Recommendations for the Development of AMR and AMU Surveillance in Canada

These recommendations derive from an evaluation and assessment of antimicrobial resistance and antimicrobial utilization (AMR and AMU) surveillance in Canada, detailed in the 2014 report "Surveillance of Antimicrobial Resistance and Surveillance in Canada". These recommendations are presented separate from the full report (which can be accessed on this website or at www.nccid.ca) at the behest of the sponsoring agency, the National Collaborating Centre for Infectious Diseases. It was felt that the provision of detailed recommendations was outside the mandate of this knowledge translation focused organization. The Principal Investigators, as core member of the AMMI Canada Antimicrobial Stewardship and Resistance Committee, are pleased to present this document on behalf of the ASRC, and the project Advisory Committee.

The recommendations are intended to strengthen AMR and AMU surveillance in Canada. They are based on key findings from the project survey of key experts, literature review, and assessment. While recognizing that the goals of these recommendations may be met by various means, we have chosen to propose specific actions for accountable and collaborating organizations, including timelines and other details. The nature of the recommendations are largely consistent with those from previous Canadian conferences and projects, however, we believe that these more detailed recommendations, including timelines and accountabilities, will be more likely to provide support and focus on specific options and decisive actions. Given that the drafts of this work have been widely shared and there is a current, positive upsurge on attention to AMR-AMU as a public health issue, we anticipate that these recommendations will intersect with current actions and discussions. We are pleased to promote the shared goal of strengthening Canadian AMR and AMU surveillance as a foundation for coordinated efforts to combat this complex problem.

Phase 1: Suggested timeline - years 1 and 2

1. **Establish a federally coordinated national cross-sectoral integrated system of Canadian AMR and AMU surveillance (hereafter, abbreviated as CAAS) that includes and builds upon existing surveillance programs. To support and coordinate the work of CAAS, an Office for Antimicrobial Resistance is proposed within the PHAC Infectious Diseases Prevention and Control Branch, to align and expand existing AMR and AMU surveillance components, including elements of the CNISP and CIPARS programs.**

Accountable – the federal government, including the Public Health Agency, Infectious Diseases Prevention and Control Branch, Canadian Food Inspection Agency, Health Canada, and the Public Health Network, and provincial and territorial governments, including health and agriculture ministries. The table at the end of this section summarizes the accountable and collaborating agencies.

Functions -- The main functions of the CAAS would include:

a) Development of working groups to address the main sectors of AMR and AMU - hospital, community, and food chain/zoonotic - with dedicated personnel for project management, data handling, and operational support.

b) Creation of standardized AMR and AMU surveillance definitions and metrics, design of national surveillance program initiatives and corresponding performance indicators, and provision of additional support and integration for provincial and territorial initiatives.

c) Central provision of timely current surveillance results and development of publically available integrated national AMR and AMU surveillance reports (see Recommendation 5).

The CAAS would incorporate and integrate the current national surveillance programs in PHAC (CIPARS, CNISP), and existing and planned provincial programs. A new Office of AMR would align federal AMR activities, and coordinate and support the CAAS, as part of PHAC's Infectious Diseases Prevention and Control Branch. Direct reporting to the Deputy Head and Chief Public Health Officer, Associate Deputy Minister and/or the Assistant Deputy Minister, Infectious Disease Prevention and Control would indicate both the priority of this work and recognize it's complexity and scope, as well as facilitate transparent communication with federal and provincial agencies and committees involved in Canada's Public Health AMR response. An advisory committee for the CAAS would include representation from AMR and AMU human and animal stakeholder groups including infectious diseases, microbiology, pharmaceutical sciences, infection prevention and control, and public health as well as animal health, veterinary medicine, agriculture and food animal producers.

Schematic and list of agency and committee acronyms:

<table>
<tr><th>Primary Accountable Agencies</th><th>Working through Divisions, but not limited to:</th></tr>
<tr><td rowspan="5">Public Health Agency of Canada
and
Canadian Food Inspection Agency</td><td>Infectious Diseases Prevent and Control Branch</td></tr>
<tr><td>Canadian Nosocomial Infection Surveillance Program</td></tr>
<tr><td>National Microbiology Laboratory
Laboratory for Foodborne Zoonoses</td></tr>
<tr><td>Pan-Canadian Public Health Network -- Infectious Disease Steering Committee</td></tr>
<tr><td>Canadian Integrated Program for Antimicrobial Resistance Surveillance</td></tr>
<tr><td>Agriculture and Agri-food Canada</td><td rowspan="2">Veterinary Drug Directorate</td></tr>
<tr><td>Health Canada</td></tr>
<tr><td>Provincial/territorial health and agriculture ministries</td><td>Pan-Canadian Public Health Network – Infectious Disease Steering Committee</td></tr>
<tr><td>Provincial/territorial microbiology reference laboratories</td><td>Public Health Laboratory Network</td></tr>
<tr><th colspan="2">Collaborating Agencies (representing proposed stakeholder groups in the CAAS)</th></tr>
<tr><td colspan="2">Association of Medical Microbiology and Infectious Diseases
Canadian College of Microbiologists
Canadian Association for Clinical Microbiology and Infectious Diseases
Canadian Pharmacy Association
Canadian Veterinary Medical Association
Canadian Animal Health Laboratorians Network
IMS Health Canada
Commercial diagnostic microbiology laboratories</td></tr>
</table>

