

Original Research

# Attitudes and perceptions of Jordanian pharmacy students toward deprescribing: a cross-sectional study

Shatha M. Al Omari , Hamza Alhamad , Muna Barakat , Hana M. Sawan , Marcia C. Mecca , F. Al Bahar 

Received (first version): 13-Sep-2022

Accepted: 07-Oct-2022

Published online: 27-Apr-2023

## Abstract

**Objective:** Pharmacists are in a unique position to identify medications that should be deprescribed. Including deprescribing as part of medical and pharmacy curriculum has been proposed as a substantial change to increase the practice of deprescribing. The aims of this study were to evaluate if pharmacy students were exposed to the term of deprescribing in their classes and how they were taught about it (e.g., lecture, case problems, experiential). We also aimed to assess the deprescribing knowledge, attitudes, abilities, and confidence of pharmacy students in Jordan. **Methods:** Both paper-based and online questionnaires surveys were distributed to third year pharmacy students and above at 12 schools of pharmacy in addition to graduated student (bachelors and diploma). The survey included three sections, including (i) demographics and questions on their exposure to deprescribing and other experiences within their curriculum; (ii) questions regarding their attitudes, ability, and confidence regarding deprescribing, and (iii) questions to assess the factors that may influence the deprescribing process from the students' perspectives. Study responses were extracted from Google Form® as an Excel sheet and exported into Statistical Package for Social Sciences version 24.0 (SPSS Inc., Armonk, NY: IBM Corp, USA) for statistical analyses. Descriptive statistics, including frequency and proportions, were calculated and reported appropriately. **Results:** Around half of the participating students (n=202, 49.5%) were familiar with the term "Deprescribing," and only 74 (18.1%) students reported exposure to deprescribing instruction through required coursework. Less than half (n=193, 47.3%) reported exposure during elective courses, and fewer (n=47, 11.5%) reported exposure in both required and elective courses. Less than half of the students (n=191, 46.8%) were confident to recommend deprescribing strategies for health care providers in patients with potentially inappropriate medications. **Conclusion:** The results of this study revealed that pharmacy students' attitudes and perceptions about deprescribing were generally positive, however, for didactic and experiential training, pharmacy schools should assess their curricula and consider adding content and assessment of deprescribing knowledge and skills.

**Keywords:** deprescribing; education; geriatrics; pharmacy; polypharmacy; survey research

## INTRODUCTION

The most common definition of polypharmacy is the use of five or more non-prescription and prescription drugs by one person at the same time.<sup>1</sup> There may be certain instances of suitable polypharmacy in which therapy is optimized; nevertheless, several drugs may be unneeded and even detrimental in the vast majority of situations.<sup>2</sup> Polypharmacy is a significant issue, particularly among older adults and at-risk populations, due to

its association with a variety of negative outcomes, including mortality, severe medication reactions, longer hospital stays, and hospital readmissions.<sup>3-8</sup>

To lower the frequency and adverse effect of polypharmacy, deprescribing has become an essential skill for health care professionals, which is defined as "a systematic process of identifying and discontinuing medications in instances in which existing potential harms outweigh potential benefits within the context of an individual patient's care goals, the current level of functioning, life expectancy, values, and preferences."<sup>9,10</sup> Deprescribing should be considered as one element of good prescribing and must be seen by the physician in the same way as prescribing or continuing a medication, with the potential for harm as well as benefit.<sup>11</sup> As a concept, deprescribing was first mentioned as a Tier 1 issue in the American College of Clinical Pharmacy (ACCP) Pharmacotherapy Didactic Toolkit in the newly published 2019 version (highest priority).<sup>12,13</sup>

Generally, deprescribing is a complex process that necessitates clinical expertise, collaborative decision-making with patients and caregivers, and cross-communication among all healthcare providers. Lack of time and resources to perform such efforts, patient expectations, and insufficient research and education linked to deprescribing are all barriers to deprescribing.<sup>7</sup> Therefore, educating health care practitioners at all education levels (the undergraduate, graduate, and continuing professional), which would include instruction on deprescribing as part of the curricula in medical and pharmacy education, has

**Shatha M. AL OMARI\***. Faculty of pharmacy, Zarqa University, Jordan, P O Box 132222, Zarqa 13132, Jordan. somari@zu.edu.jo

**Hamza ALHAMAD**. Faculty of pharmacy, Zarqa University, Jordan, P O Box 132222, Zarqa 13132, Jordan. halhamad@zu.edu.jo

**Muna BARAKAT**. Faculty of pharmacy, Applied Science Private University, Jordan, Al Arab st. 21, Amman-11931, Jordan. m\_barakat@asu.edu.jo

**Hana M. SAWAN**. Faculty of pharmacy, Zarqa University, Jordan, P O Box 132222, Zarqa 13132, Jordan. habusawan@zu.edu.jo

**Marcia C. MECCA**. Department of Internal Medicine/ Geriatrics, Yale School of Medicine, USA. marcia.mecca@yale.edu

**F. AL BAHAR**. Faculty of pharmacy, Zarqa University, Jordan, P O Box 132222, Zarqa 13132, Jordan. falbahar@zu.edu.jo



been considered as a significant reform to increase the practice of deprescribing.<sup>14</sup> Furthermore, several recent studies have shown the importance of pharmacists supporting deprescribing throughout the care continuum.<sup>15-18</sup> Pharmacists are uniquely well-positioned to detect drugs that should be stopped, such as a lack of indication or benefit, unbearable adverse effects, or recognized dangers to the patient from drug-drug or drug-disease interactions, in addition to the ability of pharmacists to help with the formulation of a tapering and discontinuation strategy in collaboration with the patient and physician.<sup>19</sup>

