

A Cross-Sectional Evaluation of Opioid Dispensing Competencies in Final-Year Pharm-D Students: A Multicenter Study from Punjab, Pakistan

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Background: The opioid crisis continues to be a public health concern worldwide due to the high rates of misuse and associated mortality. Opioid dispensing competencies are critical for pharmacy graduates to promote the rational use of opioids.

Purpose: To evaluate the opioids dispensing competencies among the final year Pharm-D students in Punjab, Pakistan.

Design: A multicenter cross-sectional study.

Methods: A validated survey was used to evaluate 11 competencies related to opioid use from the final year Pharm-D students from diversely located accredited institutes. On a summative scale, correct response to each survey item was worth a score/point. Descriptive statistics was used for categorical variables while independent *t*-test computed group differences.

Results: A total of *n* = 661 final year Pharm-D students from 28 institutes (8 public and 20 private) completed the survey with an overall response rate of 78.5%. Comparatively, the students who had either completed a community or hospital internship, or studying in the educational institutions located in the provincial capital demonstrated a significant higher competency score. There was no significant difference in the overall mean competency scores based on gender or system of assessment used in the Pharm-D degree programs. Among eleven opioid competencies, students received the lowest scores for “opioid overdose management”, “opioid monitoring” and “therapeutic uses of opioids”.

Conclusion: Pharm-D students in Pakistan require additional training and skills on many of the opioids related competencies to ensure patient’s safety in healthcare settings. There is a need to revise the curriculum and teaching methodologies to improve the competencies of Pharm-D students in opioid dispensing.

Plain Language Summary: The study was conducted to assess the opioids dispensing competencies of final-year Pharm-D students in Punjab, Pakistan. These competencies were identified in an Australian study which defined 11 consensus-based core competencies on opioid use and dispensing for pharmacist. Given the ongoing opioid crisis, it is crucial for future pharmacists to acquire the necessary knowledge, skills, and confidence to handle opioid prescriptions, provide patient education, and contribute to harm reduction efforts. The results of the study underscored the importance of continuous education and training for pharmacy students in opioid use and dispensing. Competency in this area is essential for reducing the risk of opioid misuse and overdose, ensuring safe and effective patient care, and supporting broader public health efforts to combat the opioid crisis. The findings suggest that among eleven opioid

competencies, students received the lowest scores for “opioid overdose management”, “opioid monitoring” and “therapeutic uses of opioids”. This calls for the development of specialized training programs, policy changes, and enhanced support for pharmacy students in these areas as they prepare to navigate the complexities of opioid dispensing and patient safety in their future careers.

Keywords: opioid use, opioid dispensing, opioid competency, pharmacy students, pharmacy education

Background

Opioids represent a class of drugs that mitigate moderate to severe pain and notable examples include morphine, codeine, oxycodone, tramadol, hydrocodone, and fentanyl. For decades, opioids have been used in clinical practice to relieve pain in cancer patients, or in patients recovering from surgery, accidents and others with chronic pain conditions, such as arthritis.^{1,2} Despite being an effective pain remedy, long-term use of opioids carry the risks of addiction or tolerance, where the individual craves higher doses to achieve the same pleasure or pain-relieving effect.³ Therefore, their benefits are often offset by the risks associated with their use, such as tolerance, addiction, and overdose-related mortalities. In addition, the costs related to opioid addiction and overdose globally are estimated to be in billions of dollars.⁴

Opioids use/misuse has increased in recent years, which has resulted in an alarming surge in the opioid addiction and overdose deaths; a phenomenon termed as “opioid crisis”, an epidemic continues to worsen.⁵ As of 2019 World Drug Report, around two-thirds of the total drug-related deaths in 2017 were attributed to opioids.⁶ Similarly, there have been 68,849.25 confirmed reports of opioid overdose deaths in 2020.⁶ The opioid epidemic is a global phenomenon that is not limited to any particular geography. Overuse of opioids, both prescription and illicit, is common in the United States, practically all of Europe, Asia, and Africa. In the United States alone, opioids caused 70,000 deaths in 2017. In the same context, United Nations raised a red flag in 2022 on the steep rise in the use of opioids from 0.7% to 1.2% with Asia reporting the highest number of confirmed cases of (ie 5790,000) in the past decade.^{6,7} Thus, opioid crisis remains a priority area for research in the realm of public health.⁸

