

# TAKING A BITE OUT OF ANTIBIOTIC PRESCRIBING



*A workshop report on  
developing a sustainable  
antimicrobial stewardship  
strategy for Canadian dentistry:  
January 2024*

## *Executive Summary*

A workshop was held on October 17<sup>th</sup>, 2023, bringing together Canadian dental leaders and global experts to coordinate a strategic antimicrobial stewardship agenda for Canadian dentistry. The workshop shared global best practices, challenges and evidence-informed approaches to address dental antibiotic prescribing.

Overall, a leadership gap in antimicrobial stewardship in Canadian dentistry was acknowledged. Three priorities for action and collaboration for more appropriate antibiotic prescribing were identified and themed as: data, education and accountability. Actions to address these priorities include changes to dental prescribing practice, education of current and future dentists, data monitoring and analysis, and professional accountability mechanisms. Canadian dentists are poised to serve as national and global leaders in advancing the critical agenda of antimicrobial stewardship.

## Background

Antibiotic prescribing is inherent to the practice of dentistry. It is estimated that dentists are responsible for 10% of all antibiotics prescribed to humans globally. However, research has shown that up to 80% of dental antibiotic prescriptions may be considered unnecessary.<sup>(1, 2)</sup> Given the significance of the problem of antimicrobial resistance (AMR)—recognized as one of the top ten global public health threats by the World Health Organization (3), directly responsible for 1.27 million deaths and associated with approximately 5 million death cases worldwide in 2019 (4)—it is crucial to develop stewardship strategies for Canadian dentistry to address this critical problem.

While medicine and pharmacy have made significant stewardship efforts in Canada, antimicrobial stewardship (AMS) in dentistry is still nascent, lacking structure, consensus and coordination. Nevertheless, there is interest and support for moving forward with dental AMS in Canada, by both government and dental organizations, as well as other health care providers, and a recognized need for research in this field (5).

With evidence of growing interest and momentum, a workshop was planned to bring together health care leaders and experts to determine an effective approach to dental AMS in Canada. This workshop marked the initial engagement of a diverse group of participants (Appendix A) committed to the development of a unified action plan for dental AMS in Canada. “Taking a Bite Out of Antibiotic Prescribing: Developing a sustainable Canadian AMS Strategy in Dentistry” was held on October 17, 2023, at the Faculty of Dentistry, University of Toronto.

The workshop was conceived as part of a collaborative effort involving researchers from three universities: Universities of Manchester, Melbourne and Toronto. It was funded by the Manchester-Melbourne-Toronto (MMT) Research Fund<sup>i</sup>. The researchers from Manchester and Melbourne are recognized as leaders with significant experience in dental AMS in their respective countries, as well as globally and their expertise provided valuable input to this project.

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<sup>i</sup> The Manchester-Melbourne-Toronto Research Partnership Development Fund 2022, provided by the Universities of Manchester, Melbourne and Toronto

## Pre-workshop focus groups

*As an initial step towards developing an effective approach to dental AMS in Canada, researchers from the University of Toronto conducted a preliminary study to understand the perspectives of Canadian leaders and experts on dental AMS.*

*Online focus groups were held in the summer of 2023 to inform the development of the subsequent inter-professional, multi-stakeholder workshop, held on October 17, 2023, at the Faculty of Dentistry, University of Toronto.*

**Online focus groups  
with dentists,  
physicians,  
pharmacists,  
educators,  
regulators, policy-  
makers, advocates**

## The workshop

The workshop commenced with panel presentations by researchers from British Columbia, Ontario, United States, United Kingdom, and Australia, with the purpose of sharing insights and innovations in AMS best-practices in these jurisdictions (Appendix B). Based on the presentations and individual expertise, attendees were invited to participate in one of three group discussions. These were structured so as to define three key priorities for action and collaboration in dental AMS, as well as to outline the initial phase of an action plan for Canadian dentistry. One member from each group subsequently presented the key points from its discussion to the entire assembly.

“Antibiotics are important adjuncts to preventing and treating serious dental infections. So, when patients need them, we really need them to work.”

## Three priorities for action and collaboration in Canadian dental AMS: Data, Education, Accountability

### 1. Data

The collection of robust data on dental antimicrobial prescribing was considered by participants to be a major priority for developing stewardship strategies in dentistry. It can be argued that data collection is foundational for the development of evidence-supported guidelines and for effective educational and evaluation efforts in AMS, all of which were perceived as essential pre-conditions for action and collaboration. Moreover, data will serve to support better research, patient care, and thus, public health, by providing a more comprehensive and integrated view of dental antimicrobial prescription practices and outcomes.

