Antimicrobial Stewardship: 
A Call to Action

Gary Garber MD FRCPC FACP FIDSA
Chief-Infection Prevention and Control
Public Health Ontario
Professor, Departments of Medicine
U Ottawa and U Toronto
Div. of Infectious Diseases,
The Ottawa Hospital
Objectives

• Explain the widespread interest in antimicrobial resistance?
• Describe Antimicrobial Stewardship as a patient safety issue
• Explain why ASP and IPAC need to work together
• Describe the antimicrobial stewardship program (ASP) at Public Health Ontario
Antimicrobial Resistance Requires Global Action

“AMR...is a slow-motion tsunami. It is a global crisis that must be managed with utmost urgency”.

AMR is the “greatest and most urgent global risk”.

“AMR is a serious and growing public health threat”
Can we stop the Tsunami?
Antimicrobial Stewardship: Why Now?

• ASP is **NOT** a new concept in healthcare
• 25% reduction of outpatient antibiotic prescriptions in Canada since 1998.
• Some parameters of resistance have stabilized.
• New antimicrobial resistant organisms (AROs) have emerged
  • Carbapenemase Producing Enterobacteraceae (CPE)-NDM-1
• No effective antibiotics available and patients die
• Little new antimicrobials coming on the horizon
• Accreditation Canada made ASP an ROP
Antimicrobial Resistance is a Public Health Threat

- Tetanus: 60,000
- Road traffic accidents: 1.2 million
- Cancer: 8.2 million
- Measles: 130,000
- Cholera: 100,000–120,000
- Diarrhoeal disease: 1.4 million
- Diabetes: 1.5 million

AMR now 700,000 (low estimate)

AMR in 2050: 10 million
How Does Resistance Occur?

- Resistance is natural
- Some bacteria are inherently resistant to some classes of antibiotics
- Many mechanisms of resistance
- Some are inducible
- Some are constitutive
- Some are transferrable
MCR-1

• A plasmid that contains the resistance complex
• The plasmid can pass these resistance genes to other organisms
• The “mobile” plasmid, makes it scary as it can pass easily to “common” organisms. The complex resistance is no longer a rare hospital organism but can be seen widely.
• Found in animal excrement, then in food supply and finally in patients
• Large plasmids often inhibit growth under “normal” conditions
Effect on Resistance; Darwinian Selection

- Bacteria do NOT develop resistance
- Bacteria spontaneously mutate \( \frac{1}{10^5} \)
- Antibiotics act as the environmental stimulus, the selective pressure.
- Selection is of the “fittest”
- In the presence of an antibiotic, a resistance gene will confer a selective advantage
Antimicrobial Use is a Driver of AMR

- Antimicrobial use is linked to antimicrobial resistance
  - Patient
  - Population

- Antimicrobial drugs are unique as they are the only pharmaceutical agents that have “transmissible loss of efficacy over time”
How do we stop the spread of resistance?

• “sand bags”

• Prevent the passage of the organism from person to person
  1. Sanitation
  2. Hand hygiene
  3. Infection Control principles and practice

• “stop the rain”

• Don’t enable the organism to grow:
  1. Restrict the antibiotic environment which gives the organism its survival advantage
  2. Use effective antimicrobial which evades the resistance

Appropriate use of antibiotics....Antimicrobial Stewardship
Antimicrobial Stewardship- Historical Approaches

• Control of usage was based on prescribing restriction, guidelines, & pathways

• Hide susceptibility patterns to veer prescribers to certain antimicrobial classes or “cheaper” drugs.

• These approaches had limited beneficial impact
Why Did Control Measures Not Work?

• Prescribers don’t like to be told what to do
• Evidence for the restrictions was often lacking ... credibility gap.
• Guidelines were vague
• Guidelines often encourage broad spectrum coverage by being overly inclusive.
• Effective impact was not sustainable
Myths about antibiotics

• More is better
  “broad spectrum superior to narrow spectrum”
• Don’t change what ain’t broke
  “stick with the meds which the patient has responded to”
• IV is superior to PO
• Narrow spectrum is inferior care- “simplification”
• Individual prescribing has no impact on resistance
Goal of Antibiotic Therapy

• The right antimicrobial, dose and duration
• Goal: cure infection with minimal toxicity and minimal impact on selective (resistance) pressure.

• **Inappropriate Use** leads to:
  - Unnecessary exposure to antimicrobial
  - Increased cost
  - Antibiotic resistance and “super-infections”
  - Increased LOS
Clostridium difficile

- **250,000** infections per year
- **14,000** deaths
- **$1,000,000,000** in excess medical costs per year

**Threat Level: URGENT**
Antibiotics Cause Harm Beyond the Recipient

Residents of long-term care homes that use more antibiotics are more likely to experience antibiotic-related harm (including *C. difficile*, antibiotic-resistant organisms).\(^1\)

Patients on hospital wards that use more antibiotics are at higher risk of acquiring *C. difficile* infection, even when they haven't recently received antibiotics.\(^2\)

Receiving an antibiotic while hospitalized increases the risk that the next patient occupying the same bed will acquire *C. difficile*.\(^3\)

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Does prescribing make a difference in preventing resistance?