Pakistan (the 5th most populous country in the world) has been under the direct impact of the “imported opioid crisis” from its neighboring countries, including China, Afghanistan and India where nearly one-third of the world’s opioid users reside.^{9,10} There is a growing concern in Pakistan about the widespread misuse and abuse of prescription opioids across the country. According to the United Nations Office on Drugs and Crime, Pakistan is among the top 10 countries with the highest rates of opioid addiction. A national survey on drug use in Pakistan found that 4.25 million people suffer from drug addiction.¹¹ The survey also documented 1.6 million people admitting to opioid abuse. In addition, 7 million individuals take drugs regularly, of which 4 million use cannabis, and 2.7 million use opiates.¹¹

Two of the many precipitating factors in the opioid crisis are inappropriate/suboptimal dispensing and inept handling of opioids in community or hospital setting. Dispensing (delivery of drugs and related information to patients) of opioids from pharmacies or drug stores strictly requires services of a qualified person (pharmacist) and a valid prescription.^{12,13} It also involves a meticulous process of documentation of the particulars of the patient, prescriber and the exact dose dispensed. Optimal opioids dispensing ensures rationale opioids use and aims to avoid the overuse or misuse of the drugs.¹⁴ Further, the minimal information must be provided to patient on storage conditions of opioids, drug reconstitution for oral administration, expected adverse effects, and the importance of treatment adherence. On the other hand, dispensation of the opioids without a valid prescription, or from an inadequately trained, unskilled pharmacy staff has been associated with serious risks including but not limited to opioids abuse, misuse, diversion, addiction, dependence, overdose and even death.¹⁵

Opioid dispensing competencies refer to the knowledge, skills, and abilities that a pharmacy graduate must acquire to promote rational opioid use and reduce the non-medical or misuse in the society.¹⁶ Recently, an Australian study defined 11 consensus-based core competencies on opioid use and dispensing for pharmacist. These competencies include knowledge of pharmacokinetics, pharmacodynamics, adverse effects, and potential interactions with other medications and how to store, handle and dispose of opioids. It also includes physiological roots of different types of pain, pain management ladder, state laws and regulations related to controlled substances in a jurisdiction, including the schedules of controlled substances.¹⁶ Further, ability to identify and monitor vulnerable groups for signs of opioid’s addiction or

overdose or misuse and making critical dose adjustments. Similarly, necessary skills, such as patient counselling, communication skills, and sociopsychological understanding of the issues related to addiction and misuse of the opioids are also part of the competencies.¹⁶

Opioid dispensing competencies are critical for pharmacy students to learn because in many Asian countries including Pakistan, pharmacy students represent the future healthcare professionals who may be the first point of contact for patients seeking medicines for pain management in community as well as in hospital setting.^{17,18} In addition, opioid overdosing produce a major burden on the healthcare system and patient's safety which can be safely controlled by managing refills and restrict dispensing of opioids without prescription.¹¹ Thus, it is important that pharmacy students are well-prepared to identify and prevent potential opioid misuse in their future practice and competent enough to manage overdose cases. In line with recent crisis, pharmacy schools in the US are incorporating specific opioids related competencies in their Doctor of Pharmacy (Pharm-D) curriculums to ensure that students are well-prepared to handle the complex issues of opioid use and misuse.^{18,19} A recent scoping review in US provided evidence on training on different areas of opioid use to pharmacy students in their Pharm-D.²⁰ However, to what extent pharmacy students are competent to handle these issues in the final year of their Pharm-D degree program remains an under-research area in many developing countries including Pakistan. Similarly, it is also important to note that as the opioid crisis has evolved, and the understanding of opioid dispensing has also been updated; hence, there is a need to investigate whether the current curriculum of pharmacy in Pakistan sufficiently covers the updated guidelines and makes pharmacy graduates ready to handle the issues surrounding opioids use.²¹

In Pakistan, even though the opioid crisis poses a significant public health threat, yet there is a notable gap in research evaluating the quality of training and competencies provided to future health practitioners. While a limited number of studies in literature have explored the perceptions of medical, nursing and pharmacy students regarding opioid use, there is a clear deficiency in research focusing on pharmacy students in Pakistan.^{20,22,23} Thus, the present study aims to evaluate the opioids dispensing competencies among the final year Pharm-D students in Punjab, Pakistan.