In Canada, although healthcare is publicly funded, both dental care and pharmaceuticals prescribed outside of the hospital setting are primarily privately funded, thereby making prescription data by community dentists challenging to obtain. As such, the collection and centralization of prescription data in dentistry faces numerous other challenges, including a lack of effective communication between different segments of collected information. Mandated data collection for antimicrobial use could provide a more accurate understanding of over-prescription tendencies and support AMS interventions, such as audit and feedback, a strategy that has been successfully adopted in the medical field. Therefore, any opportunities to collect data, must be seized through engagement with partners, including dental associations, health agencies, and government bodies.

Robust data is essential for understanding and reducing over-prescribing of antibiotics in dentistry

*“It is a capital mistake to theorize before one has data.”*  
— Sherlock Holmes

### 2. Education

There was engaging discussion to develop strategies for enhancing education, which must target both patients and providers. These strategies were categorized into three main areas of focus: training of dental students and retraining of providers; dental prescription guidelines; and, knowledge mobilization.

## 2.1 Training and Re-training

Discussions of education and training focused on both the training of dentistry students in the ten dental schools of Canada, and re-training of practicing dentists through continuing dental education (CDE) programs.

With respect to training dental students, ensuring standardization of the curriculum on antimicrobial resistance and stewardship in all ten dental schools in Canada was considered most imperative. This could be supported and strengthened by revising accreditation standards for dental undergraduate and postgraduate education to include competencies in AMS and including assessment of such in licensing exams, such as the National Dental Examining Board of Canada exams and the Royal College of Dentists of Canada Fellowship exams.

In terms of re-training dentists, there are different categories of dental practitioners which make CDE in antimicrobial resistance and stewardship important. Firstly, over half of new dentists practicing in Canada are international dental graduates who are certified through a direct licensing process. Irrespective of these dentists being graduated from accredited or non-accredited programs (based on being recognized by the Commission on Dental Accreditation of Canada), there is considerable variation in education on antimicrobial resistance and stewardship among schools. Therefore, some form of retraining for internationally-trained dentists should be instituted.

Secondly, as dentists start practicing in the real world, which is a different environment than the intra-mural practice of dental schools, the guiding force for dental prescriptions is sometimes **beyond** clinical conditions. Therefore, there is a continuous need to address the gap between education and real-world practice. Further, evidence suggests that physicians who are late or mid-career are more likely to overprescribe antibiotics (6) and it is likely that the same trend is present in dentists. Bridging the gap between evidence and practice can be challenging. For example, there are clinical instructors in dental schools, who are generally practicing dentists, and not full-time academics, and they may have a different understanding on antibiotic prescribing than those supported by the latest research and by evidence-supported practices in antimicrobial resistance. Passing on their own perceptions, not supported by evidence, to dentists in making can be detrimental for future dentistry.

*Education in AMR and AMS must begin at the start of undergraduate education and continue through the practice years. Appropriate dental antibiotic use should be communicated to other health care providers, patients and the public.*

To this end, workshop participants agreed that CDE courses and other elements of provincial quality assurance (QA) requirements should be developed for practicing dentists. Currently, continuing education courses that aim to update dentists on AMR and AMS aspects are not mandatory. Participants highlighted that dentists who usually choose to attend such courses are already more cognizant of such issues than those who do not attend. Aligning CDE with QA requirements of dental regulators was therefore deemed to be important. It was further suggested there should be consistency in the curricula of other health sciences such as medicine and pharmacy, so that the messaging about dental antibiotic use is aligned.

## ***2.2 Dental prescribing guidelines***

Evidence-informed guidelines need to be developed and kept updated to reflect the latest evidence, as a means to improve providers' knowledge for better management of oral and dental conditions without relying on inappropriate antimicrobial usage. Guidelines would provide practitioners with readily available resources for shared decision making with patients, ensuring that their decisions could withstand pressures from outdated recommendations by other health care practitioners, patients' demands for antibiotics, and potential patient complaints and/or litigation. Such guidelines could support regulators to develop standards for setting expectations for dental practitioners and also to review complaints from patients judiciously, which are not in compliance with guidelines/standards.

