



Implementation of pharmacist-led deprescribing in collaborative primary care settings

Shanna C. Trenaman^{1,7} · Natalie Kennie-Kaulbach² · Eden d'Entremont-MacVicar³ · Jennifer E. Isenor^{2,4} · Carole Goodine⁵ · Pamela Jarrett^{1,6} · Melissa K. Andrew^{1,7}

Received: 27 April 2022 / Accepted: 20 June 2022
© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2022

Abstract

In many jurisdictions pharmacists share prescribing responsibilities with other members of the primary care team. Responsibility for deprescribing, the healthcare professional supervised withdrawal of medications that are no longer needed, has not been assumed by a specific member of the primary care team. In this commentary we describe implementation of pharmacist-led deprescribing in collaborative primary care settings using the seven components of knowledge translation. Patient and stakeholder engagement shaped the deprescribing intervention. The intervention was implemented in three collaborative primary care clinics in two Canadian provinces. The evaluation included measures of medication appropriateness, patient satisfaction, and healthcare professional satisfaction. Pharmacist-led deprescribing in primary care was acceptable to both patients and healthcare professionals and demonstrated a reduction of medications deemed to confer more risk than benefit. Our findings support successes in pharmacist-led deprescribing. Future work is needed to understand how to successfully implement and evaluate pharmacist-led deprescribing more widely.

Keywords Deprescriptions · Deprescribing · Intersectoral collaboration · Pharmacists · Primary health care

Abbreviation

FTE Full-time equivalents

✉ Shanna C. Trenaman
shanna.trenaman@dal.ca

- ¹ Department of Medicine (Geriatrics), Dalhousie University, Veterans Memorial Building, 5955 Veterans Memorial Lane, Halifax, NS B3H 2E1, Canada
- ² College of Pharmacy, Faculty of Health, Dalhousie University, 5968 College Street, PO Box 15000, Halifax, NS B3H 4R2, Canada
- ³ Queens Family Health, Nova Scotia Health, 175 School Street, Liverpool, NS B0T 1K0, Canada
- ⁴ Department of Community Health and Epidemiology, Centre for Clinical Research, 5790 University Avenue, Halifax, NS B3H 1V7, Canada
- ⁵ Horizon Health Network, Doctor Everett Chalmers Hospital, 700 Priestman Street, PO Box 9000, Fredericton, NB E3B 5N5, Canada
- ⁶ Horizon Health Network, 400 University Avenue, PO Box 2100, Saint John, NB E2L 4L2, Canada
- ⁷ Geriatric Medicine Research, Dalhousie University / Nova Scotia Health Authority, 1427-5955 Veterans' Memorial Lane, Halifax, NS B3H 2E1, Canada

Introduction

Optimal medication management occurs on a continuum that includes initial assessment and diagnosis, prescription of drug therapy, patient medication adherence, monitoring for effect or adverse events, and discontinuation or modification of therapy when treatment is no longer needed or risks exceed benefits [1, 2]. Discontinuation of medications can be challenging due to complex patient, provider, and healthcare system barriers [3]. Deprescribing is defined as the process of withdrawal of a medication, supervised by a healthcare professional with the goal of managing polypharmacy and improving outcomes [4]. Assigning deprescribing responsibilities to a specific healthcare professional may improve medication management by addressing issues such as continuity of care, multiple prescribers, and time. Primary care acts as the patient's medical home and is the preferred site for preventative care like deprescribing.

We describe development of a pharmacist-led deprescribing intervention for integrated collaborative primary care settings, and how we address each of the seven essential components of knowledge translation [5] in implementation at three sites in two Canadian provinces. The seven essential components of knowledge translation include identification

of a problem, adaptation of knowledge to local context, assessment of barriers to knowledge use, selection, tailoring, and implementation of an intervention, monitoring knowledge use, evaluation of outcomes, and sustaining knowledge use [5]. By focusing on knowledge translation in design and implementation, we expect the intervention will be more easily adopted into different practice sites.