Methods

Study Design, Setting & Sample

It was a multicenter cross-sectional study to collect data of the final year Pharm-D students in Punjab, Pakistan in addition to Islamabad Capital Territory. As per official data (15 Nov 2022), there were 152 institutions (26 public, 126 private) offering Pharm-D degree program in Pakistan. Whereas 95 pharmacy institutes (10 public, 85 private) were accredited by the PCP to offer Pharm-D degree program in the jurisdiction of Punjab and Islamabad.²⁴

In our investigation focusing on final year pharmacy students, we employed Raosoft, an established online sample size calculator, to ascertain the requisite sample size because of its ease in accessibility and reliability in calculating sample size using 95% CI. The study focused on final year pharmacy students in 28 accredited institutes in Punjab and Islamabad Capital territory (ICT) as out of 95 institutes 62 had no final year at the time of survey and five declined due to students' preparations or exams, leaving 28 institutes to collect data. Assuming each of the final year class in the 28 institutions accommodates the maximum allowable student intake by the Pharmacy Council of Pakistan (ie 200 students/intake), the total population across these institutions would be 5600 (ie 28×200). Consequently, the minimum sample size required to represent final year pharmacy students' population in the 28 institutions, was calculated to be 360 final year students and an anticipated response distribution of 50%, maintaining a 5% margin of error and a 95% confidence interval. Recognizing the inherent variability in participant engagement, we prudently opted for a more expansive initial target sample size. This strategic decision was made to mitigate potential uncertainties and to enhance the robustness of our study's findings. Further, for the sake of statistical robustness, we opted to include institutions from all nine divisions of Punjab, providing a more comprehensive and diverse representation of the Pharm-D student population. Our intent was to capture the geographical diversity of the province, recognizing that differences in educational experiences and perspectives which may exist across different regions. By including institutes from various divisions, we aimed to ensure a holistic and representative sample that goes beyond a single city.

Inclusion and Exclusion Criteria

Only final year students of an accredited pharmacy institution by the Pharmacy Council of Pakistan were included in the sample. Further, an institute must be located within the jurisdiction of the province of Punjab, or ICT in order to be included in the sample. Thus, out of 95 accredited pharmacy institutes in Punjab and ICT, 62 were newly established/approved (all in private sector) and thus had no final year class at the time of survey and hence were excluded from the sample in line with the exclusion criteria given below. Thus, remaining 33 accredited institutes (with final year) were approached for data collection. These institutes were diversely located in various administrative divisions of the province of Punjab namely: Lahore (provincial capital), Sargodha, Multan, Faisalabad, Bahawalpur, Rawalpindi, and Sahiwal besides Islamabad Capital Territory. Nevertheless, five institutes, despite having final year students, declined participation due to their students being on preparatory leaves or engaged in exams leaving it to 28 institutes.

Students were excluded if they belong to a non-accredited institute, or located outside the jurisdiction of Punjab, or not in the final year of the Pharm-D degree program. Similarly incomplete survey forms collected were excluded in the final analysis.

Survey Instrument

The survey instrument was based on the idea of 11 core opioid competencies and survey items were developed through extensive literature review.^{10,25–30} These competencies were basically devised by Association of Faculties of Pharmacy of Canada's Opioid (AFPC) Working Group³¹ while an Australian study gained expert consensus to define explicitly the core competencies for pharmacists related to opioids dispensing.¹⁶

The survey instrument had two main sections ie demographic section and core opioid competencies. Demographic section asked respondents (students) about the gender, age, and details of the institute (public/private, location etc). It also covered the perceived quality and usefulness of the pharmacy curriculum deployed to teach opioid use and crisis and management. While the second section was related to the core opioid competencies. It was comprised of 11 sub-sections corresponding to the 11 defined competencies. Each section/competency was evaluated with the use of five statements (survey items) which required the respondent to choose the correct answer out of five mutually exclusive options. Each correct answer would constitute one point. A summative scale was used to compare the mean scores of each competency against a variety of variables, such as gender, type of institute, location of the institute, system of assessment in the Pharm-D degree.

Validity and Reliability of the Survey Instrument

The survey instrument was adopted from a previous study with approval, as mentioned, survey items were produced through extensive literature review. Six experts, including two professors, two associate professors, and two lecturers, evaluated the face and content validity of the items as detailed in the Mubarak et al, 2023.²⁹ [Table S1](#) outlines the Cronbach's alpha value against each of the eleven opioid competencies. [S1 Appendix](#) outlines the final version of the survey administered.

