Rational Therapeutics and Medication Policy Research Group

RTMP

What Canadians need to know about their medication

Report of the RTMP national stakeholder roundtable

April 20th, 2017

Ottawa, Ontario

www.rationaltherapeutics.ca

Acknowledgements

Participating Organizations:

Keynote Speaker:

Chris Power, CEO, Canadian Patient Safety Institute

Presenters:

Patricia Carruthers-Czyzewski, Manager, Risk Communications, Health Canada

Lynne Zucker, Vice President, Clinical Systems Integration, Canada Health Infoway

Panelists:

Isabelle Laurendeau, Biomedical Field Sales Representative, EBSCO Health (DynaMed)

Raymond Chevalier, Pharmacist and Président, Vigilance Santé

Lynette Kosar, Information Specialist and Pharmacist, RxFiles Academic Detailing Program

Barry Power, Director of Therapeutic Content, Canadian Pharmacists Association (RxTx)

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RTMP Members:

Dr. L. M. Bjerre, MD, PhD, CCFP

Dr. Doug Coyle, MA, MSc, PhD

Dr. Barb Farell, BScPhm, PharmD, FCSHP

Dr. Marc-André Gagnon, PhD

Dr. Roland Halil, PharmD, ACPR, BScPharm, BSc (Hon)

Don Husereau, BScPharm, MSc

Dr. Julian Little, MA, PhD

Dr. Jordan Littman, MD

Dr. Kevin Pottie, MD, MSc

Dr. Kednapa Thavorn, B.Pharm, M.Pharm, PhD

Dr. Régis Vaillancourt, OMM, CD, B.Pharm, Pharm D, FCSHP, FFIP

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Letter from research group lead

Dr. Lise M. Bjerre, MD, PhD, CCFP

Lead, Rational Therapeutics and Medication Policy Research Group

Thanks to ongoing advancements in the field of medical therapeutics, more medications are available to health care providers and patients to help treat and manage a range of health conditions than ever before.

While these medical breakthroughs have improved quality of life and longevity for millions of Canadians, the availability and use of multiple prescription and over-the-counter medications, combined with various natural health products, have also exacerbated health risks – and health spending – associated with their use and misuse.

As a result, medication management has emerged as a top priority among health care providers and patients, alike. But managing medications well requires universal access to high-quality medication information for both patients and health care providers – and this universal access is lacking in Canada.

While various medication information resources designed as point-of-care clinical decision-making tools are available to health care providers in Canada, there are no agreed-upon quality standards in place guiding their format and content, and there is no universal access to them. Indeed, these tools are usually available only through paid subscriptions – the cost of which is often borne by health care providers themselves, particularly in community-based primary care.

From a health care provider's perspective, the ideal Canadian medication reference would be integrated with patients' electronic medical records and readily available at the point-of-care to help answer medication-related questions and to facilitate appropriate prescribing and deprescribing during patient visits.

Health care providers in Canada should have universal access to high-quality, standardized medication information and right now, they don't. This is deeply concerning.

Without universal access to such a tool, it is difficult for health care providers to keep up with constantly evolving information about the multitude of medications available on the market, including information related to serious adverse effects identified after a medication is already approved and released on to the market.

All health care providers in Canada should have access to the same, high-quality medication information, and right now, they don't. This is deeply concerning. Indeed, surgeons are not expected to pay out of their own pockets for scalpels and suture materials, the tools of their

trade – why, then, should family doctors, who write approximately 85% of all prescriptions for Canadians, be expected to do so for medication information, a basic tool of their trade?

Evidence suggests that by empowering patients, we would improve population health. Universal access to good quality medication information in a language and format appropriate to the general public would help empower Canadians to make better decisions about medications, for themselves and their loved ones, and to participate more fully in their own care.

We can learn from the experience of countries like the Netherlands, Australia, Denmark and others, who identified access to medication information as a central component of high-quality, patient-centered care, and are global innovators and leaders in this field. It is about time for Canada to catch up.

We are calling upon the federal government to lead the way forward; to enlist the support of its provincial and territorial counter-parts; to invest in the work required to provide universal access to point-of-care, Canadian medication information, for health care providers and for patients.

This work will help reduce and prevent inappropriate prescribing and medication misuse, thereby potentially saving our health system hundreds of millions of dollars annually, and saving lives. Furthermore, this should also be an integral part of any future Canadian Pharmacare policy and plan.

We hope that this report – summarizing the result of a joint effort among national-level stakeholder organizations and patient safety advocates – will set us in the right direction; towards the ideal Canadian medication reference.

I would like to acknowledge the support of the University of Ottawa Faculty of Medicine and Department of Family Medicine with this work and thank the Canadian Institutes of Health Research for funding the symposium. A special thanks everyone who attended the symposium and contributed to this report, and we thank our readers for their attention to this important issue. Please feel free to distribute this report broadly across your various networks.

Sincerely,

Dr. Lise M. Bjerre, MD, PhD, CCFP

Assistant Professor and Clinician-Investigator | Department of Family Medicine, University of Ottawa
Clinical Research Chair in Pharmacoepidemiology and Medication Appropriateness | Department of Family Medicine and Faculty of Medicine, University of Ottawa
Scientist | Bruyère Research Institute, Ottawa
Cross-appointed | School of Epidemiology and Public Health, University of Ottawa
Adjunct Scientist |Institute for Clinical Evaluative Sciences (ICES)
Staff Physician | The Ottawa Hospital Civic Family Health Team

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Executive summary

In Canada, medication problems created by inappropriate prescribing and medication misuse lead to preventable illness, injury, hospitalization and death year after year. These issues cost our health care system millions of dollars on top of what we spend on public medication programs, not to mention the human cost in terms of disability and death.

At a time when more and more seniors are prescribed a growing number of medications for an increasing number of health conditions, in addition to the growing number of over-the-counter and natural health products that are also available to consumers, our governments need to do more to protect population health by ensuring that both providers and patients can make fully informed decisions about which medications to prescribe and use, or to discontinue.

Currently, a number of medication information resources are available to Canadian health care providers for use as point-of-care clinical decision-making tools. However, no standards exist to regulate the development and presentation of medication information provided by these sources, and they are not universally accessible or paid for by the health care system. Care providers often have to cover the high cost of subscriptions out of pocket. At the same time, none of these tools has been designed specifically for use by Canadian patients; there is a lack of standardized medication information for patients presented in lay language, in a clear and understandable fashion.

> *"Medication information is to primary care what a scalpel is to surgery, but surgeons don't have to pay for their scalpels."*
>
> *Dr. Lise M. Bjerre*

The current situation puts Canadian patients at risk.

Concerned with these issues, the Ottawa-based Rational Therapeutics and Medication Policy Research Group (RTMP), under the leadership of Dr. Lise M. Bjerre, practicing family physician and Clinician-Investigator at the University of Ottawa Department of Family Medicine and Bruyère Research Institute, obtained funds from the Canadian Institutes for Health Research (CIHR) to convene a symposium of national-level stakeholder organizations and patient representatives to clearly identify the medication information needs of Canadians, examine currently available sources of information, learn about what is being done in other countries, and determine the desirable characteristics of a medication information resource that would meet the needs of Canadian patients and health care providers.

The Symposium was attended by a variety of national-level stakeholder organizations and patient advocates, who collaborated to develop a shared vision:

We envision a universally and easily accessible Canadian medication reference designed to meet the diverse needs of both health care providers and the public, which is sustainable and delivers trustworthy information about prescription and over-the-counter medications and natural health products, at no cost to the individual user.

To realize this vision, we have developed a work plan outlining our next steps but in order to move forward, we need support from the federal government.

Therefore, we recommend that the Government of Canada:

Confirm the need for a Canadian medication reference that is evidence-based and universally accessible to all Canadian patients and health care providers, leveraging existing medication information resources, as a critical part of the delivery of quality health care to all Canadians.

Facilitate engagement with key stakeholder organizations, including existing medication information providers, to contribute to an action plan to develop the ideal Canadian medication reference.

Allocate funding for the research and development of a clear action plan to develop the ideal Canadian medication reference, leveraging the strengths of existing tools and practices, and incorporating promising practices from around the world.

Commit to developing standards relating to the quality of medication information provided to Canadian health care providers and patients, in order to ensure that patients and providers across the country are making health care decisions based on the same quality of information.

Empower Canadian patients and families by providing medication information that is accessible and understandable regardless of age, ability, income or other potential barriers.

Encourage evidence-based, appropriate prescribing by ensuring that their health care providers have universal access to the best evidence and clinical decision-making tools when prescribing medications.

The national stakeholders roundtable, in partnership with the RTMP, and in collaboration with our networks, look forward to working with the Government of Canada and its provincial and territorial counterparts, to improve health care for all Canadians.

