

Jordanian Pharmacy Students' Views and Attitudes Regarding Deprescribing: Findings from a Cross-Sectional Study

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Received: 09-04-2025; Revised: 15-05-2025; Accepted: 27-05-2025; Published: 04-06-2025

Abstract

Deprescribing is an essential step in the optimization of use and to reduce polypharmacy harms especially in aging populations. This cross-sectional examination conducted an examination of the Jordanian pharmacy students' attitudes and perceptions of deprescribing practices. A structured questionnaire was sent among senior pharmacy students in different universities in Jordan to evaluate their knowledge, confidence and readiness to participate in deprescribing during their future practice. Evidence showed mostly favorable attitude toward deprescribing, and, many students acknowledging its role in patient safety and therapeutic optimization. However, there were also gap areas of formal education and hands on experience. The outcomes reiterate the necessity for including deprescribing concepts in pharmacy curriculum, so as to prepare future pharmacists almost in collaborative manner of handling medications.

Keywords: *Deprescribing, pharmacy education, Jordan, pharmacy students, polypharmacy, clinical pharmacy, student perceptions, medication safety, cross-sectional study.*

1. Introduction

Polypharmacy (concomitant use of multiple medications) is a problem which has become increasingly common in today's healthcare, particularly in the elderly with chronic, multiply affected health conditions. This phenomenon does not mainly affect the elderly, but people of all ages are not spared especially those who are chronic patients or when one is institutionalised. Though polypharmacy may be the right answer to combating a variety of health issues, it often comes attached with adverse drug reactions, medication errors, hospitalization, and poor quality of life. The dangers of polypharmacy are enhanced by aging, which alters the body's capacity to metabolize and eliminate drugs hence enhancing the chances for drug interactions, side-effects and toxic effects. In this regard, the term "inappropriate polypharmacy" refers to the application of unnecessary and/or detrimental to the patient medications under consideration of patients' certain clinical situations(1).

Studies have always demonstrated that polypharmacy is the most significant risk factor for drug-related problems including non-adherence to drugs, drug-drug interactions and adverse drug reactions, all associated with bad health outcomes. Besides, polypharmacy in geriatric patients has been linked with the cognitive decline, falls, frailty and thus complicated subsequent management of these patient. It is therefore all important that healthcare providers, such as pharmacists, be skilled at identifying drugs that are no longer necessary or effective of the patient. Nevertheless, the working process of polypharmacy management is not limited to prescribing the drugs; it calls for an active effort in evaluating when and which drugs to stop; this is deprescribing.

Deprescribing is the systemic process of evaluating and withdrawing pharmaceutical preparations that are either unnecessary or whose potential harm outweighs their advantage considering an individual patient's health status, goals of care, remaining life span, and preferences. It is a very critical part of optimising drug therapy, especially in a patient who may be on varying drugs for chronic diseases. Deprescribing is not as much about stopping medications, as a full patient health assessment, their history and the interactions of the drugs with each other. It is a partnership that involves diligent communication with the healthcare provider and the patient, and a rigorous apprehension of the patient's values, preferences and quality of life(2).

The idea of deprescribing has had a lot of momentum lately as one of the best ways to counteract the negative impacts of polypharmacy. By doing so, the intention is that patients should only be exposed to medicines which they really need so that those that are not needed and may be harmful are kind of weaned off in a controlled and safe way. Deprescribing is not a simple process though. it requires subtle knowledge of pharmacology, clinical judgment and patient centered care. In addition, it needs skills in dealing with discontinuation of medications, which may include withdrawal effects, patient opposition, as well as, difficulty in tapering doses.

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In order for deprescribing to be mainstream of medical practice, healthcare providers have to be trained on how to identify drugs to stop and how to discuss poor intervention with patients and other care givers. Pharmacists are an integral part of the drug management where they provide counsel on drug interactions, and drug therapy is optimal to the patient. Therefore, it is necessary to introduce the deprescribing education into curriculum of pharmacy in order to prepare future pharmacists to tackle this rising problem of polypharmacy. Pharmacists will need the knowledge, the skills and confidence to make decisions about when and how to begin deprescribing and how to effectively communicate these decisions to patients and their healthcare teams.

