

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

# Research in Social and Administrative Pharmacy

journal homepage: [www.elsevier.com/locate/rsap](http://www.elsevier.com/locate/rsap)

## Deprescribing guidelines: An international symposium on development, implementation, research and health professional education



Barbara Farrell<sup>1,a,b,c,\*</sup>, James Conklin<sup>a,d</sup>, Lisa Dolovich<sup>e,f</sup>, Hannah Irving<sup>a</sup>, Malcolm Maclure<sup>g</sup>, Lisa McCarthy<sup>h,e,i</sup>, Frank Moriarty<sup>j</sup>, Kevin Pottie<sup>a,b,k</sup>, Lalitha Raman-Wilms<sup>l,e</sup>, Emily Reeve<sup>m,n</sup>, Wade Thompson<sup>o</sup>

<sup>a</sup> Bruyère Research Institute, 43 Bruyère St., K1N 5C8, Ottawa, Ontario, Canada

<sup>b</sup> Department of Family Medicine, University of Ottawa, Ottawa, Ontario, Canada

<sup>c</sup> School of Pharmacy, University of Waterloo, Waterloo, Canada

<sup>d</sup> Concordia University, Montreal, Quebec, Canada

<sup>e</sup> Leslie Dan Faculty of Pharmacy, University of Toronto, 144 College Street, M5S 3M2, Toronto, Ontario, Canada

<sup>f</sup> Department of Family Medicine, McMaster University, Hamilton, Ontario, Canada

<sup>g</sup> Department of Anesthesiology, Pharmacology and Therapeutics, University of British Columbia, 2775 Laurel Street, V5Z 1M9, Vancouver, British Columbia, Canada

<sup>h</sup> Women's College Research Institute, 76 Grenville St., M5S 1B2, Toronto, Ontario, Canada

<sup>i</sup> Department of Family and Community Medicine, University of Toronto, Toronto, Ontario, Canada

<sup>j</sup> HRB Centre for Primary Health Care Research, Royal College of Surgeons in Ireland, 123 St Stephen's Green, D02 YN77, Dublin, Ireland

<sup>k</sup> Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Ontario, Canada

<sup>l</sup> College of Pharmacy, Rady Faculty of Health Sciences, University of Manitoba, 750 McDermot Avenue, R3E 0T5, Winnipeg, Manitoba, Canada

<sup>m</sup> NHMRC Cognitive Decline Partnership Centre, Kolling Institute of Medical Research, Northern Clinical School, Faculty of Medicine and Health, University of Sydney, Royal North Shore Hospital, St Leonards, NSW, 2065, Australia

<sup>n</sup> Geriatric Medicine Research, Faculty of Medicine and College of Pharmacy, Dalhousie University and Nova Scotia Health Authority, NS, Canada

<sup>o</sup> Research Unit of General Practice, Department of Public Health, University of Southern Denmark, JB Winsøvsvej 9, Odense, 5000 C, Denmark

### ARTICLE INFO

#### Keywords:

Deprescribing  
Polypharmacy  
Guidelines  
Medication management  
Implementation  
Education  
Research

### ABSTRACT

Deprescribing is a clinically important and feasible innovation that ensures medication efficacy, reduces harms, and mitigates polypharmacy. It involves reducing doses or stopping medications that are not useful, no longer needed, or which may be causing harm. It may also involve changing to a safer agent or using non-pharmacological approaches for care instead. Clinical guidelines combined with behaviour changes (of health care providers (HCPs), the public, and health care decision-makers) are needed to integrate deprescribing into routine practice. Using rigorous international standards, the Bruyère Research Institute Deprescribing Guidelines research team validated a ground-breaking deprescribing guideline methodology and developed or co-developed 5 evidence-based deprescribing guidelines. In March 2018, the team hosted an international symposium convening HCPs, researchers, public agencies, policymakers, and patient advocates in Ottawa, Ontario, Canada. This 3-day symposium aimed to facilitate knowledge exchange amongst guideline developers, users, and the public; initiate partnerships and collaborations for new deprescribing guideline recommendations and effectiveness research; and to continue work on HCP deprescribing education activities. An interprofessional planning committee developed an overall agenda, and small groups worked on session objectives and formats for different components: methods for rigorous deprescribing guideline development, implementation experiences, research/evaluation experiences and educational needs. Through a series of keynote speakers, panel discussions, and small working groups, the symposium provided a forum for participants to meet one another, learn about their different experiences with deprescribing guidelines, and develop collaborations for future initiatives. One

\* Corresponding author. Bruyère Research Institute, 43 Bruyère St., Ottawa, Ontario, K1N 5C8, Canada.

<sup>1</sup> Symposium lead.

E-mail addresses: [bfarrell@bruyere.org](mailto:bfarrell@bruyere.org) (B. Farrell), [james.conklin@concordia.ca](mailto:james.conklin@concordia.ca) (J. Conklin), [lisa.dolovich@utoronto.ca](mailto:lisa.dolovich@utoronto.ca) (L. Dolovich), [hiring@bruyere.org](mailto:hiring@bruyere.org) (H. Irving), [malcolm.maclure@ubc.ca](mailto:malcolm.maclure@ubc.ca) (M. Maclure), [lisa.mccarthy@utoronto.ca](mailto:lisa.mccarthy@utoronto.ca) (L. McCarthy), [frankmoriarty@rcsi.ie](mailto:frankmoriarty@rcsi.ie) (F. Moriarty), [kpottie@uottawa.ca](mailto:kpottie@uottawa.ca) (K. Pottie), [Lalitha.Raman-Wilms@umanitoba.ca](mailto:Lalitha.Raman-Wilms@umanitoba.ca) (L. Raman-Wilms), [emily.reeve@sydney.edu.au](mailto:emily.reeve@sydney.edu.au) (E. Reeve), [wthompson@health.sdu.dk](mailto:wthompson@health.sdu.dk) (W. Thompson).

<https://doi.org/10.1016/j.sapharm.2018.08.010>

Received 27 August 2018; Accepted 27 August 2018

1551-7411/ © 2018 Elsevier Inc. All rights reserved.

hundred thirty participants, from 10 countries and representing over 100 institutions and organizations took part. Symposium proceedings are presented in this issue of RSAP for sharing with the wider community engaged in the care of patients with problematic polypharmacy.

## 1. Introduction

A 3-day symposium hosted by the Bruyère Research Institute Deprescribing Guidelines Research Team was held in Ottawa, Ontario in March 2018. Funded by the Centre for Aging and Brain Health Innovation through a Knowledge Mobilization Partnership Program grant, this symposium aimed to facilitate knowledge exchange among deprescribing guideline developers, users and the public, initiate partnerships and collaborations for new deprescribing guideline recommendations and effectiveness research, and to continue work on health care provider deprescribing education activities. Deprescribing guidelines produced through Bruyère are being used internationally and this symposium was the first initiative aimed at providing in-person cross-collaboration opportunities amongst those who developed and those who are using the guidelines. The goals were to engage champions and build networks to foster sustainability and scalability of deprescribing guideline development, to influence the movement to implement deprescribing guidelines in Canada and internationally, and to facilitate collaborations amongst researchers. The symposium convened researchers, health care providers (HCP), leaders of deprescribing implementation projects, policy makers, representatives of national organizations, and members of the public. While the primary goals were focused on deprescribing guideline development, use and research, the planning committee recognized that discussions would naturally lead to collaboration about other deprescribing initiatives and educational needs. This paper aims to briefly describe how the symposium was organized, present key messages from each session conducted and comment on the overall experience and outcomes. Four additional papers in this series address in more detail, specific discussions and participant recommendations related to deprescribing guideline development, implementation, research, and education.