This vision and set of recommendations have been endorsed by:

Canada Health Infoway / Inforoute Santé du Canada

Canadian Medical Association / Association médicale canadienne

Canadian Nurses Association - Association des infirmières et infirmiers du Canada

The Canadian Patient Safety Institute

Canadian Pharmacists Association / Association des Pharmaciens du Canada

National Pensioners Federation / Fédération Nationale des Retraités

Department of Family Medicine, University of Ottawa / Département de médecine familiale, Université d'Ottawa

Institute for Safe Medication Practices Canada (ISMP Canada) Institut pour la sécurité des medicaments aux patients du Canada

Introduction

Canada lacks a universally accessible medication information reference that fully meets the needs of both patients and health care providers. This is unacceptable, given what we know about medication use and misuse in Canada.

What we know now

Canadians are often prescribed multiple medications

- In 2012, nearly two-thirds (65.9%) of seniors had claims for 5 or more medication classes under public medication programs, and more than one-quarter (27.2%) claimed 10 or more[1]
- 39.3% of Canadians age 85+ take 10 or more medications[2]
- 60.9% of Canadian seniors living in long-term care homes took 10 or more medications, compared to 26.1% living in the community[3]

Medication program spending continues to grow in Canada

- In 2014, Canadians spent an estimated $34.6 billion on medication, the majority of which (85.0%) was spent on prescription medications, at an estimated $29.4 billion[4]
- Prescribed medications accounted for an estimated 14.9% of total health expenditures[5]
- About 68% of $4.4 billion spent in Canada in 2012 on public medication programs was on seniors age 65+[6]

Canadian seniors are often prescribed potentially inappropriate medications

- In 2012, almost one-quarter of Canadian seniors on public medication programs used one potentially inappropriate medication from the Beers list and over 5% used multiple potentially inappropriate medications[7]
- Almost one-in-ten seniors age 65+ on a public medication program was prescribed Lorazepam, a benzodiazepine,

"The federal government has taken the very narrow, constitutionalist stance that pharmaceutical policy is, for the most part, solely a provincial responsibility. It offers no financial assistance for provincial medication plans, nor has it passed laws that would ensure policy makers, health professionals, and patients have critical information about the safety, efficacy, and even the availability of medications on the Canadian market.

Health care professionals and patients are left with limited scientific information about which medications are best for their patients, and scarcely any independent information sources."

From the Foreword by Steve Morgan, PhD (June 2014)

Gagnon, M-A (2014). *A Roadmap to a Rational Pharmacare Policy in Canada.* Canadian Federation of Nurses Unions; June 2014.

[1] CIHI (2014). Page 9. Medication Use Among Seniors on Public Medication Programs in Canada, 2012. Accessed May 26, 2017 from: https://secure.cihi.ca/free_products/Medication_Use_in_Seniors_on_Public_Medication_Programs_2012_EN_web.pdf
[2] Ibid.
[3] Ibid., page 10.
[4] OECD.Stat database. http://stats.oecd.org/
[5] Ibid.
[6] CIHI (2014). Page 12. Medication Use Among Seniors on Public Medication Programs in Canada, 2012. Accessed May 26, 2017 from: https://secure.cihi.ca/free_products/Medication_Use_in_Seniors_on_Public_Medication_Programs_2012_EN_web.pdf
[7] Ibid., pg. 9

for anxiety, the most commonly prescribed medication on the Beers list of potentially inappropriate prescriptions due to the associated risk of falls and other adverse events[8]

Primary care practitioners prescribe the most and often have questions

- Primary care practitioners prescribe about 85% of all prescription medications in Canada
- A recent study found that clinicians raised 0.57 questions per patient seen and, of these questions, 34% were related to medication treatment[9]
- A secondary analysis of the "Just-in-Time" information librarian consultation service database of questions asked by physicians at the point-of-care revealed that 52% of questions asked related to therapy; of these, 69% 70.7% addressed questions about medication treatment, representing 36% of all point-of-care questions[10]

Medication-related adverse health events costly to our health system

- Almost one-quarter of adverse events that patients present with in hospital are related to medication errors, according to the 2004 Adverse Events Study[11]
- The cost to our health system per adverse health event related to medication use is over $4,000 with the total cost estimated at $400 million per year[12]

Prescription medication abuse as a public health crisis

- Addiction is a potential side effect of prescription medication use; especially relating to the use of opioids (used to treat pain), benzodiazepines (used to treat anxiety and sleep disorders), and stimulants (used to treat attention deficit disorder)[13]
- In 2012, 410,000 Canadians reported abusing prescription medications like opioid pain relievers[14]
- In 2015, over 80,000 Canadian teenagers used prescription medications to get high[15]
- Fentanyl, a synthetic opioid medication used to treat pain, has drawn national attention in the past year due to the number of overdose deaths reported across Canada[16]
- To promote the safe and effective use of opioid treatment for chronic non-cancer pain, researchers at the Michael G. DeGroote National Pain Centre recently published *The*

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[8] Ibid, pg. 27.

[9] Del Fiol G, Workman TE, Gorman PN. Clinical Questions Raised by Clinicians at the Point of Care: A Systematic Review. *JAMA Intern Med.* 2014; 174(5):710–718. doi:10.1001/jamainternmed.2014.368

[10] Bjerre LM et al. What do primary care practitioners want to know? A content analysis of questions asked at the point of care, *Journal of Continuing Education in the Health Professions*. 2013; 33(4): 224-234.

[11] Baker et al (2004). The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *Canadian Medical Association Journal.* 2004; 170(11). Accessed July 5, 2017 from: http://www.cmaj.ca/content/170/11/1678.full.pdf+html

[12] Canadian Patient Safety Institute. How much do adverse events cost? Web page. Accessed July 5, 2017 from: http://www.patientsafetyinstitute.ca/en/toolsResources/Research/commissionedResearch/EconomicsofPatientSafety/Pages/default.aspx

[13] Government of Canada (2016). About prescription medication abuse. Web page. Accessed May 26, 2017 from: https://www.canada.ca/en/health-canada/services/substance-abuse/prescription-medication-abuse/about-prescription-medication-abuse.html

[14] Ibid.

[15] Ibid.

[16] See, for example: http://www.cbc.ca/news/canada/ottawa/fentanyl-crisis-ottawa-mayor-national-strategy-1.3945136

2017 Canadian Guideline for Opioids for Chronic Non-Cancer Pain, which updated the 2010 guideline using funding from Health Canada[17]

Purpose

Concerned with these issues, the Ottawa-based Rational Therapeutics and Medication Policy Research Group (RTMP), under the leadership of Dr. Lise M. Bjerre, practicing family physician and Clinical Investigator at the University of Ottawa Department of Family Medicine and Bruyère Research Institute, obtained funds from the Canadian Institutes for Health Research (CIHR) to convene a symposium of national-level stakeholder organizations and patient representatives. The purpose of the symposium was to clearly identify the medication information needs of Canadians, examine currently available sources of information, learn about what is being done in other countries, and determine the desirable characteristics of a medication reference that would meet the needs of Canadian patients and health care providers.

Structure of the day

Below we have summarized the day's agenda. The full version of the agenda is included in Appendix B.

Morning Session (open to the public)

- Welcome Remarks from Dr. Lise Bjerre, RTMP Research Group Lead
- Presentation of currently available medication information resources
    - Health Canada
    - Canadian Pharmacists Association
    - DynamedPlus / Micromedex
    - RxFiles
    - Vigilance Santé
- Presentation on emerging opportunities by Canada Health Infoway
- Keynote address by Chris Power, CEO of the Canadian Patient Safety Institute

Afternoon Session (working session, by invitation only)

- Facilitated small group discussion of medication information needs
    - Part 1: The ideal Canadian medication information resource
    - Part 2: Moving from gaps to implementation
- Whole group report-back and consensus-building
- Closing remarks by Dr. Lise Bjerre, RTMP Research Group Lead

Orientation to report

This report summarizes the current situation, in terms of current gaps and opportunities relating to medication information in Canada, from the varied perspectives of medication information providers, Health Canada – Canada's regulatory health authority, innovation catalysts, academia and patient safety advocates. It also puts forward a collective vision and set of values and principles that provide a framework for the ideal Canadian medication reference, and articulates a number of priorities, next steps and recommendations to move forward. The full

[17] Busse et al (2017). *The 2017 Canadian Guideline for Opioids for Chronic Non-Cancer Pain.* Accessed June 26, 2017 from : http://nationalpaincentre.mcmaster.ca/documents/Opioid%20GL%20for%20CMAJ_01may2017.pdf

report, including its recommendations, has been endorsed by a range of national-level stakeholder organizations (as noted above), and it is our hope that it will garner attention and support from key funders and decision-makers.