Data Collection and Reporting

Four research associates (Pharm-D degree holder) and four Pharm-D final year students were trained on different aspects of data collection strictly based on the inclusion/exclusion criteria previously defined. They were then sent to different institutes offering Pharm-D degree program in Punjab. Data were collected from 15th Nov 2022 to 10th December 2022.

To ensure a streamlined process, prior to data collection, research supervisors sought institutional approval from the concerned management of the institute through a phone call and fixed an appointment. The data collection was conducted during regular class sessions. To collect data efficiently within the given time frame, we conducted careful planning for the sites of data collection. Our strategy involved leveraging personal vehicles for travel, enabling us to cover nine cities, including Faisalabad, Sargodha, Sahiwal, Multan, and Rawalpindi etc. While on-site, our team maximized their time by staying in the vicinity of the institutions. This allowed for flexibility in the data collection process, ensuring surveys were administered efficiently while accommodating the schedule and availability of final year students prior telephonic

appointment and permission from the concerned heads of all 28 participating institutions, facilitated us to visit final-year classrooms directly. Data were collected from all the students present in the class who volunteer to participate. The whole process of data collection roughly ranged between 45 and 50 min at any given institute; giving opportunity to cover other institutes within the given city in one go. Study was reported in line with the STROBE guidelines ([S2 Appendix](#)).

Data Management and Statistical Analysis

We used Statistical Package Social Sciences (version 22 IBM, California, USA) for data management and analysis. Descriptive statistics was used to evaluate categorical variable, while mean scores were compared between two groups for different variables using *t*-test.

Ethics

Study received ethical approval from the Research Ethics Committee, Lahore Pharmacy College, Lahore Medical & Dental College (ref# LPC/ETH/25/09/22). The original ethical approval document has been uploaded in the supporting information section [S3 Appendix](#). Participation in this survey was voluntary. Written consent was taken as part of the main survey after detailing the aims and objectives of the study and how the data would be used with assurance of keeping the anonymity of the institute as well as of the student (neither the authors nor the data collectors had access to identification of the survey respondents at any stage of the research).

Results

A total of $n = 661$ final year Pharm-D students (predominantly females = 62.3%) from 28 educational institutes (8 public and 20 private) from 9 major divisions of Punjab completed the survey in all respect with an overall response rate of 78.5%. Majority of the survey responses came from Lahore and ICT due to greater number of pharmacy institutes in these cities. It is crucial to emphasize that our recruitment of 661 students from 28 institutions significantly exceeded the originally calculated requirement of 360 students. This decision was guided by the principle that a larger sample size enhances the reliability and generalizability of study findings. [Table 1](#) provides a breakdown of the response rates based on different cities.

Only 18.9% students mentioned that the community pharmacy internship was a mandatory requirement for the Pharm-D degree programs in their institutes. Nevertheless, 53.1% students (mainly from private institutes) had completed some form of community pharmacy internships. [Table 2](#) summarizes the demographics of the survey participants. Similarly, only 9.4% of students perceived quality of education/training (during Pharm-D) on the management of patients

Table 1 Response Rate

Sr.	City	No. of Institutes	No. of Students Approached (a)	No. of Students Completed. (b)	Response Rate (%)
1.	Lahore	16	359	303	84.4
2.	Bahawalpur	1	51	39	76.5
3.	Multan	1	59	52	88.1
4.	Sargodha	1	44	34	77.2
5.	Sahiwal	1	46	31	67.4
6.	Rawalpindi	1	37	24	64.9
7.	Islamabad	4	136	98	72.1
8.	Faisalabad	2	73	49	67.1
9.	Sialkot	1	37	31	83.8
	Overall/Total	28	842	661	78.5