## 2. Background

Deprescribing is an important, feasible innovation to ensure medication efficacy, reduce harm and mitigate polypharmacy. It involves reducing doses or stopping medications where continued use does not align with the individual's goals of care, where the medication is no longer needed, or may be causing more harm (e.g. cognitive impairment, falls) than benefit. It may also involve changing to a safer agent or using non-pharmacological approaches instead. Clinical guidelines and behaviour change (of HCPs, the public, and health care decision-makers) are needed to integrate deprescribing into routine practice. Using rigorous international standards, the Bruyère Research Institute Deprescribing Guidelines research team validated deprescribing guideline methodology<sup>1</sup> and developed four evidence-based deprescribing guidelines (and a fifth in collaboration).<sup>2–6</sup> Piloting of the implementation of guidelines in long-term care and primary care demonstrated beneficial outcomes (e.g. reduced pill burden and costs,<sup>7</sup> increased HCP self-efficacy for deprescribing<sup>8</sup>). A description of this work, publications, and tools is found [here](#).

These efforts have garnered [Commonwealth Fund and Institute for Healthcare Improvement](#) innovation recognition; more work is needed for widespread mobilization. Guideline developers would benefit from systematically incorporating deprescribing recommendations in practice guidelines; the public and HCPs would benefit from increased awareness, knowledge, and tools; HCP educators would benefit from collaboration to incorporate deprescribing into health care curricula; researchers would benefit from explicit outcomes, knowledge synthesis approaches, and implementation activities. Ultimate benefits include

improved health of older adults and decreased costs.

In 2017, our research team received a Knowledge Mobilization Partnership Program Grant from the [Canadian Centre for Aging and Brain Health Innovation](#). This organization drives innovation in the aging and brain health sector with a goal of allowing older adults to age safely while maintaining cognitive, emotional, and physical well-being. Funding from this grant supported several knowledge mobilization efforts related to the team's deprescribing guideline initiatives including the symposium described in this report.

Older adults and individuals with dementia commonly take multiple medications, some of which are no longer needed or may be causing harm; polypharmacy can place them at risk of harm and limit their well-being. Older adults are particularly at risk for experiencing medication adverse effects (memory loss, cognitive impairment, balance problems, falls) that contribute to emergency room visits, hospitalization and death.<sup>9–15</sup> “Potentially inappropriate medications” (PIM) are those considered to be of more potential harm than potential benefit. In Canada, 2 of 3 people over 65 years take > 5 different medications; 2 of 5 people over 85 years old take > 10 medications.<sup>16</sup> Nearly 50% of adults aged 85 years and over take at least one PIM. Canadians spent \$419 million on PIM medications for seniors and \$1.4 billion on health care costs to treat related side effects in 2013.<sup>17</sup> In that same year, for drug classes addressed by our guidelines, public drug programs spent \$250 million on proton pump inhibitors, \$97 million on antipsychotics and \$135 million on benzodiazepines.<sup>18</sup> While 70–90% of patients are willing to stop a medication if their prescriber says it is possible,<sup>19,20</sup> these conversations are challenging due to lack of guidelines and processes, brief patient encounters, and lack of clarity about optimal deprescribing guideline implementation and little public awareness.<sup>21,22</sup> While criteria exist to identify PIM, there were no robust evidence-based deprescribing guidelines until we developed our methodology.<sup>1</sup>

Deprescribing guidelines provide HCPs with evidence to support decision-making for specific medications and offer safe ways to reduce dosages and monitor effects. Deprescribing guideline development methodology can foster the creation of additional deprescribing guidelines for other drug classes. Scaling up use of these guidelines and engaging the public and health care decision-makers in conversations about maximizing use of these tools will bring deprescribing into the routine care dialogue. This will reduce pill burden, improve related health outcomes (e.g. cognitive impairment and falls from benzodiazepine and antipsychotics overuse), reduce medication costs, and reduce emergency department visits and other health system use due to medication-related adverse events.<sup>23</sup> Organizations are attempting to implement these guidelines but previously there has been no coordinated mechanism to share challenges and build on each other's successes. Nor have principles of deprescribing been widely incorporated into health care education curricula. Our symposium aimed to address these challenges by providing a forum for collaborative problem-solving.

## 3. Participants and setting

Promotion of the symposium began in December 2017 with a ‘save the date’ poster distributed at international, national, and local medical and research conferences and public events. Targeted emails were sent to current recipients of the Bruyère Deprescribing Guidelines research newsletter or individuals who had previously contacted or collaborated with the Bruyère team, then advertising via Twitter. Several organizations hosted information on their websites or distributed ads via newsletters. The Centre for Learning, Research and Innovation based at

Bruyère Research Institute was engaged to advertise to members of the public; invitations were also sent to public organizations represented at a Deprescribing Fair hosted at Bruyère in December 2017. Planning committee members circulated registration details to their networks.

One hundred thirty people, including planning committee members and speakers, attended the symposium. Most attendees were Canadian (107/130, 82%), and there was also representation from the US (12/130, 9%), and 8 other countries (Australia, Belgium, Brazil, Denmark, England, Ireland, Italy, and Spain). While a majority of the Canadian attendees were from Ontario (83/107, 78%), 7 other provinces were represented (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, and Quebec).

The symposium attracted participants from across care contexts (family practice, long-term care, community pharmacy, hospital, academia, etc.) and disciplines (Table 1). Many had used one or more of the evidence-based guidelines, though about 1/3 had not personally used any of the guidelines.

#### 4. Symposium design

The symposium planning committee included researchers previously involved in the development and evaluation of deprescribing guidelines through the Bruyère Research Institute, other researchers interested in deprescribing guideline evaluation, and members of the public (one who had contacted our team with an interest in collaboration and one representing the Family Councils of Ontario). Staff supports included a full-time program manager and a part-time events/communication coordinator.

The planning committee met in-person in November 2017, then by teleconference once in December, and bi-weekly until the symposium. They began by articulating each of their own goals for the symposium, planned overall learning objectives, brainstormed the format and speakers, and assigned most responsible persons for the planning of each component. Subsequently, the most responsible persons for each component worked together and with program staff to recruit speakers, articulate specific learning objectives for each session, and coordinate group meetings through January and February for speakers to share approaches and ensure a logical flow of learning throughout each day.