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*Guidelines provide clear recommendations for best practices, and help patients to make informed decisions*

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## ***2.3 Knowledge mobilization***

Although developing relevant guidelines are central to educating dentists and patients about the appropriate use of antibiotics, the output of information alone will not suffice in terms of changing behaviour. Participants pointed to the fact that the majority of interventions solely based on education and regulation do not generate change, given that behavioral components are not addressed. Participants agreed that promoting behavioral change requires the use of robust behavioral change theory for designing a sound knowledge mobilization plan. Such theories can assist dental leaders and providers in several ways: by providing a structured framework for understanding providers' motivation when prescribing antibiotics in situations where they are unnecessary; by examining the reasons behind patient expectation for receiving antibiotic prescriptions; by effectively intervening for better stewardship in dentistry; by determining the target audience for information; by framing messages; and, by facilitating the monitoring and evaluation of the impact of AMS strategies and messaging for behavioral change.

Applying behavioral change theories to dental AMS knowledge mobilization may enhance the adoption of best practices (7) and contribute to the broader public health goal of mitigating antibiotic resistance through informed interventions.



If the primary goal of disseminating information on AMS is to facilitate behavioral change, then addressing concerns related to changing providers’ prescription habits, overcoming potential obstacles to change, and managing patients’ expectations are of paramount importance. To effectively impact patients’ treatment and promote responsible antimicrobial use, it is essential to engage AMS partners in knowledge dissemination while also communicating with grassroots dentists and patient populations.

Although there have been several advances on the west coast of Canada through the leadership of groups such as ‘Do Bugs Need Drugs’<sup>ii</sup>, strategies for patient education in AMR and AMS are currently not consistent across the country. Participants noted that dissemination of information to the public should be centralized and focused on raising awareness through national campaigns. At the same time, pre-existing local or provincial initiatives or mandates for AMS need to include components related to dental prescribing.

Participants believe that disseminating information to the public should involve demonstrating the impact of antimicrobial resistance on individuals and using patients’ voices to share personal stories of experiencing AMR. Furthermore, patients should be informed about the difference between inflammation and infection, as well as the distinction between local and systemic infections. This can be facilitated through the use of devices similar to the viral prescription pads commonly used in medical contexts and other shared decision aids that have been disseminated to primary care providers through the Choosing Wisely Canada campaign to avoid unnecessary antibiotic prescriptions for viral infections in primary care settings.(8)

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<sup>ii</sup> <https://dobugsneeddrugs.org/>



With respect to the information disseminated to providers, messaging should be framed in a way that conveys that dental AMS is a professional obligation, rather than a choice. Currently, AMS is not considered to be integral to a dental professional's role.

Participants contrasted this to significant resources and attention driven towards appropriateness of opioid prescribing by dentists, given the prescription opioid public health crisis. Hence, strategies for disseminating information on responsible dental antibiotic prescribing should treat this category of medication similarly to that of opioids.

### 3. Accountability

As mentioned, participants suggested that antibiotics should be treated in a similar fashion to controlled substances, such as opioids. This approach would enable the tracking of antibiotic prescriptions in a manner similar to the Narcotics Monitoring System (NMS)<sup>iii</sup>, resulting in the creation of more robust data, which is critical for dental AMS, as noted earlier. Implementation of specific provisions to make healthcare providers more accountable was also recommended, including record-keeping requirements and monitoring systems. These measures are seen as enablers for ensuring accountable and responsible antibiotic use. Accountability mechanisms should be similar to those regulating the improper management of opioids, or with those ensuring the quality of disease management, through regulatory standards.

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*Dental AMS is a professional obligation and should be integral to a dental professional's role*

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<sup>iii</sup> <https://www.ontario.ca/page/narcotics-monitoring-system>

## Moving forward: Action plan for Canadian Dental AMS

When tasked with selecting among the three priority topics for developing an initial actionable plan, workshop participants selected data and education as primary objectives

### 1. Data

To collect data for dental AMS effectively, it is essential to have a clear understanding of the objectives for data collection and to develop a plan that outlines which types of data should be collected. Moreover, participants emphasized the significance of considering both balancing measures and potential consequences when planning and implementing data collection strategies for dental AMS in Canada. This approach ensures that data collection efforts effectively address the issue while minimizing any unintended consequences.