This study is intended to be one of the first in Jordan to assess whether and how pharmacy students were taught about deprescribing as part of them. We also aimed to assess pharmacy students' deprescribing knowledge, attitudes, abilities, and confidence. The results of this study will add to the literature by providing more information on the implementation of deprescribing into professional pharmacy curriculum in Jordan, as well as whether particular deprescribing objectives and outcome metrics for didactic and experiential training are required.

## MATERIALS AND METHODS

### Study design and participants

A cross-sectional study was conducted from 25 November 2021 to 25 January 2022 among the Pharmacy and Pharm.D students from all accredited pharmacy programs in Jordan (n = 12) in addition to graduated pharmacist and diploma students. Both paper-based and online questionnaires were used to collect data. Paper copies of the questionnaire were printed and filled face to face by pharmacy and Pharm.D s. One faculty member specializing in geriatrics at each school received an email detailing the study and a link to the online survey instrument, with the request that the email and link be distributed to the appropriate student email lists. The survey link was emailed to the chair of the pharmacy practice department if no such faculty member could be discovered. Faculty members were urged to forward the email to Pharm.D and pharmacy students in their third year and above. Incomplete surveys were excluded from analysis. All participants were required to fill in a consent form before filling in the questionnaire. To maximize confidentiality, personal identifiers were not required.

### Survey development

The cross-sectional web-based survey was adapted from previously published surveys.<sup>7,8</sup> The developed survey was distributed to three random pharmacy practice professors to assess the readability and validity before pilot testing among twenty randomly selected participants to check for clarity, relevancy, and acceptability and for validity and reliability testing. The data collected during the piloting process was not included in the study's final results. In addition, the developed, inclusive and well-designed survey was distributed to the study population.

The survey included three sections, including (i) demographics and questions on their exposure to deprescribing and other

experiences within their curriculum; (ii) questions regarding their attitudes, ability, and confidence regarding deprescribing, (iii) questions to assess the factors that may influence the deprescribing process from the student perspective.

### Sample size calculation

The sample size was calculated using the Kish formula for sample size estimation at a 95% significance level and 5% error margin.<sup>20</sup> The estimated sample size was 384. However, a total of 408 undergraduate students were recruited in the present study.

### Ethical approval

The study was approved by the applied University of Science Ethics Committee (approval # 8/7/2021).

### Outcome measures

The following outcomes were assessed: pharmacy students' knowledge, attitudes, ability, and confidence toward deprescribing.

### Data analysis

Study responses were extracted from Google Form<sup>®</sup> as an Excel sheet and exported into Statistical Package for Social Sciences version 24.0 (SPSS Inc., Armonk, NY: IBM Corp, USA) for statistical analyses. Descriptive statistics, including frequency and proportions, were calculated and reported appropriately.

## RESULTS

### Sociodemographic characteristics of participants

All completed responses in our study were analyzed (n=408). The majority of the participating students were female (n=307, 75%), and 66.2% belonged to private universities (n=270). In addition, more than half of the study sample were in their fourth or fifth year of pharmacy (n=220, 54%) and had a plan to work in the community or hospital settings (n=245, 60%). At the same time, 200 students plan to pursue postgraduate studies (49.0%). Table 1 summarizes the characteristics of the respondents.

Variable	n	%
<b>Gender</b>		
Male	101	24.8
Female	307	75.2
<b>Institution Type</b>		
Public	138	33.8
Private	270	66.2
<b>Specialty</b>		
Pharmacy student (Bachelor level)	312	76.5
Pharm D student	90	22.1
Diploma	6	1.5
<b>Professional Year</b>		
Third	38	9.3



Fourth	95	23.3
Fifth	125	30.6
Sixth	67	16.4
Graduates	83	20.4
<b>Plans upon graduation (more than one option was/were allowed)</b>		
Work as a pharmacist at the community or hospital settings	245	60.0
Continue postgraduate studies (MSc., PhD)	200	49.0
Pharmacy residency programs and or fellowships	92	22.5
Jordan Food and Drug Administration	53	13.0
Work at the pharmaceutical company/industry	117	28.7
Work in the non-pharmacy field	41	10.0

### Students' familiarity and reported exposure to deprescribing in school of pharmacy

Around half of the participating students (n=202, 49.5%) were familiar with the term "Deprescribing" Figure 1. On the other hand, the students were more aware of the term's "polypharmacy" (n=303, 74.3%) and "Medication review," (n=311, 76.2%). Only 74 (18.1%) students reported exposure to deprescribing instructions through required coursework. Less than half (n=193, 47.3%) reported exposure during elective coursework, and fewer (n=47, 11.5%) reported exposure in both required and elective. Upon asking the participants about the curricular activities that include deprescribing instruction, 46.9% (n=191) reported clinical training (community/ hospital), followed by school lectures (n=131, 32.1%). Others confirmed the role of clinical simulations (n=54, 13.2%), research projects (n=45, 11.0%) and online coursework (n=35, 8.6%) in receiving deprescribing instruction, Table 2.

