



## CAHS Major Forum 2017 on Antimicrobial Resistance Summary Report Arising from Forum

November 6, 2017

### Strategies to control the antibiotic resistance *tsunami*: Is Canada doing its part?

*When we treat animals with antibiotics, we are treating the microflora in the rivers, the fish and aquatic life in those rivers, the animals that drink from those rivers and the humans that get their drinking water from those rivers. We are all very interconnected.*

-Dr. Herman Barkema

*Canada is already a key player in influencing global approaches to antimicrobial resistance, and has the potential to make a significant contribution to international efforts.*

-Dr. Marc Sprenger

### Background and the Need

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The global emergence and spread of antimicrobial resistant bacteria and resistance genes is widely regarded as one of the greatest single threats to medicine and global population health, putting many of the transformative health practices of the 20<sup>th</sup> century in jeopardy. Without action today, projections suggest that by 2050 more people will die of bacterial infections than cancer<sup>1</sup>.

The World Health Organization has undertaken a global action plan that incorporates public awareness, surveillance and monitoring, research into the impact of reducing antibiotic agents in various contexts and the development of new antibiotic drugs, and improved global coordination. In Canada, actions to counter antimicrobial resistance include surveillance, monitoring, and encouraging responsible practices in human healthcare, farming, and animal food production and veterinary medicine. Canada's support for an integrated "One Health" approach has been welcomed by the WHO and other global leaders. The underlying tenet of One Health is that the health of humans is inextricably linked to the health of animals and the environment, within the human-animal-environment ecosystem.

The Council of Canadian Academies (CCA) has been asked by the Public Health Agency of Canada to support the development of its strategy on antimicrobial resistance (AMR) by conducting a major assessment on the current state of knowledge, particularly in relation to the socio-economic impact of AMR on Canadians and the Canadian healthcare system. The Canadian Academy of Health Sciences (CAHS) will collaborate on this assessment.

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<sup>1</sup> Review on antimicrobial resistance. Tackling drug-resistant infections globally: Final report and recommendations. 2016. [https://amr-review.org/sites/default/files/160525\\_Final%20paper\\_with%20cover.pdf](https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf)

On September 14, 2017, the CAHS focused its annual major forum on the topic of AMR, bringing together global and Canadian scientists and policy-makers to explore the current science and different policy frameworks. The purpose was to develop the foundation for a major assessment on AMR, through the sharing of a comprehensive body of knowledge and focused discussion by the large group of participants.

Throughout the day, there was considerable discussion of the fact that Canada's benchmarks are relatively promising, compared to many other countries and that there are many places in the world where antibiotic use (and misuse) is more problematic. At the same time, antimicrobial organisms are not deterred by borders, and AMR has the same destructive potential in Canada as everywhere else. Canada has accountability both as a member of the G7 to provide global leadership, and as a steward for its food security, the health of its human and animal populations, and its environment to contribute to novel solutions.

This report briefly overviews the key elements presented by the speakers, and summarizes in greater detail the discussions and recommendations of the participants. This should serve as the launching point for the framing of the Major Assessment question.

## **Overview of Recommendations**

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Across all of the speakers' presentations and table discussions, four key themes emerged:

1. Canada has a responsibility to act as a global leader on AMR, but the most effective role(s) needs to be defined;
2. Because AMR is such a complex issue, it requires an integrated strategy involving One Health;
3. There are some existing solutions that need better evidence and increased uptake, including public education;
4. There is a high need to continue developing and sharing new solutions.

The participants agreed that a Major Assessment is needed to guide the creation of an actionable strategy, and urged the CCA to go beyond the initial question posed by PHAC. AMR has a direct impact not only on human but also on animal health and the health of the environment, with the potential to have profound socio-economic impact on Canadians and Canadian healthcare, agriculture and aquaculture.

Participants urged the CCA to cast a wide net in the major assessment in developing a comprehensive portrait of the economic, health, security and social impact of AMR in Canada, and to craft an evidence-based strategy to combat AMR at home and globally.