Application of the seven essential components of knowledge translation in the implementation of pharmacist-led deprescribing in primary care

Identification of problem

Responsibility for deprescribing has not yet been assigned to a specific healthcare professional and family physicians cite lack of time, fragmentation in care, withdrawal concerns, lack of support, difficulty engaging patients, and uncertainty as barriers to deprescribing [3, 6–9]. Nurse practitioners (who autonomously diagnose and treat illnesses, order and interpret tests, prescribe medications, and perform medical procedures) [10, 11], nurses [12], general practitioners [13], and pharmacists [14–20] have been studied as potential supervisors for the deprescribing process. Within interprofessional primary care teams pharmacists bring their knowledge of medications to optimize the management of chronic diseases. Primary care pharmacists conduct full patient pharmaceutical assessments, identify, and resolve drug-related problems, monitor drug therapy, answer drug information questions, and educate patients and other healthcare providers [21]. When pharmacists assume prescribing and deprescribing responsibilities in support of other primary care providers it improves access and timeliness of care [22, 23]. Meta-analysis has identified 13 pharmacist-led deprescribing interventions [24]. These studies demonstrate reductions in use of targeted medications but did not measure changes in clinical outcomes or quality of life. A general lack of studies with limited outcomes investigated mean that gaps in understanding remain which prompted our pharmacist-led deprescribing intervention for integrated collaborative primary care settings.

Adapt knowledge to local context

We engaged three collaborative family practice clinics in Atlantic Canada: two in Nova Scotia and one in New Brunswick. Each site had a pharmacist integrated into the primary care team. One site had pharmacist support 0.2 full-time equivalents (FTE) each week and the other two sites had pharmacist support 0.5 FTE each week. To develop the pharmacist-led deprescribing intervention we engaged six

patient and caregiver representatives and 20 researchers, clinicians, and policy makers. The research team included representation from each of the three practice sites. The research team met for a two-day facilitated workshop [25]. We covered topics including medications to target for deprescribing, characteristics of patients likely to benefit from deprescribing, how to implement a pharmacist-led collaborative deprescribing process, and how to evaluate the intervention [25]. Follow-up communication via email allowed final development of the intervention [25].

Ethics approval was granted on 26 April 2019 in Nova Scotia by the Nova Scotia Health Research Ethics Board (file number 1024257) and on 19 September 2019 in New Brunswick by the Horizon Health Research Ethics Board (file number 100475) to implement the intervention at the three sites.

Assessment of barriers to knowledge use

Site visits prior to implementation fostered relationship building between the research team and site staff. Better understanding the participating sites' care environments allowed the research team to adapt the intervention for each site to facilitate successful implementation. At the New Brunswick site paper records were deemed important for record keeping, whereas in the Nova Scotia sites electronic health records were used for communication and record keeping.

Sites used a variety of methods to identify potential deprescribing intervention candidates. These methods included computer generated lists of potential patients for deprescribing based on prescribing patterns from the electronic health record management system, physician identification of potential candidates, pharmacist identification through the course of medication review, and self-referral.

Selection, tailoring, and implementation of intervention

The intervention was designed to be flexible enough for implementation in any collaborative family practice clinic that had an integrated pharmacist (Fig. 1). A list of target medications for deprescribing was chosen with our patient and caregiver partners. The resulting medication list was used to develop a toolkit comprised of a curated list of deprescribing resources for patients and for healthcare providers. The toolkit was made freely available at www.fewer.pillslessrisk.ca [26]. We focused on deprescribing eight medication classes; antipsychotics, potent anticholinergics (defined by a score of three on the anticholinergic cognitive burden scale [27]), proton pump inhibitors, long term colchicine, excessive antihypertensives (documented hypotension or falls), opiates benzodiazepines, and other sedatives.