The final agenda and program speaker bios can be found [here](#). The focus, target audience and objectives for each component of the symposium are outlined in [Box 1](#) below:

#### 5. Symposium key messages

March 26, 2018.

Welcome address: Inaugural experiences developing deprescribing guidelines.

Presenter: Barbara Farrell, BScPhm, PharmD, FCSHP - Scientist, Bruyère Research Institute.

Key messages:

- Rigorously developing evidence-based deprescribing guidelines using Grading of Recommendations Assessment, Development and Evaluation (GRADE)<sup>24</sup> requires significant resources and time; however, the rigorous process lends credibility and user-confidence.
- A one-page decision support algorithm to accompany each guideline has been cited by users as the greatest facilitator to implementation; important to begin with this end in mind.
- Desire for deprescribing guidelines and tools is high but challenges for the Bruyère team continue (e.g. responding to requests for modification and translation of algorithms, wide-spread availability results in loss of control and limits ability to acquire funds for support).

Keynote: Why do we need a high quality method for developing deprescribing recommendations?

Presenter: Kevin Pottie, MD, MCLSc, CCFP, FCFP – Scientist, Bruyère Research Institute and GRADE Working Group Methodologist.

Key messages:

- The GRADE approach is a series of methods from panel formation to guideline implementation; it helps select, appraise and synthesize the best evidence for a clinical recommendation; summary of findings tables show pooled estimates of effect and rate the quality or certainty of recommendations.
- This approach was used to develop the deprescribing guidelines because it transparently weighs benefits of the intervention (in this case deprescribing), harms of continuing or deprescribing the medications, associated costs, and values and preferences to determine recommendations.
- High-quality methods enable international collaboration and knowledge mobilization.

Panel Discussion: How do we make sure guidelines are developed efficiently and effectively while meeting the needs of users?

Panelists: Health care provider perspective: Candia Cotton, BScPharm, BScNutrition, Dr. Everett Chalmers Regional Hospital, Patient/public perspective – Johanna Trimble, Member, Patients for Patient Safety Canada, BC Patient Voices Network, Policy Perspective – Barry Jones, BPharm, Senior Policy Analyst, Health Canada.

Key messages:

- HCPs view the evidence-based deprescribing guidelines as being a summary of the best available evidence, trustworthy, developed by the “right” people, flexible, allowing room for considering patient values and preferences and easily accessed and interpreted; improvements could include incorporating sample patient scenarios and more guidance about how to start conversations with patients.
- Patient advocates emphasize fully involving patients and families in deprescribing conversations in order to maintain trust. Discussions should include quality of life issues and should highlight the importance of prescriber-prescriber communication to ensure medication burden is considered and deprescribed medications are not accidentally re-prescribed.
- Policy analysts face many challenges in today's pharmaceutical landscape (e.g. niche drugs, biologics, stakeholder demand, ageing populations, patchwork listing, etc.) in addressing affordability, accessibility, and appropriate use of prescription drugs. In dealing with deprescribing guideline challenges in Canada, collaboration with national organizations such as CADTH (for comparative clinical and cost effectiveness), Canadian Institute for Health Information, and the Drug Safety and Effectiveness Network (for drug utilization) would be valuable. Therapeutic areas such as oncology and orphan drugs may be challenging.<sup>25,26</sup>

**Table 1**  
Participant background.

Profession	No. of Attendees
Physician (including medical students)	15
Pharmacist (including pharmacy students)	68
Nurse (including nursing students)	1
Nurse Practitioner (including nurse practitioner students)	3
Government and Policy (e.g. CADTH, Canadian Institute for Health Information, Canadian Foundation for Healthcare Improvement)	13
Researchers (not a nurse, pharmacist or physician; not with government or policy, identifies as a ‘researcher’ or ‘research assistant’)	12
Other (e.g. business development people, marketing, administrators from Family Health Teams, and members of the public)	18

**Box 1**

*March 26, 2018 (leads: Lisa McCarthy, Barbara Farrell)*

**Focus:** Aimed at collaboration with guideline developers to incorporate deprescribing guideline methods and results into current clinical practice prescribing guidelines and discuss research needed to support future guideline development.

**Target Audience:** Individuals and organizations who develop clinical guidelines.

**Objectives:**

- Develop partnerships with guideline developers
- Identify ways in which guideline developers can incorporate evidence-based deprescribing recommendations into clinical practice guidelines
- Determine how user needs for evidence-based deprescribing guidelines can be integrated into the development process
- Identify research and supports needed to facilitate future evidence-based deprescribing guideline development

*March 27, 2018 (leads: Barbara Farrell, James Conklin)*

**Focus:** Aimed at sharing ongoing projects, challenges, successes with guideline implementation, including public engagement strategies (part of day devoted to breakout sessions).

**Target Audience:** Individuals or organizations implementing evidence-based deprescribing guidelines and monitoring implementation.

**Objectives:**

- Develop partnerships with people and sites using and evaluating the guidelines
- Identify key public engagement strategies
- Facilitate knowledge exchange among stakeholders to expand dissemination, adoption, and implementation of evidence-based deprescribing guidelines

*March 28, 2018 (leads: Lalitha Raman-Wilms – education, Wade Thompson - research)*

**Focus:** Aimed at interprofessional discussion about incorporating deprescribing guidelines into curricula, sharing ongoing research, and building opportunities to collaborate on a deprescribing guidelines research agenda (two breakout sessions).

**Target audience:** Health profession educators, national educational associations, accreditors, researchers interested in deprescribing guideline implementation and evaluation.

**Objectives:**

- Develop partnerships with educators and researchers
- Build knowledge, skills and support for behaviour change to integrate use of evidence-based deprescribing guidelines into health care professional practice
- Develop an international deprescribing guideline development and research agenda
- Identify deprescribing guideline evaluation strategies and relevant outcome measures

Small working groups:

*Getting started on an evidence-based guideline* (using a guideline co-ordinator instruction guide created to accompany the Bruyère team's guideline methodology paper<sup>1</sup>).

Moderator: Lisa McCarthy, BScPhm, PharmD, MSc, Scientist, Women's College Research Institute, Women's College Hospital.

Small group facilitators:

Lise Bjerre, MD, PhD, CCFP, Scientist, Bruyère Research Institute (focus on statins).

Key messages:

- The prevalence of statin use makes this topic an important one; key clinical issues include uncertainty about effectiveness for primary prevention beyond age 80 and about risk of harm with increasing age, gaps in long-term evidence for effectiveness (beyond 5 years), and challenges with communicating uncertainty about benefit and harm to patients in the face of incomplete evidence.

Feng Chang, RPh, BScPhm, PharmD, Associate Professor, School of Pharmacy, University of Waterloo (focus on opioids).

Key messages:

- The overuse and high risk of harm associated with use of opioids has resulted in a new Canadian treatment guideline<sup>27</sup>; a separate deprescribing guideline could be complementary but scope may be difficult to restrain and the subjective nature of chronic pain, complex costs, hyperalgesia, and demand for recommendations on

alternatives add to the complexity and workload associated with developing a guideline.