2. **Commit to maintain funding for existing national surveillance programs (CNISP, CIPARS, and organism based surveillance) that will form the core of CAAS, as well as funding for the Office of AMR, and plan support for expanded activities within an integrated multi sector plan to evolve towards comprehensive Canadian AMR and AMU surveillance.**

Accountable: federal government, through PHAC, Health Canada, and Agriculture and Agri-Food Canada, and CIDSC, provincial and territorial ministries of health and agriculture, and public health agencies, public health laboratories.

Collaborative: Commercial laboratories

Provincial Ministries of Health and Ministries of Agriculture would continue to develop initiatives on antimicrobial resistance and utilization surveillance in affiliation with the CAAS surveillance network. A shared model is optimal for infrastructure support, recognizing that provincial data are needed to inform local, regional, national and international analysis and planning. Federal support and leadership are required for effective coordination, setting national standards and direction, and developing appropriate infrastructure to collate these data into a national AMR and AMU surveillance picture.

3. **Initiate a Canadian antimicrobial susceptibility data warehousing initiative, a new surveillance component designed to address the current absence of AMR surveillance in key community (and hospital) pathogens. Initially, antibiograms (antimicrobial susceptibility data from microbiology laboratories) would be collated for comparison, with eventual data collection based on the European Union model, submitted from individual laboratories to a centralized database, to support ongoing resistance monitoring as well as development and evaluation of AMU/stewardship interventions.**

Accountable: PHAC, CAAS

Collaborative: provincial, public and commercial laboratories, AMMI Canada and CAMM

We found a significant gap in current AMR surveillance in Canada with respect to community-based AMR data. Community and hospital antimicrobial resistance data are generated daily in microbiology laboratories, but valid comparison is limited because of differing laboratory methodologies and variation in reporting. With development of national data sharing agreements across provincial and territorial governments under a public health mandate, collaborative development of agreed antibiogram processes, definitions, and technical infrastructure would enable better data collation and comparison. Support for distinguishing in-hospital from community isolates would expand data on hospital-driven AMR, and provide for anonymized line listed data by isolate. The system could be piloted in provinces that have begun this work, with central support from the Office of AMR. Priority organisms for initial surveillance are presented in Tables 4.1 and 4.3.

4. **Centralize and enhance the national collation of hospital antimicrobial utilization data in the Office of AMR, to provide data to support hospital based antimicrobial stewardship programs and development of national guidelines.**

Accountable: Office of AMR, CAAS,

Collaborative: through CAAS - CNISP, AMMI Canada-CHEC and ASRC, Public Health Network

Potential sources for hospital utilization data include direct collection from sentinel hospital pharmacies (CNISP model), or hospital purchasing data through the IMS proprietary dataset (CIPARS model). Comparison of these data sets for accuracy and cost by the CAAS would support recommendations for future hospital utilization reporting, including considerations of representativeness of sentinel sites, and basic reporting requirements from all sites. The Office of AMR would provide technical support for data collection and analysis.

5. **Publish an annual, comprehensive, integrated AMR and AMU surveillance report, to include the AMR data currently collected by CIPARS and CNISP, data collected under recommendations 3 and 4, federally owned propriety community AMU data, and data on AMU in food and companion animals (including Own Use importation and Active Pharmaceutical Ingredients), AMR data in veterinary pathogens, and any data available on soil and water surveillance for AMR organisms and antimicrobials.**

Accountable: CAAS, with all collaborating agencies coordinated by the Office of AMR

The Office of AMR would initiate publically available integrated AMR and AMU reporting including characterization of relevant denominators and performance indicators and advise on requirements to obtain data where they are missing, or on development of alternate data sources (such as use of provincial pharmacy records rather than proprietary datasets). The CAAS advisory committee would review and provide advice on report content and presentation.