A summary question that reflects much of the Forum’s discussion would be:

*What is the current impact of AMR in Canada, and what should Canada do to create and drive solutions, at home and as a global leader?*

## **Overview of the Forum**

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The Forum was opened by Carol Herbert, President of the Canadian Academy of Health Sciences, and John Conly and John Prescott, Forum Co-chairs, representing the medical and veterinary sectors, respectively. Eric Meslin, President and CEO of the Council of Canadian Academies outlined that the federal government is looking to the Council of Canadian Academies to provide evidence on the impact of AMR with a goal of informing policy. The initial question posed by the Public Health Agency of Canada is: *What is the current state of knowledge on the socio-economic impact of antimicrobial resistance on Canadians and the Canadian healthcare system?*

Foundational context for the day was set by two Keynote Speakers, Marc Sprenger, Director, Antimicrobial Resistance Secretariat for the World Health Organization, and Siddika Mithani, President of the Public Health Agency of Canada. Both speakers emphasized the global impact on health, food security and economics of AMR, and emphasized the value of a “One Health” approach to fighting AMR. Global trends such as increased meat consumption in Asia and India, and the open availability of antibiotics in many countries, contribute to a complex global web of causes of AMR. Even if Canada achieves its internal goals, AMR will continue to rise globally, and Canada will continue to experience the same impact of reduced effectiveness of antibiotics and new, threatening organisms. Canada needs to act as part of a global effort. Dr. Mithani emphasized that there is momentum and multi-sectoral political support to act on AMR-related issues, and that now is a ripe time to move forward.

Across the rest of the day, 16 scholars overviewed evidence and their work in four panels: the value of a One Health Strategy; the current state of Surveillance of AMR organism threats in Canada; the current state of stewardship in Canada in the human and veterinary sectors; and the possibilities of innovative new solutions.

Throughout the day, all 120 participants in the room held table discussions to distill their key insights from each panel, and at the end of the day, made recommendations for priorities and how to inform the Major Assessment. These table recommendations are captured below. These do not reflect an official stance of the CCA or CAHS, but rather, a synthesis of the themes that were shared by all participants in the Forum.

## Detailed Table Insights

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### 1. Canada's global responsibility on AMR

#### **Recommendation:**

Canada has a responsibility as an affluent nation to contribute to an integrated global solution for AMR, through research into novel solutions, sharing technical expertise, and modeling and testing best practice.

- The major assessment should define the best role for Canada's contribution to a global strategy – e.g., to test diagnostics, collaborate on research, champion the “One Health” approach. Could our remote and rural sites be used as test sites/models for diagnosis, management and prevention of ARO that could be applied locally and globally?
- Recognize and frame AMR as a national security/biosecurity issue, which will drive innovation and serve as a model for other countries.
- Are there Canadian success stories where we can provide technical assistance internationally?
- What international collaborations could most meaningfully benefit from our contributions?

### 2. The need for an integrated strategy, such as One Health

#### **Recommendation:**

While One Health has some challenges, AMR has multi-dimensional, complex causes and impacts, and must be addressed through an integrated approach that encourages cross-sectoral dialogue and science. This “wide-cast” approach should include human and animal health, agriculture and aquaculture and economic and environmental impact.

- A multi-dimensional approach should include approaches to collaboration across sectors, with specific, specialized research and actions in each sector, and enable flexible action in each sector with shared overarching mission.
- Priorities in this sphere include raising level of knowledge of AMR in animals and the environment to the same level as AMR in humans.
- Canada's One Health approach needs to align with federal-provincial jurisdictions while encouraging a pan-Canadian, sustainable approach that doesn't depend on regional political will.

### 3. Generate stronger evidence for and drive uptake of existing solutions

#### **Recommendation:**

Foster evidence, and knowledge translation, for existing solutions, including making options simple to use and competitive. Public education is a critical component.

Strategies suggested by the audience tables to reduce antibiotic use and to improve stewardship include:

- Fostering infection prevention, including hand hygiene, and uptake of vaccines.
- Reducing antibiotic use in food-producing animals to where the benefits are clear and substantial.
- Promote better prescribing practices within existing protocols, targeting primary care and specialist healthcare professional education. Some specific items within this theme included finding the best models for antibiotic prescribing and monitoring and determining how to support increased involvement of professional associations, regulators and others to support best practices.
- Develop an integrated national public campaign to reduce demand for antibiotics, including education in primary schools, influencing consumer understanding of the need for antibiotics and increasing demand for AMR-friendly food sources.
- Assess the impact of *Choosing Wisely* and build on it.
- Create incentives for health, industry and consumers to reduce demand for antibiotics.
- Link disease prevention practices, including hand hygiene, to the need to reduce AMR.
- Develop and share scientific evidence for alternative therapies to antibiotics such as probiotics and other natural sources.
- Encourage adequate funding of hospital-based stewardship teams.

