

## REVIEW ARTICLE

# Education about deprescribing for pre-licensed and licensed healthcare professionals: A scoping review

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### Abstract

Deprescribing is complex because it involves patients' health, values, and preferences. The World Health Organization and Canadian Medication Appropriateness and Deprescribing Network have recommended that deprescribing be integrated into health curricula, prompting the need for further understanding about deprescribing education. The purpose of this research is to describe the literature regarding deprescribing education provided to healthcare professionals. We conducted a scoping review using the five-step model by Arksey and O'Malley with revisions from Levac et al. The databases searched included Medline, Scopus, Embase and ERIC. Papers were included if they were written in English and contained an educational intervention about deprescribing tailored toward physicians, pharmacists or nurses. White papers and conference abstracts were included. A total of 4853 abstracts were eligible for screening and 46 papers were included (25 full texts, 15 conference abstracts and 6 white papers). Thirty-three papers utilized group education for their intervention and of these, 20 involved interactive portions. Medicine was the most targeted profession, included in 29 papers. The most common outcomes were the number of medications deprescribed and an increase in learner knowledge and self-efficacy regarding deprescribing using self-assessment surveys or post-educational examinations. We found that there is evidence that educational interventions can increase participant knowledge regarding deprescribing and improve self-efficacy. To expand the education of deprescribing, future interventions should engage and utilize a variety of health professions and interventions could include real patients. Further research is required to determine the retention and application of deprescribing knowledge gained from single educational interventions.

### KEYWORDS

continuing, education, deprescribing, education, healthcare curricula, teaching

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## 1 | INTRODUCTION

Polypharmacy and potentially inappropriate medication (PIM) use are common in older adults. One approach to addressing polypharmacy and PIMs is to implement deprescribing, a term first used in 2003 that can be defined as the act of reducing or stopping medications in which the risk of harm is higher than the possible benefits of continuing the medication.<sup>1,2</sup>

Polypharmacy is commonly defined as five or more medications which include prescription and nonprescription medications.<sup>3</sup> Globally, 37% of the general population and 45% of older adults experience polypharmacy.<sup>4</sup> In addition to older age, polypharmacy can be caused by clinicians following clinical practice guidelines, practice patterns that support prescribing, advertising influence from pharmaceutical companies, patient demand and societal expectations.<sup>5,6</sup> Polypharmacy is associated with morbidity and decreased quality of life.<sup>7</sup> As the number of medications prescribed increases, clinical complexity increases, contributing to side effects, drug interactions and medication burden.<sup>8</sup> There is a correlation between the number of medications prescribed and an increase in adverse drug reaction-related hospitalizations.<sup>9</sup>

Another prevalent issue is the prescribing and use of PIMs, medications that should, for the most part, be avoided in older adults. The prevalence of PIMs has been increasing for the past two decades, with a pooled prevalence of 36.7% in older adults worldwide.<sup>10</sup> PIM use is associated with poorer health-related quality of life, adverse drug events, hospital admissions and health system use, disability and mortality in older adults.<sup>11</sup>

While deprescribing can be implemented as part of the routine assessment of medications, it is often used to address polypharmacy and PIMs. Deprescribing is a complex process and can be difficult to perform.<sup>12</sup> Physicians report hesitancy to deprescribe medications that were prescribed by another physician or when patients felt unwilling to discontinue select medications.<sup>13</sup> Other reported barriers include patient engagement and time constraints.<sup>13</sup> Pharmacists describe practice barriers such as settings which focus on productivity over clinical services.<sup>4</sup> Lack of deprescribing guidelines as well as disease-specific guidelines that fail to include deprescribing information are other barriers.<sup>4</sup> Although there are tools to assist in reducing the number of medications that an individual is taking, these are not sufficient to replace critical thinking skills when choosing to deprescribe a medication.<sup>14</sup> In addition, deprescribing is patient-specific and requires a holistic look at the patient's overall health and medical conditions, life expectancy, patient's values, preferences and health goals, which may not be easily addressed in an efficient medical visit.<sup>15</sup>

The World Health Organization Medication Safety in Polypharmacy Technical Report discusses how healthcare professionals may play a significant role in reducing inappropriate polypharmacy and how advances in healthcare curricula should include developing the required skills to address polypharmacy.<sup>16</sup> The Canadian Medication Appropriateness and Deprescribing Network (CADeN), one of the first national networks devoted to deprescribing, recommends that Canadian healthcare schools integrate deprescribing in their curricula.<sup>17</sup>

The prevalence of polypharmacy and PIMs in the aging population, increasing evidence for deprescribing and the complexity surrounding deprescribing all support a need for deprescribing education to be further understood and developed. The purpose of this scoping review was to describe the current literature in regard to deprescribing education provided for healthcare professionals.