6. **Create a collaborative national working group on animal AMR and AMU within CAAS, to establish minimum reporting requirements for antimicrobial susceptibility data from Canadian academic, provincial and commercial veterinary laboratories, and identify data sources to develop an AMU surveillance system for food animal production, companion animals and aquaculture, supported by the Office of AMR.**

Accountable: CAAS

Collaborative: microbiology associations (AMMI, CCM, CVMA, CAHLN-Canadian Animal Health Laboratorians Network, food animal industry and producer representatives

The development of AMR reporting for animal populations should be done in a collaborative framework drawing on expertise in human health. Pilot projects could be initiated in sentinel sites (e.g. CIPARS sites) and academic veterinary centres to create a model which could be expanded to large commercial labs and smaller labs over time. In animal AMU more comprehensive food animal data is a specific need; current information is

based on purchased data, but an optimal system would be based on utilization data, with development of methods to assess unregulated sources (i.e. active pharmaceutical ingredients (APIs), Own Use antimicrobials).

7. **Propose an Antimicrobial Resistance Research Strategic Initiative, as a collaboration of PHAC with CIHR and other Federal-Provincial-Territorial and private industry stakeholders to bring together basic, epidemiologic, pharmacologic and clinical sciences to identify the specific data needs that the improved AMR surveillance system would provide.**

Accountable: CAAS for proposal development, with PHAC, HC, AAFC, CFIA, EC and CIHR

Strategic initiatives under CIHR fund collaborative groups to develop strategies that address specific priorities that "identify key gaps, and opportunities, in order to propose solutions". Given that AMR is a major concern in health research and is significantly understudied, and will require engagement of health researchers, institutions, health providers, public policy makers and citizens, this is an area that would fit well with the CIHR strategic initiatives mandate. The identified gaps and opportunities pertaining to data would guide the on-going development of AMR and AMU surveillance.

Phase 2: Year 3 through 5

8. **Develop legislation for both the formal recognition of the "One Health" initiative by the Public Health Agency of Canada, and the elimination of importation loopholes for food animal and veterinary use, i.e. the Own Use Provision and importation of active pharmaceutical ingredients (API), for antimicrobials of importance in human health.**

Accountable for hosting collaboration to develop proposal: CAAS, Minister of Health, Health Canada

Major collaborator-the Ad Hoc Committee for Antimicrobial Stewardship in Canadian Agriculture and Veterinary Medicine

The One Health framework is well recognized and provides a valuable framework for AMR, AMU and zoonotic disease assessment and control. Development of a regulatory solution to the problem of API and Own Use importation for antimicrobial use is considered essential to enable accurate surveillance of antimicrobial usage in food animals and could address public health, food safety, and trade risks. Industry and producer stakeholder groups should be invited to contribute to a staged implementation, leading to veterinary oversight of antimicrobial use in veterinary and food animal populations. There are successful international models to support sensitivity to the requirements of Canadian food animal producers. The working groups of CAAS can support development of proposed legislation, led by the Office of AMR.

9. **Develop methods to collect data on indications for prescribing in all antimicrobial utilization surveillance systems (including community and veterinary), to support development of prescriber audit and feedback for education and AMR control.**

Accountable: CAAS

Collaborative: provincial and regional surveillance and stewardship programs

Indication for antimicrobial prescription data can be collected through linkage of provincial billing and prescription data or by standard periodic audit. These data should be used to provide prescriber feedback, and support development of guidelines and other interventions. Local use of prescriber feedback is an evidence-based method of improving antimicrobial prescribing. Provinces or regions that are more advanced in this type of data linkage could be engaged in this initiative.

10. **Develop and disseminate AMR and AMU education materials for use by training programs and continuing education in human medical and veterinary health professions, and for the general public.**

Accountable: NCCID, CAAS

Collaborative: CVMA, professional associations including AMMI Canada and others, provincial agriculture

Education is not explicitly within the mandate of this report, but is an integral component to the processes and infrastructure recommended here. Accurate, relevant and current data on AMR and AMU are an important foundation for the development implementation of education progress for professionals and the public. In collaboration with knowledge translation agencies and academic institutions, an education focused subgroup of CAAS and stakeholder professional agencies would:

1) Retrieve information from the CAAS regarding prescribing practices by discipline and profession (doctors, veterinarians, for example) as a needs assessment and to understand a baseline

2) Develop appropriately focused educational materials for new instruction and curricula.

Materials developed in this fashion could be freely shared, and be used to support the integration of stewardship-focused AMR education. These efforts should take place at the level of educational institutions and professional bodies, including certification granting bodies and professional associations, in medical, veterinary, dental, pharmacy, and other health professions education.