The following objectives for data collection were proposed by workshop participants: to help track antimicrobial use; to aid development of evidence-informed guidelines; to address the gaps between evidence/emerging science and clinical dental practice; to plan and evaluate interventions to address suboptimal prescribing patterns; to address providers' fear of change as well as patients' expectations; and, ultimately, to prevent complications and comorbidities linked to antimicrobial resistance.

Participants suggested that data to enhance the effectiveness of dental AMS efforts should be collected in two different ways. First, at the national level, antibiotic use data might be in the form of line-listed, anonymized prescriptions to allow for detailed analysis of drug, dose, duration, indication, and broad prescriber demographics. It was proposed that this could be explored with the national sources, such as the Non-Insured Health Benefit plan data with Indigenous Services Canada, administrative data with Canadian Institute for Health Information, and data for Canadian Armed Forces through Canadian Forces Dental Services. It is also important to keep a tab on evolving opportunities, such as the Canadian Dental Care Plan or future Pharmacare programs. Second, more specific data could be collected at the provincial level, for the purpose of guiding individual practitioners prescribing behaviors through audit and feedback, mentoring and coaching. This latter concept is currently being explored in both BC and Ontario.

*Understanding the purpose of data collection will determine how it is collected.*

*Anonymous data collected nationally will help us to understand general prescribing patterns to inform research projects and awareness campaigns.*

*Practitioner specific data collected provincially will support targeted interventions such as audit and feedback.*

Ideally this early work in these two provinces could inform a broader pan-Canadian data strategy with the depth and scope to support innovative dental AMS efforts.

## 2. Education

To understand and promote the standardization of antimicrobial resistance and stewardship disciplines in dental schools, participants suggested that an initial study be conducted with the purpose of examining baseline data and teaching patterns from all ten Canadian dental schools. To this end, strong communication with deans and/or key faculty members of dental schools across Canada should be established to gather information concerning four-year curricula, the percentage of the curriculum dedicated to antibiotic resistance and stewardship, and the allocation of teaching hours dedicated to such topics in the ten Canadian dental schools. This will help to identify and address the main and most urgent deficiencies in dentistry programs across Canada.

In tandem, a second study, aimed at conducting an environmental scan of dental regulatory bodies and associations in Canada's three territories and ten provinces, should be developed with the purpose of assessing the availability and quality of continuing dental education courses. The ultimate objective of both studies is to seek, understand, and promote the equivalency of antimicrobial resistance and stewardship courses in dental curricula across Canadian dental schools and dental regulatory bodies.

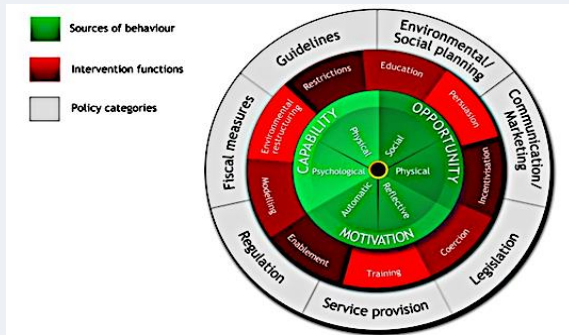
### Gathering Data to Enhance Education

Two environmental scans

1. Dental education curricula in all ten dental faculties across Canada to understand what is being taught to dental students in regards to antimicrobial indications, usage and unnecessary usage, and unintended effects.
2. Continuing education courses on antibiotic resistance and stewardship offered by regulatory colleges, dental associations, and dental faculties in

To address the discrepancy between theoretical and practical education, participants suggested that dental schools provide training sessions, in antibiotic resistance and stewardship, for clinical instructors teaching at these institutions. In addition, to educate the existing workforce, continuing education courses in AMR and AMS should be mandatory, free of charge when possible, and built-in to the QA programs operated by regulatory bodies. As concerns the employment of a behavioral change theory to develop evidence-informed guidelines, facilitate information dissemination, and enhance knowledge mobilization to improve public and provider education, two suggestions for analytical lenses were proposed by participants: the Behaviour Change Wheel (BCW), and the Social Behaviour Change Communication (SBCC) theory.