## 2 | METHODS

This scoping review was conducted following the five-step framework first introduced by Arksey and O'Malley<sup>18</sup> and advanced by Levac et al.<sup>19</sup>

### 2.1 | Identifying the research question

Our research question was as follows: What educational approaches have been utilized for pre-licensed and licensed healthcare professionals to increase knowledge and skills in deprescribing?

The objectives of this scoping review were to identify the preferred approach used to teach deprescribing to healthcare professionals, to describe any differences in teaching and learning about deprescribing for medical, pharmacy or nursing students, to describe any differences in teaching, learning and the content about deprescribing for licensed physicians, pharmacists or nurses, and to describe any barriers or facilitators in teaching deprescribing.

### 2.2 | Identifying relevant studies

Four databases were searched: EMBASE (1974 to June 2023), Scopus (1966 to June 2023), MEDLINE (1946 to June 2023) and ERIC (1964 to June 2023). The search strategy was developed in consultation with a librarian (L.D.) (Supplement 1, Supporting Information Data S1). There were no limits on the setting, location or year of publication; only literature available in English was included. All relevant papers were uploaded into the software Covidence for the study selection process.

### 2.3 | Inclusion criteria

This review included licensed and pre-licensed medicine, pharmacy and nursing professionals. These disciplines were chosen as they are most likely to engage patients in deprescribing due to scopes of practice relating to medication decisions and prescribing. We included studies that conducted any form of education (eg, classroom education, virtual interaction, learning modules, etc). Consistent with the broad purpose of a scoping review, we included literature that did not involve an educational intervention but discussed how deprescribing education should be approached, such as published articles under expert opinion, White papers or official society/organizational position. These were included for two reasons. First, there is limited

scientific evidence for deprescribing curricula and, second, deprescribing is a relatively new educational concept and as such there is limited high-quality evidence.

## 2.4 | Exclusion criteria

We excluded papers that did not include deprescribing education or include outcomes that could not be extrapolated to deprescribing. We also excluded commentaries that discussed deprescribing, but not deprescribing education.

## 2.5 | Review process

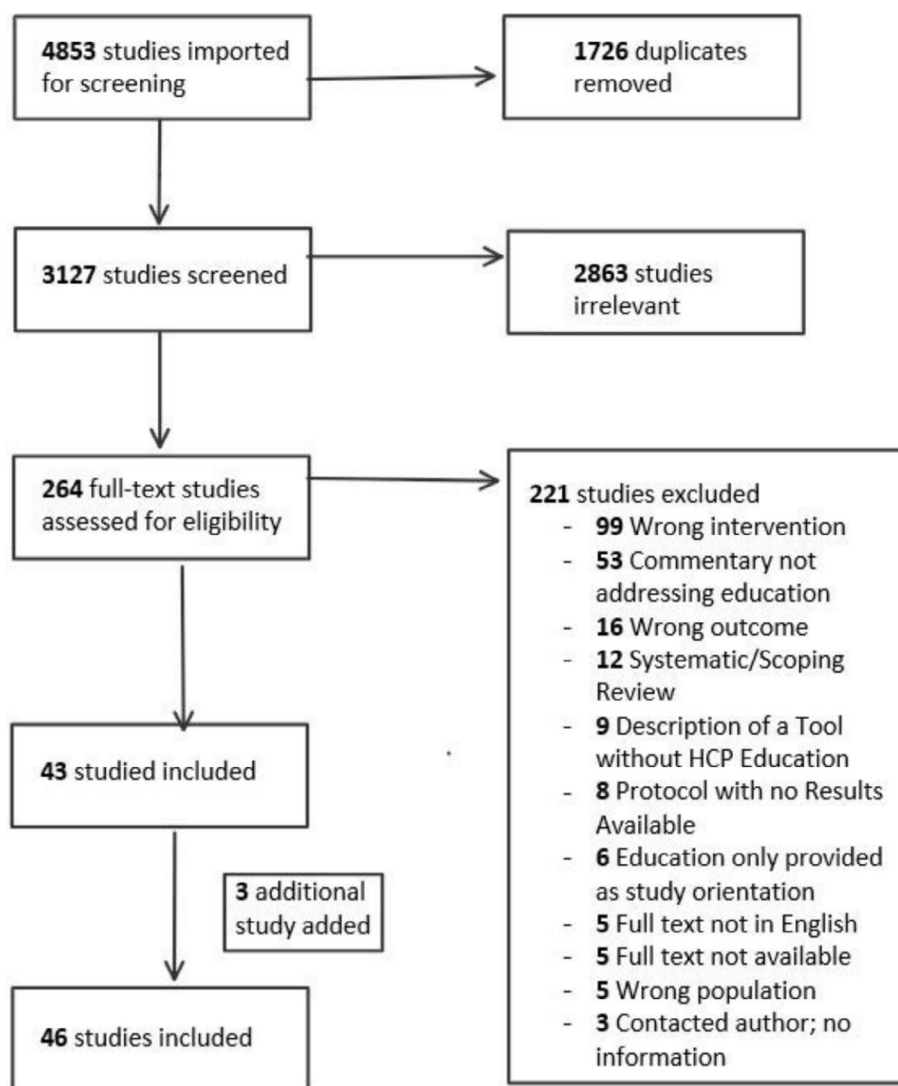
The review was done in stages, beginning with a title and abstract screening. Using the software Covidence, at least two researchers independently read the identified title and abstracted eligible for full-text review. Discrepancies in this process were rectified by consensus

after discussion between the investigators. A third-party reviewer assisted with the decision when a consensus could not be reached.