Table 2 Demographics of the Survey Participants

Variable	Category		n (%)	
Gender	Male		249 (37.7)	
	Female		412 (62.3)	
System of assessment in your Pharm-D degree program	Annual		283 (42.8)	
	Semester		378 (57.2)	
Type of institute	Public		217 (32.8)	
	Private		444 (67.2)	
Location of the institute	Provincial capital		303 (45.8)	
	Other cities		358 (54.2)	
Have you completed a community pharmacy internship?	Yes	Public	351 (53.1)	137 (39.0)
		Private		214 (61.0)
	No	Public	310 (46.9)	80 (25.8)
		Private		230 (74.2)
If YES, what was the duration of community internship?	Less than a month		61 (17.4)	
	1 month		115 (32.8)	
	2 months		79 (22.5)	
	3 months		57 (16.2)	
	More than 3 months		39 (11.1)	
Was the community internship made mandatory by your college/university?	Yes	Public	125 (18.9)	39 (31.2)
		Private		86 (68.8)
	No	Public	536 (81.1)	178 (33.2)
		Private		358 (66.8)
Have you completed a hospital pharmacy internship?	Yes	Public	275 (41.6)	91 (33.1)
		Private		184 (66.9)
	No	Public	386 (58.4)	126 (32.6)
		Private		260 (67.4)
If YES, what was the duration of hospital internship?	Less than a month		62 (22.5)	
	1 month		116 (42.2)	
	2 months		59 (21.5)	
	3 months		23 (8.4)	
	More than 3 months		15 (5.5)	
Was the hospital internship made mandatory by your college/university?	Yes	Public	243 (36.8)	95 (39.1)
		Private		148 (60.9)
	No	Public	418 (63.2)	122 (29.2)
		Private		296 (70.8)

Note: n= number.

at risk of self-harm or suicide as “excellent”. On the other hand, quality of education on identification of patient at risk of opioid drug diversion was perceived as “very poor” by 24.7% of students. Table 3 presents perceived quality of education/training on different aspects of opioid use.

There was no significant difference observed in the overall mean competency scores based on gender or system of assessment used in the Pharm-D degree program. Contrary, the students who had either completed a community or hospital internship demonstrated a significant higher overall mean competency score compared with students who had not completed any sort of internship. Similarly, mean scores were significantly better for students studying in the public sector institutes, or the institutes located in the provincial capital (Lahore). Table 4 compares different variables plotted against the summative mean score of all the core opioids competencies.

Table 3 Perceived Quality of Education/Training on Different Aspects of Opioid Use

Statements	Very Poor n (%)	Poor n (%)	Acceptable n (%)	Good n (%)	Excellent n (%)
HOW DO YOU RATE THE QUALITY OF EDUCATION AND TRAINING (OFFERED IN THE PHARM-D CURRICULUM IN YOUR INSTITUTE) ON THE MANAGEMENT OF:					
Pain	69 (10.4)	90 (13.6)	221 (33.4)	202 (30.6)	79 (12.0)
Patient at risk of self-harm/suicide	87 (13.2)	150 (22.7)	213 (32.2)	149 (22.5)	62 (9.4)
Opioids prescription misuse	62 (9.4)	91 (13.8)	185 (28.0)	220 (33.3)	103 (15.6)
Opioid overdose	73 (11.0)	82 (12.4)	195 (29.5)	210 (31.8)	101 (15.3)
HOW DO YOU RATE THE QUALITY OF EDUCATION/TRAINING (OFFERED IN THE PHARM-D CURRICULUM IN PAKISTAN) ON THE IDENTIFICATION OF A PATIENT AT RISK OF:					
Self-harm/suicide	92 (13.9)	186 (28.1)	213 (32.2)	120 (18.2)	50 (7.6)
Opioids prescription misuse	53 (8.0)	117 (17.7)	214 (32.4)	199 (30.1)	78 (11.8)
Opioids drug diversion	163 (24.7)	92 (13.9)	232 (35.1)	145 (21.9)	29 (4.4)
Opioids overdose	68 (10.3)	101 (15.3)	206 (31.2)	195 (29.5)	91 (13.8)

Note: n= number.

Table 4 Different Variables Against the Summative Mean Score of All the Core Opioids Competencies

Variable	Category	Mean (SD)	t* (p-value)
Gender	Male	16.07 (6.802)	-0.791 (0.429)
	Female	16.47 (6.115)	
System of assessment in your Pharm-D degree program	Annual	16.64 (6.318)	1.124 (0.261)
	Semester	16.08 (6.425)	
Type of institute	Public	17.78 (6.482)	4.171 (0.000)*
	Private	15.61 (6.213)	
Location of the institute	Provincial capital	16.85 (5.906)	1.981 (0.048)*
	Other cities	15.87 (6.732)	
Have you completed a community pharmacy internship?	Yes	16.79 (6.562)	2.025 (0.043)*
	No	15.79 (6.136)	
Have you completed a hospital pharmacy internship?	Yes	16.92 (6.242)	2.031 (0.043)*
	No	15.90 (6.452)	

Note: *Independent t-test, p-value (≥ 0.05) Bold values indicate statistical significance.