	n	%
<b>Instruction on deprescribing</b>		
Required coursework	74	18.1
Elective coursework	193	47.3
Both required and elective	47	11.5
None	94	23.0
<b>If instruction on deprescribing was part of the curriculum (didactic or experiential) at your school/college of pharmacy, during what curricular activities did this occur? (more than one option was/were allowed)</b>		
Lectures	131	32.1
Community pharmacy training	110	27.0
Hospital pharmacy training	81	19.9
Patient-centered case problems	53	13.0
Clinical simulations	54	13.2
Pharmacy research projects	45	11.0
Online coursework	35	8.6
Deprescribing was not covered in any educational activities	94	23.0
Not applicable*	79	19.4

\* If none of the options is/are applicable, they could choose "not applicable"

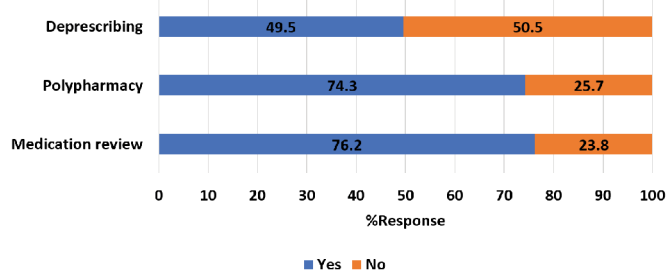


Figure 1. Percentages of participants' familiar with essential terms

### Student attitudes and perceptions regarding deprescribing

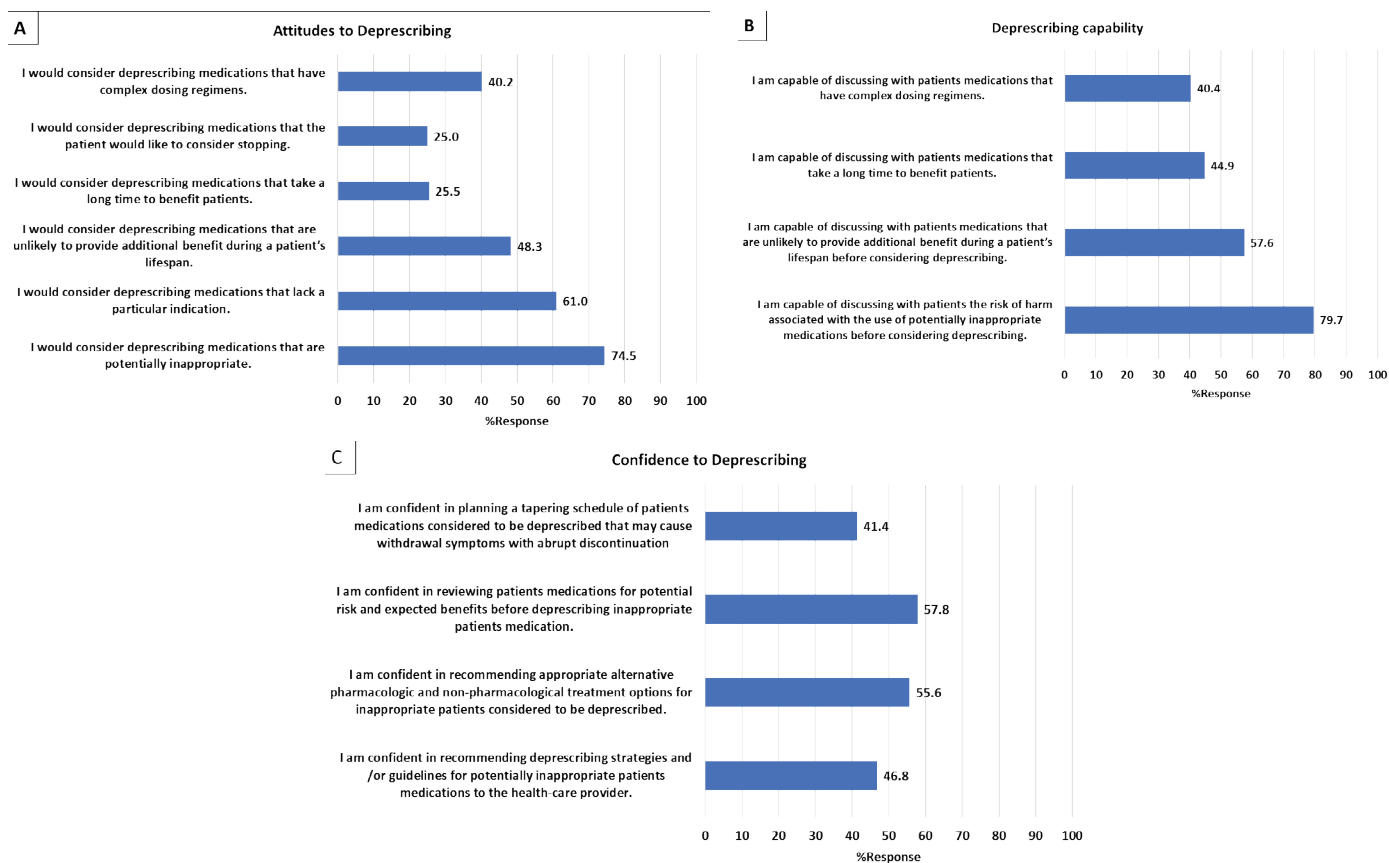
Student attitudes toward deprescribing were varied, Figure 2(a). Most of the students (n=304, 74.5%) would consider deprescribing potentially inappropriate medication. Less would consider deprescribing a medication that lacks indication (n=249, 61.0%), a non-beneficial medication (n=197, 48.3%) and in complex dosing regimens (n=164, 40.2%). On the other hand, one-quarter of the respondents would consider deprescribing according to patient preference to stop a medication (n=102, 25.0%) or for medications with prolonged time to benefit (n=104, 25.5%).