- Funding opportunities may be available but pressure to produce a guideline quickly must be balanced with necessary rigour.

Incorporating deprescribing recommendations within existing clinical practice guidelines.

Presenter: Carlos R. Fernandez, BSc(Pharm), PharmD, Health Outcomes Research Consultant.

Key messages:

- Clinical practice guidelines rarely consider frailty or number of comorbid conditions, and generally do not incorporate recommendations on deprescribing; if there is an absence of strong evidence on deprescribing, guideline developers could more explicitly state whether there is a lack of evidence or uncertainty surrounding the optimal duration of use of medications.
- Journal editors and professional bodies could make consideration of deprescribing a requirement for any guidelines they publish and/or endorse. Government and payers could also exert influence via cost coverage mechanisms.

Planning a GRADE deprescribing special interest group.

Presenters: Lisa Dolovich, BScPhm, PharmD, MSc, Ontario College of Pharmacists Professorship in Pharmacy Practice, Leslie Dan Faculty of Pharmacy, University of Toronto and Kevin Pottie, MD, MCIsc < CCFP, FCFP, Scientist, Bruyère Research Institute, GRADE

## Working Group Methodologist.

## Key messages:

- There was widespread agreement to explore the GRADE Working Group ([www.gradeworkinggroup.org](http://www.gradeworkinggroup.org)) processes to develop a GRADE Deprescribing Special Interest Group linked to (but not the same as) the emerging [ResearchGate International Deprescribing Research Interest Group](#).
- Conducting a systematic review to examine how deprescribing is incorporated into current guidelines would be an extremely useful foundational project to increase an understanding of how to scale up the incorporation of deprescribing into guidelines that include pharmacotherapy management.

## Moving deprescribing initiatives forward (panel discussion).

Panelists: Feng Chang, Lise Bjerre, Lisa Dolovich

Moderator: James Conklin PhD, Scientist, Bruyère Research Institute.

## Key messages:

- Developing future guidelines (e.g. statins or opioids) requires considerable work to establish the guideline's scope (e.g. population to focus on, patient preferences, etc.), the composition of the guideline development team (consider including behavioural scientists, ethicists, and lawyers as well as physicians, specialists, pharmacists, and patients), and the support tools needed to aid the decision process.
- One promising strategy for moving deprescribing initiatives forward is to create strategies for influencing prescribing guideline teams to include a deprescribing component. Implementing this strategy could involve interventions targeting journal editors and policy-makers.
- A deprescribing guidelines special interest group requires terms of reference, a methods mapping paper (showing current methods and gaps), analysis of existing guidelines' discussion of deprescribing (if any), a standardized assessment approach for why people stop medications, and a mechanism for sharing information among groups active in this area.
- See accompanying article "Deprescribing recommendations: an essential consideration for clinical guideline developers" for further information.

## Reflection and next steps.

Presenter: Lisa McCarthy, BScPhm, PharmD, MSc, Scientist, Women's College Research Institute, Women's College Hospital.

## Key messages:

- The potential richness of including non-clinician (e.g. ethicist, lawyer) and international team members on future guideline development teams is energizing.
- Many exciting avenues can be explored regarding new guideline topics, how to further refine the methods for their development and directions for advocacy with existing clinical practice guideline developers.
- All are important in work toward the most important objective: shifting conversations that happen between patients and prescribers to include deprescribing as part of daily practice.

March 27, 2018.

Welcome.

Presenter: James Conklin, PhD, Scientist, Bruyère Research Institute.

## Key messages:

- Evidence-based deprescribing guidelines can be used to ameliorate the problem of polypharmacy among elderly patients by changing attitudes, priorities, workflows, and behaviours.

- Individuals experience the problem of polypharmacy in different ways, and thus it is important to listen to and understand diverse perspectives, including the perspective of patients and the public.
- A diverse group of committed stakeholders, such as the symposium attendees, allows better understanding of how to encourage people to think about and take action on deprescribing, how to create new social structures that encourage deprescribing, and how to change behaviour such that deprescribing becomes a routine part of care.

Keynote: The long and winding road: moving a good idea into routine practice.

Presenter: Frank Federico, RPh, Executive Director, Strategic Partners, Institute for Healthcare Improvement (IHI).

## Key messages:

- Deprescribing can be understood as part of the overall patient safety movement, and as an innovation that is being implemented in specific health care contexts.
- Implementing deprescribing guidelines is urgent and important because medications are the most common intervention in health care and are associated with many adverse events that include emergency room visits, admissions, and readmissions. WHO's Third Global Patient Safety Challenge calls for reducing severe avoidable medication-related harm globally by 50% in 5 years.<sup>28</sup>
- The IHI Innovators Network in the US is pilot testing the implementation of deprescribing guidelines by setting clear goals and a measurement framework, by creating process maps to depict current flows of activity, and by using rapid testing (Plan-Do-Study-Act cycles) to implement the innovation.
- Overall, IHI is attempting to create safe, reliable, and effective care by bringing leadership that helps organizations to foster a culture of psychological safety, accountability, teamwork, and effective communication, along with a learning system focused on transparency, reliability, improvement, measurement, and continuous learning.

Learning from implementation experiences in different care contexts (panel presentation).

Panelists: Vittoria Maio, PharmD, MS, MSPH, Thomas Jefferson University, Tonya Thomas, PharmD, Clinical Pharmacist Ascension Innovator Network member, Barbara Farrell, BScPhm, PharmD, FCSHP, Bruyère Deprescribing Guidelines team.

## Key messages:

Vittorio Maio on the Italian experience.

- A deprescribing guideline education study in the Local Health Authority of Parma, Italy, engaged 70% of local family physicians who volunteered to learn about proton pump inhibitors (PPI), antipsychotic, antihyperglycemic and benzodiazepine receptor agonist deprescribing; some physicians were reluctant to stop a medication that had been started by someone else; others worried about malpractice.
- Robust research on deprescribing with more guidelines/algorithms and approaches for engaging physicians will help move practice forward.

Tonya Thomas on the Ascension Health experience in the US.

- A PPI deprescribing intervention study in 3 inpatient hospital settings used HCP education, removal of PPIs from order sets and clinical decision support order alerts requiring PPI indication documentation to shift prescribing culture.
- Challenges included different alert systems and technologies; overall, pop-up alerts have been successful and are being rolled out hospital-wide.

Barbara Farrell on the Ontario experience.

- Deprescribing guideline pilot studies in primary care, long-term care, and community pharmacies have found the deprescribing algorithms to have been the main tool clinicians used, along with a pamphlet to inform patients.
- Incorporation of the algorithm into routine medication review has been more effective as an implementation approach than designing projects with proactive identification of eligible patients from databases.

Deprescribing guideline implementation – what works and what doesn't: opportunities to learn from each other (small group discussions).

Moderator: James Conklin, PhD, Scientist, Bruyère Research Institute.

