Self-Perceived Competencies, Knowledge, Skills, and Attitudes of Healthcare Professional Students in Deprescribing: A National Survey

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ABSTRACT

BACKGROUND: Deprescribing effectively reduces overprescribing but remains underused in clinical practice. Education is key to improving uptake, yet limited research has examined how future healthcare professionals are being prepared.

OBJECTIVE: To evaluate the extent to which current education prepares future Belgian healthcare professionals for deprescribing and to identify factors associated with higher self-perceived competency.

DESIGN: Cross-sectional online survey between April and June 2024.

PARTICIPANTS: Undergraduate and postgraduate students in medicine, pharmacy, and nursing from Belgian universities and nursing schools.

MAIN MEASURES: Self-perceived competencies (7 items), knowledge and skills (19 items) were assessed using items from Farrell's framework, and attitudes were measured using 25 items from a Theoretical Domains Framework-based questionnaire. Data were analyzed using descriptive statistics and linear regressions, with composite competency scores as outcomes and curriculum level, clinical experience, and deprescribing exposure as predictors. Open-ended responses were thematically coded.

KEY RESULTS: A total of 1777 responses were included (509 in medicine, 792 in pharmacy, and 476 in nursing). Exposure to deprescribing within the curriculum was common in medicine and pharmacy but rare in nursing. Among medicine and pharmacy students, greater self-reported exposure to deprescribing and more advanced academic level were significantly associated with higher self-perceived competency scores ($p<0.001$). Across all groups, students reported higher confidence in the early steps of the deprescribing process and lower confidence in assessing the deprescribing potential of individual medications and implementing deprescribing plans. Attitudes were generally positive, with strong intentions to deprescribe, perceived benefits, and alignment with professional identity. Barriers included patient reluctance, competing priorities, and time constraints. Students recommended more practical and interprofessional education, introduced earlier and more broadly in the curriculum.

CONCLUSIONS: Findings highlight encouraging self-reported competencies and reveal opportunities to strengthen deprescribing education, particularly in nursing programs, with greater emphasis on the later stages of the deprescribing process.

KEY WORDS: deprescribing; health professional education; medicine; nursing; pharmacy

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INTRODUCTION

Overprescribing refers to the prescription of medication that is not, or no longer, clinically indicated, is ineffective, misaligned with treatment goals, or has an unfavorable benefit-risk ratio.[1] It may result from systemic, behavioral, or cultural prescribing practices and can lead to adverse health outcomes, including falls, cognitive impairment, hospitalization, and even death.[2,3] Deprescribing is an approach aimed at addressing overprescribing and has been defined as "the planned and supervised process of dose reduction or stopping of medication(s) that may be causing harm or are no longer providing benefit".[4,5] The process includes reviewing all current medications, assessing their risk–benefit balance in the patient's context, prioritizing those for discontinuation, implementing a tapering plan, and monitoring outcomes.[6] Deprescribing is increasingly recognized as an interprofessional process, involving collaboration among physicians, pharmacists, nurses, and patients. Recent systematic reviews have found that deprescribing is feasible, generally well-tolerated, safe, and effective.[7–12] However, despite this evidence, deprescribing is not routinely implemented in clinical practice and is too often reactive.[13,14]

Preparing healthcare professionals (HCPs) for deprescribing is a key strategy to overcome barriers to its adoption.[15–18] The World Health Organization (WHO) recommends that educational curricula for physicians, pharmacists, and nurses should develop competencies necessary for managing polypharmacy and reducing medication overuse.[19] Canadian leaders advanced this agenda by first guiding deprescribing's integration into undergraduate, postgraduate, and continuing professional development,[16] then developing an interprofessional competency framework for medicine, nursing, and pharmacy.[20]

To date, most research on deprescribing education has focused on practicing HCPs,[21–23] with an emphasis on prescribers.[24,25] Despite their critical role in medication monitoring and patient education, less attention has been given to other HCPs such as nurses, and to a lesser extent pharmacists.[26] Two recent European surveys found that fewer than half of hospital physicians, general practitioners, geriatricians and geriatricians-in-training reported training in deprescribing.[23,27] Studies targeting *future* HCPs consistently indicate that deprescribing is not sufficiently covered in the curricula, with students often lacking confidence to deprescribe without senior support.[17,18,24,25,28,29] Most of these studies were conducted outside of Europe. [24,25]

In Belgium, medication overuse is highly prevalent.[30–32] In recent years, various stakeholders, including policymakers, researchers, and HCPs, have initiated efforts to reduce overuse and support deprescribing[33,34]. However, systematic evaluation of educational programs remains lacking. Therefore, this study aimed to explore the self-perceived knowledge, skills, and attitudes of undergraduate and postgraduate students in medicine, pharmacy, and nursing regarding deprescribing.

METHOD

Study Design

We conducted a cross-sectional online survey targeting undergraduate and postgraduate students in medicine, pharmacy, and nursing. The report follows the Consensus-Based Checklist for Reporting of Survey Studies. Ethical approval was obtained from the UCLouvain Ethics Committee (29 March 2024, 2024/12MAR/125).

