobial stewardship programs. It would also support the uptake and sustainability of the program.

Measurement and Evaluation

There was agreement that antimicrobial use measurement needs to become a priority. A consensus group should be established to examine how best to measure and report antimicrobial use in Ontario. There was also agreement that development and implementation of an antimicrobial stewardship scorecard would be valuable in assessing overall progress in individual hospitals, regions and the province. Criteria for measurement and evaluation should be developed from literature standards, for example, the IDSA - SHEA Guidelines.

Hospitals

Individual institutions need to define baseline performance and measure progress against predetermined criteria. Numerous approaches were discussed and proposed including:

- Antimicrobial consumption (drug purchased or dispensed)
- Overall antimicrobial use (rather than one antimicrobial class)
- Hospital-wide and patient care area level
- Costs (e.g., antimicrobial costs, length of stay costs, etc.)
- Antimicrobial resistance rates
- Length of stay, mortality
- Numbers of fungal infections, *Clostridium difficile* days or rates, isolation days
- Change in antimicrobial use: Defined Daily Doses(DDD) per 100 Patient-Days
- Most hospitals have difficulty measuring Days of Therapy (DOT)

Individual interventions at patient and prescriber levels would be challenging to measure:

- Need IT to develop or modify existing flags in pharmacy system to capture interventions/incidents, and then can average cost reductions monthly.
- Have to use surrogate markers e.g., resistance, super infections (Methicillin-resistant *Staphylococcus aureus*, *Clostridium difficile*, *Candida albicans*), readmission to hospital or readmission to higher level of care

Regions and Province

There was agreement on the importance of measuring the province-wide impact of antimicrobial stewardship with discussion around whether reporting of performance through the scorecard should be on a mandatory or volunteer basis. Participants agreed on the value of hospital comparisons to aggregate data. Examples of province-wide measures included:

- Number of hospitals using data
- Number of interventions
- Number of interventions resulting in change
- Number of interventions by intervention type, e.g. dose change, de-escalation
- Antimicrobial use and resistance data
- Customer satisfaction

There was also agreement that implementing antimicrobial stewardship programs and initiatives is a change management process. Measures suggested here included the success of education and training programs, and overall participation level in stewardship initiatives. Examples included:

- Numbers certified/completion of the program
- Implementation/process checklist
- Structures in place
- Resources allocated
- Awareness
- Compliance with guidelines

Resources in Ontario hospitals or agencies that can be leveraged

Participants agreed that resources exist that could be leveraged to support the implementation of Antimicrobial Stewardship Programs across Ontario. Suggestions included the following organizations:

- Local Health Integration Networks
- Regional Infection Control Networks
- Associations:
  - Canadian Society of Hospital Pharmacists, Ontario Hospital Association, Ontario Pharmacists Association
- Ontario Antimicrobial Stewardship Project team
- ISMP Canada
- Safer Healthcare Now! – Communities of Practice
- Pharmaceutical industry in a later phase
- Accreditation Canada
- International Society for Infectious Diseases

Resources also exist in terms of expertise:

- Pharmacist and infectious diseases physician expertise in stewardship
- Medical directors of Regional Infection Control Networks (RICNs) and RICN structure
- Specialty networks of pharmacists (Drug Use Evaluation Pharmacists Specialty Network, Infectious Diseases Pharmacists Specialty Network)

Other resources identified include:

- Existing infection reporting data
- Published articles on cost savings
- Attentive public

Marketing this intervention to stakeholders

Participants agreed on the need for a comprehensive marketing strategy to support the implementation of antimicrobial stewardship programs and initiatives. Participants identified key stakeholders and suggested a number of messages and strategies.

Stakeholders

- MOHLTC
- OAHPP
- LHINs
- Ontarians
- Hospital Administration
- Pharmacy & Therapeutics Committees
- Medical Advisory Committees
- Front Line Hospital Staff :
  - Pharmacists
  - Family Physicians
  - Infectious Diseases and other Specialist physicians
  - Infection Control Practitioners
  - Finance
  - Patient safety

Messages

- Frame this as a patient safety and quality of care issue
- Link to Accreditation Canada requirements
- Educate and market to hospital staff and physicians
- Market to Ontarians to allay concerns about public perception of hospitals (e.g., hospital-acquired infections) and impact on hospital fundraising
- Market as a global issue, and part of our contribution to the world (antimicrobial resistance is the World Health Organization's number three patient safety challenge)
- Include existing infection reporting data including microbial organism resistance, outbreaks (CDAD)
- Frame around patient safety, but stress cost minimization and effective/efficient use of resources

Strategies

- Business case to hospital administration and LHINs
- Benchmarking and provincial reporting
- Broad education around antimicrobial stewardship to all levels, e.g., OHA conference, pharmacist, physician and health executive organizations and conferences
- Mandate antimicrobial stewardship programs at the hospital level
- Make antimicrobial stewardship programs a public reporting requirement
- Free educational programs
- Conference posters and publication of data and projects
- Use local champions and external experts to present rounds, meet senior leadership team, etc.