Regarding the students' deprescribing capability, Figure 2(b) represents the reported responses assuming that participants had access to the patient, clinical assessments, and laboratory values. About 80% (n=325) stated they felt capable of discussing the potentially harmful effects of inappropriate medication use with patients before considering deprescribing. As well, 235(57.6%) and 183(44.9%) participants would discuss the "medications that are unlikely to provide additional benefit during a patient's lifespan" and "medications that take a long time to benefit patients", respectively. Figure 2(c) demonstrated the "Confidence to Deprescribing" arm among the participants. Less than half of the students (n=191, 46.8%) were confident to recommend deprescribing strategies for health care providers in cases of potentially inappropriate medication use. Just over half were confident to recommend an appropriate alternative treatment (n=227, 55.6%) and review medication tradeoffs prior to deprescribing. In parallel, 169 (41.4%) students were confident in their ability to plan a tapering schedule for patients when needed.

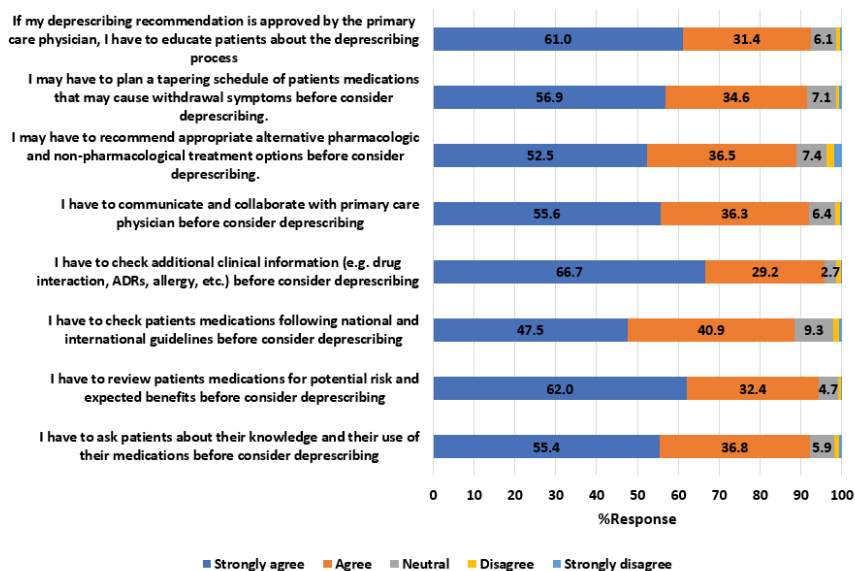
### Student's agreement with the deprescribing process

As illustrated in Figure 3, students revealed a high level of agreement with the tips of the deprescribing process. More than 90 percent of the respondents have agreed or strongly agreed that before considering deprescribing, they have to check the patient's knowledge and adherence to their medication (92.2%), review the medication (potential risk vs. benefit, 94.4%), check the clinical parameters (95.8%), contact the primary health care provider (91.9%) and plan a tapering schedule in case of withdrawal risk (91.4%). A similar agreement level (92.4%) was reported after the physician's agreement for the deprescribing recommendation, as the pharmacist must educate the patient about this process. Only 2.2% of them have disagreed or strongly disagreed with the need to use national/international guidelines to proceed with deprescribing recommendations.





**Figure 2.** Percentage of participants who agreed with the deprescribing related attitude, capability and confidence (more than one option was allowed)



**Figure 3.** Students' level of agreement with the deprescribing process, assuming that he/she had access to the patient, clinical assessments, and laboratory values

### Factors that may influence the deprescribing process from the student's perspectives

Among all study participants, more than 90% confirmed (agreed/strongly agreed) that the deprescribing process may be facilitated by earnest health care provider efforts

(90.7%), providing relevant education (91.9%), identifying the unnecessary drug use (92.2%) and systematic medication review (90.4%), Table 3. On the other hand, between 70-89% of the students have agreed/strongly agreed that the success of the deprescribing process may be impeded due to incomplete