Participants

We surveyed students in the final stages of pre-licensure training (Pharmacy: Master 1–2; Medicine: Master 2–3; Nursing: Bachelor 3–4), corresponding to the later years of undergraduate professional education and including supervised clinical placements. These participants were categorized as early- and mid-level learners. We also surveyed post-licensure trainees enrolled in specialty programs (Hospital Pharmacy, General Practice, Geriatrics, Nursing Science), referred to as advanced learners. A detailed description of the Belgian training structure is provided in Appendix 1. All Belgian universities with eligible programs were invited by the research team to participate. Since nursing bachelor's degrees in Belgium are offered at university colleges, we also invited a convenience sample of 13 of these institutions.

Questionnaire Development

Three discipline-specific questionnaires (medicine, pharmacy, nursing) assessed self-perceived core competencies, knowledge, skills, and attitudes related to deprescribing. As deprescribing is not legally authorized for pharmacists and nurses in Belgium, their questions focused on *supporting patients and physicians in the deprescribing process* instead of deprescribing.

Each questionnaire comprised five sections. The first (7 items) collected sociodemographic data. Sections 2 and 3 assessed self-perceived core competencies, knowledge, and skills. Items were based on the *Competency Framework for an Interprofessional Approach to Deprescribing* by Farrell et al..[20] Section 2 included 7 statements corresponding to the framework's seven core competencies. Section 3 addressed specific knowledge and skills, drawing from Farrell's list of 93 items. To ensure feasibility (completion time $\leq$ 15 min), 19 items were selected to balance relevance and coverage of both technical and cognitive skills related to identifying deprescribing opportunities (8 items), shared decision-making (SDM) (5 items), and implementation planning (6 items).

Items were adapted as needed for the pharmacy and nursing versions to reflect the Belgian legal and professional context. All items used a 5-point Likert scale to assess agreement.

Section 4 evaluated attitudes toward deprescribing using items adapted from a previously developed questionnaire on barriers to benzodiazepine deprescribing, based on the Theoretical Domains Framework (TDF).[23] The TDF consolidates 128 theoretical constructs into 14 domains representing key behavioral determinants.[35,36] Items from the Knowledge and Skills domains were excluded as they were already covered in earlier sections. We retained 25 items for pharmacy and nursing students and 24 for medicine students, from 8 TDF domains (Beliefs about Consequences; Social/Professional Role and Identity; Social Influences; Emotion; Environmental Context and Resources; Memory, Attention and Decision Processes; Goals; and Reinforcement). For items requiring prior clinical exposure, the response option "I haven't had enough clinical experience to respond" was added.

Section 5 included two multiple-choice questions on exposure to deprescribing and interprofessional practice during didactic instruction, plus one open question on curricular perspectives.

In sections where the chronological order of questions was not critical (Sections 3 and 4), items were randomized for each participant to minimize order bias.

Drafts were revised with partner institutions. Minor edits improved clarity. English versions were translated into French and Dutch via forward-backward translation, involving two independent bilinguals per language. Adjustments followed consensus review.[37]

Pilot testing with two students from each discipline (French and Dutch versions) was performed to assess clarity and timing. Minor changes were made accordingly. Final questionnaires are available on Open Science Framework (https://osf.io/54m9n/files).

Survey Procedure

The survey ran for 9 weeks from April 3, 2024, onwards through LimeSurvey (Internal Version 5.6.68+240625). Participating institutions distributed the link to their students and sent two reminders. Additionally, they were encouraged to allow in-class time for completion. A prize draw offered a €100 voucher per discipline.

Data Analysis

Data were exported from LimeSurvey in CSV format and analyzed using R (v4.3.1) via RStudio. Respondents were excluded if they only completed sociodemographic items, left all items blank, submitted duplicates (identified from email addresses), or used straight-line responses. The response rate was calculated by dividing the number of included respondents by the total number of individuals invited to participate, which primarily reflected the number of students enrolled in each program. The structure of missing responses was examined, and the data were assumed to be Missing at Random (MAR), primarily due to respondents' time-related constraints on completing the survey, inferred from the position of the missing entries at the end of the questionnaires. A matrix plot confirmed that missingness showed no association with auxiliary variables, supporting the MAR assumption.

Descriptive statistics summarized participant characteristics and responses. Likert-scale (5-point) responses on competencies, knowledge, and skills were summarized using item-level frequencies. Attitude items were summarized by mean scores, following methodology from the original survey.[23] Negative attitude items were reverse-coded so that lower scores consistently reflected higher barriers, regardless of the item wording. Scores ≥ 4 were classified as enablers, from 3 to 4 as moderate barriers, and < 3 as major barriers.[23]

We aimed to identify factors associated with higher self-perceived competency. A composite competency score was calculated by averaging responses to the 7 core competency items, after checking variable correlations. Regression diagnostics confirmed model assumptions. Variables were theory-driven and iteratively removed to optimize the model. Separate regressions were run due to curriculum differences across disciplines. Each model included gender, curriculum level, healthcare experience, concurrent job in healthcare, exposure to deprescribing, and interprofessional collaboration as predictors.