For full-text screening, at least two authors independently read articles to assess if the content met the inclusion criteria. Authors of conference abstracts whose abstracts were ambiguous or met the inclusion criteria were contacted by email to provide a written description of the study content or to set up a virtual meeting to provide further information. Twenty authors were contacted and six authors provided an email response to the questions.<sup>20-25</sup> Two personal interviews were conducted with authors for further insight into their research.<sup>26,27</sup> Discrepancies of full texts and conference abstracts were addressed similarly to the title and abstract screening process.

Lastly, authors A.Y. or B.C. extracted data into a predetermined data extraction spreadsheet. The data extracted were identified a priori. To ensure consistency in extraction, 10% of the articles were verified by the other authors.

The education types within Table 1 are divided into three main categories. The term “workshop” is used to describe interventions that were interactive and case based unless otherwise specified. The term



**FIGURE 1** PRISMA diagram including the number of records identified, included and excluded, and the reasons for their exclusion.

“lecture” is used to describe didactic interventions that were non-interactive. The term “academic detailing” is used to describe educational outreach from one healthcare professional to another. For more detail, please refer to Supporting Information Table S1 and Data S1 and S2).

### 3 | RESULTS

#### 3.1 | Study selection

The search yielded 3127 studies after removing duplicates across the three databases shown in our PRISMA diagram (Figure 1). Of the 3127 titles and abstracts screened, 264 papers were eligible for full-text review and 43 papers met the inclusion criteria for data extraction. Through our contact with an author (Sun et al) regarding their paper, they informed us of another very recently published paper that could be included.<sup>24</sup> Additionally, two papers which met the inclusion criteria were discovered through personal alerts of new publications, resulting in two additional full-text studies being included for data extraction.<sup>28,29</sup> The 46 studies resulted in 25 full-text studies, 15 conference abstracts and six White papers (Tables 1–3). The full dataset is available in the Supporting Information Tables S1–S3 and Data S1 and S2.

#### 3.2 | Study characteristics

The majority of the studies were completed in the United States, followed by Australia (Tables 1 and 3).

##### 3.2.1 | Full-text articles

Of the 25 full-text interventions studied, 20 included group teaching<sup>30–50</sup> and 15 involved interaction within the group setting.<sup>30–37,39–41,44–46,48</sup> Almost all of the studies included case-based learning to assist with reinforcing deprescribing concepts.<sup>30–32,34–37,39–41,44–46,48</sup> Three of the 25 studies involved one-on-one teaching,<sup>40,50,51</sup> with two of these studies enrolling more than 100 participants.<sup>50,51</sup> Five studies involved self-directed learning.<sup>28,36,39,43,52</sup> Not all studies described educational content, but they did frequently include definitions of one or more of the following: deprescribing, potentially inappropriate medications, polypharmacy and/or inappropriate polypharmacy. Some papers also provided resources or tools to assist healthcare professionals in deprescribing, such as the AGS Beers Criteria<sup>45</sup> or the START/STOPP criteria.<sup>35,38,40,53</sup> A paper by Rudolf et al included resource cards using the PRISCUS guidelines on PIMs.<sup>50</sup> Only nine of the 25 intervention studies included a control group.<sup>30–34,37,40,41,48</sup>

The most common teachers/education developers were physicians, who were involved in 12 out of the 25 included studies.<sup>30,31,34–37,39–42,44,46</sup> This was followed by pharmacists and nurses/nurse practitioners, who were involved in seven<sup>30,33,36,41,44,46,51</sup> and six studies,<sup>40,42,45–47,54</sup> respectively.