Table 3. Students' perception toward the factors that may influence the deprescribing process (n=408)					
Factors	n (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<b>Factors that may facilitate the success of deprescribing</b>					
Earnest health-care provider effort	204(50.0)	166(40.7)	31(7.6)	5(1.2)	2(0.5)
A good patient- health-care provider relationship	200(49.0)	165(40.4)	37(9.1)	4(1.0)	2(0.5)
Providing relevant patient education	222(54.4)	153(37.5)	30(7.4)	2(0.5)	1(0.2)
Identifying redundant and unnecessary medications based on knowledge (physiology, pharmacology, current guidelines)	219(53.7)	157(38.5)	23(5.6)	7(1.7)	2(0.5)
Systematic periodic medication review in collaboration with multidisciplinary health care providers	206(50.5)	163(40.0)	32(7.8)	4(1.0)	3(0.7)
<b>Factors that may impede the success of deprescribing:</b>					
Incomplete health-care provider effort (ie, lack of time)	196(48.0)	124(30.4)	59(14.5)	26(6.4)	3(0.7)
New patients (first encounter, awaiting full information)	156(38.2)	133(32.6)	70(17.2)	42(10.3)	7(1.7)
Satisfaction with current regimens and reluctant to deprescribe	176(43.1)	140(34.3)	57(14.0)	32(7.8)	3(0.7)
Patient belief relating to recommendations from consultants or other providers	182(44.6)	130(31.9)	56(13.7)	35(8.6)	5(1.2)
Resistance from consultants or other health-care providers	166(40.7)	127(31.1)	75(18.4)	35(8.6)	5(1.2)
<b>Factors that required reintroducing of deprescribed medications:</b>					
Changes in patient disease condition (e.g, laboratory results, vital signs, or clinical manifestations)	210(51.5)	164(40.2)	24(5.9)	4(1.0)	6(1.5)
Medication regimen modification based on changes in patient disease condition (e.g., hypo/hypertension, hypo/hyperglycaemia..etc)	179(43.9)	196(48.0)	25(6.1)	5(1.2)	3(0.7)
Health-care provider's certain recommendations favouring the previous medication regimen	154(37.7)	167(40.9)	60(14.7)	19(4.7)	8(2.0)

healthcare provider efforts (78.4%), new patients-related issues (70.8%), satisfaction with the current regimen and reluctance to deprescribe (77.5%), patient beliefs (76.6%) and health care providers' resistance (71.8%). Furthermore, potential contributors to the reintroduction of deprescribed medications were endorsed by students (agreed/strongly agreed), including changes in patient disease condition (91.7%), modification of the patient medication regimen (91.9%), and recommendation of health care provider for particular regimen (78.7%).

## DISCUSSION

Pharmacists are the foundation of safer and more efficient health care system especially after the change of pharmacy profession from traditional dispensing techniques to more patient-centered care as a result of improvements in pharmacy practice and the introduction of pharmaceutical care.<sup>21,22</sup> Therefore, pharmacists should be prepared for deprescribing practices to address the complex requirements of patients.<sup>7,23,24</sup> Additionally, it's crucial for pharmacy students to have deprescribing knowledge and skills.<sup>25</sup> This study aimed to explore whether pharmacy students were exposed to deprescribing within their curriculum and how they were taught about deprescribing (e.g., lecture, case problems, experiential). We evaluated pharmacy students' knowledge, attitudes, ability, and confidence toward deprescribing. To our knowledge, this is the first Jordanian study that focused solely on the significance of incorporating deprescribing into

professional pharmacy curricula as an outcome measure for didactic and experiential training.

Our findings demonstrate that pharmacy students were more familiar with the terms "education review" and "polypharmacy" than "deprescribing," with less than a quarter being exposed to "deprescribing" curricula. These findings align with study on this topic carried out by Poots et al. among pharmacy and medical students at King's College London.<sup>27</sup> Poots et al. found that while students were familiar with the terms "medication review" and "polypharmacy," only a small minority of students knew what the term "deprescribing" meant.<sup>26</sup> These findings suggest that greater emphasis is needed on deprescribing in pharmacy curricula.

In addition, pharmacy students' attitudes and perceptions toward deprescribing were evaluated. Most pharmacy students would consider deprescribing potentially inappropriate medication and, to a lesser extent, medications that lack indication, non-beneficial medications, and complex dosing regimens. However, about one-quarter of the pharmacy students would consider deprescribing according to the patient's preference to stop the medication and the proposed time to benefit for a medication. This is consistent with the result from the US study conducted by Clark et al.<sup>7</sup> The study by Clark et al. revealed that almost all students agreed or strongly agreed that they felt comfortable suggesting deprescribing for potentially inappropriate medications to a medical provider, but respondents were less confident in doing so for elderly



patients when life expectancy no longer justifies potential benefits or recommending deprescribing in elderly patients with poor life expectancy.<sup>7</sup>

Pharmacy student perceptions of deprescribing skills were also evaluated. The majority of pharmacy students felt able to discuss the potentially harmful effects of inappropriate medications with patients before considering deprescribing. Less than half of students would discuss the medications that are unlikely to provide additional benefit during a patient's lifespan, and less than half would discuss medications that take a long time for benefit. Concerning pharmacy student deprescribing confidence, more than half of pharmacy students were confident to recommend the appropriate alternative treatment. Less than half of pharmacy students were confident to recommend deprescribing strategies for health care providers in case of potentially inappropriate medication use and plan a tapering schedule for patients when needed. The emerging themes point to a higher requirement for student pharmacists to receive precise teaching on deprescribing. Although certain evidence-based guidelines have been created and used locally, more extensive application of these guidelines is necessary, as is the creation of further guidelines as needed, to make deprescribing more widespread in practice, which will increase student exposure.<sup>27</sup>

Finally, pharmacy students' perception of the factors that influence deprescribing was assessed. More than 90% of the pharmacy students agreed or strongly agreed that the deprescribing process may be facilitated by earnest health care provider efforts, providing relevant education, identifying unnecessary drug use, and systematic medication review. In contrast, between 70-89% of the pharmacy students have agreed or strongly agreed that the success of the deprescribing process may be impeded due to incomplete healthcare provider efforts, new patient-related issues, patient satisfaction with the current regimen and reluctance to deprescribe, patient beliefs, and health care providers resistance. Also, students agreed that reintroducing deprescribed medications may be affected by several factors including changes in disease severity, modification of the patient medication regimen, and recommendations of another health care provider for a particular regimen.