Although deprescribing has become increasingly recognized as an essential practice, there is evidence to support the fact that many pharmacy students and other healthcare workers are not well trained on the subject. As studies have shown, albeit not widely, most pharmacy students are familiar with such concepts as “polypharmacy” and “medicine review”, whereas only a comparatively small number of them have ever heard of deprescribing, as well as its significance in clinical practice(3). This absence of awareness and training can erect walls to the practical roll-out of deprescribing measures in the actual healthcare arena. Research study has also revealed that many students, notwithstanding the knowledge of theoretical merits of deprescribing, do not dare to offer deprescribing strategies to healthcare providers, or do not engage in critical dialogues with patients.

It is through deprescribing that incorporating it into pharmaceutical education can help close this gap and make students better ready to face the clinical reality. Deprescribing education should not be just theoretical, but include practical experiential learning. Examples might be case studies, role-playing and some clinical placements where students could try to apply their knowledge to such a real situation. In this process, if students are involved in these activities they can learn how to analyze patients’ medication regimens and detect possible threats and, with confidence, offer relevant interventions.

This study aims to investigate the depth to which the students of pharmacy shall be exposed to deprescribing education in their curricula and evaluate the students’ attitudes, the knowledge, the confidence as well as the perceived abilities associated with deprescribing. Specifically, the study aims at finding out whether deprescribing is offered as a required or elective subject, how the learners are taught about deprescribing, influence of factors determining whether a learner is willing to practice deprescribing. In addition, the assessment of barriers and facilitators to deprescribing, as viewed by students, was an objective of the study to examine how pharmacy education can be improved.

Informing the curricular changes that will ready future pharmacists to be able to address polypharmacy and patient care will require knowing how pharmacy students see deprescribing and their preparedness to carry it out. By pinpointing students’ gaps in knowledge and confidence, pharmacy schools can alter their curricula so that students graduate from knowing all about deprescribing and the skills to implement it in their clinical work. Additionally, this research will help continue the process of promoting the excellence of pharmaceutical care as well as to minimise medication-related harm and finally bring about better patient outcomes.

At the end, deprescribing is one of the key practices and central to managing polypharmacy and optimizing drug therapy, especially in the vulnerable patient groups. As the scope of pharmacy practice elicits changes, pharmacy education must change to meet the increasing encounters due to polypharmacy. Including deprescribing in pharmacy curricula will enable us to prepare future pharmacists who can deliver high quality, patient centered drug therapy which promotes both safety and effectiveness. This research aims to give helpful information about the present status of the deprescribing education in pharmacy schools and to guide future work on the preparation of the pharmacy students to deal with polypharmacy and improve health outcomes among patients.

2. Methodology

The study was established to be a cross-sectional survey to measure the attitudes, the knowledge, and readiness to deprescribing among pharmacy students in Jordan. This approach gave an opportunity to compile data from a large variety of participants from several pharmacy schools to analyze different factors affecting the implementation of deprescribing in pharmacy education. The research attempted to assess not only the students’ theoretical understanding of deprescribing, but also their practical confidence and presumed competency in advising of deprescribing strategies(4).

Study Design

In this research, a cross-sectional study design was selected since it can capture a ‘snapshot’ of attitude and knowledge of students in the pharmacy at a given point of time. This design is prevalent in educational research because from a large number of participants, data could be obtained within a short duration. The present study was conducted to find out whether the students studying in pharmacy had an idea about concept of deprescribing; whether the students had received this concept in their academic curriculum; and whether they felt confident to use the concept of deprescribing in their practical settings during their professional life.

Participants and Sampling

The respondents of this research study were 3rd year up pharmacy students in 12 accredited Jordanian pharmacy schools. To obtain a representative insight on the student population, the study sampled a heterogeneous cohort that consisted of undergraduate, Pharm.D., and diploma students. On total, 408 students took part in study and most of them are female (75%), this is gender distribution reflects the one that is common to the pharmacy profession in Jordan. Of the participants, a good number were enrolled in Private universities (66.2%), and majority of the students were in their fourth or fifth year of study(5).