Participant summary

The symposium brought together stakeholders from diverse backgrounds, each sharing an interest in improving medication information for the benefit of all Canadians. The morning session was open to the public, while working sessions in the afternoon were by invitation only. In all, there were 37 individual participants, including one patient advocate who could not attend in person but submitted input via email. The breakdown of participants is illustrated in Figure 1 below, with full-day participants summarized by stakeholder group.

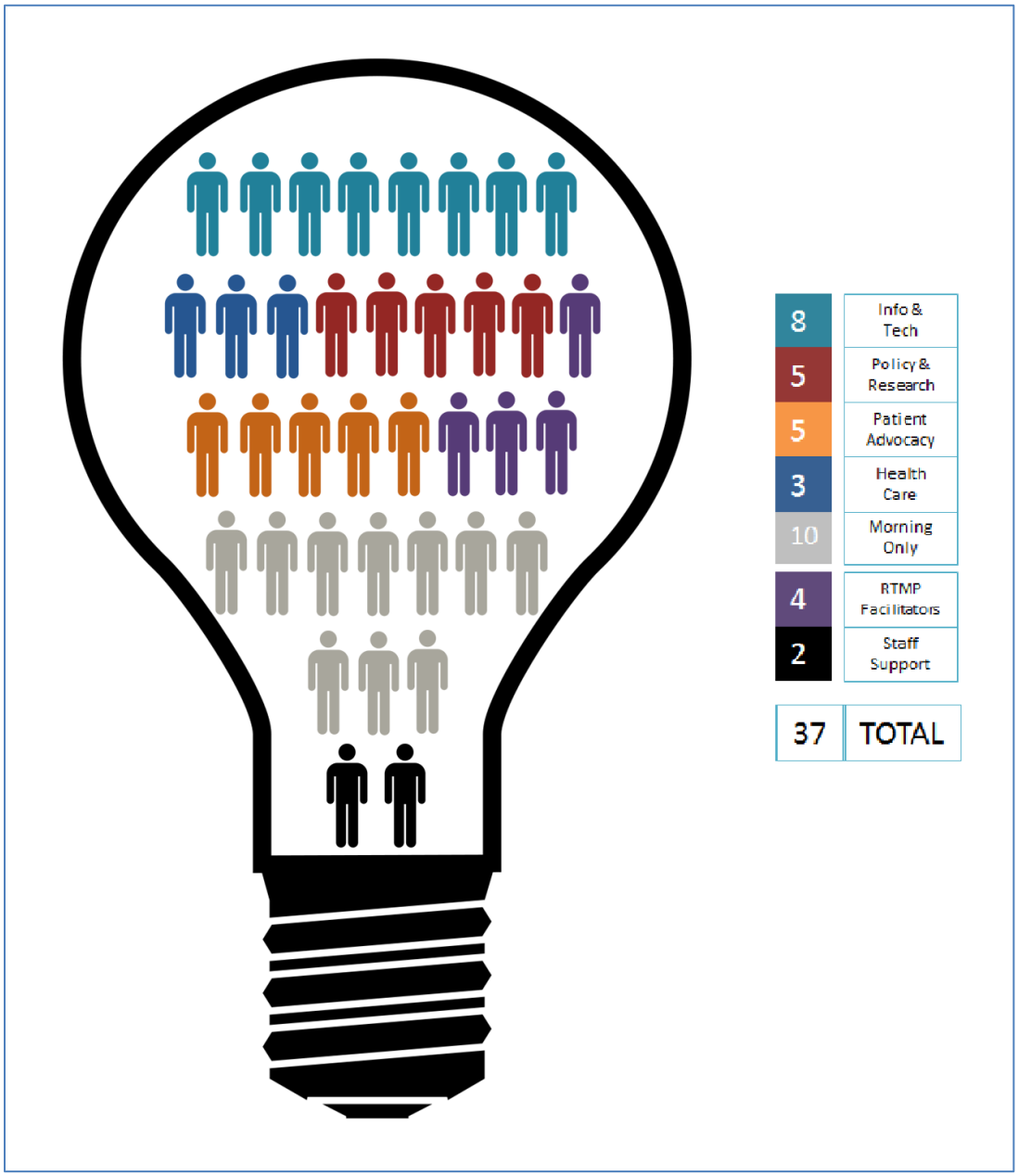

Figure 1: Summary of individual participants

Summary of keynote

Knowledge is power:

Help keep me safe!

By: Chris Power
CEO, Canadian Patient Safety Institute

The evidence is clear: medication safety is still a serious issue.

More than half of Canadians are using prescription medications at any given time and almost one-quarter of adverse events that patients present with in hospital are related to medication errors, according to the 2004 Adverse Events Study.

Around the world, treatment for an adverse event relating to medication-related problem is the most common treatment intervention sought by patients in hospital. According to a 2017 report by the World Health organization, medication errors cost $42 billion USD per year. More than the cost to our global, and domestic, health care systems, medication errors can cost patients their lives.

CPSI is working hard to improve medication safety in Canada. In 2014, CPSI and the Institute for Safe Medication Practices (ISMP) Canada hosted the Medication Safety Summit which led to the development of the Medication Safety Action Plan, currently being implemented by CPSI and multiple partners across Canada.

These are important steps, but we still have a lot of work to do. Patients and families want to be able to safeguard their loved ones; recognize the moments that matter; be able to report incidents of harm; and, access the tools they need to help make informed decisions to maintain health and prevent harm. To meet these needs, CPSI has developed, in collaboration with ISMP Canada and others, the “5 Questions to Ask About Your Medications” tool, which is available online at safemedicationuse.ca. It has been endorsed by an international network of stakeholders and is helping to improve medication safety for patients and families both at home and abroad.

In the medication safety policy context, Vanessa’s Law received Royal Assent in 2014 as an amendment to the Food and Medications Act. It includes new rules that strengthen the regulation of therapeutic products and improve the reporting of adverse reactions by health care institutions. These measures are also intended to improve Health Canada’s ability to collect post-market safety information and take appropriate action when a serious health risk is identified.

These steps represent important progress, but we still have a lot of work to do in Canada and around the world to realize a patient-centred system that champions safe medication practices.

Countries like the Netherlands have developed leading approaches that could be adapted to the Canadian context in order to create a more coherent national system. Greater involvement from the federal government and other national-level stakeholder organizations can help to scale and spread the tools we have, that are working, and help facilitate the adaptation of international leading practices where relevant.

We still have a lot of work to do.

Highlights from provider panel

Currently available medication resources

Below is a summary of the key points presented by each medication information provider.
Note: Lexicomp / UpToDate was also invited to present, but was unable to attend. It is possible that other medication information providers were also missed; however, we welcome their input and involvement going forward.

Table 1: Summary of Presentations from Medication Information Providers

	Health Canada / Santé Canada	Canadian Pharmacists Association / Association des Pharmaciens du Canada	DynaMed Plus / TRUVEN HEALTH ANALYTICS / IBM Watson Health™	RxFiles — Objective Comparisons for Optimal Drug Therapy	VIGILANCEsanté
Overview	The Drug Product Database (DPD) is a central location for product specific information on medications authorized by Health Canada for use in Canada. It contains approximately 47,000 products that are currently approved, marketed or have been withdrawn from the Canadian market. Data found in the DPD online query is updated nightly. The Canadian Product Monograph (CPM) describes	RxTx is a source for prescribing and managing medication therapy at the point of care. It includes the Compendium of Pharmaceuticals and Specialties (CPS); Compendium of Therapeutic Choices; Compendium of Therapeutics for Minor Ailments; and, Compendium of Products of Minor Ailments. Clinical content is updated weekly. CPhA may elect to perform an urgent update between scheduled releases. All updates are automated.	<u>Dynamed Plus with select Micromedex (Truven) content</u> 5,000+ topics, with over 2,000 medication topics provided by Micromedex (Truven). 4,000+ medical graphics and images, including 1,000+ images from the American College of Physicians. Updated daily. Off-label considerations included. Micromedex content in DynaMed Plus includes summary medication information, medication	Produced by RxFiles Academic Detailing. Known for its unique format: one page of comprehensive information. Available online, mobile app or in print. Online charts are updated on an ongoing basis and updated versions are posted online weekly or monthly as necessary. App updated every 3-4 months (users of the hard copy are asked to check regularly online to view updates).	Can be installed locally or accessed online. Can be used as stand-alone software or interfaced with an EMR. Updated monthly. Standardized identification and coding for 120,000 products on the market in Canada. Photo database of over 10,000 products. Includes monographs, information for the patients, clinical tools for the