Sustainability

The effectiveness of an Ontario antimicrobial stewardship program hinges on the sustainability of the programs and initiatives. Participants suggested a number of strategies for ensuring sustainability.

Communication

- Effective ongoing communication of results to stakeholders
- Gain the interest of health care leaders at all levels
- Create discussion fora
- Link with other national organizations for presentation

- Present/share experiences at meetings
- Scorecard should be prominent in the organization
- MOHLTC to facilitate common communication process

Education

- Curricula in medical and pharmacy schools
- User friendliness
- Annual updating and new participants
- Core group available for ongoing support

Research

- Ongoing work on how to measure antibiotic use, benchmarking antibiotic use among hospitals
- Ongoing work to further understand the relationship between antimicrobial use and resistance, and the interaction between infection control and antimicrobial stewardship

Resourcing

- Need sustained staffing and information technology resources

Integration

- Integration within hospitals of Infection Control, Infectious Diseases, Pharmacy
- Integration in Ontario of Infection Control, Infectious Diseases, Pharmacy, MOHLTC and OAHPP via central Antimicrobial Stewardship Program website
- Link CSHP, ISMP Canada and Antibiotic Strategies International/Roland Gareis Consulting Inc. to share and compare results/scorecards

Summative Plenary Discussion

Following is a summary of themes that emerged in the summative plenary discussion.

Priority Interventions – Where to Start

There was broad consensus that the top six interventions are the best ones to focus on in the upcoming year. Several possible approaches were identified for determining where to start.

Start with simple-to-implement interventions

- "Low hanging fruit" will differ by hospital site and ability to implement will vary
- The six selected interventions are useful and maybe are not the easiest
- In order to build sustainability, the piloted intervention(s) must be successful

Start Slowly and Build

- Create building blocks and implement some before others: consider sequencing
- Consider a minimum basic program to start

Develop a hospital-specific business case

- Business case to describe what you can do with what you have; use existing template

- Implementing an Antimicrobial Stewardship Program would be the start, then the institution would tailor program elements

Pilot something substantial
- Substantial interventions in the pilot will demonstrate impact
- Complexity of the pilot will depend on the selected interventions; do we take all six or just some?
- If you reduce complexity, you lose the capability of the project

Menu versus Bundle of Interventions
- Support a fully developed program as a pilot versus a pick-and-choose approach; less likely to get hung up on the picking stage
- Menu of items that a site can choose from dilutes the impact; every facility will have its own starting point

Stewardship Program vs. Content
- Stewardship Program describes the process and provides structure
- Focus for next steps should be on the content
  - Involve measurements at beginning and end of intervention
  - Need certain structures including the Antibiotic Stewardship Team and infrastructure

Measurement

- Identify best approach with a time line
- Provide assistance to hospitals that can't currently collect the data
- Find ways to work together to enable sites to report antimicrobial consumption data; approach vendors to develop tools to report DDD (or DOT)
- Create central data repository to which data can be sent and converted to DDD (or DOT)
- Tools available to share now: ABC Calc 3.1 spreadsheet for calculating DDD's (developed by Dominique L. Monnet, Sweden) is available from the ESCMID Study Group on Antibiotic Policies' web page

Tools Needed for the Pilot

- Start-up kits similar to those used in Safer Healthcare Now!
- Central website for sharing data, tools, strategies, frequently asked questions
- Educational modules: how to get data, how to manipulate data
- Data collection module

Other Advice

- Consider that we are trying to change a culture
  - Quick fixes, short interventions won't change a culture
  - Pilot sites will need help from experts on change management and changing culture

- Education
  - Include in health sciences curricula: Medicine, Pharmacy, Nursing, etc.
  - Ongoing professional training programs need to include this topic

- Information sharing groups on antimicrobial consumption
  - Need an organized approach; we do have the info but need an organized way to use by all
  - Drug Use Evaluation Pharmacists Specialty Network has expertise on antimicrobial measurement; pilot study

Closing Comments

Dr. Allison McGeer provided a summary of highlights from the consensus conference, stating that there appears to be broad consensus for moving the Antimicrobial Stewardship Project forward to a pilot phase in Ontario. It was also clear that antimicrobial use measurement needs to become a priority.