Due to non-normal data (based on QQ plots), Kruskal-Wallis tests compared competency scores across disciplines.

Open-ended responses were coded by two independent researchers (L.A. and C.C.) using a thematic approach in NVivo 14 and verified by a third (A.S.). Results were compared and discussed until a consensus was reached.

RESULTS

Response Rate and Characteristics of Respondents

A total of 2,219 responses were received, of which 442 were excluded. This left 1777 responses for analysis: 509 from medicine students, 792 from pharmacy students, and 476 from nursing students. The estimated response rates were 10.9% (509/4638), 42.7% (792/1856), and 17.0% (476/2802), respectively. Among all respondents included, 78.9% identified as women, and 76.3% were early and middle-level learners. Detailed characteristics are presented in Table 1.

Most medicine and pharmacy students reported being "sometimes" or "often" exposed to deprescribing in their didactic instruction (70.2% and 67.3%, respectively), whereas the majority of nursing students reported being exposed "rarely" or "never" (62.0%). Interprofessional collaboration was reported as being "often" or "very often"

Table 1 Characteristics of Respondents per Discipline

Characteristics	Respondents, *n* (%)		
	Medicine (*N* = 509)	Pharmacy (*N* = 792)	Nursing (*N* = 476)
Age, median (IQR)	24.0 (23.0—27.0)	23.0 (22.0–25.0)	24.0 (22.0–32.0)*
Gender			
Woman	360 (70.7)	644 (81.3)	398 (83.6)
Man	145 (28.5)	145 (18.3)	75 (15.8)
Other	0 (0.0)	1 (0.1)	1 (0.2)
Preferred not to answer	4 (0.8)	2 (0.3)	2 (0.4)
Learning level†			
Early	185 (36.3)	342 (43.2)	140 (29.4)
Middle	150 (29.5)	352 (44.4)	186 (39.1)
Advanced	174 (34.2) ‡	98 (12.4)	150 (31.6)§
Previous working experience in healthcare (prior to entering training)			
> 12 months	32 (6.3)	62 (7.8)	170 (35.7)
> 6 and ≤ 12 months	4 (0.8)	21 (2.7)	26 (5.5)
≤ 6 months	21 (4.1)	43 (5.4)	37 (7.8)
None	452 (88.8)	666 (84.1)	243 (51.1)
Combining studies with job in healthcare (concurrently)			
> 12 months	19 (3.7)	45 (5.7)	186 (39.1)
> 6 and ≤ 12 months	7 (1.4)	21 (2.7)	40 (8.4)
≤ 6 months	9 (1.8)	44 (5.6)	44 (9.2)
None	474 (93.1)	682 (86.1)	206 (43.3)

†Learning level: Early learner: Pharmacy: Master 1, Medicine: Master 2, Nursing: Bachelor 3; Middle-level learner: Pharmacy: Master 2, Medicine: Master 3, Nursing: Bachelor 4; Advanced learner: post-licensure in Hospital Pharmacy, General Practice, Geriatrics, Nursing Science

‡Corresponding to 134 General Practice students and 40 Geriatrics students

§Corresponding to 144 nurses following the Master's in nursing sciences and 6 nurses following the specialization in Geriatrics

*3 missing values excluded from median

Table 2 Curricular Exposure to Deprescribing and Interprofessional Practice

Curricular exposure	Respondents, *n* (%)		
	Medicine (*N* = 509)	Pharmacy (*N* = 792)	Nursing (*N* = 476)
During my* didactic instruction** *(i.e., lectures, seminars, not clinical placements)**, deprescribing of potentially inappropriate medication has been mentioned:			
Never	7 (1.7)	22 (3.2)	129 (33.8)
Rarely	94 (23.4)	107 (15.6)	108 (28.3)
Sometimes	144 (35.8)	176 (25.7)	109 (28.5)
Often	138 (34.3)	285 (41.6)	34 (8.9)
Very often	19 (4.7)	95 (13.9)	2 (0.5)
(Missing)	*107*	*107*	*94*
During my* didactic instruction** *(i.e., lectures, seminars, not clinical placements)**, interprofessional practice has been mentioned:			
Never	9 (2.2)	14 (2.0)	35 (9.2)
Rarely	64 (15.9)	51 (7.4)	41 (10.8)
Sometimes	80 (19.9)	187 (27.3)	53 (13.9)
Often	140 (34.7)	281 (41.0)	123 (32.3)
Very often	110 (27.3)	152 (22.2)	129 (33.9)
(Missing)	*106*	*107*	*95*

included in the curriculum by 62.0% of medicine students, 63.2% of pharmacy students, and 66.1% of nursing students (Table 2).