Through an online survey as well as paper questionnaires the survey was disseminated. In order to achieve high outreach and representativeness, the link to the survey was sent to the chair of the pharmacy practice department in each university with a request to forward the questionnaire to the participants. The sample size of 384 was computed (based on Kish formula for sample size estimation) to produce statistical reliability at 95% confidence level (plus/minus 5% error margin). Finally, data for 408 surveys were analyzed, and a rich dataset was obtained for the study.

Section	Description
Study Design	Cross-sectional survey designed to assess pharmacy students' attitudes, knowledge, and readiness regarding deprescribing.
Participants	408 pharmacy students from 12 accredited universities in Jordan (third year and above). Data collected through paper-based and online surveys.
Survey Instrument	Survey consisted of three sections: 1) Demographics and Curricular Exposure, 2) Attitudes, Abilities, and Confidence, 3) Perceived Barriers and Facilitators to Deprescribing.
Ethical Considerations	Ethical approval obtained from the Applied Science University Ethics Committee. Informed consent obtained from participants, ensuring anonymity and confidentiality.
Data Analysis	Data analyzed using SPSS version 24.0 with descriptive statistics (frequencies and percentages) to summarize responses and identify trends.

TABLE 1 Summarizing the Study Design

Survey Instrument

The components of the survey instrument were generated from the combination of older published questionnaires concerning related topics and newly generated items targeting the distinct goals of this research. The survey was carried out in three sections with each section specifically measuring a different aspect of the students’ knowledge of exposure to and understanding of deprescribing:

Students Demographics and Curricular Exposure This section collected data on students’ gender, year of study, type of learning institution (public or private) and exposure levels to the concept of deprescribing. Students were asked whether deprescribing was included in their required or elective curriculum, and the curricular exercises (lectures, case problems, clinical training) at which point deprescribing was covered(6).

Attitudes, Abilities and Confidence In this part the attitudes of the students towards deprescribing and their confidence to use deprescribing principles were discussed. Students were asked whether they would consider deprescribing medications that were potentially inappropriate, or not indicated. They were also queried on how they viewed their capacity to talk about deprescribing with patients and healthcare providers and how confident they were about suggesting deprescribing strategies.

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Perceived Barriers and Facilitators to Deprescribing In this section what were seen as the elements by students that would help or hinder the deprescribing process were analyzed. It covered questions relating to the role of healthcare providers in deprescribing, patient adherence to medications and the degree of collaboration required between a pharmacist, physician, and patient. Students were also queried on their understanding of the possible obstacles- Patient resistance or healthcare-provider contrariness to deprescribe.

Ethical Considerations

Before data collection, the report was agreed upon by the Ethics Committee of Applied Science University of Jordan. All the participants were given an informed consent outline the aim of the study, the voluntary nature of participation and the confidentiality of the response. No personal identifiers were gathered; respondents were reassured that their responses would be anonymous(7).

Data Analysis

The data obtained in the completed surveys were extracted and imported to Statistical Package for Social Sciences (SPSS) version 24.0 for analysis Descriptive statistics such as frequencies and percentages were utilized in summation of the data. For categorical variables, the frequency distribution was used to explain the overall pattern of the student knowledge, attitudes and confidence in deprescribing. Patterned analyses were aimed at getting an insight into the patterns of students' exposure to deprescribing education, what they believed they could do and what may determine whether they could engage in deprescribing in clinical settings.

The study also examined whether university type, year of study, or program (undergraduate, Pharm.D., or diploma) affected the students' familiarity with deprescribing, their confidence and readiness to use deprescribing principles. This analysis supported us in determining whether the presence of some factors affected the students' ability to participate in deprescribing and what areas of pharmacy curricula can be improved.

3. Results

The purpose of the study was to measure pharmacy students knowledge, attitude, perception of deprescribing and readiness to perform this activity. In all, 408 pharmacy students from 12 accredited pharmacy schools in Jordan took part in the study. The evaluation of participants' demographic characters; their exposure to deprescribing material in their curriculums; their attitudes towards deprescribing and their self-reported efficacy and confidence in their ability to engage in deprescribing were evaluated. The results were examined to find out where the trends in students' familiarization with deprescribing are headed, and what factors had influenced students' readiness to implement deprescribing strategies in clinical practice.