- Is resistance inevitable?
- Is resistance futile?
- Is the problem a knowledge gap? An education gap?
- Is prescribing a behavior? Based on pattern recognition
- What are the influencers to effect change?
- Is it time to look at prescribing as a behavior rather than just a knowledge based activity?
To prevent resistance to antibiotics in ICU

• Rotate the antibiotics
To prevent resistance to antibiotics in ICU

• Rotate the antibiotics

• OR

• Rotate the attending physician
Antibiotic Overuse Leads to Harm

What is the problem?

50% of antibiotic courses are unnecessary

78% of residents receive at least one antibiotic course each year

How are antibiotics overused?

There is variability in prescribing:

Homes with the highest use are using 10x more antibiotics than homes with the lowest use

Duration of therapy is often longer than necessary

Why is this important?

Residents in homes with higher antibiotic use experience more harm:

24% increased risk of *Clostridium difficile* infection, diarrhea, allergic reactions and antibiotic-resistant organisms

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Antimicrobial Stewardship is Needed in All Sectors

- 20% Humans
- 80% Animals
- 93% Community
- 7% Hospital

What is changing? Animal sector

- Federal Gov’t has new regulations limiting the importation of antimicrobials for animal use
- More veterinarian oversight.
- Exclusion of antimicrobials for growth promotion
- Antibiotics for infection treatment is still appropriate

- What we call Infection Control, the animal sector calls Biosecurity
PHO Antimicrobial Stewardship Strategies for health care institutions

Intervention Type

- Formulary-related
- Structural/Process
- Clinical
- Prescribing Guidance
- Microbiology-related

Program Stage

- Early
- Intermediate
- Advanced

Ontario ASP Landscape Survey

PHO initiated a voluntary online survey of hospitals in Ontario in September 2016.

Purpose

• To understand how the landscape of antimicrobial stewardship in Ontario healthcare facilities has evolved since 2013
  ▪ How many now have an ASP in place?
  ▪ What structural elements are in place?
  ▪ What is the scope of program implementation?

• To identify priority areas for further advancing antimicrobial stewardship across the province
Survey invitation sent (N=131)
Mental health, Ambulatory Care excluded

74% Response rate (n=97)

- Acute Teaching 15% (15)
- Large Community 45% (44)
- Small Community 28% (27)
- CCC & Rehab 11% (11)
Small Community hospitals slightly under represented, Acute Teaching hospitals had highest response rate

Overall response rate by hospital type

- Acute Teaching: 93% (15/16)
- Large Community: 77% (44/57)
- Small Community: 61% (27/44)
- CCC & Rehab: 79% (11/14)

Denominator = 131
Q: Do you currently have a formal ASP at your organization?

Almost all have or are building a formal Antimicrobial Stewardship Program.

- Yes: 88% (85/97)
- No: 7% (7/97)
- Implementing: 5% (5/97)

**Acute Teaching**
- 93% (14/15)

**Large Community**
- 93% (41/44)

**Small Community**
- 78% (21/27)
- 15% in progress (4/27)

**CCC & Rehab**
- 82% (9/11)
- 9% in progress (1/11)

**Denominator = 97**
Q: Are there designated funding/resources for your ASP?

Half of ASPs do not have designated funding/resources

**YES** 50% (45/90)

**NO** 50% (45/90)

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<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
<th>Denominator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Teaching</td>
<td>86%</td>
<td>12/14</td>
</tr>
<tr>
<td>Large Community</td>
<td>68%</td>
<td>28/41</td>
</tr>
<tr>
<td>Small Community</td>
<td>12%</td>
<td>3/25</td>
</tr>
<tr>
<td>CCC &amp; Rehab</td>
<td>20%</td>
<td>2/10</td>
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Small Community hospitals are least likely to have designated resources for ASPs.
Q: Please describe any ongoing challenges to advancing ASP at your corporation:

Nearly two thirds reported effort to report ASP metrics and IT limitations as challenges to moving local ASP forwards.

- Work effort required to report ASP metrics (64%)
- Limited IT capabilities (64%)
- Lack of Infectious Disease expertise (37%)
- Lack of ability to report ASP metrics (33%)
- Appropriate antimicrobial use not a publicized hospital priority/strategic goal (21%)
What is new: Acute Care

• Stewardship programs are now becoming well established in Ontario
• Many hospitals don’t have the recommended resources to effectively monitor their progress
• ASP is a bit like IPAC in the ’90
Q: Your organization has implemented the following ASP Strategies:

<table>
<thead>
<tr>
<th>Program Stage</th>
<th>Early</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Type</td>
<td>Antibiograms</td>
</tr>
<tr>
<td>Acute Teaching</td>
<td>93</td>
</tr>
<tr>
<td>Large Community</td>
<td>93</td>
</tr>
<tr>
<td>Small Community</td>
<td>70</td>
</tr>
<tr>
<td>CCC &amp; Rehab</td>
<td>45</td>
</tr>
<tr>
<td>Overall</td>
<td>81</td>
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</table>
Q: Your organization has implemented the following ASP Strategies:

**Antimicrobial Stewardship Strategy:**
Prospective audit with intervention and feedback

Formal assessment of antimicrobial therapy by trained individuals, who make recommendations to the prescribing service in real time when therapy is considered suboptimal.