Key messages:

- Participants identified deprescribing guideline implementation challenges arising from existing routines and priorities, constraining policies and processes, and workplace cultures that focus on prescribing rather than deprescribing.
- Participants also identified factors facilitating implementation of deprescribing guidelines including efforts to educate and empower patients and caregivers, education and skill-building for HCPs, improved interprofessional collaboration, and culture transformation in practices.
- See accompanying article “Implementing Deprescribing Guidelines into Frontline Practice: Barriers and Facilitators” for further information.

Moving deprescribing forward – what needs to happen so deprescribing becomes a part of routine care.

Presenter: Alan Cassels, CD, MPA – Drug Policy Researcher, Faculty of Human and Social Development, University of Victoria.

Key messages:

- Communication vehicles such as web-based video need to be used to spread the word about polypharmacy and deprescribing, especially in terms of the patient and family perspectives.
- Some clinicians are reluctant to deprescribe because they are unaware of the original indication for the prescription, they worry about workload increases, they do not want to be seen as contradicting a specialist, and they find it difficult to talk to elderly patients about quality of life and life expectancy.
- System barriers to deprescribing include short primary care visits, inadequate medication monitoring systems, and pharmacy payment systems that fail to reward deprescribing; the biggest single barrier is fear - of upsetting the status quo, of challenging the authority of prescribers, of upsetting the specialists.
- Change will happen when patients are encouraged to ask questions, to accept drug ‘holidays’ as a normal part of care, to speak up when they have concerns, to realize that they can say “no thanks” when a prescriber recommends a medication.

Concurrent sessions:

Changing health care provider behaviour: how do psychological approaches help us understand barriers to deprescribing and develop de-implementation interventions?

Presenter: Nicola McCleary, PhD, Postdoctoral Fellow Clinical Epidemiology Program, Ottawa Hospital Research Institute.

Key messages:

- Changing HCP behaviour is needed if we are to successfully implement deprescribing guidelines in practice. We need to draw on behavioural science insights into determinants of behaviour and effective ways of changing behaviour.
- Much behaviour change appears to arise from external factors such

as Ministry influence and media coverage, and internal factors such as existing quality improvement routines.

- A behaviour change approach starts with analyzing who needs to do what differently, the barriers and enablers of the required behaviours, the most appropriate behaviour change methods, and ways of measuring outcomes. Tailor the change strategies to the barriers and enablers that exist in the care contexts that you are working with.
- There are numerous theories that can be drawn on. Consider using the Theoretical Domains Framework, which synthesizes 33 theories into 12 comprehensive domains.<sup>29</sup>

What role can policy play in the implementation of deprescribing initiatives?

Presenter: Justin Turner, BPharm, MClInPharm, PhD, Senior Advisor, Science Strategy, Canadian Deprescribing Network (CaDeN), Postdoctoral Fellow, Centre de recherche Intitut universitaire de gériatrie de Montréal.

Key messages:

- Policy can be used to influence behaviour in several ways. For example, policies could make it more difficult to prescribe a medication, increase the expenses incurred by patients, monitor the use of the medication, encourage physicians (monetarily) to monitor medication use, or educate the public.
- Policy interventions are most effective when other contextual influences (e.g. competing practice priorities, availability of alternatives) are taken into consideration.
- A combination of mechanisms (regulatory change plus patient engagement and education) helped to reduce benzodiazepine usage in Denmark.<sup>30</sup>

Engaging with the public – aiming for collaborative care for deprescribing.

Presenters: Emily Reeve, BPharm(Hons), PhD, Research Fellow, Kolling Institute of Medical Research, Northern Clinical School, Faculty of Medicine and Health, The University of Sydney and Johanna Trimble, Member, Patients for Patient Safety Canada and the BC Patient Voices Network.

Key messages:

- From the researcher perspective, consumer involvement increases the quality of research, improves likelihood of funding, enhances recruitment and retention, and facilitates adoption of evidence into practice. It also increases public trust in research through transparency.
- From the consumer perspective, the central reason for being involved in research is to ensure that harms which may have happened to you or a loved one do not happen to others. Factors that lead to positive consumer involvement include: match between passion of researchers and the consumer and when the consumer feels heard, respected, has the opportunity to drive the research question, and can see a clear path of the research to improving practice.

Creating sustainability for deprescribing guideline implementation (panel discussion).

Panelists: Nicola McCleary, Justin Turner, Emily Reeve.

Key messages:

- A variety of different methodologies are available to investigate barriers, enablers and process of guideline implementation (e.g. from qualitative to quantitative and mixed).
- Assessment of unintended consequences of deprescribing interventions is important.
- Need to encourage more consumer advocates to be involved;

funding is important to enable this.

Why deprescribing is a ‘wicked’ problem and what to do about it.

Presenter: James Conklin, PhD, Scientist, Bruyère Research Institute.

Key messages:

- Before solving a problem, we must understand or frame the problem. Some problems are “technical”: there is a known solution, there are experts who know how to apply the solution. Others are “wicked”: they are difficult to describe, different people have different attitudes to the problem, and stakeholders recognize more than one possible solution.
- Implementing deprescribing guidelines into health care practices is a wicked problem. Finding a solution involves searching in the local context for an approach to bring lasting improvement.
- To solve a wicked problem, stakeholders engage in a process of learning. Stakeholders come together and take on meaningful roles in the work of change. Implementing deprescribing is a team sport.
- Wicked problems require that we think broadly, consider novel approaches, and listen to the perspectives of the people who understand the problem differently. The process of change must allow us to try out new approaches, monitor and discuss results, and learn as we go.

March 28, 2018.

Welcome.

Presenter: Lalitha Raman-Wilms, BScPhm, PharmD, FCSHP, Professor and Dean, College of Pharmacy, Rady Faculty of Health Sciences, University of Manitoba.

Key messages:

- Research guides the development of curriculum and education/practice guides research.
- Education is a continuum from prelicensure to post-graduate and continuing professional development. Similarly, prescribing and deprescribing are on a continuum in practice.
- For implementation of deprescribing guidelines to be effective in practice, common outcomes sets for research should be identified.

Keynote: Deprescribing guidelines education and research – the interplay and the way to move forward.

Presenters: Lisa Dolovich, BScPhm, PharmD, MSc, Ontario College of Pharmacists Professorship in Pharmacy Practice, Leslie Dan Faculty of Pharmacy, University of Toronto and Ivy Oandasan, MD, CCFP, MHSc, FCFP, Associate Director, Academic Family Medicine, College of Family Physicians of Canada.

Key messages:

- Research has identified a strong need for health professions education to formalize teaching related to prescribing (and thus deprescribing) because of its complexity.
- Deprescribing requires research to inform curriculum through the promotion of regular knowledge exchange between researchers and educators.
- Lifelong learning for health professions should be advanced to catalyze ongoing behaviour change interventions related to deprescribing.

Educator breakout stream:

Learning to be a better prescriber (presentation, group discussion).

Presenter: Zubin Austin, BScPhm, MBA, MLSc, PhD, FCAHS, Professor and Murray Koffler Chair in Pharmacy Management, University of Toronto.