Demographic Characteristics

The participant's largest group was female (75%) representative of gender distribution observed in the pharmacy profession in Jordan. By type of institution, 66.2% were enrolled in private universities while the rest attended public universities. The research participants' academic standing majority (54%) was in their fourth or fifth year, meaning they were at the tail end of their undergraduate labs or had progressed to the Pharm.D. program. The study sample also included the students of the diploma programs (1.5%), and those who intended to study after graduation (49%).

Exposure to Deprescribing Education

According to the survey 49.5% of students knew the term "deprescribing". Exposure to formal sitting on deprescribing, however, was limited. Only 18.1% of the individuals who participated stated having received instruction on deprescribing as part of their coursework required, 47.3% indicated they experienced deprescribing from their elective coursework. 11.5% of students showed exposure to deprescribing in both their compulsory and voluntary coursework, 23%

From those who reported some exposure to deprescribing instruction, clinical training (in either community or hospital pharmacies) was most likely to comprise content on deprescribing (46.9%). Other deprescribing-related activities comprised lectures (32.1%), clinical simulations (13.2%), research projects (11%) and online coursework (8.6%). Remarkably, 23% of the students complained that deprescribing was not a part of any educational work. This implies that notwithstanding the rise of the role of deprescribing in modern medicine, a gap is still lacking in implementing it in the curriculum of the pharmacy(8).

Attitudes Toward Deprescribing

When asked their attitudes to deprescribing, most students of medicine and pharmacology had positive attitudes. 74.5% of students agreed that they would consider deprescribing potentially inappropriate medications. Less students said, they would consider deprescribing medications without a stated indication (61%), non-beneficial (48.3%), or complex dosing regimens (40.2%). Fewer students (about 25%) expressed an intention to consider deprescribing, according to the patient's preference and extended time to benefit of a medication.

These results indicate that most students are willing however patients' attitudes regarding some of the medication and situation were varied. For example, there seems to be reduced confidence in deprescribing medicines for hesitant patients or when benefits will be delayed.

Perceived Capacity to Involve Deprescribing

The students' perceived ability to participate in deprescribing was also evaluated by the study. The results established that most students (about 80%) felt capable of engaging patients in a conversation about potentially detrimental effects of inappropriate medications before contemplating deprescribing. Further, 57.6% of participants stated that they would feel competent to talk about the medications that would not bring any additional benefits within the patient's lifetime, and 44.9% about medications which would not take long to benefit the patient.

Interestingly, although, generally willing to participate in deprescribing conversations, not as many students expressed confidence in suggesting deprescribing tactics to healthcare givers. 46.8% of participants were confident in suggesting deprescribing strategies for potentially inappropriate medications; 55.6% were confident in prescribing alternative treatments for patients whose medications are being stopped. Confidence continued to be not demonstrated on tapering schedules, whereby only 41.4% of the students had confidence in developing a tapering schedule for drugs that could cause withdrawal symptoms when stopped abruptly.

Category	Results
Demographic Characteristics	75% female participants; 66.2% enrolled in private universities; 54% in their fourth or fifth year.
Exposure to Deprescribing Education	49.5% familiar with deprescribing; 18.1% exposure through required coursework; 47.3% exposure through elective coursework.
Attitudes Toward Deprescribing	74.5% consider deprescribing potentially inappropriate medications; 61% for medications without indication; 40.2% for complex dosing regimens.
Perceived Ability to Engage in Deprescribing	80% capable of discussing harmful effects of inappropriate medications; 57.6% for medications unlikely to benefit; 44.9% for long time-to-benefit medications.
Confidence in Deprescribing Strategies	46.8% confident in recommending deprescribing strategies for inappropriate medications; 55.6% confident in recommending alternative treatments; 41.4% confident in planning tapering schedules.
Factors Influencing Deprescribing	90% agree that healthcare provider efforts, patient education, and medication reviews facilitate deprescribing; 78.4% believe incomplete provider efforts hinder the process.