Core Competencies and Associated Variables

Ratings on the seven core competencies varied across items. The highest ratings were for taking a complete medication history, with over three-quarters of respondents in each group feeling capable (95.1%, 77.4%, and 92.2%, respectively). In contrast, the lowest ratings were for preparing a deprescribing and monitoring plan, with fewer than half feeling capable across all groups (39.7%, 43.9%, and 40.1%, respectively). The second lowest ratings were for assessing the deprescribing potential of each medication. Details for all seven items in each group are shown in Fig. 1.

Among medicine and pharmacy students, greater self-reported exposure to deprescribing in the curriculum and

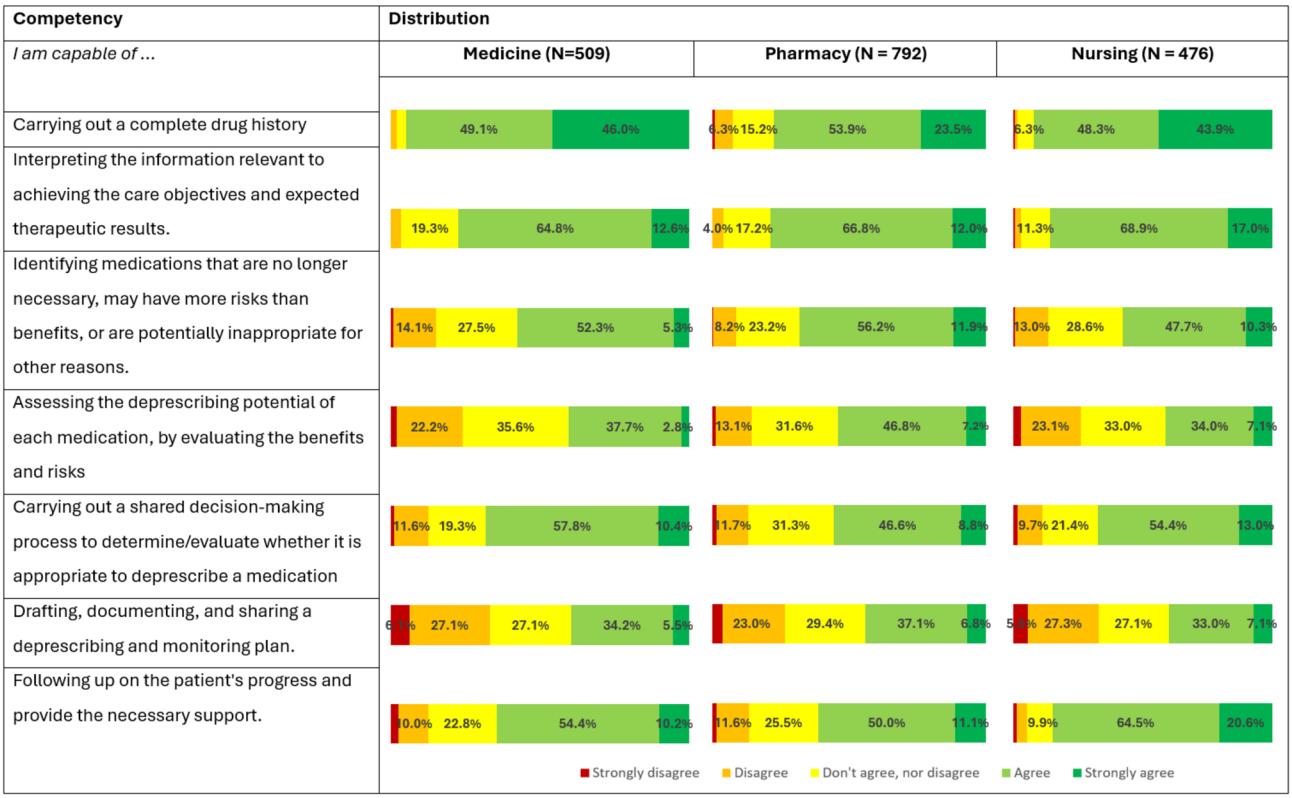


Figure 1 Self-perceived competencies for the seven core competencies of Farrell's framework.

advanced academic level were significantly associated with higher self-perceived competency scores (Table 3). Among pharmacy students, prior healthcare experience before pharmacy studies was significantly associated with higher competency scores ($p < 0.001$). For nursing students, the only factor significantly associated with higher competency was combining studies with a healthcare job ($p = 0.04$).

Specific Knowledge and Skills

Ratings on the 19 items covering specific knowledge and skills are presented in Table 4. Among the eight items related to assessing deprescribing opportunities, pharmacy students generally scored higher than medicine or nursing students. For example, 66.8% of pharmacy students reported knowing tools to identify potentially inappropriate medications (PIMs), compared to 49.7% of medicine and 32.4% of nursing students. Similarly, 61.9% of pharmacy students reported being able to identify and manage prescribing cascades, compared to 35.4% of medicine and 24.4% of nursing students.

Responses to the five items on patient-centered care and SDM varied widely. While most participants reported being able to establish a therapeutic relationship with patients, fewer than one-third knew the steps of the SDM process for deprescribing.