Dr. McGeer highlighted the next steps including:

- Take what we have learned so far to a broader group for broader feedback, starting with the OHA Conference in the fall.
- Develop and submit to OAHPP and MOHLTC a detailed proposal for the pilot project. It will be very important to ensure that the pilot captures the right components and is designed to ensure maximum benefit for all
- ISMP Canada has a Project web site is in the works; the link will be shared with participants. Everyone was encouraged to suggest web site content, on which a good start was made at this conference.

Finally, Dr. McGeer thanked MOHLTC and OAHPP for funding and support, as well conference participants, expert speakers, project team colleagues and everyone who had contributed to making the consensus conference a success.

Appendix A: Ontario Antimicrobial Stewardship Project Team

Phase I (Survey) Team Members

Allison McGeer, MSc, MD, FRCPC	Director, Infection Control Infectious Diseases Physician, Mount Sinai Hospital, Toronto
Donna Lowe, PharmD	Drug Utilization Coordinator University Health Network, Toronto
Linda Dresser, PharmD	Pharmacy Practitioner - Infectious Diseases North York General Hospital, Toronto Assistant Professor, Leslie Dan Faculty of Pharmacy University of Toronto
Kevin Katz, MD, FRCPC	Medical Director, Infection Control and Prevention; Infectious Diseases Physician and Medical Microbiologist North York General Hospital, Toronto
Steen Hansen, BSc(CompSci)	Information Technology Coordinator Institute for Safe Medication Practices Canada
Archie Kwan, BScPhm	Drug Utilization Coordinator The Scarborough Hospitals, Scarborough
David U, MScPhm	President and CEO Institute for Safe Medication Practices Canada

Appendix B: Conference Registrants

Following are the conference registrants

Monique Agostinelli	York Central Hospital
Madelyn Ashcroft	Regional Infection Control Networks
Anne Bialachowski	Community and Hospital Infection Control Association, Regional Infection Control Network
Anne Marie Bombassaro	London Health Sciences Centre
Nora Boyd	Canadian Committee on Antibiotic Resistance
Helen Briggs	Lakeridge Health Centre
Frances Brisebois	Sudbury Regional Hospital
Kim Carter	North Bay General Hospital
Jeff Chan	Thunder Bay Regional Health Sciences Centre
Danny Chen	York Central Hospital
Tom Chin	St. Michael's Hospital
Nick Daneman	Sunnybrook Health Sciences Centre
Gerald Evans	Association of Medical Microbiology and Infectious Disease Canada
Tania Fernandes	Trillium Health Centre
Greg Gamble	Thunder Bay Regional Health Sciences Centre
Nancy Giovinazzo	Joseph Brant Memorial Hospital
Sandra Howie	Mount Sinai Hospital
Phil Jackson	Ontario Agency for Health Protection and Promotion
Margaret Jay	Peterborough Regional Health Centre
Tiffany Jay	Ontario Ministry of Health and Long-Term Care
Amir Khosrovaneh	Royal Victoria Hospital
Stephen Lapinsky	Mount Sinai Hospital
Donald Low	Mount Sinai Hospital, Ontario Agency for Health Protection & Promotion
Chris Fan Lun	Markham Stouffville Hospital
Cheryl Main	Hamilton Health Sciences Centre, St. Joseph Healthcare
Leslie McArthur	Royal Victoria Hospital
John McBride	Canadian Society of Hospital Pharmacists Ontario Branch
Susan McKenna	Kingston General Hospital
David Millar	Joseph Brant Memorial Hospital
Andrew Morris	Mount Sinai Hospital, University Health Network
Lynn Nadeau	Hotel Dieu Grace Hospital
Marie Paluzzi	Sault Area Hospitals
John Pilla	Medication Use Management Services
Monique Pitre	University Health Network
Zagorka Popovski	Hamilton Health Sciences Centre
Mark Quigg	South Bruce Gray Health Centre
Karen Riley	Hotel Dieu Grace Hospital, Windsor Regional Hospital
Coleman Rotstein	University Health Network
Roger Sandre	Sudbury Regional Hospital
Karen Sequeira	Ontario Hospital Association
Doug Sider	Provincial Infectious Disease Advisory Committee; Ontario Agency for Health Protection and Promotion
Greg Soon	Peterborough Regional Health Centre
Lorne Small	Credit Valley Hospital
Vida Stankus	St. Joseph's Healthcare, Hamilton
Kathy Suh	The Ottawa Hospital
Joanne Stockford	Credit Valley Hospital
Peter Thornley	Hamilton Health Sciences Centre
Tim Tripp	University Health Network
John Vlasschaert	Peterborough Regional Health Centre
Sandra Walker	Sunnybrook Health Sciences Centre
Jill White	Halton Healthcare
Gary Wong	University Health Network
Rosemary Zvonar	The Ottawa Hospital