It is crucial to stress that teaching about medication review, polypharmacy, and deprescribing involves more than simply educating students about which drugs should be taken into consideration for stopping.<sup>26</sup> Learning about patient characteristics, clinical decision-making, and, most crucially, barriers to deprescribing is crucial for students and juniors.<sup>26</sup> In the literature, a number of deprescribing initiatives programs have been discussed. These initiatives provide transparent ways to mimic deprescribing strategies in the majority of healthcare settings.<sup>27</sup>

Beers Criteria<sup>®</sup> or the STOPP/START criteria is one of an easily accessible and provide a simple way for pharmacy students to understand polypharmacy deprescribing. Throughout, apply an approach for deprescribing to hypothetical cases.<sup>28</sup> Introduction of such explicit criteria to schools of pharmacy will help pharmacists in identifying potential inappropriate medications and deprescribing candidates.<sup>27</sup>

This is the first Jordanian study conducted to assess the preparedness of pharmacy students to deprescribe and the significance of incorporating deprescribing into professional pharmacy curricula. This is considered a strength of this study. However, this study has limitations. The results from this study are considered a significant contribution that would influence pharmacy curricular changes and highlights a chance to improve the strategy to educate around deprescribing. Also, this study provides evidence to explore changes in the pharmacist role in deprescribing in Jordan and expected to influence Jordanian pharmacy school curricula. This is crucial and may impact future curricular changes by pharmacy schools' deans based on the CAPE (Center for the Advancement of Pharmacy Education) educational outcomes. Consequently, the results collected from this study may not be generalizable. Thus, future studies are required to decide whether including a particular deprescribing outcome measures for didactic and experiential pharmacy training is successful in changing clinical practice.

## CONCLUSIONS

Findings from this study showed that pharmacy students' perceptions and attitudes toward deprescribing were generally positive, however, there was more variability in their perceptions of their ability and confidence in deprescribing. Also, there was a general agreement among pharmacy students that before considering deprescribing, they have to check the patient's knowledge and adherence to their medication, review the medication tradeoffs, check the clinical parameters, contact the primary health care provider, and plan tapering schedules when needed. This study uncovers areas for improvement in integrating deprescribing into professional pharmacy curricula in Jordan.

## AUTHOR CONTRIBUTIONS

Conceptualization Shatha M. Al Omari, and Hamza Alhamad.; methodology, Shatha M. Al Omari.; formal analysis, Muna Barakat.; investigation, Hana M. Sawan; resources, Shatha M. Al Omari, Muna Barakat; data curation, Shatha M. Al Omari, Hana M. Sawan; writing—original draft preparation, Shatha M. Al Omari, Muna Barakat, Hamza Alhamad ; writing—review and editing, Shatha M. Al Omari, Marcia C. Mecca; visualization, Shatha M. Al Omari, Hana M. Sawan, F. Al Bahar; supervision, Shatha M. Al Omari; project administration, Shatha M. Al Omari. All authors have read and agreed to the published version of the manuscript.

## FUNDING

This research received no external funding.

## INSTITUTIONAL REVIEW BOARD STATEMENT

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of THE APPLIED



SCIENCE PRIVATE UNIVERSITY (Reference number: 2021-PHA-24, Approval date: 8/ July/2021).

## ACKNOWLEDGMENTS

We gratefully acknowledge the faculty and staff who facilitated the distribution of this study.