The lowest ratings were for items related to implementing and monitoring a deprescribing plan. For instance, fewer than half of pharmacy students and fewer than a third of medicine students reported knowing deprescribing tools or how to manage adverse drug withdrawal events.

Attitudes

Attitudes toward deprescribing revealed similar patterns across the three disciplines. Scores for all attitude items are presented in Table 5. We identified enablers (mean ≥ 4) in three TDF domains: most participants intended to implement deprescribing in their future practice (*Intentions*); viewed deprescribing, along with collaboration with other HCPs, as part of their professional role (*Social/Professional Role and Identity*); and primarily perceived benefits from deprescribing (*Beliefs about Consequences*). In contrast, major barriers (mean < 3) were related to perceived patient reluctance (*Social Influences*), competing priorities (*Goals*), and shortages in staff members and time in practice (*Environmental Context and Resources*).

Curricular Perspectives

To enhance the preparedness of future students for deprescribing, students across disciplines recommended the integration of dedicated courses and seminars that include clinical cases.

Table 3 Multiple Linear Regression of Factors Influencing the Deprescribing Competency Score

3a. MEDICINE			
Coefficients	Estimate	*p*-value	95% CI
(Intercept)	3.800	<0.001*	(3.70, 3.91)
Gender: Man (vs Woman)	0.051	0.35	(−0.06, 0.16)
Learning level: Early learner (vs Advanced learner)†	−0.540	<0.001*	(−0.67, −0.42)
Learning level: Middle-level learner (vs Advanced learner)†	−0.220	<0.001*	(−0.34, −0.09)
Previous working experience in healthcare: Yes (vs No)	−0.015	0.85	(−0.17, 0.14)
Combining studies with job in healthcare: Yes (vs No)	0.110	0.25	(−0.08, 0.31)
Deprescribing mentioned during didactic instruction "(Very) Often" (vs "Never" to "Sometimes")	0.180	<0.001*	(0.08, 0.29)
Interprofessional collaboration mentioned during didactic instruction: "(Very) Often" (vs "Never" to "Sometimes")	−0.022	0.69	(−0.13, 0.09)
Multiple *R*-squared: 0.21	Adjusted *R*-squared: 0.19		
3b. PHARMACY			
Coefficients	Estimate	*p*-value	95% CI
(Intercept)	3.600	<0.001*	(3.44, 3.71)
Gender: Man (vs Woman)	0.072	0.19	(−0.03, 0.18)
Learning level: Early learner (vs Advanced learner)†	−0.420	<0.001*	(−0.55, −0.29)
Learning level: Middle-level learner (vs Advanced learner)†	0.007	0.91	(−0.12, 0.14)
Previous working experience in healthcare: Yes (vs No)	0.210	<0.001*	(0.09, 0.32)
Combining studies with job in healthcare: Yes (vs No)	0.100	0.11	(−0.02, 0.22)
Deprescribing mentioned during didactic instruction: "(Very) Often" (vs "Never" to "Sometimes")	0.210	<0.001*	(0.13, 0.30)
Interprofessional collaboration mentioned during didactic instruction: "(Very) Often" (vs "Never" to "Sometimes")	0.055	0.22	(−0.03, 0.14)
Multiple *R*-squared: 0.20	Adjusted *R*-squared: 0.19		
3c. NURSING			
Coefficients	Estimate	*p*-value	95% CI
(Intercept)	3.500	<0.001*	(3.30, 3.65)
Gender: Man (vs Woman)	0.016	0.82	(−0.13, 0.16)
Learning level: Early learner (vs Advanced learner)†	0.022	0.77	(−0.13, 0.17)
Learning level: Middle-level learner (vs Advanced learner)†	0.120	0.09	(−0.02, 0.26)
Previous working experience in healthcare: Yes (vs No)	0.110	0.06	(0.00, 0.23)
Combining studies with job in healthcare: Yes (vs No)	0.120	0.04 *	(0.00, 0.24)
Deprescribing mentioned during didactic instruction: "(Very) Often" (vs "Never" to "Sometimes")	0.160	0.10	(−0.03, 0.34)
Interprofessional collaboration mentioned during didactic instruction: "(Very) Often" (vs "Never" to "Sometimes")	0.026	0.65	(−0.09, 0.14)
Multiple *R*-squared: 0.04	Adjusted *R*-squared: 0.03		

†Learning level: Early learner: Pharmacy Master 1, Medicine Master 2, Nursing: Bachelor 3; Middle-level learner: Pharmacy: Master 2, Medicine: Master 3, Nursing: Bachelor 4; Advanced learner: post-licensure in Hospital Pharmacy, General Practice, Geriatrics, Nursing Science, *Significant ($p < 0.05$)

The specific content and focus of these educational interventions varied by discipline. Medicine students emphasized the need for training centered on the identification of PIMs, drug interactions, and adverse effects. Pharmacy students highlighted the need for courses on initiating the deprescribing process and effective communication strategies with both patients and physicians. Both disciplines mentioned the need for practical, in-depth examples applicable to clinical practice. Additionally, medicine and pharmacy students emphasized the need to incorporate existing resources related to deprescribing into their education, including the use of algorithms within their courses. Nursing students advocated for greater emphasis on polypharmacy, adverse drug reactions, and the identification of medications suitable for deprescribing. They requested a more comprehensive pharmacology course and related clinical courses. In addition to medicine and pharmacy, they also called for deprescribing to be mentioned more often in the curriculum, as it is particularly lacking in nursing education.