Key messages:

- Prescribing is a cognitively complex art built upon a foundation of science.
- Many factors influence prescribing: learners' style of learning, their traits, how curriculum is administered, the ‘culture’ within a profession and the health system, and societal and system factors such as peer and public expectation, rewards, and negative influences.
- Within the context of prescribing, deprescribing seems to be somewhat absent in being explicitly discussed in the literature.
- Quality prescribing is currently not consistently taught and often not assessed, placing less importance on this.

Developing a national approach to quality prescribing and deprescribing (presentation, group discussion).

Presenter: Zubin Austin, BScPhm, MBA, MLSc, PhD, FCAHS, Professor and Murray Koffler Chair in Pharmacy Management, University of Toronto.

Key messages:

- Ensuring teaching and assessment of prescribing and deprescribing in health professions education will require curricular reform and support nationally by educators, accreditors, and relevant associations involved in education for entry-to-practice through the career of health professionals.
- Educators need to be supported in implementing changes to curriculum that incorporates deprescribing.
- A greater public/patient and health professional awareness is important in enabling deprescribing in practice.
- See accompanying article “Deprescribing: an educational imperative” for further information.

Researcher stream:

Participatory vs. expert-led evaluation: competing factors in guideline implementation and evaluation.

Presenter: Malcolm Maclure, ScD, Academic Chair in Patient Safety and Professor in the Department of Anesthesiology, Pharmacology and Therapeutics at UBC.

Key messages:

- A framework for classifying types of expert-led research on deprescribing guidelines impacts can be built by drawing analogies with phases of research on pharmaceuticals (e.g. in vitro: research and development on algorithms for communicating a guideline; pre-clinical toxicity studies: research on push-back from target users; Phase 0: research on speed and fidelity of guideline uptake; Phase 1: research on acceptability/trade-offs between overly concise vs. excessively detailed guideline descriptions; Phase 2: guideline implementation trial in controlled environment in hospital; Phase 3: pragmatic trial of initial dissemination of guideline in real-world community care; Phase 4: rapid-cycle ongoing evaluation of health system-wide deprescribing quality improvement program).
- Process evaluations can range from ‘macro’ (e.g. comprehensive program evaluation) to ‘meso’ (e.g. narratives within one institution, individuals clinicians using individual tools) to ‘micro’ (e.g. interviews of perceptions of users in retrospect).
- Participatory approaches to process evaluation of implementations in real-world complex systems might be as important as rigorous effectiveness trials designed by experts.
- There is often a trade-off between rigour and participation: participatory quality improvement entails less rigorous evaluation but might have more impact in the long run.

Deprescribing research: past and future.

Presenter: Wade Thompson, PharmD, MSc, PhD (candidate), University of South Denmark.

Key messages:

- The number of deprescribing studies has grown rapidly and includes clinical research, studies on patient values and preferences, surveys and health economic studies among others.<sup>31</sup> The body of clinical evidence has been summarized by several systematic reviews, which have characterized deprescribing studies as being: (1) deprescribing interventions (interventions designed to promote deprescribing activities such as education or medication reviews) or (2) medication-specific withdrawal studies.<sup>32–34</sup>
- These studies suggest that deprescribing appears to be safe and feasible but there is limited data on clinical outcomes.<sup>31</sup> Clinical studies have generally been limited by small sample sizes, lack of control groups, inconsistency in outcome measures and short-term follow-up; future studies should overcome these limitations.<sup>31</sup> While patient values, goals, and preferences regarding deprescribing have been investigated, there has been little research into how to incorporate these into decision-making in clinical practice.<sup>31</sup>
- A recent study aimed to address inconsistency in outcomes and developed a core outcome set for studies aimed at reducing polypharmacy.<sup>35</sup>

World Café Sessions: Deprescribing research priorities and important outcome measures for developing guidelines and Evaluating the implementation and effectiveness of deprescribing guidelines.

Moderators: Emily Reeve, BPharm(Hons), PhD, Research Fellow, Kolling Institute of Medical Research, Northern Clinical School, Faculty of Medicine and Health, The University of Sydney and Wade Thompson, PharmD, MSc, PhD (candidate), University of South Denmark.

Key messages:

- Future directions in deprescribing research include focus on high-quality studies measuring clinically important outcomes, pharmacoeconomics of deprescribing, implementation in different settings/populations, management during the deprescribing process and engaging patients in shared decision making.
- See accompanying article “Deprescribing: future directions for research” for further information.

Evaluating deprescribing guideline implementation initiatives: rapid fire presentations of ongoing research.

Moderator: Frank Moriarty, Post-doctoral researcher, HRB Centre for Primary Care Research, Royal College of Surgeons in Ireland, Dublin, Ireland.

Key messages:

- A number of research initiatives (feasibility studies, observational and randomised controlled trials, cost-effectiveness analysis) are underway in a variety of practice settings (hospital, community pharmacy, long-term care) and involve both medication specific studies (e.g. deprescribing antipsychotics, PPIs, antihypertensives, inhaled corticosteroids) using deprescribing guidelines as well as wider interventions to enhance deprescribing.

Reconvening for summary, reflection and next steps.

Panelists: Zubin Austin, Frank Moriarty

Presenter: Lalitha Raman-Wilms, BScPhm, PharmD, FCSHP, Professor and Dean, College of Pharmacy, Rady Faculty of Health Sciences, University of Manitoba.

Key messages:

- Deprescribing is part of the continuum of prescribing and needs to be reflected within health professional curriculum. Deprescribing research and education inform each other and patient/public engagement is important as it can influence both. Mechanisms for researchers and educators to collaborate internationally are needed to move deprescribing forward.

Closing remarks.

Presenter: Barbara Farrell, BScPhm, PharmD, FCSHP - Scientist, Bruyère Research Institute.

Key messages:

- The symposium provided an opportunity for those passionate about deprescribing to meet, learn from each other and discuss how to move forward to minimize medication risk as we age.
- Next steps should include:
  - evidence- and outcome-based research developed through international collaborations,
  - training for new and practicing HCPs, and members of the public,
  - improved patient engagement and advocacy.

## 6. Symposium outputs

The purpose of the Bruyère Deprescribing Guidelines Symposium was to influence the movement to implement deprescribing guidelines into health care systems in Canada and internationally, recognizing that this aim would lead to discussion and collaboration beyond the use of the guidelines themselves. In relation to achieving the goals of creating champions and building networks, these have been accomplished based on the diversity of those who attended and the interactions experienced and observed by the organizing committee. The broader goals of the symposium included influencing attitudes of participants, encouraging the formation of new collaborations, and creating a coherent and stable effort to promote and implement deprescribing. Achievement of these goals is difficult to capture, especially within the short period since the symposium concluded. However, new collaborations formed as a result of the symposium, and several attendees made clear steps towards initiatives which could improve the care of older adults through deprescribing. These include enhanced collaborations amongst and between Canadian and international government funded agencies (e.g. CADTH, Canadian Institute for Health Information, Health Canada, American Geriatrics Society, Canadian Deprescribing Network), public attendees and Bruyère researchers, international visits, and meetings aimed at establishing deprescribing networks in other countries (e.g. the US, UK), formation of a GRADE special interest group on deprescribing and invitation to bring the topic to the next GRADE Working Group meeting in Washington (2019), and partnerships with health care organizations aiming to incorporate use of the guidelines into routine care.