**TABLE 1** Participants and educational interventions.

Characteristic	Articles with this objective
<b>Participants</b>	
<10 total participants	27 <sup>a</sup> , 36, 55 <sup>a</sup>
10–100 total participants	20 <sup>a</sup> , 23 <sup>a</sup> , 25 <sup>a</sup> , 30, 31, 32, 33 <sup>b</sup> , 35, 37, 38, 39, 40 <sup>b</sup> , 41, 44, 45, 46, 47, 54, 56 <sup>a</sup>
>100 total participants	22 <sup>a</sup> , 26 <sup>a</sup> , 34, 42, 48, 50, 51, 52, 58 <sup>a</sup>
<b>Education recipients</b>	
Physicians (including medical students and residents)	20 <sup>a</sup> , 25 <sup>a,c</sup> , 26 <sup>a</sup> , 27 <sup>a</sup> , 30, 31, 32, 33, 34 <sup>c</sup> , 35, 36, 37, 38, 39 <sup>c</sup> , 40, 41 <sup>c</sup> , 42, 43 <sup>c</sup> , 44 <sup>c</sup> , 46, 47, 48, 49 <sup>c</sup> , 50, 51, 52, 54, 55 <sup>a,c</sup> , 56 <sup>a,c</sup> , 58 <sup>a,c</sup> , 59 <sup>a</sup> , 60 <sup>a,c</sup>
Pharmacist	22 <sup>a</sup> , 27 <sup>a</sup> , 30, 33, 42, 43, 46, 49
Nurses	20 <sup>a</sup> , 23 <sup>a</sup> , 27 <sup>a</sup> , 36, 40, 41, 42, 43, 45, 46, 49, 54, 60 <sup>a</sup> , 61 <sup>a</sup>
Other	20 <sup>a</sup> , 26 <sup>a</sup> , 40, 42, 43, 46, 49
<b>Education provider</b>	
Physicians	23 <sup>a</sup> , 26 <sup>a</sup> , 30, 31, 34, 35, 36, 37, 39, 40, 41, 42, 44 <sup>c</sup> , 46, 56 <sup>a</sup>
Pharmacists	25 <sup>a</sup> , 26 <sup>a</sup> , 30, 33, 36, 41, 44, 46, 51, 55 <sup>a</sup> , 59 <sup>a</sup> , 63 <sup>a</sup>
Nurses	26 <sup>a</sup> , 27 <sup>a</sup> , 40, 42, 45, 46, 47, 54
Other	41, 49
<b>Duration of intervention</b>	
<1 h	28, 38, 42, 43, 47, 55 <sup>a</sup>
1–24 h	22 <sup>a</sup> , 23 <sup>a</sup> , 25 <sup>a</sup> , 27 <sup>a</sup> , 30, 31, 33, 34, 35, 37, 39, 40, 41, 42, 44, 45, 46, 54, 56 <sup>a</sup>
>1 day (including multiple days)	20 <sup>a</sup> , 52, 57 <sup>a</sup>
<b>Teaching style</b>	
Group	20 <sup>a</sup> , 22 <sup>a</sup> , 23 <sup>a</sup> , 25 <sup>a</sup> , 26 <sup>a</sup> , 27 <sup>a</sup> , 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 54, 55 <sup>a</sup> , 56 <sup>a</sup> , 57 <sup>a</sup> , 62 <sup>a</sup> , 63 <sup>a</sup>
One-on-one	26 <sup>a</sup> , 40, 50
Self-directed learning	23 <sup>a</sup> , 28, 36, 39, 43, 51, 52
<b>Education type</b>	
Workshop	20 <sup>a,d,e</sup> , 22 <sup>a,d,e</sup> , 23 <sup>a,d,e</sup> , 25 <sup>a,d,e</sup> , 30 <sup>d,e</sup> , 31 <sup>d,e</sup> , 32 <sup>d,e</sup> , 33 <sup>e</sup> , 34 <sup>d,e</sup> , 36 <sup>d,e</sup> , 37 <sup>d,e</sup> , 39 <sup>d,e</sup> , 40 <sup>d,e</sup> , 44 <sup>d,e</sup> , 46 <sup>d,e</sup> , 48 <sup>d,e</sup> , 50, 56 <sup>a,d,e</sup> , 57 <sup>a,d,e</sup>
Lecture	27 <sup>a</sup> , 31 <sup>d,e</sup> , 36, 37, 38, 40, 42, 47, 49, 54, 55 <sup>a</sup> , 57 <sup>a,d,e</sup> , 58 <sup>a</sup> , 60 <sup>a</sup> , 62 <sup>a</sup> , 63 <sup>a</sup>
Academic detailing	26 <sup>a</sup> , 51, 59 <sup>a</sup>
Other	23 <sup>a</sup> , 28, 34, 35 <sup>d,e</sup> , 37, 40, 41 <sup>d,e</sup> , 43, 45 <sup>d,e</sup> , 52, 61 <sup>a</sup>

<sup>a</sup>Abstract.

<sup>b</sup>Measured as number of sites enrolled.

<sup>c</sup>Included students and/or residents.

<sup>d</sup>Case-based intervention.

<sup>e</sup>Interactive intervention.