Create higher impact tracking and surveillance drivers of change:

- Create a dashboard that includes full economic and health assessment with true outcomes (i.e., not reduction of use but the impact of reducing use; possible adverse impact of AMR action)

#### **4. Create new solutions**

##### ***Recommendation:***

Incent the development of novel strategies to prevent the need for antibiotics and reduce their use in human/animal food production and health. These strategies need to be as simple as possible and must enable producers to remain competitive.

Strategies include:

- Emphasize forward-looking strategies (e.g., rapid diagnostics) not backward-looking (e.g., surveillance). Develop more precise diagnostics to foster more appropriate matches between disease and antibiotics, including “designer cocktail anti-infectives” and hand-held diagnostic computers, and develop research that enables DNA analysis for precision matching between the individual and the specific antibiotic.
- Develop “low-tech” solutions for resource-limited settings.
- Develop pharmaceutical alternatives to antibiotics/adjuvant therapies.

- Deepen research into barriers to infection (fecal microbiota transplantation, immunoregulators, probiotics) and strategies for effectiveness when antibiotics are used, such as prophylaxis of the microbiome prior to antibiotic use.
- Develop new treatment guidelines for many diseases in humans and animals with the goal of rethinking antibiotic use.
- Create a special prize or competition to incent inventive solutions – e.g hand held DNA analysis.

## Major Assessment Questions

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Overwhelmingly, the participants in the Forum believed that AMR is a complex problem that will require multiple questions to be addressed by the CCA Major Assessment. Participants emphasized a desire for forward-thinking, action-oriented recommendations along with a comprehensive analysis of the current state.

The draft question provided at the time of the meeting to CCA by the Public Health Agency of Canada was: *What is the current state of knowledge on the socioeconomic impact of antimicrobial resistance on Canadians and the Canadian healthcare system?*

Forum participants recommended that the Major Assessment touch on the four major themes outlined above. And beyond content recommendations, many participants emphasized that the major assessment should include concrete, actionable recommendations.

Specific suggested topics were:

1. Analysis of the *impact of AMR* in Canada which should address :
  - impact on agriculture, aquaculture and food security, not just the health of the human population;
  - the mortality and morbidity burden, direct and indirect costs of AMR (hospital, animal, environmental, community)
  - impact on food supply, including the national and social security impact of a contaminated food supply, and food accessibility and affordability;
  - the cost of inaction, including the risk/burden of illness on an aging population.
2. Current state of knowledge regarding infections with resistant organisms
3. Current evidence, impact and best practices for prescribing and stewardship in humans, animals and the environment
4. The state of comparative surveillance data across Canada and identification of any gaps
5. The impact Canada can have on the global state of AMR with identification of the most effective strategies we can undertake.
6. Develop the optimal strategy to implement a One Health approach including the steps that can be taken to mitigate the impact for animals, humans and the environment in Canada

and globally using a coordinated cross-sectoral approach with entertainment of creating a coordinated centre of excellence for stewardship, resource sharing, education and funding.

7. Determine what research/increased surveillance in humans, agriculture and aquaculture would have the most impact.
8. Incentivize and drive social innovation and truly novel solutions.
9. Develop surveillance processes to truly track prescribing practices and the impact on all populations in Canada.
10. Determine what Canada can do in R&D, new diagnostics and technology and assess how a targeted investment in AMR could stimulate R&D and innovation in the Canada research system, including rapid point of care diagnostics.
11. Decide what goals should be set to cultivate effective action for antibiotic use and stewardship and what the strongest economic drivers are that could lead to effective change.

Many of the participants also emphasized the imperative for the CCA assessment to have concrete, actionable recommendations, including an overarching pan-Canadian business plan to implement an AMR strategy, with clear targets, economic analysis and strategies for facilitating swift update of new therapeutics.

Overall, the participants in the Major Forum recommended that the CCA take a comprehensive, action-oriented approach to the assessment, with a question such as:

*What is the current impact of AMR in Canada, and what should Canada do to create solutions, at home and as a global leader?*

Speaker presentations and PowerPoint slides are available on the Past Fora page of the CAHS website at <http://www.cahs-acss.ca/past-fora/>