	properties, claims, indications, contraindications for use, warnings and precautions, dosing of a medication, and other information required for optimal, safe, effective use. It also provides a summary of the key information in plain language for consumers.		dosing, single interactions, evidenced off-label use, lab recommendations, and IV screening. . <u>Full Micromedex Subscription</u> The full version of Micromedex includes much more detailed information, but requires an additional subscription to access.		professionals, indications and dosages, performs 18 validations (interactions) and gives alerts.
 Access	The DPD is available, free of charge. It can be accessed online: https://www.canada.ca/en/health-canada/services/medications-health-products/medication-products/medication-product-database.html. Information from the DPD can also be accessed from the Medication and Health Product Register (https://hpr-rps.hres.ca/). Specifically, the Patient Medication Information from the CPM can be accessed here, with a link to the complete CPM from the DPD. Links to other safety information produced by Health Canada can also be accessed (e.g., ongoing	• Web and mobile access as well as the ability to Integrate RxTx within Dispensing and EMR solutions. • Individual subscription to RxTx $739 per year • Bulk discounts available • Hospital pricing based on bed count • 80,000 physicians have CPS as a CMA member benefit. • 500 hospitals in Canada use CPS /RxTx.	<u>Dynamed Plus with select Micromedex (Truven) content</u> DynaMed Plus is available on an institutional or personal subscription basis. Individual yearly subscriptions are $395 USD for physicians, $195 USD for licensed medical practitioner (e.g. Nurse, Pharmacist) and $149 USD for clinicians in training/residents. DynaMed Plus is available to CMA members and is included in the annual membership fee. The full version of Micromedex is not included in the CMA membership.	Books are currently $89-$120 + tax/shipping with bulk discount available. Website subscription* (includes Plus App): • 1 year: $59 + tax • 2 years: $99 + tax * newsletters and additional online documents available for free	520$ per concurrent non-interfaced license for 1 year. Various prices depending the EMR for interfaced solution

	product-specific summary safety reviews).		<u>Full Micromedex Subscription</u> Access to Micromedex by subscription. Micromedex is not currently sold as individual licenses, only as institutional licenses.		
 **Audience**	DPD is for use by health care professionals and consumers. The CPM includes three sections: Health Professional Information, Scientific Information and Patient Medication Information (formerly titled Consumer Information).	Health care professionals who are involved in prescribing and managing medication therapy, including physicians, nurse practitioners, nurses, pharmacists, pharmacy technicians, dentists etc.	<u>Dynamed Plus with select Micromedex (Truven) content</u> Dynamed Plus is targeted primarily to physicians, but it is also widely used by all clinicians in the circle of care. Not accessible to patients. Patient handouts for disease topics but not for medication topics. <u>Full Micromedex Subscription</u> Micromedex includes CareNotes and MedicationNotes in 15 languages for patient education. CareNotes can be customized for each hospital	• RxFiles: primary care prescribers • GeriRxFiles: health care providers looking after older adults and/or long-term care	Targeted for health-professionals, with a strong component of patient-oriented material to support counseling. Used by more than 20,000 health professionals across Canada.

			and can accommodate multiple sites.		
Canadian Content	Authoritative Canadian content for medication products.	Content is created by Canadian experts, for Canadian health care practitioners treating Canadian patients. CPS includes Health Canada-approved monographs and information for the patient. Therapeutic content includes Canadian guidelines and products available on the Canadian market.	• American Companies • Canadian brand names with link to HC DPD • Trade names by country • Micromedex supports Canada specific labeling • Link to Canadian medication guidelines • Links to Health Canada for medication shortage and backorder status	Produced in Canada. Always includes Canadian guidelines.	Fully bilingual and developed by Canadians. Medication coverage by province.

Key findings

There are several medication information resources designed for use as clinical decision-making tools at the point-of-care in Canada

- In addition to the regulatory information provided by Health Canada, as Canada's regulatory health authority, several non-regulatory sources of medication information are available in Canada, including those summarized above and Lexicomp / UpToDate

Medication information resources designed for use as point-of-care clinical decision-making tools contain non-regulatory medication information

- Health Canada is Canada's regulatory health authority, which provides government-approved and therefore 'official' information ("regulatory information")
- Medication information developed by non-government sources is unregulated

Non-regulatory medication information resources are available…at a cost

- The Medication Product Database (including Canadian Product Monograph) is available free-of-charge to patients and prescribers, but, was not necessarily designed as a tool to support clinical decision-making at the point-of care
- Although physicians can access the Compendium of Pharmaceutical Specialties and DynaMed Plus as part of their membership to the Canadian Medical Association, not all physicians are members and not all members would choose to use these tools
- Micromedex is not currently sold as individual licenses, only institutional licenses
- Some documents provided by RxFiles are available for free, online
- Individual subscriptions range in price from $59 CAD+ tax to over $700 per year, while institutional licensing is generally based on bed count

Non-regulatory medication information resources do not target patients

- Health Canada information is available to patients, providers and scientists alike
- The medication information resources summarized in the table above were not specifically designed for use by patients or the public, who may benefit from plainer language summaries, particularly among those with lower levels of literacy (including health literacy)
- Some resources allow prescribers to print patient handouts or access information to use in patient counselling

Levels of Canadian content vary, with two major providers based in the U.S.

- Non-regulatory resources include varying levels of Canadian content
- Resources produced by Health Canada, CPhA, RxFiles and Vigilance Santé are arguably the most Canadian in that they are developed by Canadians, for Canadians.

- EBSCO Health, IBM Watson Health and Lexicomp / UpToDate are the largest providers of non-regulatory medication information resources in Canada, but are owned by American companies

Health Canada's DPD contains information on the largest number of products

- As Health Canada provides information on the full list of medications approved in Canada, it provides information on the greatest number of medications
- Non-regulatory sources of information often link to Health Canada resources, but the extent to which current regulatory information is incorporated may differ

Although intended to perform a similar function, all resources differ in format

- All non-regulatory medication resources were all designed for use as clinical decision-making tools at the point-of-care; however, formats range from computer software, to online documents, electronic databases and mobile applications, to hard copy compendiums with some resources offering access in different formats
- The availability of different formats creates choice for health care providers

Information provided by non-regulatory sources is updated at different times

- Data found in the Health Canada DPD online query is updated nightly
- Vigilance Santé is updated monthly
- RxFiles online charts are updated on an ongoing basis and updated versions are posted online weekly or monthly as necessary, while the app is updated every 3-4 months (users of the hard copy are asked to check regularly online to view updates)
- DynaMed Plus is updated daily
- RxTx Clinical content is updated weekly, although CPhA may elect to perform an urgent update between scheduled releases.

Emerging opportunities

Presented by Canada Health Infoway

Canada is among few developed countries without a comprehensive e-prescribing system[18].

An annual tracking survey conducted for Infoway in 2016[19] found that 44% of prescriptions in Canada are handwritten and given to the patient, while 38% are computer generated and given to the patient. The remaining 18% were either faxed or, in rarer cases, e-prescribed (mainly in Quebec).

Yet, 78% of Canadians would encourage their health care provider to use an e-prescribing service[20].

E-prescribing is the secure electronic creation and transmission of a prescription between an authorized prescriber and a patient's pharmacy of choice.

In Canada, prescriptions are:

44% hand written

38% computer generated and taken to the pharmacy in person

18% faxed or electronically prescribed

With a five-year funding commitment, the federal government has directed Infoway to expand eprescribing across Canada.

PrescribeIT is a national e-prescribing service operated by Infoway.

The objective of PrescribeIT is:

> ***To create, operate and maintain a financially self-sustaining e-Prescribing Service that will be the solution of choice for e-transmission of prescriptions for government, prescribers, and pharmacies for the ultimate benefit of the patient. Benefits derived from the service will be meaningful to all key stakeholders.***

To move the project forward, Infoway is collaborating with a network of public and private sector stakeholder organizations and is leveraging its earlier experience in Electronic Health Records.

78% of Canadians would encourage their pharmacist / HCP to use an eRx service

[18] PWC (2015). No title. Internal document, not publicly available.
[19] Neilson (2016). Accessed July 6, 2017 from: https://infocentral.infoway-inforoute.ca/en/resources/docs/med-mgmt/1778-report-2017-current-prescribing-and-dispensing-landscape-in-canada
[20] Ibid.

Toward an ideal Canadian medication reference

In all, 20 individual stakeholders contributed to the afternoon working session (in addition to one who submitted input via email), which was attended by invitation only, as well as four Facilitators and two support staff, as summarized in Figure 2.

The afternoon session aimed to:

- Gain consensus on a vision statement and guiding principles for the ideal Canadian medication reference; and,
- Develop a list of key priorities and immediate next steps for key stakeholders to take to help realize this vision.

Stakeholders were pre-assigned to one of four key stakeholder groups and then distributed across four tables in a manner aimed at creating as much diversity as possible at each table.