## DATA AVAILABILITY STATEMENT

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## References

1. Khan N, Chattopadhyay K, Leonardi-bee J. Incidence, prevalence, risk factors and health consequences of polypharmacy in adults in South Asia: a systematic review protocol. *JBI Evid Synth.* 2019;17(11):2370-2377. <https://doi.org/10.11124/JBISRIR-D-18-00001>
2. Elbeddini A. Deprescribing for all: A narrative review identifying inappropriate polypharmacy for all ages in hospital settings. *BMJ Open Qual.* 2021;10(3):1-7. <https://doi.org/10.1136/bmjog-2021-001509>
3. Masnoon N, Shakib S, Kalisch-Ellett L, et al. What is polypharmacy? A systematic review of definitions. *BMC Geriatr.* 2017;17(1):230. <https://doi.org/10.1186/s12877-017-0621-2>
4. Caughey GE. Comorbidity in the elderly with diabetes: Identification of areas of potential treatment conflicts. *Diabetes Res Clin Pract.* 2010;87(3):385-393. <https://doi.org/10.1016/j.diabres.2009.10.019>
5. Caughey GE. Increased risk of hip fracture in the elderly associated with prochlorperazine: is a prescribing cascade contributing? *Pharmacoepidemiol Drug Saf.* 2010;19(9):977-982. <https://doi.org/10.1002/pds.2009>
6. Milton JC, Hill-Smith I, Jackson SHD. Prescribing for older people. *Mt Sinai J Med.* 2011;78(4):613-626. <https://doi.org/10.1002/msj.20278>
7. Clark CM. Knowledge and Attitudes of Student Pharmacists Regarding Polypharmacy and Deprescribing: A Cross-Sectional Study. *Pharmacy.* 2020;8(4):220. <https://doi.org/10.3390/pharmacy8040220>
8. Thomas JM. Development and validation of a polypharmacy knowledge assessment instrument. *Am J Pharm Educ.* 2019;83(5):6435. <https://doi.org/10.5688/ajpe6435>
9. Reeve E, Gnjidic 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):1254-1268. <https://doi.org/10.1111/bcp.12732>
10. Scott IA. Reducing Inappropriate Polypharmacy: The Process of Deprescribing. *JAMA Intern Med.* 2015;175(5):827-834. <https://doi.org/10.1001/jamainternmed.2015.0324>
11. Farrell B, Mangin D. Deprescribing is an essential part of good prescribing. *Am Fam Physician.* 2019;99(1):7-9.
12. Schwinghammer TL. The 2016 ACCP Pharmacotherapy Didactic Curriculum Toolkit. *Pharmacother J Hum Pharmacol Drug Ther.* 2016;36(11):e189-e194. <https://doi.org/10.1002/phar.1846>
13. Flannery AH. 2019 Update to the American College of Clinical Pharmacy Pharmacotherapy Didactic Curriculum Toolkit. *JACCP J Am Coll Clin Pharm.* 2020;3(2):455-464. <https://doi.org/10.1002/jac5.1178>
14. Raman-Wilms L, Farrell B, Sadowski C, et al. Deprescribing: An educational imperative. *Res Soc Adm Pharm.* 2019;15(6):790-795. <https://doi.org/10.1016/j.sapharm.2018.08.011>
15. Martin P, Tamblyn R, Benedetti A, et al. Effect of a Pharmacist-Led Educational Intervention on Inappropriate Medication Prescriptions in Older Adults: The D-PRESCRIBE Randomized Clinical Trial. *JAMA.* 2018;320(18):1889-1898. <https://doi.org/10.1001/jama.2018.16131>
16. 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):115-118. <https://doi.org/10.1111/jgs.15623>
17. Navy HJ, Weffald L, Delate T, et al. Clinical Pharmacist Intervention to Engage Older Adults in Reducing Use of Alprazolam. *Consult Pharm J Am Soc Consult Pharm.* 2018;33(12):711-722. <https://doi.org/10.4140/TCP.n.2018.711>
18. Lasota ST, Merrey W, Ross PA, et al. Provider Responsiveness to Pharmacist Recommendations in a Population Health Setting. *Pharm.* 2019;34(5):308-316. <https://doi.org/10.4140/tcp.n.2019.308>
19. Swieczkowski D, Merks P, Gruchala M, et al. The role of the pharmacist in the care of patients with cardiovascular diseases. *Kardiol Pol.* 2016;74(11):1319-1326. <https://doi.org/10.5603/KP.a2016.0136>
20. Wiegand H, Kish L. Survey Sampling. John Wiley & Sons, Inc., New York, London 1965, IX + 643 S., 31 Abb., 56 Tab., Preis 83 s. *Biom. Z.* 1968;10:88-89.
21. Nusair MB, Alhamad H, Mukattash T, et al. Pharmacy students' attitudes to provide rational pharmaceutical care: A multi-institutional study in Jordan. *J Pharm Sci.* 2021;14(1):27-36.
22. Al-Daghastani T, Tadros O, Arabiyat S, et al. Pharmacists' perception of the coronavirus pandemic (Covid-19) in Jordan: A cross-sectional study. *Int J Environ Res Public Health.* 2021;18(21):11541. <https://doi.org/10.3390/ijerph182111541>
23. Coe A, Kaylor-Hughes C, Fletcher S, et al. Deprescribing intervention activities mapped to guiding principles for use in general



- practice: A scoping review. *BMJ Open*. 2021;11(9):e052547. <https://doi.org/10.1136/bmjopen-2021-052547>
24. Barne N, Jubraj B, Grant D, et al. Medication review, polypharmacy and deprescribing: Results of a pilot scoping exercise in undergraduate and postgraduate education. *Pharm Educ*. 2021;21(1):126-132. <https://doi.org/10.46542/pe.2021.211.126132>
25. Peletidi A, Troullaki M. Abstracts. *Int J Pharm Pract*. 2020;28(1):5-39.
26. Poots AJ, Jubraj B, Ward E, et al. Education around medication review and deprescribing: a survey of medical and pharmacy students' perspectives. *Ther Adv Drug Saf*. 2020;11:2042098620909610. <https://doi.org/10.1177/2042098620909610>
27. Springer SP, Cernasev A, Barenie RE, et al. "I Think Deprescribing as a Whole Is a Gap!": A Qualitative Study of Student Pharmacist Perceptions about Deprescribing. *Geriatr*. 2022;7(3):60. <https://doi.org/10.3390/geriatrics7030060>
28. Institute BR. Polypharmacy and Deprescribing. 2020;48(7):468-471. <https://doi.org/10.1016/j.mpmed.2020.04.003>

## SECTION-1

### Demographic and curricular exposure to deprescribing

Please write the name of your university (i.e., for example, Jordan University, Zarqa university, Jordan University of science and technology etc.):

.....