**TABLE 2** Outcomes of educational interventions.

			Outcome measure						
			Increase in self efficacy/ implementation	Increase in learner knowledge of DeRx	Course evaluation	Identification of PIM's	Changes in prescribing habits (resulting in DeRx)	Decrease in number of PIM's/ clinical DeRx	Other
Outcome population	HCP	MD	25 <sup>a,c</sup> , 43, 44, 46, 52, 54	20 <sup>a</sup> , 22 <sup>a,c</sup> , 25 <sup>a,c</sup> , 35, 41 <sup>b</sup> , 43, 44, 55 <sup>a</sup> , 56 <sup>a</sup> , 58 <sup>a</sup>	22 <sup>a,c</sup> , 34, 46	34, 47	31 <sup>b</sup> , 32 <sup>b</sup> , 39 <sup>b</sup> , 51 <sup>b</sup>		
		Ph	46	20 <sup>a,c</sup>	46	33 <sup>b</sup>			
		NP, RN	23 <sup>a,c</sup> , 45, 46, 54	20 <sup>a,c</sup> , 41 <sup>b</sup> , 45	46		61 <sup>a</sup>		
		Other	43	20 <sup>a,c</sup> , 43					
Patient								26 <sup>a</sup> , 27 <sup>a,c</sup> , 30 <sup>b</sup> , 31 <sup>b</sup> , 35, 36, 37 <sup>b</sup> , 38, 40 <sup>b</sup> , 42, 47 <sup>b</sup> , 48 <sup>b</sup> , 49, 50, 51 <sup>b</sup> , 52, 57 <sup>a</sup> , 59 <sup>a,b</sup> , 60 <sup>a,b</sup> , 61 <sup>a,b</sup> , 62 <sup>a,b</sup> , 63 <sup>a</sup>	28 <sup>a</sup> , 30 <sup>b</sup> , 32 <sup>b</sup> , 33 <sup>b</sup> , 37 <sup>b</sup> , 48, 50 <sup>b</sup> , 57 <sup>a,b</sup> , 60 <sup>a,b</sup>

Abbreviations: DeRx, deprescribing; HCP, healthcare profession; MD, physician; NP, nurse practitioner; Ph, pharmacist; RN, registered nurse.

<sup>a</sup>Conference abstract/personal communication.

<sup>b</sup>Papers that showed statistically significant results.

<sup>c</sup>Abstract with additional information provided.

Ten of the 25 intervention studies involved interprofessional education.<sup>30,33,36,40–43,46,49,54</sup> Education recipients were in the profession of medicine in 22 out of 25 studies,<sup>30–44,46–49,51,52,54</sup> with six including medical students/residents<sup>34,39,41,43,44,49</sup> and 18 including physicians.<sup>30–33,35–38,40,42,43,46–49,51,52,54</sup> This was followed by nine out of 25 for nurses/nurse practitioners<sup>36,40–43,45,46,49,54</sup> and six out of 25 for pharmacists.<sup>30,33,42,43,46,49</sup>

### 3.2.2 | Conference abstracts/personal communications

Of the 15 conference abstracts and personal communications, 10 includes a group teaching style.<sup>20,22,23,25–27,55–58</sup> Six of these studies involved interactive portions within the group setting and case-based learning.<sup>20,22,23,25,56,57</sup> One study included self-directed learning<sup>23</sup> and one utilized one-on-one teaching.<sup>26</sup> Four studies did not specify the teaching style.<sup>59–62</sup> No reviewed abstracts included a control or comparison group.

The most common education providers were physicians<sup>22,23,26,56</sup> and pharmacists,<sup>25,26,55,60</sup> who were each involved in four out of the 15 included abstracts. This was followed by nurses, who were involved in two abstracts.<sup>26,27</sup> Six abstracts did not specify the education provider.<sup>20,57,59,61–63</sup>

Three of the 16 abstracts involved interprofessional education.<sup>20,27,61</sup> Education recipients were physicians or medical students/residents in 10 abstracts, with the assumption that in Hurley et al, “clinicians” were physicians for our review.<sup>20,22,25–27,55,56,59–61</sup> This

was followed by nurses/nurse practitioners<sup>20,23,27,61,62</sup> and pharmacists,<sup>20,27</sup> who were involved in five and two of the abstracts, respectively.

### 3.3 | Outcomes

The outcomes (see Table 2) are organized based on the outcome measured and which population the outcome was intended to affect. This is done as the outcomes are diverse and to account for studies that included multiple outcomes. Details of the outcomes can be found in the Supporting Information Table S2 (Outcomes of Educational Interventions).

The most common outcomes evaluated were learner experience and an increase in self efficacy.<sup>20,22,23,25,35,41,43–46,52,54–56,59</sup> Post-educational surveys or tests, including multiple-choice examinations, true and false quizzes, and self-reflection surveys using the five-point Likert Scale, were the most common methods of gathering outcome data. Ten articles utilized these assessments immediately post educational session<sup>20,23,25,43–46,54,56,59</sup> compared to four articles using long-term follow-up to determine retention of knowledge.<sup>22,35,41,55</sup> Sleath et al did not specify the time of follow up.<sup>52</sup> The studies most commonly gathered outcomes relating to memorization, application to patient cases and the likelihood of implementation into practice.