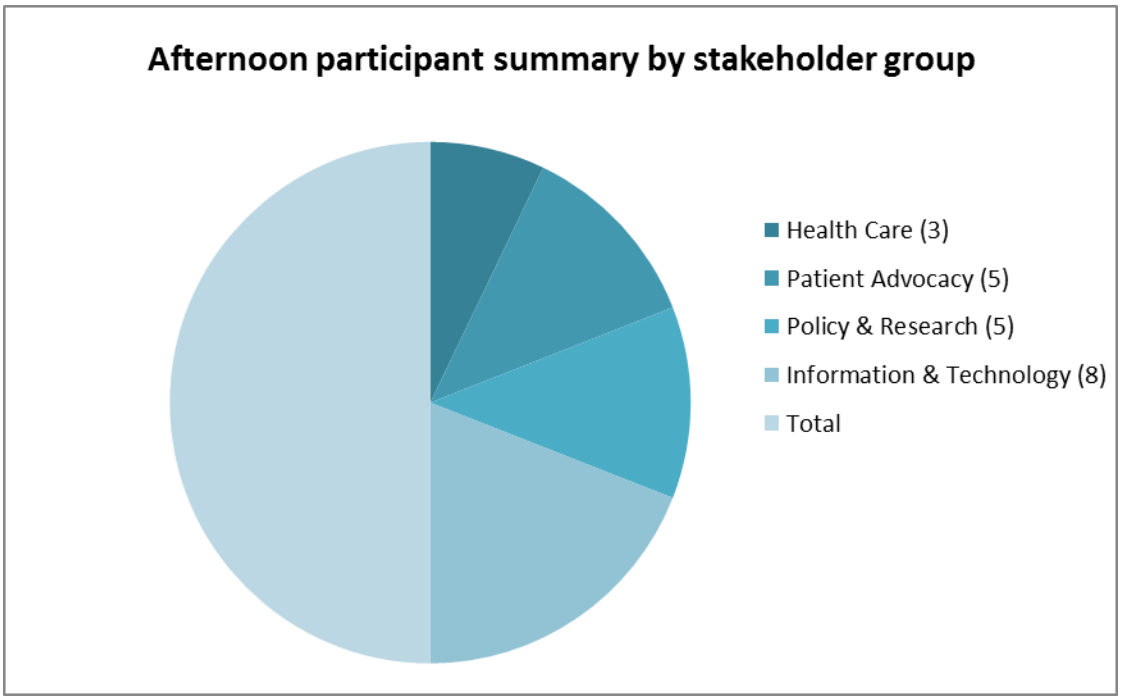

Figure 2: Summary of individual participation in afternoon session, by primary stakeholder group

In addition to facilitating the small group discussion, two of the RTMP Facilitators contributed to the 'post-it exercise', which gathered stakeholder feedback as to the key features they would envision in an ideal Canadian medication reference. One participated from the Health Care perspective, while another participated from the Policy & Research perspective. One other Health Care participant also contributed to the Policy & Research perspective. Their contributions are included in the analysis of ideas and agreement in a subsequent section.

The following sections summarize stakeholder feedback from the brainstorming activities designed to gather feedback on the most important values and principles, and key features, of an ideal Canadian medication reference.

Values and principles

In small groups, stakeholders were asked to brainstorm about the values and principles that would be most important to them in an ideal Canadian medication reference that could be used by both health care providers and patients. The word cloud below provides a visual representation of the values and principles that were discussed most frequently; the larger the word, the greater the frequency with which it was discussed. The methodology used to develop the word cloud is included in the Appendix.

Figure 3: Word cloud depicting results of brainstorm on values and principles

The largest words were discussed at all four tables. We achieved consensus on the importance of an accessible and evidence-based tool that provides current medication information.

Related to the key concept of accessibility was the idea of universality, in that the ideal Canadian medication reference should be available to both patients and health care providers at no cost to the user. Stakeholders were also clear that the resource should be accessible to all Canadians, regardless of age, ability, literacy (including health and computer literacy), language or cultural background.

Related to the need for evidence-based information were ideas about the importance of credible, peer-reviewed, independent, referenced, reliable, trustworthy and objective information that is free of commercial bias, which would be customizable to individual user preferences and the information needs of both patients and health care providers.

Key features of the ideal Canadian medication reference

The "post-it exercise" was designed to gather stakeholder feedback as to the most important features of the ideal Canadian medication reference, in terms of the following aspects:

- Format
- Content
- Accessibility
- Scope
- Information Source
- Funding Source

As noted earlier, two of the RTMP Facilitators participated in this activity, bringing the total individual participant count to 23, including the stakeholder who participated by email and the two RTMP facilitators who contributed their ideas as well. As noted previously, one Health Care stakeholder also contributed from the Policy & Research Perspective. This activity therefore generated a total of 115 ideas from 23 individual participants, who brought 24 perspectives.

The research team analyzed the ideas generated for internal agreement within stakeholder groups in order to identify the three themes with the widest agreement. Elements of agreement considered were the number of ideas on a particular topic, and the number of times the topic was mentioned by different sources (e.g. members of the same stakeholder group sitting at different tables (4) or submitting input by email (1)).

Table 2: Strong Emerging Themes based on Level of Agreement within Stakeholder Groups

Stakeholder Group	Themes	# Ideas	# Sources
Health Care	Universal access	2	2/3
Patient Advocacy	Easy to use and understand	9	4/4
	Emphasis on medication safety	9	2/4
Policy & Research	Evidence-based / independent / trusted	7	3/3
	Customizable to multiple users	5	2/3
	Current / up-to-date information	3	2/3
Information & Technology	Easy to use and understand	5	4/4
	Evidence-based / independent / objective	7	3/4

In terms of both the number of ideas generated and agreement between individual stakeholders within the stakeholder group across different tables, the Patient Advocacy and Information & Technology groups strongly agreed that the ideal Canadian medication reference should be easy to use and understand. The Policy & Research stakeholder group agreed with the Information & Technology group on the importance of a Canadian medication reference being evidence-based, independent and objective/trusted. The Health Care provider stakeholders felt

particularly strongly about the need for universal access to such information, while the Patient Advocacy group identified medication safety as an area of emphasis.

Looking at overall agreement between all participating individuals (as opposed to individuals within each stakeholder group), another strong theme emerged, namely, that the tool should be funded by government sources, or by a national health care organization, not by individual health care providers themselves, or by industry, and that access by individual users should be universal, i.e. 'free'.

In terms of the scope of the ideal Canadian medication reference, individual stakeholders offered a number of interesting ideas. There was general consensus among stakeholders that the resource would be used by health care providers as well as patients, but using different versions/modules to address the needs of both user groups. Several stakeholders indicated that the resource for providers should serve as a clinical decision-making tool.

In terms of its format, stakeholders offered a number of ideas relating to the particular capabilities that should be built into the resource. Beyond being user-friendly and accessible, the following more specific ideas were offered by individual stakeholders:

Integrated Technology

- Interoperability (ability to exchange information with other systems)
- Integration with Electronic Medical Record
- Available from several sources
- Optimized for different devices (e.g. computer, mobile etc.)

User Experience

- Interactivity
- Facilitate engagement with patients
- Translation (multi-lingual)
- Customization including scalable content (e.g. different language / depth of information for different users)
- Usable at point-of-care
- People can enter their own info into the resource (e.g. photographs of medications, medication lists)
- Inter-user reliability
- Multimedia and visuals (e.g. photo, video, infographic)
- Multiple formats (computer and non-computer)

Interactive Tools

- Interaction checker where medications can be entered one by one, or linked with a patient's medication list in an EMR, and the possible interactions will be displayed

- Side effects checker where a medication can be entered and the possible side effects will be displayed or, conversely, a side effect can be entered and the medications where that effect is found is displayed

Type of Information

- Give absolute benefits/harms ratios for each medication similar to the number needed to treat (NNT) and number needed to harm (NNH) information although laypeople seem to resonate more with the information represented in percentages e.g. of all who take this medication 93% will benefit and 7% will receive no benefit, 20% will experience harms such as (list the common and uncommon harms).
- Indications
- Off-label indications
- Contraindications
- Adverse effects / side-effects
- Include information about whether a medication is known to be potentially inappropriate, such as those listed in the Beers criteria, STOPP/START criteria, list of medications with high anticholinergic load etc.
- Information on dosing given: e.g. Start low and go slow (for elders)
- Special warnings about importance of tapering doses of medications when necessary "do not stop medication without talking to your doctor first"
- Clinically relevant medication interactions
- Polypharmacy considerations
- Information for special populations (e.g. geriatrics, pediatrics)
- Canadian AND international content with references

Organization of Information

- Have an interdisciplinary provider section and a public section
- Need something like plain language medication facts table for consumers AND detailed Health Technology Assessment (HTA) / Clinical Practice Guidelines (CPG) / Prescribing Metrics (PM) for health professionals (and others in between)
- Include a "What You Need to Know About This Medication" section (for patients)
- Glossary of terms
- Most important safety warnings at the beginning of each listing e.g. black box warnings and information on how to manage
- Use Cates' plots (smiley/sad faces) where possible to illustrate ratio of harms and benefits.