What is your gender?

Male

Female

Please select if you are:

Pharmacy student (i.e. Bachelor of pharmacy)

Pharm D student

Diploma

Postgraduate students

What year are you in?

Third years

Fourth-year

Fifth-year

Sixth-year (only if you are Pharm D students)

Graduate student

Please indicate if you are generally familiar with the following: (please select all that may apply):

I am familiar with the term "Medication review".

I am familiar with the term "Polypharmacy".

I am familiar with the term "Deprescribing".





Regarding if there is/are instruction(s) on deprescribing as part of your pharmacy curriculum? (please select all that apply):

Yes, there is/are instruction(s) on deprescribing as a REQUIRED part of the pharmacy curriculum.

Yes, there is/are instruction(s) on deprescribing as an ELECTIVE part of the pharmacy curriculum.

No

I am not sure

If instruction on deprescribing was part of the curriculum (didactic or experiential) at your school/college of pharmacy, during what curricular activities did this occur? (please select all that apply):

Lectures

Community pharmacy training

Hospital pharmacy training

Patient-centered case problems

Clinical simulations

Pharmacy research projects

Online coursework

Deprescribing was not covered in any educational activities

What are your current plans upon your graduation from your college/school of pharmacy (select all that apply)

Work as a pharmacist at the community or hospital settings

Continue postgraduate studies (MSc., PhD)

Pharmacy residency programs and or fellowships

Jordan Food and Drug Administration

Work at the pharmaceutical company/industry

Work in non-pharmacy field

## SECTION-2

Regarding your "Attitudes to Deprescribing", and assuming that you had access to the patient, clinical assessments, and laboratory values: (please select all that may apply):

I would consider deprescribing medications that are potentially inappropriate.

I would consider deprescribing medications that lack a particular indication.

I would consider deprescribing medications that are unlikely to provide additional benefit during a patient's lifespan.

I would consider deprescribing medications that take a long time to benefit patients.

I would consider deprescribing medications that the patient would like to consider stopping.

I would consider deprescribing medications that have complex dosing regimens.



Regarding your “Deprescribing capability”, and assuming that you had access to the patient, clinical assessments, and laboratory values: (please select all that may apply):

I am capable of discussing with patients the risk of harm associated with the use of potentially inappropriate medications before considering deprescribing.

I am capable of discussing with patients’ medications that are unlikely to provide additional benefit during a patient’s lifespan before considering deprescribing.

I am capable of discussing with patients’ medications that take a long time to benefit patients.

I am capable of discussing with patients’ medications that have complex dosing regimens that have complex dosing regimens.

Regarding your “Confidence to Deprescribing”, and assuming that you had access to the patient, clinical assessments, and laboratory values: (please select all that may apply):

I am confident in recommending deprescribing strategies and /or guidelines for potentially inappropriate patients’ medications to the health-care provider.

I am confident in recommending appropriate alternative pharmacologic and non-pharmacological treatment options for inappropriate patients considered to be deprescribed.

I am confident in reviewing patients’ medications for potential risk and expected benefits before deprescribing inappropriate patients’ medication.

I am confident in planning a tapering schedule of patient’s medications considered to be deprescribed that may cause withdrawal symptoms with abrupt discontinuation

During “Deprescribing process”, and assuming that you had access to the patient, clinical assessments, and laboratory values: please indicate how much do you agree with the following:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I have to ask patients about their knowledge and their use of their medications before consider deprescribing					
I have to review patients’ medications for potential risk and expected benefits before consider deprescribing					
I have to check patients’ medications following national and international guidelines before consider deprescribing					
I have to check additional clinical information (e.g. drug interaction, ADRs, allergy, etc.) before consider deprescribing					
I have to communicate and collaborate with primary care physician before consider deprescribing					
I may have to recommend appropriate alternative pharmacologic and non-pharmacological treatment options before consider deprescribing.					
I may have to plan a tapering schedule of patient’s medications that may cause withdrawal symptoms before consider deprescribing.					
If my deprescribing recommendation is approved by the primary care physician, I have to educate patients about the deprescribing process					

**SECTION-3**

Regarding “Factors that may influence the Deprescribing Process,” please answer the following questions (13,14,15) indicating your degree of agreements or disagreements:

Factors that may facilitate the success of deprescribing:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Earnest health-care provider effort					
A good patient- health-care provider relationship					
Providing relevant patient education					
Identifying redundant and unnecessary medications based on knowledge (physiology, pharmacology, current guidelines)					
Systematic periodic medication review in collaboration with multidisciplinary health care providers					

Factors that may impede the success of deprescribing:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Incomplete health-care provider effort (ie, lack of time)					
New patients (first encounter, awaiting full information)					
Satisfaction with current regimens and reluctant to deprescribe					
Patient belief relating to recommendations from consultants or other providers					
Resistance from consultants or other health-care providers					

Factors that required reintroducing of deprescribed medications:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Changes in patient disease condition (e.g, laboratory results, vital signs, or clinical manifestations)					
Medication regimen modification based on changes in patient disease condition (e.g., hypo/hypertension, hypo/hyperglycemia.etc)					
health-care provider’s certain recommendations favouring the previous medication regimen					