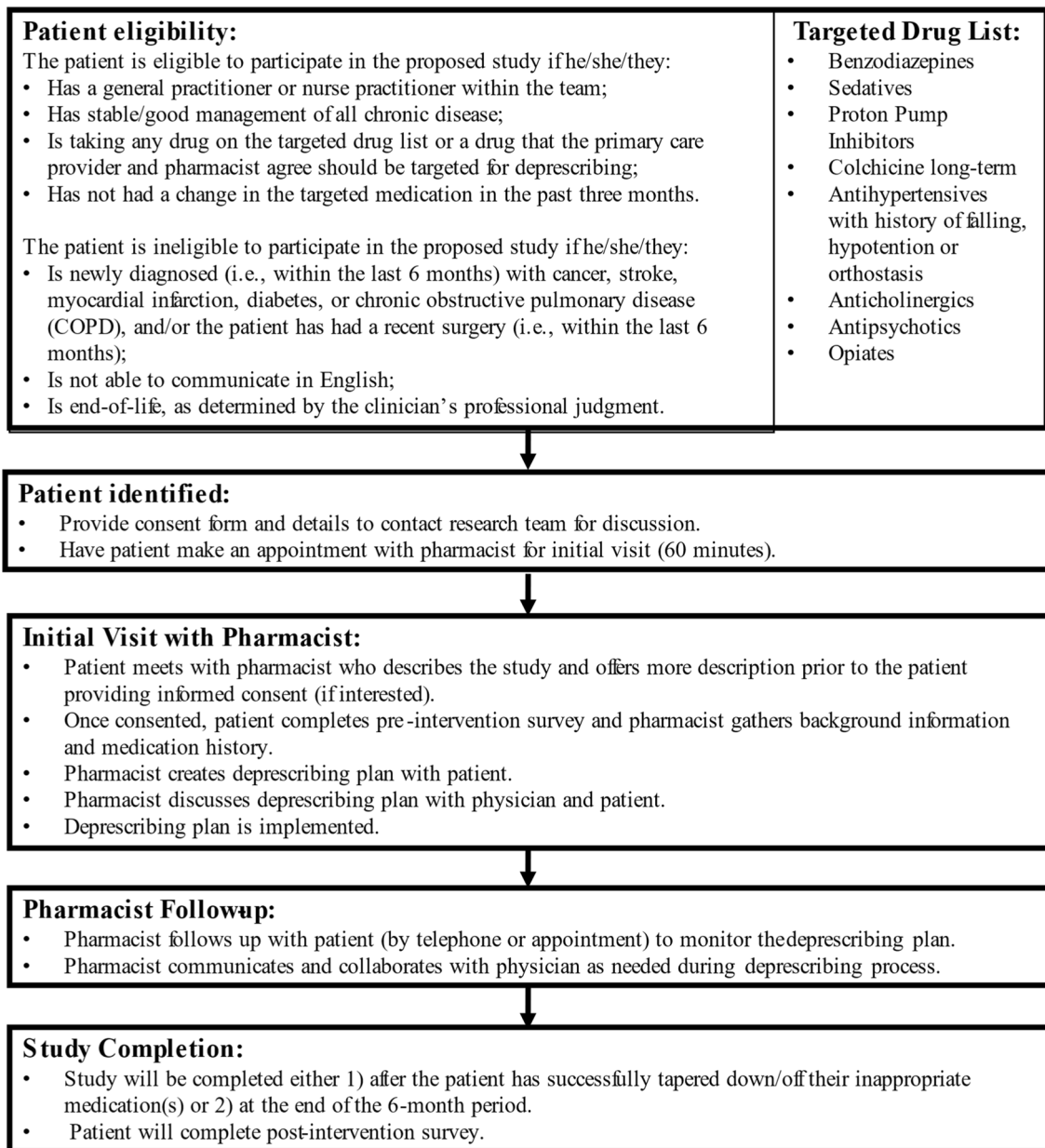


Fig. 1 Description of the deprescribing intervention and study procedures

The intervention was not limited to deprescribing these medication classes and the collaborative care teams were encouraged to support patients in deprescribing whichever medications were identified to confer more risk than benefit. The pharmacist met with each patient to create a personalized deprescribing plan which included the pharmacist's and the patient's shared deprescribing goals. Patient-pharmacist meetings occurred either in person or over the phone. The patient was provided resources from the study website to support them while working through deprescribing the targeted drugs. Details of deprescribing were captured

including presence of drug withdrawal reactions at each follow-up visit.