Across all three disciplines, there was a shared call for increased interprofessional collaboration, including joint seminars. Students also recommended that deprescribing be addressed across a broader range of medication classes. Furthermore, they proposed incorporating deprescribing-related exercises into clinical placements to reinforce practical application.

DISCUSSION

Main Findings and Interpretation

This survey revealed that self-reported exposure to deprescribing during the curriculum was relatively high among medical and pharmacy students, but lower among nursing students. Self-perceived competencies were generally higher for the initial steps of the deprescribing process compared to the later stages. This pattern is consistent with previous findings,[27,38] and our results further suggest that these

Table 4 Self-perceived knowledge and skills

Item	% (strongly) agree		
	MEDICINE (N = 509)	PHARMACY (N=792)	NURSING (N = 476)
Assessing prescription and opportunities for deprescribing			
I am capable of interpreting the literature supporting the therapeutic efficacy and safety of available treatment options.	69.4	76.3	68.5
I am capable to determine if any of the patient's medications are potentially inappropriate and give the reason.	60.5	73.4	60.9
I globally know the optimal pharmacological and non-pharmacological options for managing patients' most common medical problems.	60.1	67.3	56.1
I can explain what potentially inappropriate medications are.	59.5	68.7	53.6
I know the evidence concerning the impact of the use of multiple medicines on the patient's health.	56.4	66.7	56.1
I am capable of identifying when non-pharmacological options for the prevention and management of a disease would be appropriate for a patient and whether they could facilitate deprescribing.	50.7	58.7	50.6
I know tools that can be used to identify potentially inappropriate medications.	49.7	66.8	32.4
I know how prescribing cascades develop, how to evaluate and manage them.	35.4	61.9	24.4
Patient-centered care and shared decision-making			
I am capable of establishing and maintaining a therapeutic relationship with the patient and their family/caregivers.	76	65.3	84
I am capable of discussing with patients and/or their families/caregivers regarding their values, preferences, beliefs and goals of care regarding continued use of the medication versus deprescribing.	70.1	60.4	77.9
I know how to take into account patients' values, goals and perspectives regarding their medication use and their health status.	62.7	54.4	68.1
I am capable of identifying relevant, evidence-based therapeutic targets and goals of care based on patient-specific characteristics.	55.4	53.8	60.5
I know the steps of the shared decision-making process for deprescribing.	32.6	22.9	19.1
Implementing deprescribing - plan and monitoring			
I am capable of establishing and maintaining a relationship with the professional team in charge of the patient.	66.2	61.4	81.9
I am capable of [MED] deciding/ [PHARM/[NURSE] advising on which medication should be stopped gradually and which can be stopped at once.	46.2	68.3	39.3
I know how to manage adverse events related to medication withdrawal.	25.1	40	48.1
I am capable of developing a follow-up plan including the symptoms and signs that should be monitored during deprescribing, how often and over what period, and by whom.	26.3	35.9	46.6
I am capable of [MED] determining/ [PHARM/NURSE] advising on when to slow down or stop the deprescribing process, and/or to determine whether it is necessary to consider other therapies.	32.4	38	33.2
I know guidelines, algorithms, and other tools/resources for deprescribing.	36.1	46.3	13.9