What we envision

As part of the brainstorming exercise, each group was asked to develop a working vision statement. The resulting vision statements were:

Table 3: What Stakeholders Envision as the Ideal Medication Information Resource

Table 1	Table 2	Table 3	Table 4
"A trustworthy, user-centred and universally accessible publicly funded resource for Canadians that includes information not only about prescription medications but also over-the-counter and natural health products."	"A medication information resource that is accessible (funding and formatting), evidence-based (trustworthy), sustainable and relevant to the Canadian context."	"A medication information resource that the public and health care providers can easily use and rely on to make the best decisions about care."	"A medication information resource that is patient-centred, evidence-based information that is accessible, customizable, sustainable and provided as open-access."

There is considerable overlap between the vision statements that were generated. Given this overlap, and based on the whole group report-back and consensus-building session at the end of the afternoon working session, the following over-arching vision statement was developed and has been endorsed by the below-noted organizations and individuals:

> ***We envision a universally and easily accessible Canadian medication reference designed to meet the diverse needs of both health care providers and the public, which is sustainable and delivers trustworthy information about prescription and over-the-counter medications and natural health products, at no cost to the individual user.***

Our next challenge is to move from the current situation towards the ideal Canadian medication reference. Our key priorities and next steps are outlined below.

Our priorities and next steps

Stakeholders felt strongly that it would be important not to 'reinvent the wheel' by building a new medication information resource if it might be possible to address identified gaps by better leveraging capabilities that exist today and borrowing from international best practices. As a result of this discussion, the national stakeholder roundtable agreed that its first key priority is to conduct a comprehensive needs assessment, in order to confirm the best way forward. The following work plan has emerged to guide our next steps.

KEY PRIORITY: NEEDS ASSESSMENT Answer the question: "How do we capitalize upon the existing resources we have, while moving towards a universally accessible Canadian medication reference?"			
What	**Who**	**How**	**When**
A. Identify leader(s) to move work forward	• Steering Committee to set direction • RTMP Research Lead in collaboration with RTMP members, with support from research staff	• Identify and recruit Steering Committee members	• Fall/winter 2017
B. Develop scope of work, including reasonable timelines, for study to confirm need, which includes multi-sector stakeholder engagement strategy	• RTMP Research Lead, in collaboration with RTMP members, with support from staff, and with direction from with Steering Committee	• RTMP Research Lead and staff will build on feedback received from national stakeholder roundtable during 2017 RTMP Symposium to design study	• Winter/spring 2017-18, once Committee is in place
C. Identify and apply for funding opportunities for study	• Collaborate with Steering Committee, RTMP collaborators and broader networks to identify leads, including opportunities to leverage funding from multiple sources • Prepare funding	• Assign staff to gather information and complete funding applications under supervision of RTMP Research Lead and with input from RTMP members and Committee, as needed	• As soon as the scope of work is developed, in winter 2018

KEY PRIORITY: NEEDS ASSESSMENT Answer the question: "How do we capitalize upon the existing resources we have, while moving towards a universally accessible Canadian medication reference?"			
What	**Who**	**How**	**When**
	submissions		
D. Implement study once funding is secured	• Research Lead, in collaboration with RTMP members, with support from staff, and with direction from the Committee	• Roles and responsibilities articulated in the scope of work will be executed in accordance with funding agreement(s)	• To be determined based on funding agreement
E. Report-back to Stakeholder Roundtable	• RTMP Research Lead, on behalf of research team	• Presentation and information sharing during in-person event	• TBD

Recommendations

We, the undersigned, recommend that the Government of Canada:

Confirm the need for a Canadian medication reference that is evidence-based and universally accessible to all Canadian patients and health care providers, leveraging existing medication information resources, as a critical part of the delivery of quality health care to all Canadians.

Facilitate engagement with key stakeholder organizations, including existing medication information providers, to contribute to an action plan to develop the ideal Canadian medication reference.

Allocate funding for the research and development of a clear action plan to develop the ideal Canadian medication reference, leveraging the strengths of existing tools and practices, and incorporating promising practices from around the world.

Commit to developing standards relating to the quality of medication information provided to Canadian health care providers and patients, in order to ensure that patients and providers across the country are making health care decisions based on the same quality of information.

Empower Canadian patients and families by providing medication information that is accessible and understandable regardless of age, ability, income or other potential barriers.

Encourage evidence-based, appropriate prescribing by ensuring that their health care providers have universal access to the best evidence and clinical decision-making tools when prescribing medications.

This vision and set of recommendations have been endorsed by:

Canada Health Infoway / Inforoute Santé du Canada

Canadian Medical Association / Association médicale canadienne

Canadian Nurses Association - Association des infirmières et infirmiers du Canada

The Canadian Patient Safety Institute

Canadian Pharmacists Association / Association des Pharmaciens du Canada

National Pensioners Federation / Fédération Nationale des Retraités

Department of Family Medicine, University of Ottawa / Département de médecine familiale, Université d'Ottawa

Institute for Safe Medication Practices Canada (ISMP Canada) Institut pour la sécurité des medicaments aux patients du Canada

Conclusion

It was a successful day. Clear consensus emerged among a broad and diverse group of stakeholders that an accessible, evidence-based and up-to-date Canadian medication reference is required to meet the needs of both patients and health care providers nationwide.

In the current state, there are a range of medication information resources, each with their own capabilities, format, target audience, costs and type and level of Canadian content. In this fragmented landscape, neither patients nor providers have universal access to a tool that fully meets their needs.

In order to best enable appropriate prescribing, and deprescribing, there is a need for a set of standards that will ensure that each available tool delivers the information patients and health care providers need, in a format that is easy to use, and customizable. With government funding, the tool should be universally accessible at no cost to the individual user.

There is a lot of potential to integrate point-of-care medication information resources with electronic medical records and e-prescribing, to facilitate improvements to patient-centred care across Canada.

As a next step, the RTMP, under the leadership of Dr. Lise M. Bjerre, will pursue funding to conduct a comprehensive needs assessment, in order to confirm the best way forward.

It is important that the Government of Canada demonstrate its support for this important work through funding and commitments that convey to the people of Canada that our government takes seriously the need to provide universal access to medication information that will facilitate the best health care decision-making, and improve patient outcomes.

The national stakeholder roundtable, in partnership with the RTMP, and in collaboration with our networks, looks forward to working with the Government of Canada and its provincial and territorial counterparts, to improve health care for all Canadians.

> *"Medication information is to primary care what a scalpel is to surgery, but surgeons don't have to pay for their scalpels."*
>
> *Dr. Lise M. Bjerre*

Appendix A: List of abbreviations

CMA	Canadian Medical Association
CPG	Clinical practice guidelines
CPhA	Canadian Pharmacists Association
CPM	Canadian Product Monograph
CPS	Compendium of Pharmaceuticals and Specialties
DPD	Drug Product Database
DSECT	Drug Safety and Effectiveness Cross-Disciplinary Training Program
EBSCO	Elton Bryson Stephens Company
HTA	Health technology assessment
NNT	Number needed to treat
NNH	Number needed to harm
PM	Practice management
RTMP	Rational Therapeutics and Medication Policy research group

Appendix B: Symposium Agenda

The morning session was open to the public. Below is the agenda.

Time	Speaker(s)	Topic
9:00 am to 9:15 am	Lise Bjerre, RTMP Research Group Lead	Welcome Remarks: • Brief introduction of the RTMP and its goals • Overview of goals, structure, and deliverables of the day • Why focus on medication information resources?
9:15 am to 10:45 am	Representatives of currently available medication information resources	Presentation of currently available medication information resources • *Health Canada* • *Canadian Pharmacists Association E-therapeutics/RxTx* • *DynaMed Plus/Micromedex* • *RxFiles* • *Vigilance Santé*
10:45 am to 11:00 am	Lynne Zucker, Vice President, Clinical Systems Integration, Canada Health Infoway	Emerging Opportunities • PrescribeIT™, Canada's Electronic Prescribing Service and other eMedication resources
11:00 am to 11:15 am	Networking and Refreshment Break	
11:15 am to 12:15 pm	Chris Power, CEO - Canadian Patient Safety Institute	Keynote Address - "Knowledge is Power: Help Keep Me Safe!" • Importance of medication information that is accessible to clinicians and the public • International models and examples
12:15 pm	Morning Session Closes	

The afternoon session was a working session, attended by invitation only. Below is the agenda.