Twenty-two papers examined the number of medications deprescribed by healthcare professionals after the intervention.<sup>26,27,30,31,35–38,40,42,47–52,57,58,60–63</sup> Classes of medications regularly examined included proton pump inhibitors, antipsychotics and

**TABLE 3** Summary of White papers

Article reference number/ country	Participants	Audience	Process	Relevant themes	Recommendations
29 (Canada)	No panel; expert consensus	Educators in medicine, nursing and pharmacy	Literature review and resources available for prescribing and deprescribing considered in proposed framework to standardize deprescribing education for all medicine, nursing, and pharmacy students	Seven competencies and associated knowledge and skills to integrate into education Consideration for interprofessional education for teaching deprescribing	The authors suggest deprescribing education can be taught on its own or integrated within other topics Recommend starting exposure of deprescribing as early as possible to learners in healthcare Integrate learning into practical cases Ensure there is continual feedback
64 (Australia)	35 respondents: medical professionals, geriatricians, pharmacologists, pharmacists, researchers	Medical students, geriatric pharmacology curriculum	Developing a geriatrics curriculum with feedback from practitioners globally in geriatrics utilizing a Delphi process	Eight learning topics discussed (#6 specific to deprescribing) Article addressed topics to be included, identification of PIMs, HCP attitude toward deprescribing	Content: describing risk factors, effects, and impacts of polypharmacy, outline evidence of deprescribing, outline how to deprescribe, implement cases to apply deprescribing knowledge, develop the willingness to identify and reduce polypharmacy
65 (Canada)	25 participants: pharmacists, physicians, professional organization representatives, public members	Leaders in health science education, faculty/school/ professional programs	Focus groups discussing strategies for teaching deprescribing as part of a curriculum	Addresses content that could be included in a curriculum Integration of module assessment	Content: implement deprescribing experiential opportunities and guidelines into courses, discuss evidence based deprescribing, examinations Delivery: active learning
66 (USA)	26 PharmD students	Pharmacists	26 PharmD students participated divided over four focus groups	Four themes were described: *for the purpose of the scoping review, only theme 3 will be discussed	Simulations: with patients and HCP Didactic: integration of deprescribing with other modules, direct instructions, cases Clinical experience: deprescribing rotations
24 (Canada)	No panel; recommendation of deprescribing framework by the authors	Nurses	(1) Literature review (2) Review of key domains from phase 1 (3) Assessment and validation of geriatric module	Addresses content to be taught to nurses in regard to deprescribing Utilizes a literature review to provide support for their recommendations	Content: PK/PD knowledge, medication management, ADRs, medication burden Delivery: CEs for deprescribing, implementing interprofessional collaboration
62 (Canada)	Two focus groups (n = 11 homecare nurses)	Homecare nurses	Focus groups for the barriers and enablers of deprescribing	Barriers: overuse of OTC medications, lack of time Enablers: emphasis on interprofessional care	Content: medical conditions, medication reconciliation, deprescribing tools and resources, non-pharmacological therapies

Abbreviations: ADR, adverse drug reactions; CE, continuing education; HCP, healthcare practitioner; OTC, over the counter; PD, pharmacodynamics; PK, pharmacokinetics.

PIMs. All papers that utilized this outcome showed an increase in deprescribing, with seven papers applying statistical analysis in their results.<sup>30,31,37,40,48,51,61</sup>

Other outcomes included evaluation of course content and changes in prescribing habits to incorporate deprescribing in practice.<sup>28,30,32,33,37,48,50,57,61</sup> Learners generally evaluated the

interventions positively.<sup>22,34,46</sup> A few papers examined changes in the intention to deprescribe<sup>39,51</sup> or changes in PIM use over time,<sup>31,32</sup> which authors purported is a reflection in decreasing polypharmacy due to deprescribing. Other outcomes included the average number of physician visits,<sup>30</sup> changes in safety outcomes,<sup>33,57,61</sup> identification of PIMs<sup>34,47</sup> and incidence of geriatric syndromes.<sup>37</sup>

Of the 40 articles, nine studies included a control group<sup>30–32,34,37,40,41,48,61</sup> and 13 of these studies presented the statistical analysis in their results.<sup>30–33,37,39–41,47,48,50,51,57</sup>