Monitoring knowledge use

Enrolled patient participants completed a pre-intervention patient survey which included questions about their satisfaction with their current medications, comfort with working with a pharmacist, and the EQ-5D, a brief questionnaire that measures five dimensions of health [28]. Once the deprescribing plan was completed, or the end of the study period was reached (whatever happened first), there was a patient

satisfaction survey that captured satisfaction with the deprescribing experience and patient quality of life [28].

Participating healthcare professionals at each intervention site completed a pre-intervention survey to ascertain attitudes about deprescribing and collaboration with pharmacist colleagues and a post-intervention survey for feedback on the intervention.

Evaluation of outcomes

Informed consent was provided by 13 patient participants across the three sites. The intervention was implemented in the Nova Scotia sites for eight months and in the New Brunswick site for three months. The mean age was 72.5 years (range 42–84). Most were living with multimorbidity. Twelve of the enrolled participants completed the intervention and answered the follow-up survey.

The team pharmacist supported patients as they attempted to discontinue an average of 2.2 medications (range 1–6) and on average successfully discontinued 0.6 medications (range 0–2). Each participant, on average, decreased the dose of 1.1 medications (range 0–4). Pre-intervention the mean number of medications taken was 9.2 (range 3–20) which decreased to 8.3 (range 0–20) after the intervention. The intervention resulted in beneficial changes in two measures of medication appropriateness; a reduction in the STOPP criteria violated (mean 1.8 to 1.5) and a reduction in the AGS Beers Criteria® 2019 [29] violated (mean 1.3 to 1.1).

We sought feedback from the patient participants and received follow-up surveys from five of the 13 patient participants. All five respondents were pleased with their experience working with the team pharmacist to discontinue medications. Two of the five respondents reported withdrawal symptoms, and both reported being pleased with how the withdrawal symptoms were managed. In contrast, pharmacists noted that three of the patients had a withdrawal reaction that required attention. This speaks to the success of the intervention as with pharmacists' support some withdrawal symptoms were not recognized by patients. Further details of the patient pre- and post-intervention surveys are shown in Table 1.

Twenty-one healthcare professionals from the three sites completed pre-intervention surveys and five from the Nova Scotia sites completed post-intervention surveys. When asked about their hopes for the deprescribing intervention in the pre-intervention survey, healthcare professional responses were varied and included two main themes: benefits to patients and improving clinical practice. Benefits to patients, pertained to improving patient engagement/buy-in for deprescribing, reducing use of controlled substances by patients, and finding opportunities to reduce medication costs to patients. Improvements to clinical practice pertained to improved collaboration between healthcare professionals, facilitating physician engagement/buy-in for deprescribing, and generally to find an approach that works. When asked about their concerns regarding the deprescribing intervention, most (13/21, 61.9%) indicated no concerns with

Table 1 Pre- and post-intervention responses to survey questions for patient participants

Survey questions	Pre-intervention response (n = 13)			Post-intervention response (n = 5)		
	<i>Comfortable</i>	<i>Uncertain</i>	<i>Uncomfortable</i>	<i>Comfortable</i>	<i>Uncertain</i>	<i>Uncomfortable</i>
How comfortable are you knowing your healthcare team pharmacist will be/is involved with helping you stop one or more of your regular medications that you no longer need and providing follow-up?	11	2	0	5	0	0
What do you expect/did follow-up with the pharmacist will look like?	<i>Telephone Calls</i>	<i>Face To Face Appointments</i>	<i>Not specified</i>	<i>Telephone Calls</i>	<i>Face to Face Appointments</i>	<i>Not specified</i>
	2	5	6	5	3	0
Are you satisfied with the number of medications you are taking?	<i>Yes</i>	<i>No</i>	<i>Not specified</i>	<i>Yes</i>	<i>No</i>	<i>Not specified</i>
	4	9	0	5	5	0
Did you use any of the resources suggested by your healthcare team?		1	4	0		
Did you experience any withdrawal symptoms?		2	3	0		
Were you pleased with how your withdrawal symptoms were managed?		2	0	3		
Were you pleased with your interactions with the pharmacist?		5	0	0		

respect to implementing the intervention and those who had concerns described patient reluctance to participate, return or worsening of medical conditions or concerns about the amount of time the intervention may take. In the post-intervention survey of healthcare professionals, it was reported by one respondent that the intervention provided a good structure for collaboration, and several respondents found it fostered good communication and adequately supported patients during deprescribing.