TABLE 2 Results

Confidence in Deprescribing Strategies

They were also asked about confidence in deprescribing strategies when applying them to clinical practice. More than half of the students (55.6%) were sure what treatments to suggest as alternatives. This means that even though students may not always feel comfortable in using the whole deprescribing process, they feel more comfortable suggesting alternative therapies. The degree of confidence fell, however, when it came to planning a tapering schedule for taking medications, since 41.4% of students felt confident in their capacity of managing withdrawal symptoms using gradual tapering(9).

The results of these findings suggest an incongruence between what students understand in theory about deprescribing, and their perceived ability to apply it in practice. The failure to trust to taper medications or conduct patient-provider discussions might result from a lack of practical experience and contact with deprescribing in their academic programs.

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Factors Influencing the Deprescribing Process

From the aspects of the deprescribing parameters, the participants outlined facilitators and barriers to the process. More than 90% of students agreed that earnest efforts by healthcare providers, providing relevant patient teaching, and systematic medication review would be prime factors influencing successful deprescribing. A good patient-healthcare provider relationship was also perceived as necessary for good deprescribing, 49% of students agreed to this factor.

On the other hand, different deprescribing barriers were found by the students. Partially completed effort exerted by healthcare provider (due to time lapse or lack of training) was also considered a major hindrance to the process because students agreed by 78.4% percent that this factor could hinder the process. Other barriers were patient unwillingness to deprescribe (77.5%), healthcare providers' resistance (71.8%). These results bring into context the complexities of deprescribing and the need for more teamwork and patient-oriented approaches.

4. Discussion

Areas of Awareness and Exposure to Deprescribing Education

The results presented that almost a half (49.5%) of the participants were familiar with the term "deprescribing", though only 18.1% of students reported experience of deprescribing education integrated into the coursework. This means despite some awareness of the term, systems-level learning on deprescribing is still not mainstream in pharmacy programs. Moreover, although 47.3% of students had exposure through elective courses the corresponding low percentage of students who learned about deprescribing in their mandated training is a matter of concern. This finding complements the conclusion from earlier studies that deprescribing is inconsistently integrated into curricula of pharmacy studies, the field gaining momentum in the modern polypharmacy and patient care.

Deprescribing has to find its place in the formal curricula of pharmacy studies, so that future pharmacists will be ready to identify and tackle harmful polypharmacy(10). A number of studies have shown the feasibility of incorporating deprescribing-related education into pharmacy programs not only to heighten awareness but also to provide students with the hands-on practical knowledge required to successfully apply deprescribing strategies. The results of this study support the call for the need of the pharmacy schools to evaluate their curricula and bring more focused work on deprescribing in both theory and practice.

Attitudes and Perceptions Toward Deprescribing

For attitudes, the study result showed that majority of students (74.5%) would consider deprescribing of potentially inappropriate medications. On the other hand, less number of students were willing to deprescribe medications that didn't have an indication, were not beneficial and had complex dosing regimens. Suggesting that even though pharmacy students generally understand the importance of deprescribing on improving patient care there might be reservations on use of some medications. This reluctance may be occasioned by lack of self confidence or experience in Discerning truly unnecessary or potential harmful medications to the patient.

It is interesting that a little over a quarter of students were considering deprescription of medications due to patient preferences or the extended time to the benefit of any medication. Perhaps, the result obtained suggests that there is need of more focus on patient-centered care in pharmacy education. Deprescribing is a personalized approach to stopping the use of drugs, and patients values, including those issues related to their quality of life, must be at the heart of this process. It is imperative that pharmacy curricula include instruction in open discussion with patients about their medications and treatment, so that students may direct patients in decision-making.

Confidence and Capacity to Use Deprescribing

The work showed that there was a significant difference between students' positive attitudes concerning deprescribing and their confidence in practising it. Although 80% of students felt able to discuss the possibly damaging consequences of inappropriate medications to patients, less students (46.8%) could feel confident of suggesting deprescribing strategies to healthcare providers. As well, only a little over 41.4% of students were sure of planning tapering schedules for drugs which may induce withdrawal symptoms. These results indicate that despite the understanding of the theoretical components of deprescribing students may not possess the necessary practical skills and clinical experience to operationalize the principles of deprescribing in practice.