Number of missing data for each item is available in Appendix 2

Table 5 Attitudes Toward Deprescribing

TDF domains and Items	Mean score (SD)*		
	Medicine ($N = 509$)	Pharmacy ($N = 792$)	Nursing ($N = 476$)
Beliefs about Consequences			
If I [MED]deprescribe/[PHARM/NURSE] support deprescribing of potentially inappropriate medication, it will negatively affect my relationship with these patients	***3.94 (0.89)***†	***3.77 (1)***†	***3.80 (0.97)***†
Deprescribing potentially inappropriate medication will have negative consequences for patients' health	*4.08 (0.8)*†	***3.87 (0.99)***†	***3.55 (1.06)***†
In general, the benefits of deprescribing potentially inappropriate medication outweigh the risks	*4.05 (0.69)*	*4.00 (0.78)*	***3.65 (0.83)***
Social/Professional Role and Identity			
Collaborating with pharmacists to support deprescribing is part of my role as a physician/nurse	*4.30 (0.74)*	--	***3.64 (0.99)***
Collaborating with physicians to support deprescribing is part of my role as a pharmacist/nurse	--	*4.47 (0.63)*	*4.16 (0.77)*
Collaborating with nurses to support deprescribing is part of my role as a physician/pharmacist	*4.25 (0.69)*	***3.79 (0.94)***	--
Supporting patients to deprescribe their medication is part of my role as a physician/pharmacist/nurse	*4.60 (0.52)*	*4.39 (0.76)*	*4.00 (0.82)*
Physicians have a role in the deprescribing process	--	*4.62 (0.61)*	*4.56 (0.63)*
Pharmacists have a role in the deprescribing process	*4.31 (0.71)*	--	***3.90 (0.9)***
Nurses have a role in the deprescribing process	***3.87 (0.87)***	***3.78 (0.89)***	--
Social Influences (from colleagues)			
My professors/teachers actively support deprescribing of potentially inappropriate medication	***3.99 (0.88)***	*4.07 (0.87)*	***3.28 (0.89)***
My fellow students are in favor of deprescribing potentially inappropriate medication	*4.07 (0.71)*	***3.94 (0.74)***	***3.42 (0.74)***
My clinical supervisor(s) support(s) the deprescribing of potentially inappropriate medication	***3.75 (0.97)***	***3.53 (1.08)***	***3.25 (0.95)***
I didn't get enough clinical experience to respond, *n* (%)‡	37 (9.0%)	216 (30.7%)	67 (17.2%)
Social Influences (from patients)			
Most patients taking potentially inappropriate medication and/or their relatives are reluctant to deprescribe them	**2.42 (0.85)**†	**2.32 (0.86)**†	**2.55 (0.9)**†
I didn't get enough clinical experience to respond, *n* (%)‡	81 (19.7%)	242 (34.5%)	69 (17.6%)
I feel a lot of pressure from patients and/or their relatives to ([NURSE] ask the physician to) renew/extend ([MED/NURSE] their prescription/[PHARM] the dispensing) of potentially inappropriate medication	**2.31 (0.89)**†	**2.48 (0.96)**†	**2.94 (1.02)**†
I didn't get enough clinical experience to respond, *n* (%)‡	81 (19.7%)	271 (38.4%)	66 (16.9%)
Intentions			
I intend to deprescribe potentially inappropriate medication in my future practice	*4.53 (0.63)*	--	--
I intend to support patients in deprescribing of potentially inappropriate medication in my future practice	--	*4.35 (0.66)*	*4.04 (0.72)*
I intend to support physicians in deprescribing of potentially inappropriate medication in my future practice	--	*4.33 (0.66)*	*4.09 (0.74)*
Emotion			
I feel frustrated by all the challenges of ([PHARM/NURSE] supporting) deprescribing (of) potentially inappropriate medication	**2.81 (0.96)**†	***3.07 (1.04)***†	***3.09 (0.94)***†
I feel stressed at the thought of ([PHARM/NURSE] supporting) deprescribing (of) potentially inappropriate medication	***3 (1.06)***†	***3.31 (1.04)***†	***3.39 (1.09)***†
Environmental Context and Resources			
I have enough time to educate and inform patients about the deprescribing of potentially inappropriate medication	**2.71 (0.98)**	**2.84 (1.07)**	**2.77 (1.11)**
I didn't get enough clinical experience to respond, *n* (%)‡	76 (18.5%)	234 (33.2%)	43 (11.0%)
There is enough staff in the medical practice/clinical department/community pharmacy/medical institution where I am doing my clinical placement to support the deprescribing of potentially inappropriate medication	***3.13 (1.03)***	**2.85 (1.17)**	**2.82 (1.1)**
I didn't get enough clinical experience to respond, *n* (%)‡	58 (14.1%)	215 (30.5%)	56 (14.4%)
I have access to appropriate patient health information (medical record, medical and medication history, etc.) to support the deprescribing of potentially inappropriate medication	***3.86 (0.82)***	***3.41 (1.13)***	***3.71 (0.98)***
I didn't get enough clinical experience to respond, *n* (%)‡	50 (12.2%)	191 (27.1%)	44 (11.3%)

Table 5 (continued)

TDF domains and Items	Mean score (SD)*		
	Medicine (*N* = 509)	**Pharmacy (*N* = 792)**	**Nursing (*N* = 476)**
Memory, Attention and Decision Processes			
Generally, I do not [MED] consider/[PHARM/NURSE] support the deprescribing (of) potentially inappropriate medication as it is a difficult and time-consuming process	***3.63 (0.96)***†	***3.80 (0.93)***†	***3.53 (0.92)***†
I didn't get enough clinical experience to respond, *n* (%)‡	71 (17.3%)	221 (31.3%)	78 (19.9%)
As long as the patient has no specific problem or request, I [NURSE] do not engage with the patient or the physician to support deprescribing/[MED/PHARM] renew/continue the [MED]prescription/[PHARM] dispensing of potentially inappropriate medication	***3.82 (0.84)***†	***3.26 (1)***†	***3.34 (1.03)***†
I didn't get enough clinical experience to respond, *n* (%)‡	58 (14.1%)	211 (30.0%)	40 (10.2%)
Goals			
Patients often have other health problems, which are usually more important for me to address than the deprescribing of potentially inappropriate medication	**2.89 (0.91)**†	**2.90 (0.91)**†	**2.87 (0.96)**†
I didn't get enough clinical experience to respond, *n* (%)‡	51 (12.4%)	214 (30.3%)	46 (11.7%)
([PHARM/NURSE] Supporting patients and/or physicians in) [MED]Deprescribing potentially inappropriate medication is a priority for me	***3.86 (0.82)***	***3.83 (0.81)***	***3.53 (0.86)***
Reinforcement			
I am reluctant to [PHARM/NURSE] support deprescribing of/[MED] deprescribe potentially inappropriate medications due to previous failed attempts	***3.46 (1.01)***†	***3.60 (1)***†	***3.57 (0.93)***†
I didn't get enough clinical experience to respond, *n* (%)‡	138 (33.6%)	270 (38.4%)	83 (21.2%)