Evaluating deprescribing using the number of medications reduced in dose or discontinued has been the reported outcome for most deprescribing studies. Our evaluation focused on patient and healthcare provider experience in addition to medication specific measures including number of medications and medication appropriateness [30].

Sustaining knowledge use

The research team maintained open lines of communication with study sites. Systematic reviews have previously identified effective communication and collaboration strategies as important for deprescribing initiatives [6, 31–33]. Using pharmacists already embedded in the primary care practices allowed us to capitalize on established communication processes and collaborative relationships to potentially build a lasting effect. We also recognized that the intervention fits well into the usual care provided by a pharmacist integrated in primary health care settings which also supports sustainability of the practice.

Challenges with enrollment may be perceived to impair sustainability of our intervention. The lengthy consent process may have deterred patient participation, particularly because several patients elected to receive the same pharmacist-led deprescribing service outside of the study. It was reported to study personnel after study conclusion by intervention pharmacists that pharmacist-led deprescribing in the collaborative primary care intervention sites continues but outside our measurement and evaluation. Continued integration of pharmacist-led deprescribing in collaborative practices would support sustainability as it could facilitate deprescribing of targeted drugs on an ongoing basis.

Challenges and limitations

Evaluation of the deprescribing intervention was halted early due to pandemic COVID-19. We had anticipated to run the study for about one year at all sites (an additional four months in Nova Scotia and nine months in New Brunswick). Premature study closure likely resulted in fewer patient participants and in fewer healthcare professionals completing the post-intervention survey. As mentioned, we had challenges obtaining consent from some potential participants

as the process was quite involved which dissuaded some eligible patients from participating, though several went on to receive the same interventions outside of the study. Support from local leaders, the research team, the clinical team, and the entire development team were present, and additional resources to support patient identification and explanation of the research program may have been beneficial.

Conclusion

Our findings support successes in pharmacist-led deprescribing. Our framework for implementation of pharmacist-led deprescribing in collaborative family practice settings was accepted by patients and healthcare professionals and succeeded in our limited evaluation to improve markers of medication appropriateness. Given that deprescribing remains challenging to implement in routine care, consideration was given to the seven components of knowledge translation [5, 34] and factored into our intervention design and implementation.

Future work must look at more widespread implementation of deprescribing, and improved evaluation approaches that include measurement of clinical outcomes in patients and provide evaluation of pharmacist-led deprescribing from multiple perspectives.

Acknowledgements This project was completed thanks to the support of the entire Medication Optimization team.

Funding This work was supported by the Canadian Frailty Network [CAT2017-10]. This work is supported by the Canadian Consortium on Neurodegeneration in Aging (CCNA) under Team 14 (PI: Melissa Andrew), which investigates how multi-morbidity modifies the risk of dementia and the patterns of disease expression. The CCNA receives funding from the Canadian Institutes of Health Research (CNA-137794) and partner organizations (www.ccna-ccnv.ca).

Conflicts of interest The authors have no conflicts of interest to declare.

References

1. Radomski TR, Decker A, Khodyakov D, et al. Development of a metric to detect and decrease low-value prescribing in older adults. *JAMA Netw Open*. 2022;5(2):e2148599. <https://doi.org/10.1001/jamanetworkopen.2021.48599>.
2. Levinson W. Considering value in prescribing and deprescribing for older adults. *JAMA Netw Open*. 2022;5(2): e2148606. <https://doi.org/10.1001/jamanetworkopen.2021.48606>.
3. Tangiisuran B, Rajendran V, Sha'aban A, et al. Physicians' perceived barriers and enablers for deprescribing among older patients at public primary care clinics: a qualitative study. *Int J Clin Pharm*. 2022;44(1):201–13. <https://doi.org/10.1007/s11096-021-01336-w>.