Following the symposium, presentation PDFs were [posted online](#), and a registrant contact list was shared with attendees (with individuals' consent). A summary report of the implementation working group meeting was sent to attendees. To facilitate collaboration, the Bruyère team also established a [ResearchGate International Deprescribing Research Interest Group](#) which all symposium participants were invited to join via email, creating a type of 'registry' for participants to populate with project information, and network with others.

Four detailed commentaries accompany this overview of the Deprescribing Guidelines Symposium. The commentaries address guideline development, guideline implementation, deprescribing education, and deprescribing research. These commentaries have also fostered continued collaboration between symposium speakers, as well as the generation of new ideas and projects. Through this approach, our aim is to share key messages and content generated by participants with others who are passionate about deprescribing.

## 7. Discussion

Hosting this symposium was a tremendous learning experience for organizers and a successful approach to engaging with international colleagues. Some of the lessons learned related to the challenges inherent in organizing any large event - competing for conference/event interest when people are deluged with options and invitations, finding

ways to advertise a 'de novo' symposium not part of people's usual conference routines, managing a large number of speakers and presentations, and finding ways to encourage members of the public to attend. Given the lack of continuing medical education or continuing professional development accreditation, there were reasonable numbers of physicians and pharmacists attending. It was encouraging to have HCP and policymaker representation from other countries.

Feedback throughout the symposium indicated that the HCPs, researchers, educators, and policymakers enjoyed connecting with patient advocates. Attendees thoroughly enjoyed being able to connect with others in similar fields, as well as a larger interprofessional audience. Discussions between pharmacists and physicians reinforced the similarities between these professions regarding the challenges of addressing polypharmacy and deprescribing, and enhanced a feeling of collegiality and common purpose. A recurrent theme throughout the symposium highlighted the need for cultural shift amongst HCPs and the public to make deprescribing part of routine care. In particular, participants felt that greater emphasis needs to be placed on encouraging members of the public to engage.

## 8. Next steps

The Bruyère Deprescribing Guidelines Research Team's knowledge mobilization grant, which funded the symposium, also included staff to support development of the symposium proceedings and associated publications, [deprescribing.org](http://deprescribing.org) website improvements, ongoing monthly twitter chats, and a series of [webinars](#) through 2018. Securing ongoing sustainable funding for vital knowledge mobilization activities like these is the next challenge. Symposium participants were energized about opportunities to grow international collaborations and to find ways to continue discussions initiated at the symposium. Attendees felt that another symposium in 2 years would be valuable and discussions are underway to determine who can lead efforts to secure funding and assume responsibility for coordination.

## Funding

Funding for the planning and implementation of the symposium was provided by a Knowledge Mobilization Partnership Program grant through the Centre for Aging and Brain Health Innovation. Additional financial support was provided by the Bruyère Centre for Learning, Research and Innovation, the Canadian Foundation for Healthcare Improvement, CADTH, Medical Pharmacies and the Canadian Deprescribing Network. Funders were not involved in the writing of this report.

## Conflicts of interest

Dr. Farrell has received honoraria for deprescribing presentations from the College of Psychiatric and Neurologic Pharmacists, the European Association of Hospital Pharmacists, and the Nova Scotia College of Pharmacists. Drs. Farrell and Conklin received a stipend from the Institute for Healthcare Improvement for advice and review of documents related to introducing deprescribing into the US healthcare system. Dr. McCarthy received travel support for a presentation to the NHS England. Dr. Pottie received travel support for a presentation to the Commonwealth Fund and Institute for Healthcare Improvement. Dr. Raman-Wilms has received an honorarium for a deprescribing presentation from CancerCare Manitoba. Dr. Reeve's post-doctoral fellowship is supported by the Australian National Health and Medical Research Council - Australian Research Council; she received a research award from the Bupa Health Foundation and deprescribing presentation fees from the Pharmacy Association of Nova Scotia and the Swiss Society of Internal Medicine. Dr. Thompson has received honoraria from the University of Ottawa, University of British Columbia and the Ontario Long-Term Care Clinicians Association for deprescribing

presentations. Drs. Dolovich, Maclure and Moriarty and Ms. Irving declare no conflicts of interest.

## Acknowledgements

The Bruyère Deprescribing Research team gratefully acknowledges the input of all authors and of public members Lorraine Purdon (Family Councils Ontario) and Judith Maxwell on the symposium planning committee. This event could not have taken place without the careful direction and planning provided by Hannah Irving and Tammie Quast. The team also thanks Heera Sen and Stephen Smith for their assistance in preparing these commentaries for publication.

## Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.sapharm.2018.08.010>.