### 3.4 | White papers

Six White papers were included in our analysis (Table 3).<sup>24,29,64–67</sup> Two focused on recommendations for the nursing profession,<sup>24,67</sup> Kashyap et al<sup>64</sup> targeted medical students, Scott et al<sup>66</sup> targeted PharmD students, and Farrell<sup>29</sup> and Raman-Wilms et al<sup>65</sup> targeted a general audience, including leaders in education and professional program faculty. One Canadian paper provided a curriculum framework for medicine, nursing and pharmacy programs.<sup>29</sup> All of the White papers included recommendations for deprescribing content. They recommended integrating deprescribing evidence, principles or guidelines into future courses. PharmD students participating in the focus group conducted by Scott et al gave specific recommendations to have deprescribing specific clinical rotations with constant reminders about deprescribing and support from their preceptors. Two White papers also included delivery recommendations, such as ensuring active learning or interprofessional collaboration is utilized.<sup>24,65</sup> Additional information can be found in the Supporting Information (supporting information Table S3 - Summary of White Papers). It should be noted that five of the White papers discussing deprescribing education were from independent researchers<sup>24,64–67</sup> and the curriculum framework was supported through the CADeN.<sup>29</sup>

## 4 | DISCUSSION

In our scoping review of literature regarding deprescribing education to healthcare professionals we identified 46 publications, which showed that the most common method of teaching was group workshops targeting physicians and that deprescribing education generally led to positive outcomes. The papers did not provide outcome measures that could be readily compared and design weaknesses hindered the ability to determine if one intervention was superior to another.

Considering our research question regarding which approaches were utilized to teach healthcare professionals, group teaching, including workshops or lectures, was by far the most common approach. This may be due to feasibility and efficiency, as it allows educators to provide education to multiple learners at one time. Grammas et al and Sun et al reported that learners appreciated interactive group learning as they were able to share various perspectives and practice experiences related to deprescribing.<sup>22,45</sup> Additionally, the papers which utilized one-on-one teaching also showed a positive

impact for deprescribing.<sup>40,51</sup> Although this is the most common method for teaching found within this scoping review, it is important to note that this does not indicate that group teaching is the most effective method for learners.

Our second and third objectives were to describe the differences in education between licensed medical, pharmacy and nursing professionals and the differences between medical, pharmacy and nursing students. Given that many interventions were interprofessional and the majority of single profession interventions included only the medical profession, it is difficult to determine differences in the education provided to these populations. The scope of practice of physicians is fairly consistent across jurisdictions, but pharmacist prescribing and medication decisions vary considerably, and nursing may include roles such as nurse practitioner, which has a broad scope and prescribing authority. The specific points of contact of each health professional in the decision-making continuum regarding medications should be factored into the educational intervention. In addition, the socialization and behaviour of each profession may be different and may influence their response to an educational intervention or need for educational content on deprescribing.

In addition, many interventions were not well described, hindering the ability to make a comparison between groups. It is not surprising that a large proportion of studies included the medical profession. Physicians may be more likely to implement changes in medications given their scope of practice and therefore may be targeted more frequently for education. However, some authors suggested that interprofessional awareness of polypharmacy and deprescribing is critical to improving medication use.<sup>24,65,67</sup> Despite the role that nurses may play in ensuring appropriate medication use, the prescribing role that nurse practitioners have and the role pharmacists play as drug experts, it was interesting to note that many of the studies did not include these team members.

The last objective was to examine the barriers and facilitators in teaching deprescribing to healthcare professionals. Most articles did not discuss barriers to teaching deprescribing, but Bregnhøj et al discussed lack of time and Bowman et al highlighted a lack of resources.<sup>32,54</sup> Facilitators for teaching deprescribing included the use of peer learning and interactive cases where learners can directly apply deprescribing principles.<sup>22,23</sup> Swanner et al reported that teaching via Zoom allowed for breakout rooms and polls, which made it easier to administer the workshop.<sup>25</sup> Garcia-Gollarte et al described learners being within the same institution and using real-life cases as examples of facilitators of education.<sup>37</sup> Since the COVID-19 pandemic there has been an expansion of literature on innovative methods of education as well as further research on the limitations of technology or remote learning. Considering evidence from this period of time or other education from other sectors may be one way to improve the quality of research on deprescribing education to ensure that adult and lifelong principles of learning are applied and technology and hands-on learning is evidence-based.

One of the greatest challenges was classifying the outcomes in a format that allowed them to be compared. The majority of papers did not include a control group. Without a comparison group or long-term follow-up, it was difficult to determine if practice changes were truly

implemented in those receiving education. A meta-analysis was not conducted as this was a scoping review. However, given the outcomes the studies did provide, we found that the majority demonstrated a positive outcome. This may also be due to publication bias, whereby only studies with positive outcomes are published in the literature. Additionally, the prevalence of positive results may have been from selection bias because 21 of the studies were based on elective educational activities and thus these learners were more likely to be interested in and more likely to implement deprescribing prior to the study interventions.<sup>25–28,30,32,33,35,36,38,39,42–47,50–52,55</sup> It is important that unsuccessful deprescribing education attempts are also described in the literature because they can assist other researchers in better understanding what needs to be changed to achieve the desired outcome. In addition, we found studies where education was a component of other interventions in clinical studies, therefore it is difficult to say that the educational component alone is the reason for the positive outcomes observed.