4. Reeve E, Gnjjidic D, Long J, et al. A systematic review of the emerging definition of ‘deprescribing’ with network analysis: implications for future research and clinical practice. *Br J Clin Pharmacol.* 2015;80(6):1254–68. <https://doi.org/10.1111/bcp.12732>.
5. Graham ID, Logan J, Harrison MB, et al. Lost in knowledge translation: time for a map? *J Contin Educ Health Prof.* 2006;26(1):13–24. <https://doi.org/10.1002/chp.47>.
6. Doherty AJ, Boland P, Reed J, et al. Barriers and facilitators to deprescribing in primary care: a systematic review. *BJGP Open.* 2020. <https://doi.org/10.3399/bjgpopen20X101096>.
7. Valverde Bilbao E, Mendizabal Olaizola A, Mandaluniz Elgezabal D, et al. What do primary care physicians think about deprescription? *J Healthc Qual Res.* 2020;35(2):87–93. <https://doi.org/10.1016/j.jhqr.2019.11.001>.
8. Gillespie RJ, Harrison L, Mullan J. Deprescribing medications for older adults in the primary care context: a mixed studies review. *Health Sci Rep.* 2018;1(7): e45. <https://doi.org/10.1002/hsr2.45>.
9. Djatche L, Lee S, Singer D, et al. How confident are physicians in deprescribing for the elderly and what barriers prevent deprescribing? *J Clin Pharm Ther.* 2018;43(4):550–5. <https://doi.org/10.1111/jcpt.12688>.
10. Kilpatrick K, Tchouaket É, Jabbour M, et al. A mixed methods quality improvement study to implement nurse practitioner roles and improve care for residents in long-term care facilities. *BMC Nurs.* 2020;19:6. <https://doi.org/10.1186/s12912-019-0395-2>.
11. Bergman-Evans B. A nurse practitioner led protocol to address polypharmacy in long-term care. *Geriatr Nurs.* 2020;41(6):956–61. <https://doi.org/10.1016/j.gerinurse.2020.07.002>.
12. Wright DJ, Scott S, Buck J, et al. Role of nurses in supporting proactive deprescribing. *Nurs Stand.* 2019;34(3):44–50. <https://doi.org/10.7748/ns.2019.e11249>.
13. Anderson K, Freeman C, Foster M, et al. GP-Led deprescribing in community-living older Australians: an exploratory controlled trial. *J Am Geriatr Soc.* 2020;68(2):403–10. <https://doi.org/10.1111/jgs.16273>.
14. Ailabouni N, Mangin D, Nishtala PS. DEFEAT-polypharmacy: deprescribing anticholinergic and sedative medicines feasibility trial in residential aged care facilities. *Int J Clin Pharm.* 2019;41(1):167–78. <https://doi.org/10.1007/s11096-019-00784-9>.
15. Cross AJ, George J, Woodward MC, et al. Deprescribing potentially inappropriate medications in memory clinic patients (DePIMM): a feasibility study. *Res Soc Adm Pharm.* 2020;16(10):1392–7. <https://doi.org/10.1016/j.sapharm.2020.01.010>.
16. Kouladjian O’Donnell L, Gnjjidic D, Sawan M, et al. Impact of the goal-directed medication review electronic decision support system on drug burden index: a cluster-randomised clinical trial in primary care. *Br J Clin Pharmacol.* 2021;87(3):1499–511. <https://doi.org/10.1111/bcp.14557>.
17. Whitman A, DeGregory K, Morris A, et al. Pharmacist-led medication assessment and deprescribing intervention for older adults with cancer and polypharmacy: a pilot study. *Support Care Cancer.* 2018;26(12):4105–13. <https://doi.org/10.1007/s00520-018-4281-3>.
18. Ammerman CA, Simpkins BA, Warman N, et al. Potentially inappropriate medications in older adults: deprescribing with a clinical pharmacist. *J Am Geriatr Soc.* 2019;67(1):115–8. <https://doi.org/10.1111/jgs.15623>.