## References

- Farrell B, Pottie K, Rojas-Fernandez CH, Bjerre LM, Thompson W, Welch V. Methodology for developing deprescribing guidelines: using evidence and GRADE to guide recommendations for deprescribing. *PLoS One*. 2016;11(8):1–12. <https://doi.org/10.1371/journal.pone.0161248>.
- Pottie K, Thompson W, Davies S, et al. Deprescribing benzodiazepine receptor agonists: evidence-based clinical practice guideline. *Can Fam Physician*. 2018;64(5):339–351. [http://www.mentalhealthexcellence.org/wp-content/uploads/2018/05/2018\\_Canada\\_Benzo\\_Deprescribg.pdf](http://www.mentalhealthexcellence.org/wp-content/uploads/2018/05/2018_Canada_Benzo_Deprescribg.pdf). <http://www.ncbi.nlm.nih.gov/pubmed/29760253>.
- Reeve E, Farrell B, Thompson W, et al. *Evidence-based Clinical Practice Guideline for Deprescribing Cholinesterase Inhibitors and Memantine*. 2018; 2018:1–14. <http://sydney.edu.au/medicine/cdpc/resources/deprescribing-guidelines.php>.
- Bjerre LM, Farrell B, Hogel M, et al. Deprescribing antipsychotics for BPSD and insomnia. *Can Fam Physician*. 2018;64:17–27. <http://www.cfp.ca/content/cfp/64/1/17.full.pdf>.
- Farrell B, Fcshp A, Black C, et al. *Deprescribing Antihyperglycemic Agents in Older Persons Evidence-based Clinical Practice Guideline*. 2017; 2017:832–843.
- Farrell B, Pottie K, Thompson W, et al. Deprescribing proton pump inhibitors: evidence-based clinical practice guideline. *Can Fam Physician*. 2017;63(5):354–364. <http://www.cfp.ca/content/cfp/63/5/354.full.pdf>.
- Thompson W, Hogel M, Li Y, et al. Effect of a proton pump inhibitor deprescribing guideline on drug usage and costs in long-term care. *J Am Med Dir Assoc*. 2016;17(7):673.e1–673.e4. <https://doi.org/10.1016/j.jamda.2016.04.020>.
- Farrell B, Richardson L, Raman-Wilms L, de Launay D, Alsabbagh MW, Conklin J. Self-efficacy for deprescribing: a survey for health care professionals using evidence-based deprescribing guidelines. *Res Soc Adm Pharm*. 2018;14(1):18–25. <https://doi.org/10.1016/j.sapharm.2017.01.003>.
- Reason B, Terner M, Moses McKeag A, Tipper B, Webster G. The impact of polypharmacy on the health of Canadian seniors. *Fam Pract*. 2012;29(4):427–432. <https://doi.org/10.1093/fampra/cmr124>.
- Budnitz DS, Lovegrove MC, Shehab N, Richards CL. Emergency hospitalizations for adverse drug events in older Americans. *N Engl J Med*. 2011;365:2002–2012.
- Shah BM, Hajjar ER. Polypharmacy, adverse drug reactions, and geriatric syndromes. *Clin Geriatr Med*. 2012;28(2):173–186. <https://doi.org/10.1016/j.cger.2012.01.002>.
- Campanelli CM, Fick DM, Semla T, Beizer J. American geriatric society updated beers criteria for potentially inappropriate medication use in older adults: the American Geriatrics society 2012 beers criteria. *J Am Geriatr Soc*. 2012;60(4):616–631. <https://doi.org/10.1111/j.1532-5415.2012.03923.x>. *American*.
- Hajjar ER, Cafiero AC, Hanlon JT. Polypharmacy in elderly patients. *Am J Geriatr Pharmacother*. 2007;5(4):345–351. <https://doi.org/10.1016/j.amjopharm.2007.12.002>.
- Wu C, Bell CM, Wodchis WP. Incidence and economic burden of adverse drug reactions among elderly patients in Ontario emergency departments: a retrospective study. *Drug Saf*. 2012;35(9):769–781. <https://doi.org/10.2165/11599540-000000000-00000>.
- Jyrkkä J, Enlund H, Korhonen MJ, Sulkava R, Hartikainen S. Polypharmacy status as an indicator of mortality in an elderly population. *Drugs Aging*. 2009;26(12):1039–1048. <https://doi.org/10.2165/11319530-000000000-00000>.
- Canadian Institute of Health Information. *Drug Use Among Seniors in Canada, 2016*. Ottawa: CIHI; 2016. [www.cihi.ca](http://www.cihi.ca).
- Morgan SG, Hunt J, Rioux J, Proulx J, Weymann D, Tannenbaum C. Frequency and cost of potentially inappropriate prescribing for older adults: a cross-sectional study. *C Open*. 2016;4(2):E346–E351. <https://doi.org/10.9778/cmajo.20150131>.
- Morgan S, Smolina K, Mooney D, Raymond C, Bowen M. *The Canadian Rx Atlas*. third ed. Vancouver: UBC Centre for Health Services and Policy Research; 2013.
- Sirois C, Ouellet N, Reeve E. Community-dwelling older people's attitudes towards deprescribing in Canada. *Res Soc Adm Pharm*. 2017;13(4):864–870. <https://doi.org/10.1016/j.sapharm.2016.08.006>.
- Reeve E, Wiese MD, Hendrix I, Roberts MS, Shakib S. People's attitudes, beliefs, and experiences regarding polypharmacy and willingness to deprescribe. *J Am Geriatr*

- Soc. 2013;61(9):1508–1514. <https://doi.org/10.1111/jgs.12418>.
21. Reeve E, To J, Hendrix I, Shakib S, Roberts MS, Wiese MD. Patient barriers to and enablers of deprescribing: a systematic review. *Drugs Aging*. 2013;30(10):793–807. <https://doi.org/10.1007/s40266-013-0106-8>.
  22. Anderson K, Stowasser D, Freeman C, Scott I. Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: a systematic review and thematic synthesis. *BMJ Open*. 2014;4(12) <https://doi.org/10.1136/bmjopen-2014-006544> e006544-e006544.
  23. Chiatti C, Bustacchini S, Furneri G, et al. The economic burden of inappropriate drug prescribing, lack of adherence and compliance, adverse drug events in older people a systematic review. *Drug Saf*. 2012;35(1):73–87. <https://doi.org/10.1111/j.1365-2710.2009.01129.x>.
  24. GRADE. GRADE Working Group. <http://www.gradeworkinggroup.org/>. Published 2004. Accessed June 8, 2018.
  25. Canadian Agency for Drugs and Technologies in Health. <https://www.cadth.ca/>. Accessed June 8, 2018.
  26. Drug Safety and Effectiveness Network. CIHR. <http://www.cihr-irsc.gc.ca/e/40269.html>. Accessed June 8, 2018.
  27. Busse JW, Craigie S, Juurlink DN, et al. Guideline for opioid therapy and chronic noncancer pain. *Can Med Assoc J*. 2017;189(18):E659–E666. <https://doi.org/10.1503/cmaj.170363>.
  28. Geneva: World Health Organization. *Medication without Harm: WHO's Third Global Patient Safety Challenge*. 2017; 2017 [https://doi.org/10.1016/S0140-6736\(17\)31047-4](https://doi.org/10.1016/S0140-6736(17)31047-4) Geneva.
  29. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implement Sci*. 2012;7(1):1–17. <https://doi.org/10.1186/1748-5908-7-37>.
  30. Eriksen SI, Bjerrum L. Reducing prescriptions of long-acting benzodiazepine drugs in Denmark: a descriptive analysis of nationwide prescriptions during a 10-year period. *Basic Clin Pharmacol Toxicol*. 2015;116(6):499–502. <https://doi.org/10.1111/bcpt.12347>.
  31. Reeve E, Thompson W, Farrell B. Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. *Eur J Intern Med*. 2017;38:3–11. <https://doi.org/10.1016/j.ejim.2016.12.021>.
  32. Johansson T, Abuzahra ME, Keller S, et al. Impact of strategies to reduce polypharmacy on clinically relevant endpoints: a systematic review and meta-analysis. *Br J Clin Pharmacol*. 2016;82(2):532–548. <https://doi.org/10.1111/bcp.12959>.
  33. Gnjjidic D, Le Couteur DG, Kouladjian L, Hilmer SN. Deprescribing trials: methods to reduce polypharmacy and the impact on prescribing and clinical outcomes. *Clin Geriatr Med*. 2012;28(2):237–253. <https://doi.org/10.1016/j.cger.2012.01.006>.
  34. Patterson SM, Bradley MC, Kerse N, Cardwell CR, Hughes CM. Interventions to improve the appropriate use of polypharmacy for older people: a cochrane systematic review. *Cochrane Database Syst Rev*. 2014;2014(10):686. <https://doi.org/10.1111/j.2042-7174.2011.00102.x>.
  35. Rankin A, Cadogan CA, Ryan C, Clyne B, Smith SM, Hughes CM. Core outcome set for trials aimed at improving the Appropriateness of polypharmacy in older people in primary care. *J Am Geriatr Soc*. 2018 10.1111/jgs.15245.