The BCW framework is based on 19 previously developed behavioral change models, and consists of three layers: COM-B system (which purports that behavior is a function of capability, opportunity, and motivation); intervention functions (interventions that can be used to change behavior); and, policy categories (policies that can support the implementation of interventions). (9)



**Behaviour Change Wheel**

Linking interventions to targeted behaviour using the Behaviour Change Wheel<sup>9</sup>

The model entails a 'behaviour system' at the hub, encircled by intervention functions and then by policy categories

In turn, the SBCC, has long been an important tool in the promotion of health programs by precipitating behavioral change, as well as altering attitudes and societal norms. (10) The SBCC involves engaging individuals, key stakeholders, patient advocates and local institutions, as well as the participation of the community through the strategic use of messaging (including patients’ stories on the impact of AMR) and communication, to create a positive behavior change in health. Communication depends on target audience and can happen at an interpersonal level or through mass communication channels. (11,12) With these concepts in mind, participants had many suggestions for the development of specific tools, adapting materials as appropriate from established programs, such as the ‘Do Bugs Need Drugs’<sup>iv</sup> initiative and Choosing Wisely Canada’s ‘Using Antibiotics Wisely Campaign.’<sup>v</sup> Below are examples of education material for the public from these two programs.



<sup>iv</sup> <https://dobugsneeddrugs.org/>

<sup>v</sup> <https://choosingwiselycanada.org/primary-care/#using-antibiotics-wisely>

## Challenges and Opportunities

While challenges to AMS were acknowledged and discussed, many opportunities for meaningful change were also identified. Challenges shared by participants included:

- Absence of robust data
- Old habits, prescription patterns, personal beliefs, and treatment expectations
- Risk aversion, patients' expectations, fear of litigation
- Knowledge gaps, lack of consistent up-to-date teaching, and clear guidelines
- Lack of chair-side aids/patient resources/toolkits
- Absence of a unified national approach

These challenges underscore a set of potential opportunities, identified by participants including:



- Growing awareness of the problem, many champions in the field of AMS
- Willingness of organized dentistry and governmental organizations to address the problem
- “Don’t need to re-invent the wheel” – draw upon work done in dentistry in the UK and Australia, and in medicine and pharmacy in Canada
- Potential data sources to explore, nationally and provincially
- Education
  - Curriculum review, CDE for clinical instructors
  - Accreditation and licensing requirements
  - Development of consistent up-to-date guidelines
  - CDE for practicing dentists
  - Regulatory quality assurance programs

## Conclusion

Given the global and critical challenge of AMR, and dentistry's particular contribution to the problem, it is important that dentistry in Canada create stewardship strategies. Dentistry in Canada lags behind in terms of creating a national framework and promoting a coordinated approach to the problem. Canadian dentists and healthcare leaders are well positioned to provide national and global leadership, as well as action on the critical global public health issue of AMS. The workshop held on October 17th, 2023 with dental leaders and antimicrobial experts, marked the beginning of a concerted effort to coordinate an effective AMS agenda for Canadian dentistry. Three priorities for action and collaboration for more appropriate antibiotic prescribing were identified: exploring opportunities for relevant data, enhancing training of dental students and re-training of practicing dentists, and professional accountability. Moreover, it concluded that, among these priorities, stakeholders should begin by gaining a better understanding of what is being focused on in dental schools and continuing education courses in terms of AMR and AMS, as well as by developing robust, standardized national data for assessing and enhancing the appropriate use of antibiotics in dental practice.

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## Appendix A: Workshop Participants

1. Amir Azarpazhooh	Professor, Dental Public Health and Endodontics, Faculty of Dentistry, University of Toronto
2. Bettina Basrani	Program Director, Endodontics, Faculty of Dentistry, University of Toronto
3. Frank Bevilacqua	CEO, Ontario Dental Association
4. Karen Born	Assistant Professor in Health Administration, Institute of Health Policy, Management & Evaluation, Dalla Lana School of Public Health, University of Toronto
5. Michael Casas	Dentist-in-Chief, Hospital for Sick Children, Toronto ON
6. Lucie Byrne-Davis	Professor of Health, University of Manchester
7. Caroline Fulop	Secretary-Treasurer, Canadian Association of Hospital Dentists
8. Helene Goldberg	Senior Dental Consultant/Team Lead, Professional Conduct and Regulatory Affairs, Royal College of Dental Surgeons of Ontario
9. Jim Yuan Lai	Professor, Teaching Stream; Vice Dean of Education, Faculty of Dentistry, University of Toronto
10. Bradley Langford	Antimicrobial Stewardship Pharmacist Specialist, Public Health Ontario; Assistant Professor, Dalla Lana School of Public Health, University of Toronto
11. Christiana Martine	Research Associate, Department of Public Health; Prosthodontist Instructor, Faculty of Dentistry, University of Toronto
12. Mark McIntyre	Pharmacist, Program Lead - Antimicrobial Stewardship at Sinai Health
13. Vanessa C. Mendes	Assistant Professor, Teaching Stream, Graduate Program Director – Periodontics, Faculty of Dentistry, University of Toronto
14. Aboubakar Mounchili	Senior Epidemiologist, Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada
15. Michelle Mun	Lecturer Digital Health Transformation, University of Melbourne
16. Brock Nicolucci	President, Ontario Dental Association
17. Jill Oxner	Program Director, Pediatric Dentistry, Faculty of Dentistry, University of Toronto
18. David Patrick	Director of Research, The British Columbia Centre for Disease Control
19. Carlos Quiñonez	Professor and Vice Dean and Director of Dentistry, Schulich School of Medicine & Dentistry, Western University