## 5 | STRENGTHS AND LIMITATIONS

A strength of this review was the broad inclusion criteria, which encompassed three different health professions, including both licensed and pre-licensed learners, as well as reviewing conference abstracts to ensure all current evidence was captured. Conference abstract authors were contacted when ambiguity regarding inclusion or exclusion was present.

This study had several limitations. Three databases were utilized for this scoping review. Although these databases are most likely to contain papers relevant to the research question, additional publications may have been missed. There is also the risk of random error in data extraction, which was addressed by having a second researcher review 10% of the papers extracted.

## 6 | IMPLICATIONS FOR PRACTICE

After a thorough review of the literature, we have three areas of suggestions to advance research in this area: increased publications, intervention considerations and outcome considerations.

First, we implore all educators in deprescribing to consider the scientific nature of providing an educational intervention and appropriately design a study to determine the impact of the intervention. Including a control group, as would be expected in other medical intervention studies, should be seriously considered and budgeted for. Additionally, more research pertaining to nursing or pharmacy should be considered as both professions can impact potentially inappropriate medications, polypharmacy and prescribing. Interprofessional collaboration is highly beneficial in patient care, especially in older adults, where polypharmacy and inappropriate medication use are most prevalent.<sup>68</sup> With this in mind, including all relevant healthcare professionals in deprescribing education would be helpful rather than studies that focus only on physicians or a sole health profession, given the

integrated nature of the healthcare system and medication decisions. Publishing interventions with negative or neutral results may also be advantageous in allowing others to understand which education interventions may be less effective. Publishing more research in this area may assist other educators in developing deprescribing education.

Second, when publishing literature in this field, consider providing enough detail for ease of replication. In the health sciences literature interventions are explained in detail, such as a medication, surgery or other form of therapy. Studies of educational interventions that fail to describe the intervention should not be submitted for publication. In addition, consider explaining the reason for choosing the intervention/teaching method used. By considering the rationale and evidence for a particular type of educational intervention educators/researchers should be able to justify why a group setting, one-on-one or a self-directed module may be the best approach for their study context. Future interventions could include application to real patients, which may be achieved with patient partners in terms of co-design and delivery or interactive cases.

Lastly, we recommend future interventions to include outcomes such as increase in learner self-efficacy or long-term retention and application of knowledge. There is an opportunity to develop validated tools to assess knowledge and skills for deprescribing and these may be used across studies for comparison. Given the challenges and nuanced approach sometimes required in deprescribing, studying self-efficacy, a measure of the individual's belief in being able to apply deprescribing principles into practice, would also provide valuable information about an intervention and could be compared across studies. Incorporating long-term follow-up (eg, 6 months post intervention) may address applicability to practice. Brief interventions with immediate post assessments may test recall but do not identify long-term problems with retention and application of the knowledge.

## 7 | CONCLUSION

Based on the review of the deprescribing education literature, most studies, regardless of type of educational intervention, found that there was improvement in the outcomes reported. However, many of these studies had poorly described interventions and did not include a control group. The most commonly selected format was direct provider to student education sessions utilizing interactive group work, although there is no evidence that this is superior to other methods. The content in the teaching sessions primarily addressed PIMs, the deprescribing process or the evidence for deprescribing. Outcomes generally showed improvement in participant satisfaction and knowledge, but practice changes were not consistently measured.

Moving forward, future researchers should consider publishing interventions of deprescribing education regardless of the outcome, designing studies with a comparator or control, considering interprofessional education and using consistent outcome measures to address this complex issue in geriatrics. We hope that by shedding light on the current landscape of deprescribing education, we can pave the way for future research in this area.

## AUTHOR CONTRIBUTIONS

B. Chow was responsible for the design of the work, data acquisition, analysis and interpretation, drafting the article and final approval of the document, and is accountable for all aspects of this research. A. Yuzwenko was responsible for the design of the work, data acquisition, analysis and interpretation, drafting the article and final approval of the document, and is accountable for all aspects of this research. L. Dennett was responsible for the design of the work, data acquisition, drafting the article and final approval of the document, and is accountable for all aspects of this research. C. Sadowski was responsible for the design of the work, acquisition, analysis and interpretation of data, drafting the work and final approval, and is accountable for all aspects of this research.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data is available through the supplemental materials with this article.

## DISCLOSURE

No financial support was received for this research. Authors B. Chow, A. Yuzwenko, and L. Dennett report no conflicts of interest. C. Sadowski reports that she is a member of the Canadian Medication Appropriateness and Deprescribing Network.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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