There are several reasons why there's no confidence in deprescribing strategies. One possible reason is the brief exposure to deprescribing that is apparent from the small proportion of students who were formally taught about deprescribing. Moreover, deprescribing is also often complex decision-making, especially when treating those with

numerous indications for a drug or multiple illnesses. Confidence in deprescribing is not enough to be theoretical; головообразный. it requires practical exposure which can be acquired through clinical placement, case based learning and role playing. The methods offer students a chance to implement their understanding in simulated or clinical environments, and to practise medication regimen assessing, deprescribing options discussion with patients, and working with healthcare teams.

Issues Preventing Deprescribing in the Clinical Practice

Several barriers to deprescribing identified in clinical practice were identified by the study. These were failure in time and resources by the healthcare providers, refusal of patients to stop and opposition from other healthcare providers. Such barriers are in line with the findings of earlier research, which emphasises that deprescribing is frequently laborious and demanding and requires a close working relationship between healthcare providers. Additionally, patients may object to deprescribing because of fears about cessation of taking medications especially if patients believe in the necessity of the medications to control their health disorders. These barriers can be overcome by a more systematic, patient-centered approach to deprescribing including open communication and shared decision-making.

Particularly pharmacists are ideally placed to break down these barriers. They can be the main actors in locating the medications that need to be deprescribed, educate patients on the benefits as well as negative implications of the same, develop deprescribing plans together with other healthcare givers(11). In order for pharmacists to fulfill this role, more training of pharmacists is needed about how they facilitate the involvement of patients and healthcare teams into deprescribing discussions and dealing with the complexities of tapering medications safely.

Implications for Pharmacy Education

The results of this study have a number of important implications to pharmacy education. There is an obvious void in current pharmacy curricula when it comes to more systematic training in deprescribing. This may simply tie in deprescribing content within established courses in the areas of pharmacology, clinical therapeutics, and care of patients, and offer specific courses in polypharmacy and deprescribing. Also, schools should focus on clinical placements and other experiential learning as part of the curriculums where trainees can see and perform deprescribing in practical cases without letting go of the pharmacology.

Pharmacy education also needs more focuses on patient centered care and the ethical implications of deprescribing. Deprescribing is not just a process of stopping medicines but an attempt to have a patient's needs, preferences and quality of life be taken into account when making decisions about patients. Training students to communicate well with patients, listen to them, meet their concerns, and include them in decision making processes will be essential for the success of the deprescribing interventions.

Conclusion

Finally, the research presents important findings regarding pharmacy students' attitudes towards deprescribing and preparedness for the act. Although students evidenced a positive attitude toward deprescribing, their FYA of implementation, as well as their lack of confidence in using deprescribing strategies, reveal the necessity to improve pharmacy education. Deprescribing should be incorporated into pharmacy curricula, and there should be more experience-based learning that will be paramount in enabling future pharmacists to address polypharmacy and optimize medication therapy on their patients. The outcome of this study is a call to action for pharmacy schools to emphasize deprescribing education to prepare students to contribute centrally to medication safety and patient outcomes.

5. Conclusion and Future work

The study has highlighted the interesting information on pharmacy students' attitudes, knowledge, and readiness to deprescribe practices. It was clear that although some students were aware of polypharmacy, few knew a lot about deprescribing or had been taught it in the course of their education. Even with this knowledge gap in formal education, overall attitudes toward deprescribing was mostly positive, and most students reported they would consider deprescribing potentially inappropriate or unnecessary medications. However, the degree of confidence using the deprescribing principles in a clinical practice setting was poorer, especially when talking about the risks of taking medications with a patient or advising a tapering regime for medications with withdrawing effects.

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The limited exposure of pharmacy students to deprescribing education was a highlight of this study. Few students reported receiving formal training on deprescribing as part of their required curriculum, fewer still received such training through elective classes. This lack of exposure indicates that the curricula of pharmacy schools might not be reflecting this important aspect of managing medication effectively even as the use of deprescribing is increasingly being identified as a vital tool in controlling the risks of polypharmacy, with populations most at risk of excess medication subscription such as the elderly population.