<table>
<tr><th>Time</th><th>Speaker(s)</th><th colspan="2">Topic</th></tr>
<tr><td>12:15 pm to 1:15 pm</td><td colspan="3">Networking and Refreshment Break</td></tr>
<tr><td rowspan="2">1:15 pm to 2:30 pm</td><td rowspan="2">Breakaway Groups</td><td colspan="2">Multi-stakeholder working groups discuss medication information needs</td></tr>
<tr><td><u>Brainstorming: The ideal medication information resource</u>
Format and Content
Scope and Accessibility
Information Source
Source of Funding</td><td><u>Ideas to action: How to move from gaps to implementation</u>
Recommendations
Possible roadblocks and how to overcome them</td></tr>
<tr><td>2:30 pm to 2:45 pm</td><td colspan="3">Networking and Refreshment Break</td></tr>
<tr><td>2:45 pm to 3:45 pm</td><td>Whole Group</td><td colspan="2">Reaching consensus on important aspects of medication information needs
Reporting of results from breakaway groups
Gaining consensus on shared vision, guiding principles and next steps towards implementation</td></tr>
<tr><td>3:45 pm to 4:00 pm</td><td>Lise Bjerre</td><td colspan="2">Preview of Symposium report
Closing remarks and summary of the day's outcomes, and of next steps</td></tr>
<tr><td>4:00 pm</td><td colspan="3">Adjournment</td></tr>
</table>

Appendix C: Biographies of RTMP members

About the RTMP

The purpose of the RTMP is to bring together academic researchers in Ottawa whose work focuses on medication appropriateness and access. Its specific goals are:

- To create opportunities for networking and developing collaborative projects among RTMP researchers;
- To provide RTMP researchers with a common platform to present their work and share relevant knowledge and findings with both professional and lay audiences; different media and approaches are used, including professional and lay symposia, a website (rationaltherpeutics.ca), and social media.
- To work toward the production of knowledge and resources for use by a broad audience – patients, clinicians, and health policy experts -- in four key areas corresponding to four levels of knowledge acquisition and application:
    - Clinical: Medication management
    - Population: Pharmacoepidemiology
    - Resource allocation: Pharmacoeconomics
    - Health Systems: Pharmaceutical policy

Biographies of members

Dr. Lise M. Bjerre, MD, PhD, CCFP

Principal Lead – Rational Therapeutics and Medication Policy Research Group (RTMP)
Assistant Professor and Clinician-Investigator - Department of Family Medicine, University of Ottawa
Clinical Research Chair in Pharmacoepidemiology and Medication Appropriateness - Department of Family Medicine and Faculty of Medicine, University of Ottawa
Scientist - Bruyère Research Institute, Ottawa
Cross-appointed Faculty - School of Epidemiology and Public Health, University of Ottawa
Adjunct Scientist - Institute for Clinical Evaluative Sciences (ICES)

Dr. Lise M. Bjerre is an epidemiologist and a practicing family physician. She is a researcher with the Department of Family Medicine at the University of Ottawa and the Bruyère Research Institute, and a staff physician working as a staff physician at the Civic Family Health Team of the Ottawa Hospital. Her program of research focuses on medication appropriateness in primary care and, in particular, on potentially inappropriate prescribing (PIP) in seniors, its identification using clinical tools and health administrative data, and its effects on patient outcomes and on the use of health care resources at the population level.

lbjerre@uottawa.ca

Dr. Marc-André Gagnon, PhD

RTMP co-lead
Associate Professor – School of Public Policy and Administration, Carleton University

Marc-André Gagnon is a political economist with Carleton University's School of Public Policy and Administration. He holds a PhD in Political Science from York University and a Master's of Advanced Study in Economics from Paris-1 Sorbonne and École Normale Supérieure de Fontenay/St-Cloud. He did his post-doctoral training with the Centre for Intellectual Property Policy at McGill University's Faculty of Law, and with the Edmond J. Safra Center for Ethics at Harvard University. His current research focuses mainly on the political economy of the pharmaceutical sector. He analyzes business models in the pharmaceutical sector, regulatory capture of public institutions, comparative regimes of health and medication insurance, as well as corporate influence over prescribing habits. He is currently Fellow with the WHO Collaborating Centre for Governance, Accountability and Transparency in the Pharmaceutical Sector, and Mentor for the Drug Safety and Effectiveness Cross-Disciplinary Training Program.

ma.gagnon@carleton.ca

Dr. Doug Coyle, MA, MSc, PhD

Professor and Interim Director – School of Epidemiology and Public Health, University of Ottawa

Doug Coyle is a health economist with over 22 years of experience and almost 200 peer reviewed publications. He obtained his PhD from Brunel University where his thesis explored issues related to handling uncertainty and variability with respect to decision making in health care. Prior to joining the University of Ottawa, Doug had worked at both the Ottawa Hospital Research Institute and the Centre for Health Economics at the University of York. He has taught graduate courses in health economics for over 20 years. He has advised numerous provincial and federal governments with respect to reimbursement of health technologies. Doug was a key contributor to the recently revised Canadian guidelines for economic evaluation.

Research Interests

- Health Economics
- Economic Evaluation
- Health Technology Assessment
- Decision Analysis
- Prioritization of Research Funding
- Health Policy

dcoyle@uottawa.ca

Dr. Barb Farrell, BScPhm, PharmD, FCSHP

Co-PI Lead, Deprescribing Guidelines for the Elderly project
Scientist - Bruyère Research Institute and CT Lamont Centre
Assistant Professor - Department of Family Medicine, University of Ottawa
Adjunct Assistant Professor - School of Pharmacy, University of Waterloo
Clinical and Research Coordinator - Pharmacy Department, Bruyère Continuing Care
Pharmacist – Geriatric Day Hospital, Bruyère Continuing Care

Dr. Farrell is a Scientist with the Bruyère Research Institute and CT Lamont Primary Health Care Research Centre, Assistant Professor with the Department of Family Medicine, University of Ottawa and Adjunct Assistant Professor with the School of Pharmacy, University of Waterloo. She maintains in clinical practice as a pharmacist in the Bruyère Geriatric Day Hospital and is Clinical and Research Coordinator in the Pharmacy Department at Bruyère Continuing Care. Dr. Farrell completed her Bachelor's and Doctor of Pharmacy degrees at the University of Toronto, and her residency at Chedoke-McMaster Hospital in Hamilton, Ontario. She has worked clinically in hospital pharmacy, community pharmacy, primary care and most recently in a specialized Geriatric Day Hospital practice, all of which have provided her with a broad perspective on pharmacy practice and the needs of patients in different health care environments. Dr. Farrell has experience in curricular design, including designing and implementing a structured practice experience program for undergraduate students and developing online educational programming focused on medication management skills for pharmacists. She was also instrumental in co-leading a large demonstration project incorporating pharmacists into primary health care teams, resulting in growth of this practice model in Canada. In recognition of these accomplishments, Dr. Farrell received the Canadian Pharmacist of the Year award in 2011.

bfarrell@bruyere.org

Dr. Roland Halil, PharmD, ACPR, BScPharm, BSc(Hon)

Assistant Professor - Department of Family Medicine, University of Ottawa
Clinical Pharmacist - Bruyère Academic Family Health Team

Dr. Roland Halil is a clinical pharmacist within the Bruyère Academic Family Health Team and an Assistant Professor in the Department of Family Medicine at the University of Ottawa. He is a consultant with the Foundation for Medical Education at McMaster University. He completed his Bachelors of Science in Biochemistry with an Honours Year in Physiology at the University of Ottawa before completing his Bachelors of Science in Pharmacy at the Memorial University of Newfoundland, his Hospital Residency program at the Ottawa Hospital and his Doctor of Pharmacy degree (PharmD) at the University of Toronto. His area of research focuses on potentially inappropriate prescribing in primary care. He is an avid lecturer with a strong focus on logic and rational prescribing. Related interests include infectious disease in primary care, technology in health care and

global health. Dr. Halil and RTMP colleague Dr. Littman won Best Original Research Article through the College of Family Physicians of Canada for 2017.

rhalil@bruyere.org

Don Husereau, BScPharm, MSc

Senior Associate – Institute of Health Economics, Alberta
Adjunct Professor – School of Epidemiology and Public Health, University of Ottawa

Mr. Don Husereau is an Adjunct Professor of Medicine at The University of Ottawa, Senior Associate with the Institute of Health Economics, and Senior Scientist at the University for Health Sciences, Medical Informatics and Technology in Hall in Tirol, Austria. Don's current research focuses on appropriate and innovative approaches to the use of evidence and economics to inform health policy based on sound principles of social justice, epistemology, and judgment and decision-making. He is currently Chair of an International Task Force that has developed consolidated health economic evaluation reporting standards (CHEERS) that are now endorsed by leading biomedical and health policy journals. Don is currently an Editorial Advisor for the biomedical journals *Value in Health* and *BMC Medicine*. He also serves on the pan-Canadian Oncology Medication Review (pCODR) Expert Review Committee (pERC) and Ontario Committee to Evaluate Drugs. Don received both his BSc and MSc from the University of Alberta's faculty of Pharmacy and Pharmaceutical Sciences.

dhuserea@uottawa.ca

Dr. Julian Little, MA, PhD

Professor, School of Epidemiology and Public Health, Faculty of Medicine, University of Ottawa

Canada Research Chair in Human Genome Epidemiology

Julian Little holds a Canada Research Chair in Human Genome Epidemiology, and is a Professor in the School of Epidemiology and Public Health at the University of Ottawa. His PhD, from Aberdeen University, was on problems of ascertainment of congenital anomalies. Subsequently, he worked for the EUROCAT Central Registry in Brussels (Belgium), as a lecturer in epidemiology in Nottingham University, as an epidemiologist in the International Agency for Research on Cancer (IARC) in Lyon, and as Professor of Epidemiology at Aberdeen University, during which he spent a sabbatical year at the Office of Genomics and Disease Prevention, CDC, Atlanta.