20. Kevin Schwartz	Infection control and antimicrobial stewardship physician, Public Health Ontario; Assistant Professor, Dalla Lana School of Public Health, University of Toronto; Co-medical Director, Antimicrobial Stewardship Program, Unity Health Toronto; Head of the Division of Infectious Diseases, St. Joseph's Health Centre – Unity Health Toronto; Adjunct Scientist, ICES.
21. Sonica Singhal	Assistant Professor and Program Director, Dental Public Health, Faculty of Dentistry, University of Toronto
22. Benoit Soucy	Director of Clinical and Scientific Affairs, Canadian Dental Association
23. Katie Suda	Research Health Scientist, Center for Health Equity Research and Promotion at the VA Pittsburgh Healthcare System; Professor of Medicine, University of Pittsburgh School of Medicine
24. Susan Sutherland	Dental Staff, Sunnybrook Health Sciences Centre; Associate Professor, Faculty of Dentistry, University of Toronto
25. James Taylor	Chief Dental Officer of Canada, Public Health Agency of Canada
26. Susan Taylor	Director, Quality, Royal College of Dental Surgeons of Ontario
27. Leanne Teoh	Senior Lecturer of Dental Therapeutics, University of Melbourne
28. Wendy Thompson	NIHR Clinical Lecturer, Division of Dentistry, University of Manchester
29. Lynn Tomkins	Former president of the Ontario Dental Association and Canadian Dental Association
30. Zain Manji	President, Ontario Society of Oral and Maxillofacial Surgeons



## Appendix B Workshop Agenda

830-9	Check in, light refreshments
9-930	Welcome – Sonica Singhal Introductions – Karen Born
930-1030	<p><b>Sharing Innovations and Best Practices in Antimicrobial Stewardship – Part 1</b></p> <p>Panelists</p> <ul style="list-style-type: none"> <li>• Christiana Martine – University of Toronto - Findings from pre-workshop focus groups</li> <li>• David Patrick – British Columbia Centre for Disease Control - The BC Experience</li> <li>• Brad Langford – Public Health Ontario/Choosing Wisely Canada – Tools to Support AMS</li> <li>• Kevin Schwartz - Public Health Ontario – Community Antibiotic Stewardship</li> </ul> <p>Panel Discussion / Q&amp;A</p> <ul style="list-style-type: none"> <li>• Karen Born - Facilitator</li> </ul>
1030-11	Networking break
11-12	<p><b>Sharing Innovations and Best Practices in Antimicrobial Stewardship – Part 2</b></p> <p>Panelists</p> <ul style="list-style-type: none"> <li>• Wendy Thompson - University of Manchester – The UK Experience</li> <li>• Leanne Teoh - University of Melbourne – Australian Initiatives</li> <li>• Katie Suda - University of Pittsburgh – The ADA AMS Guidelines for Dentists</li> <li>• Lucie Byrne Davies - University of Manchester - Understanding Behaviour Change</li> </ul> <p>Panel Discussion / Q&amp;A</p> <ul style="list-style-type: none"> <li>• Karen Born – Facilitator</li> </ul>
12-1245	Networking lunch
1245-1	Introduction to afternoon sessions
1-2	<p><b>Advancing AMS Collaboratively</b></p> <p>Small group sessions and report back - Karen Born – Facilitator</p>
2-215	Networking break
215-345	<p><b>Developing Action Plans</b></p> <p>Small group sessions</p> <p>Debrief and plenary discussion - Karen Born – Facilitator</p>
345-4	Wrap up – Sonica Singhal

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