The factors contributing to, as well as the ones contradicting the process of deprescribing, were also revealed by the research. Students prepared a list of factors that can facilitate deprescribing practices, including serious efforts on behalf of healthcare providers, appropriate patient education, and frequent medication reviews. However, they noted a number of possible barriers, such as lack of time or resources of healthcare providers, resistance from patients to cease taking medications, the unwillingness of other healthcare workers to adopt deprescribing strategies. This complexity about deprescribing emphasizes the necessity to change the approach to patients, which should involve a more cooperative, patient-centered healthcare, where communication between a patient, a pharmacist, or a physician is free.

Despite a generally positive attitude to deprescribing shown by the study, there were also a lot of students who felt uncertain about their ability to move to the strategy of deprescribing in practice. There was low confidence in providing deprescribing recommendations to healthcare providers, and less confidence in planning schedules for tapering drugs that had the potential to cause withdrawal symptoms. This would imply that though students may be conversant with the theory of deprescribing

The findings of this research underscore the need for an expanded system of instruction on deprescribing in pharmacy schooling. This should not limit itself to theoretical learning about deprescribing concepts, rather should provide hands on experiential learning opportunities where students can immerse in real world problems and apply what they have learnt in the practical set up. The incorporation of deprescribing training in clinical placement activities, case studies, role playing of how to deprescribe as a team together with healthcare teams would increase the confidence in and competence of students in adequate deprescribing utilization in practice.

Future Work

Taking the results of this study further, there exist several points of further research and development in pharmacy training. The first focus for future studies should be the effect of incorporating formal deprescribing education in curriculums for practicing pharmacies. This could be extended to understanding how various teaching approaches (e.g. lectures, clinical simulations, case discussions) affect students' attitude, self-efficacy and skills to translate deprescribing strategies into action in the clinical context. As well, it will be worthwhile exploring the contribution of experiential learning in deprescribing training, especially in the context of clinical practice in community pharmacies, or hospitals. Students can understand the complexities of deprescribing in greater detail and acquire the hands-on competency that would help them implement the concept successfully working directly with patients and healthcare teams.

Another topic that should be addressed on the research agenda is the development and testing of targeted educational ones to enhance students' deprescribing confidence. These interventions may target important components of deprescribing: communication strategies with patients and healthcare providers, identifying when patients should be deprescribed, and withdrawal side effects by tapering. What would be interesting to determine from research is how effective these interventions are in improving students' knowledge, attitude towards, and confidence of deprescribing.

Further studies may also center on what practicing pharmacists, physicians and other health care providers think about deprescribing. This would give insights into barriers that they face in actual settings in their efforts to implement deprescribing strategies and what might be done to get over these barriers. Perspectives of healthcare professionals on deprescribing are important to understand to try and contribute to the development of a relational type of deprescribing that will engage the whole healthcare team and work hand-in-hand with patients' care goals.

Finally, further studies can be conducted to explore long-term consequences of deprescribing to patient health especially benefiting medication safety, adverse drug events and quality of life improvement. Studies on clinical outcomes of deprescribing interventions in other patients elderly, those with chronic conditions and those with multiple medication use would provide additional evidence of the benefits of deprescribing as part of a holistic

medication management approach.

In conclusion, although the study showed that the pharmacy students in Jordan have generally positive attitude toward deprescribing, there is a definite requirement of more formal and more thorough education on the subject. The incorporation of deprescribing trainings in pharmacy curriculums coupled with practical practical, practice based experiences will be instrumental in the training of future pharmacists to handle polypharmacy and ultimately improve patient outcomes. By removing the obstacles to deprescribing and supporting students in their confidence in adopting deprescribing in practice we can guarantee that the pharmacist will be equipped to take a leading part in achieving medication safety and the optimisation therapeutic outcomes in patients.

Acknowledgement: Nil

Conflicts of interest

The authors have no conflicts of interest to declare

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