Dr. Little's expertise and experience lies in epidemiology in multi-disciplinary contexts, including maternal and child health, oncology, gastroenterology, gynecology, nutrition, genetics and social sciences. He has experience of health systems and universities in the UK, Belgium, France, the US and Canada, as well as work in an international organization (IARC).

Dr. Little was director of the School of Epidemiology and Public Health (formerly Department of Epidemiology and Community Medicine) in the University of Ottawa from July 2006-August 2016. He was on academic leave in the Clinical Research Unit, Xinhua Hospital, Shanghai, from September – December 2016. Since then, he has been on academic leave in Department of Biomedical and Specialty Surgical Sciences, Section of Medical Biochemistry, Molecular Biology and Genetics, University of Ferrara, Italy.

jlittle@uottawa.ca

Dr. Jordan Littman, MD

Family Physician - Advanced Access Medical Clinics
Founder and iOS Developer - Prescribe Smart
www.PrescribeSmart.com

Dr. Jordan Littman is a family physician in Ottawa, Ontario, having recently graduated from the Family Medicine residency program at the University of Ottawa. He has an interest in appropriate prescribing, particularly with regards to its cost savings potential. This interest has led him to create Prescribe Smart, an iOS application with the intent of making prescription medication costs more readily available for comparison by physicians. Dr. Littman and RTMP colleague Dr. Halil won Best Original Research Article through the College of Family Physicians of Canada for 2017.

md@jordanlittman.com

Dr. Kevin Pottie, MD, MSc

Scientist - Centre for Global Health, IPH/IRSP and Elisabeth Bruyère Research Institute,
Associate Professor - Department of Family Medicine and School of Epidemiology and Public Health, University of Ottawa
Doctor of Medicine, 1992 (Dalhousie University); Masters of Clinical Science in Family Medicine, 2001 (University of Western Ontario).

Kevin Pottie is an Associate Professor in the Departments of Family Medicine and the School of Epidemiology and Public Health at the Faculty of Medicine, University of Ottawa. He is a Principal Scientist at the Bruyère Research Institute and at the Centre for Global Health. He is a leader of the Canadian Collaboration for Immigrant and Refugee Health (CCIRH), member of the Canadian Task Force on Preventive Health Care, and practices as a family physician as part of the Champlain Immigrant Health Network. He is the lead author of the Task Force's clinical preventive guidelines for new immigrants and refugees to Canada and the Syrian Guideline update. His research interests include developing evidence-based methods to improve primary health care for disadvantaged populations and evidence-based guidelines for immigrants and refugees, integrating pharmacists into primary care, and evidence based describing guidelines.

kpottie@uottawa.ca

Dr. Kednapa Thavorn, B.Pharm, M.Pharm, PhD

Scientist and Health Economist
Clinical Epidemiology Program, Ottawa Hospital Research Institute, The Ottawa Hospital
Assistant Professor - School of Epidemiology and Public Health, University of Ottawa
Adjunct Scientist - Institute of Clinical and Evaluative Science

Dr. Thavorn is a scientist and a health economist with the Clinical Epidemiology Program at the Ottawa Hospital Research Institute. She received her bachelor's in Pharmacy from Chiang Mai University and master's degrees in Pharmacy from Naresuan University, Thailand. She earned a doctoral degree in Health Services Research from the Institute of Health Policy, Management and Evaluation (IHPME), University of Toronto. She completed two post-doctoral fellowship programs, including Applied Pharmacoeconomics from the Li Ka Shing Knowledge Institute, St. Michael's Hospital and Health Services Research from IHPME, University of Toronto. Dr. Thavorn's research interests include health economics, health technology assessment, pharmacoepidemiology, pharmaceutical policy, health services research, health equity/access to care, and HIV/AIDS.

kthavorn@ohri.ca

Dr. Regis Vaillancourt, OMM, CD, B.Pharm, Pharm D, FCSHP, FFIP

Clinical Investigator - CHEO Research Institute
Director, Pharmacy - CHEO
Board of Directors - Pharmacists without Borders Canada
Vice president - International Pharmaceutical Federation (ending October 2012)
Associate editor - Canadian Journal of Hospital Pharmacy Surveyor for Accreditation Canada

Dr. Régis Vaillancourt is currently the Director of Pharmacy at the Children's Hospital of Eastern Ontario. Dr. Vaillancourt's dedication to the pharmacy profession has been recognized locally, nationally and internationally through numerous awards and appointments. In 2004 the Canadian Pharmacists Association named him the Canadian Pharmacist of the Year. In addition to pharmacy related accolades, he was awarded the Order of Military Merit by former Governor General, Adrienne Clarkson. He is a fellow of the Canadian Society of Hospital Pharmacists, the International Pharmaceutical Federation, and the Ordre de Pharmaciens du Québec. In 2014, he became Correspondant Étranger de l'Académie National de Pharmacie, République Française.

For the last 15 years, Dr. Vaillancourt has worked closely with staff and physicians to develop infographic-based medication calendars, disease management plans and medication

instructions for their patients with low health literacy or with a lack of understanding of English and French. With the support from partners such as the International Pharmaceutical Federation, Pharmacist Without Borders – Canada, and CHEO, he developed innovative and validated tools to support health care professionals in counselling their most vulnerable patients.

rvaillancourt@cheo.on.ca

Appendix D: Methodology to develop word cloud

Original Transcript:

trusted sources
evidence-based
applicable
customizable to each patient
unbiased
at their literacy level
easy access / accessible (e-records, efficiency, user friendly, succinct, different formats e.g. visual, video, audio)
various languages
up to date conditions / medications (annually, depends)
interactive ways to understand / how to use info
scalable navigation systems e.g. Patients, Health Care Providers
proactive information - Patients, Health Care Providers
decision support tools (patients)
Costco model of recall (proactive ways to communicate / engage patients)
easy to transfer to EMR
accuracy
current
no misinformation
reliable
comprehensive
providing options for different populations (clientele)
easy to access / use (print, language, ability)
point of care
acknowledge diversity
glossary
consistency
population considerations (e.g. resistance rates, costs)
non-medication treatments
therapeutic pathways
diagnostic
independent (of politics, pharm. Interference and adv.)
evidence-based
consistency for health care providers and public
affordable
accessibility - format, content, cost (free)
easy (concise, understandable (no jargon)
current and up to date
patient and provider (2 sections but access to all)
independent
validated
systematic process for info (evidence-based, quality)
multicultural
bilingual
clinician engagement in development of topics
decision support
clarify in regards to risks
visualization (infographics or other methods of communicating)
Canadian context
reflect safety initiatives
integrated with current technology (EMR)
universality of access to information
evidence-based
peer-reviewed
credible
clear
relatable (e.g. plain language)
independent (of any conflict of interest)
balanced (reviewed objectively)
balanced (efficacy and safety)
standard solution (interoperable / shareable)
Don't reinvent the wheel

Optimized for Word Cloud[21]:

trusted
evidence-based
applicable
customizable
unbiased
literacy-level
accessible
accessible
multi-lingual
current
interactive
scalable
proactive
decision-support
proactive
engage
transferable
accuracy
current
true
reliable
comprehensive
customizable
accessible
user-friendly
diversity
consistency
population-health
non-medication-treatments
diagnostic
independent
evidence-based
consistency
affordable
accessibility
concise
understandable
current
current
universal
independent
validated
evidence-based
quality
multicultural
bilingual
decision-support
physician-engagement
clear
visual
Canadian
integrated
universal
evidence-based
peer-reviewed
credible
clear
relatable
independent
balanced
standard

[21] Converted phrases to one word or hyphenate and eliminated words that were not values or principles.

Parameters used to create:

Size of words depicts their frequency:
Largest words = 4 references; second-largest = 3; third-largest = 2; smallest = 1