Abbreviation: SD, standard deviation.

S2 Table details the mean score for individual opioid competency against different variables. Comparatively, among eleven opioid competencies, following opioid competencies received the lowest mean scores and thus emerged as priority area to focus.

1. Opioid overdose management (C-11)
2. Opioid monitoring (C-10)
3. Therapeutic uses of opioids (C-5)

The opioid overdose management receiving the lowest scores highlights a crucial area to focus with regard to patient's safety due to lack of appropriate regulatory frameworks in clinical and community-based settings to control prescription and dispensing of opioids respectively.

Discussion

Findings of this study portray a bleak outlook of the competencies of Pharm-D students in many areas of opioid dispensing and use.

The overall low mean scores in various opioids competencies indicate that Pharm-D curricula in Pakistan has numerous deficiencies to teach the key concepts in the crucial areas related to opioid use and dispensing that deems essential in the professional development of pharmacy students as a frontline healthcare work force against opioid crisis.³² The inadequate training of students in managing opioids can be attributed to multiple factors/issues. One key issue is the insufficient coverage of opioid use, monitoring, and dispensing-related content in the academic curriculum of the Pharm-D degree program. This is also correlated with the findings where most of the students did not perceive the quality of training on opioid use as “good”. Consequently, it highlights the need to include additional coursework on “opioid overdose management” beyond just the name and dose of the antagonist, “opioid monitoring”, “therapeutic uses of opioids”, “pain management”, “identification of self-harm and addiction”, “opioid diversion”, and prescribing guidelines. Addiction remains a constant long-term threat to human health and for the same reason training and education on addiction should be an essential part of not only Pharm-D but also other health professional education.^{32–34} Studies have validated the evidence that opioid training can be strengthened during undergraduate education. Thus, in response to opioid crisis, many pharmacy schools in US have made changes to their curriculum to better educate future pharmacists on the safe and appropriate use of opioids.^{21,22,35} The American Association of Pharmacy Colleges has also emphasized on the need to equip Pharm-D students in the US schools on managing the opioid crisis and have recommended incorporation of training and educational interventions from the beginning of the Pharm-D. A recent scoping review maps the literature on how pharmacy institutes are preparing students on different ethical, pharmacological and psychosocial aspects of opioid use by educating through electives, skill lab courses, and interprofessional activities in their curriculum and conducting post evaluation surveys for outcome assessment.^{20,36} Currently, in Pakistan, Pharm-D curriculum has not been updated since 2013 and there is an urgent need to update the curriculum in line with the new developments and requirements in areas pertaining to opioid use and monitoring.^{9,37} Currently, in Pakistan, much of the opioid-related education is delivered during the third year of Pharm-D degree after which the students have a little content to study in the fourth and final year. With the same curricula practiced throughout Pakistan, accredited by HEC and PCP, much of the differences in training are based on the teaching method and practical training given to the students.^{9,37}

Other crucial factors include the superficial pedagogical training and limited opportunities for experiential learning during undergraduate studies exacerbate the problem, making it challenging for students to effectively communicate and provide advice to physicians in hospital settings and the general public in community settings. There is a paucity of knowledge reported among students for disease-oriented pharmacology and therapeutics for opioids.^{9,37} This is in line with the studies conducted previously.^{18,38} Therefore, addressing the gaps in training students on opioids is crucial for ensuring that future healthcare professionals are equipped with the knowledge and skills necessary to manage opioids effectively and safely.

Another important finding of this study was the prevalence of significantly higher competency scores among the students who reported to have completed a hospital or community pharmacy internship. Ironically, most of the institutes that participated in this study reported community or hospital pharmacy internship as a non-mandatory requirement in

Pharm-D. The potential correlation between the higher competencies scores and experience of community and hospital internships stresses that HEC/PCP should make the internship in community and hospital pharmacy as the mandatory requirements for the award of the Pharm-D degree program across Pakistan. Additionally, pharmacy students may also participate in experiential education such as rotations in pain management or addiction clinics, where they can gain real-world experience in identifying and addressing opioid misuse. The evidence favors that future management of opioid crisis depends upon the quality of education, training, and skills at the undergraduate level.^{17,39} This highlights the crucial role of institutions in delivering the quality of undergraduate studies for upcoming years.