**Description**

This is an overview and not intended to be an all-inclusive summary. As a general principle, patients must be monitored by the health care team after changes to therapy resulting from recommendations made by the antimicrobial stewardship team.

Prospective audit with intervention and feedback involves the assessment of antimicrobial therapy by trained individuals (usually physicians and/or pharmacists), who make recommendations to the prescribing service in real time when therapy is considered suboptimal.

Audits are often performed by trained pharmacists (infectious disease training is preferred but not essential) ideally with physicians who have infectious disease expertise available for consultation on more complex cases.

It is important for pharmacists to have physician support, particularly at the beginning of a program and if the prescribers are unfamiliar with the antimicrobial stewardship pharmacist. This will help improve recommendation uptake by prescribers and increase pharmacist credibility. Physician support can include:

- Introduction of the antimicrobial stewardship program pharmacist to prescribers.
- Being readily available to the pharmacist for consultation and to meet with prescribers when required.
- Reinforcing pharmacists' recommendations.

The frequency of reviews will depend on staffing levels and can range from daily to weekly.

<table>
<thead>
<tr>
<th>Hospital Type</th>
<th>Prospective audit &amp; feedback(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Teaching</td>
<td>80</td>
</tr>
<tr>
<td>Large Community</td>
<td>82</td>
</tr>
<tr>
<td>Small Community</td>
<td>33</td>
</tr>
<tr>
<td>CCC &amp; Rehab</td>
<td>55</td>
</tr>
<tr>
<td>Overall</td>
<td>65</td>
</tr>
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Ontario ASP Comparison Tool

• Will enable stakeholders to compare and contrast hospital ASPs in Ontario.

• The tool displays information about individual Ontario hospital ASPs in an online, intuitive and interactive format.

• Includes contact information for each ASP.

• Primary audience is health care providers directly involved in hospital ASPs but also others interested in landscape of hospital ASPs.

• Target go-live is June 2017.
Landing page provides summary of participating hospitals/corporations

Ontario Antimicrobial Stewardship Program Comparison Tool

The Ontario Antimicrobial Stewardship Program (ASP) Comparison Tool is an interactive summary of antimicrobial stewardship programs in Ontario hospitals/corporations. Use the filters and tabs below to compare program structural elements as well as specific program strategies that have been implemented in participating hospitals. You can download your graphs and tables once you are finished. The Hospital/Corporation Profiles offer detailed information about individual programs.

Learn more about ASP and survey methodology.

ASP Implementation

53 Participating Hospital/Corporations

- Formal ASP Implemented: 48
- No formal ASP: 3
- In process of implementation: 2

ASP Comparison  Hospital / Corporation Profiles  About
What’s changing: Community Prescribing

- Long term care prescribing of antimicrobial can be tracked similar to that used for antipsychotic prescribing.
- Opioid crisis is also an issue of over prescribing.
- 2916-17: 25% of antimicrobial prescribing in Ontario is done by 2.2% of physicians.

- Prescribing is a learned behavior. How do we target change?
- Is there a role for stewardship to reduce opioid prescribing?
What’s changing: Provincial level

• Discussion over ASP metric on hospital QIP

• Development of a comprehensive surveillance database for HAI and AMR

• How can we effect change if we don’t have the data to target our interventions?

• We need to tools to measure impact of our interventions so we can establish best practices?
PHO’s Antimicrobial Stewardship Program (ASP) Goals:

Promote antimicrobial stewardship as part of an overall public health strategy to address AMR in Ontario.

Provide insights on the state of antibiotic stewardship and antibiotic use and in Ontario and identify opportunities to advance stewardship in Ontario.

Increase knowledge on what and how particular antimicrobial stewardship interventions should be implemented to advance stewardship in each sector.

Increase the implementation, scope and robustness of individual antimicrobial stewardship programs in Ontario.
Antimicrobial Stewardship is Everyone’s Role

**Prescriber:** assess benefits and risks of antibiotic therapy

**Patient:** question the need for antibiotics, understand when antibiotics are not necessary

**Policy maker:** facilitate antimicrobial stewardship in all sectors

**Public health:** advocate for antimicrobial stewardship and integrate with other approaches for maximal effect, provide data and expertise
Why should ICPs care about ASP?

• It's all about patient safety

• The best way to treat an infection is to prevent it in the first place

• The best way to avoid an infection with a resistant organism is to prevent the formation of the AMR before it spreads

• Stewardship programs can learn from the IPAC experience
  Working with lack of resources
  Influence without authority
  Multi-stakeholder collaboration
  Interface between the lab and the bedside
  Promoting behavior change