†Reversed scoring: lower scores consistently reflect higher barriers, regardless of the item wording

‡Results from this response option were not included in the mean score calculation

Number of missing data for each item is available in Appendix 3

*Scores ≥ 4 were classified as enablers (italics), from 3 to 4 as moderate barriers (bold-italics), and < 3 as major barriers (bold)

competencies tend to increase with curriculum progression and greater exposure.

Overall, our data show encouraging trends regarding self-reported exposure, competencies, and attitudes. The high levels of intention to deprescribe, strong professional identity, and positive beliefs about consequences of deprescribing are particularly noteworthy, as these factors have been shown to correlate with deprescribing behavior in clinical practice.[23] Self-reported competencies were similar to or better than those previously reported.[17,27,38] Notably, we are far from the situation described in a 2022 study of three U.S. pharmacy colleges, characterized as "deprescribing as a whole is a gap".[28] More favorable results in our study may reflect recent efforts by deprescribing-focused networks and stakeholders at international and Belgian levels,[14,33,39] which have driven advances in education and training.[20,40] This interpretation is supported by findings from a recent European survey, reporting that geriatricians in training received more education on deprescribing than licensed HCPs.[27] Alternatively, the results may reflect genuine variations between countries, universities, and training programs.

Our findings also point to areas for improvement in current curricula. The data suggest that education tends to emphasize the "what" of deprescribing more than the "how". Specifically, later stages of the deprescribing process such as developing, implementing, and monitoring a deprescribing plan are insufficiently addressed. This mirrors the findings of Zimmerman et al.,[38] where students felt more prepared to identify medications and their indications than to design and follow through on a deprescribing plan. There is a clear need for students to become more familiar with deprescribing algorithms and tools, especially since fewer than half reported knowing such resources. SDM is another critical area. Fewer than one-third of participants reported knowing the steps of the SDM process, and perceived patient reluctance was high. Educational interventions should include SDM models and exercises to build communication skills and address attitudinal barriers.

Participants' suggestions for educational formats emphasized the value of a blended approach, including integration into existing courses, dedicated modules or seminars, and interactive teaching methods such as case-based learning, simulation exercises, and interprofessional sessions. These preferences are consistent with findings from recent research,[26,41] in which case studies and instructional videos were the most favored educational methods.

The findings for nursing students are distinct. First, they differ from those for pharmacy and medical students. While physicians in Belgium can deprescribe and pharmacists are formally recognized as key contributors to the process,[33] nurses lacked an explicit mandate for deprescribing at the time of this study. Nonetheless, their roles in identifying medication-related harm, monitoring symptoms, and supporting patients during tapering remain critical.[42] This absence of a formal mandate likely explains the limited exposure to deprescribing in nursing education, consistent with previous observations.[41]

Second, despite minimal training, many nursing students reported high self-rated competence, which may reflect the Dunning-Kruger effect[43] or prior professional experience.[44] These results, together with the upcoming role of nurse practitioners in Belgium, highlight the need to refine nursing curricula to better align with clinical practice demands.

Strengths and Limitations

To our knowledge, this is the first national study assessing self-perceived deprescribing competencies using a validated competency framework. The sample was large and included three distinct professional groups, in contrast to many previous studies that focused solely on medical students[26]. This broader approach is particularly relevant in the Belgian context, where recent policy initiatives have supported the role of pharmacists in medication review and benzodiazepine deprescribing and emphasized the emerging clinical role of nurse practitioners. The use of discipline-specific questionnaires adapted to the Belgian legal and professional context strengthens the relevance and applicability of the findings.

Nonetheless, the study also has limitations. First, while the response rate was high for pharmacy students, it was lower for medical and nursing students, which may point toward a stronger selection bias in these groups. Second, as the data are based on self-assessed competencies, cognitive biases, particularly the Dunning-Kruger effect, cannot be ruled out. For a more comprehensive picture, future assessments should include objective measures of student competencies.

CONCLUSION AND PERSPECTIVES

This survey provides actionable insights to guide the future development of deprescribing education in Belgium. Each participating institution has received a tailored report comparing its results with national averages, which will support the identification of local priorities and facilitate the creation of targeted action plans. Repeating a similar survey every two to three years may help monitor progress over time. Finally, establishing a continuum between good prescribing and deprescribing education remains essential to optimize quality of care.

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Declarations

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