19. Clark CM, LaValley SA, Singh R, et al. A pharmacist-led pilot program to facilitate deprescribing in a primary care clinic. *J Am Pharm Assoc (2003).* 2020;60(1):105–11. <https://doi.org/10.1016/j.japh.2019.09.011>.
20. Kennie-Kaulbach N, Cormier R, Kits O, et al. Influencers on deprescribing practice of primary healthcare providers in Nova Scotia: an examination using behavior change frameworks. *J Med Access.* 2020. <https://doi.org/10.1177/2399202620922507>.
21. Khaira M, Mathers A, Gerard NB, et al. The evolving role and impact of integrating pharmacists into primary care teams: experience from Ontario. *Canada Pharmacy.* 2020;8(4):234–44. <https://doi.org/10.3390/pharmacy8040234>.
22. Adams AJ, Frost TP. Pathways to pharmacist prescriptive authority: do decentralized models for expanded prescribing work? *Res Soc Adm Pharm.* 2022;18(4):2695–9. <https://doi.org/10.1016/j.sapharm.2021.07.016>.
23. Stone R, Oganessian A, Marco N, et al. The impact of a pharmacist-led hypertension medication management program on older people in a skilled nursing facility. *Sr Care Pharm.* 2022;37(2):62–72. <https://doi.org/10.4140/TCP.n.2022.62>.
24. 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):532–48. <https://doi.org/10.1111/bcp.12959>.
25. Trenaman S, Willison M, Robinson B, et al. A collaborative intervention for deprescribing: the role of stakeholder and patient engagement. *Res Soc Adm Pharm.* 2020;16(4):595–8. <https://doi.org/10.1016/j.sapharm.2019.07.004>.
26. “Fewer Pills Less Risk: A Deprescribing Resource,” Dalhousie University. <https://www.dal.ca/sites/gmr/our-work/fewer-pills-less-risk.html>. Accessed 23 Aug 2021.
27. H. H. Publishing, “Anticholinergic cognitive burden scale,” Harvard Health. https://www.health.harvard.edu/newsletter_article/anticholinergic-cognitive-burden-scale. Accessed 31 Dec 2020.
28. “EQ-5D.” <https://euroqol.org/>. Accessed 29 Apr 2021.
29. By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. *J Am Geriatr Soc.* 2019;67(4):674–94. <https://doi.org/10.1111/jgs.15767>.
30. Cateau D, Ballabeni P, Mena S, et al. Deprescribing in nursing homes: protocol for nested, randomised controlled hybrid trials of deprescribing interventions. *Res Soc Adm Pharm.* 2021;17(4):786–94. <https://doi.org/10.1016/j.sapharm.2020.05.026>.
31. Stewart C, Gallacher K, Nakham A, et al. Barriers and facilitators to reducing anticholinergic burden: a qualitative systematic review. *Int J Clin Pharm.* 2021;43(6):1451–60. <https://doi.org/10.1007/s11096-021-01293-4>.
32. Cross AJ, Buchbinder R, Mathieson S, et al. Barriers and enablers to monitoring and deprescribing opioid analgesics for chronic non-cancer pain: a systematic review with qualitative evidence synthesis using the Theoretical Domains Framework. *BMJ Qual Saf.* 2022;31(5):387–400. <https://doi.org/10.1136/bmjqs-2021-014186>.
33. Huffmyer MJ, Keck JW, Grant Harrington N, et al. Primary care clinician and community pharmacist perceptions of deprescribing. *J Am Geriatr Soc.* 2021;69(6):1686–9. <https://doi.org/10.1111/jgs.17092>.
34. “toolkit.” [Online]. https://rnao.ca/sites/rnao-ca/files/RNAO_ToolKit_2012_rev4_FA.pdf. Accessed 01 Jan 2021

Publisher’s Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.