In Pakistan, student pharmacists represent an important targeted population for educational interventions focused on skill and confidence development in opioid overdose training and pain management. Thus, it is also important for pharmacy students to develop their interpersonal and communication skills that are essential for establishing trust with patients and providing them with accurate and appropriate information about opioid therapy and can identify patient at risk of abuse or misuse or self-harm. In this context, this aspect is consequential because Pakistan has always been a provider of healthcare human resource for many developed countries.

Implications for Policy, Practice and Further Research

Based on the findings of this study, the authors suggest the following implications for policy, practice, and further research:

- a. The lacking areas identified in this study should be given a priority in curriculum of the Pharm-D degree program. Some ways that pharmacy schools may incorporate opioid dispensing competencies into their curriculums include:
 - i. Providing experiential education opportunities, such as internships in community or hospitals or rotations in pain management clinics or prescribing clinics, where students can gain hands-on experience in assessing patients for opioid therapy, monitoring patients on opioid therapy, and identifying and responding to signs of opioid misuse, abuse, or overdose.
 - ii. Including instruction on alternative pain management options, such as physical therapy, over-the-counter medications, and non-opioid prescription drugs.
- b. Periodic assessment of the pharmacist competencies through licensing exams after graduation, which may include questions on pain management, addiction, and prescribing guidelines. These exams can test graduates' knowledge of these topics and help identify areas where they may need additional education or training. It is important to note that periodic assessment for license renewal has been a standard practice in various developed countries. Given the ever-evolving guidelines and advancements in pain management and addiction treatment, it becomes imperative to assess the currency of a pharmacist's knowledge. This ensures that professionals are well informed and equipped to navigate the latest developments in these critical areas of healthcare. Secondly, evaluating pharmacists on pain management, addiction, and prescribing guidelines during license renewal serves as a proactive measure to enhance patient safety. This not only ensures the continuous professional development of pharmacists but also contributes to the overall improvement of healthcare delivery.
- c. In addition to teaching and experiential learning, educational institutes should encourage students to participate in community outreach programs aimed at educating the public about the dangers of opioid abuse, opioid overdose and opioid stewardship.
- d. Limited research exists on the appraisal of the effectiveness of different teaching methods for opioid dispensing competencies. Further research should focus on evaluation of the most effective ways to teach opioids competencies in the Pharm-D curriculum. Attention must also be directed toward modifications in the current Pharm-D curriculum of Pakistan. For instance, clinical pharmacy, forensic pharmacy, and pharmacology can all incorporate a thorough and in-depth module on opioid use, diversion, addiction, and pain management.

Strengths

- a. To our knowledge, it is the first study to report competencies of final year Pharm-D students on the emerging opioid crisis management and thus may be taken as a call for action.
- b. Our study was free of the recruitment bias as the data collectors did not opt for a convenient sample of the educational institutes located in Lahore only, rather reached out to educational institutes diversely located in different geographies.
- c. Study identified the areas in opioid management where additional education and training is the need of the time.
- d. Findings may be useful for other Asian countries from an introspection point of view and urge educational stakeholders to implement experiential learning and as a mandatory requirement for Pharm-D degree program.

Limitations

- a. It was a long survey consisted of 55 items that may have resulted in the fatigue bias of the respondent. However, it was inevitable in context of the coverage of 11 core competencies related to opioid use and dispensing to draw a holistic picture.
- b. We could not collect data from the five institutes where final year students were on preparatory leaves or engaged in exams. However, given the high response rate and the sample size bigger than required, we are confident that results would remain representative of the sample.

Conclusion

This study has highlighted inadequate competencies of Pharm-D students on opioid dispensing and use in Punjab, Pakistan. Insufficient coverage of the contents related to rational opioids use, the limited prevalence of community or hospital pharmacy internships, and inadequate quality of teaching are some of the key issues contributing to the problem. This study further accentuates the urgent need to tailor Pharm-D curriculum with in-depth coverage of the topics related to pain management, identification of self-harm and addiction, opioid monitoring and diversion, and prescribing guidelines besides making the community and hospital internship as a mandatory requirement of the degree. Thus, to curtail the looming opioid crisis as part of the global health care human resource, it is inevitable to equip Pharm-D students in Pakistan with the necessary competencies to offer opioid stewardship activities which ensure rational opioid use. The curriculum revision should be made a mandatory requirement and must not be limited to a formality framework to address the evolving needs of the global public health.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.’.

Disclosure

The authors report no conflicts of interest in this work.

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