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Assessment of Opioid Dispensing Competency among Final-Year Pharm-D Students in Punjab, Pakistan: A Multicenter Cross-Sectional Study

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Abstract

The worldwide opioid epidemic persists as a serious public health challenge, driven by extensive misuse and elevated death rates. It is vital for graduating pharmacy students to master opioid dispensing skills to help ensure these medications are used appropriately and safely. This study aimed to examine the level of opioid dispensing competencies among final-year Doctor of Pharmacy (Pharm-D) students across Punjab, Pakistan. Multicenter cross-sectional survey. Researchers used a previously validated instrument to assess 11 essential competencies related to opioid handling and use. The tool was distributed to final-year Pharm-D students enrolled at accredited pharmacy institutions across the province. One point was awarded for each correct answer on the total score. Categorical data were summarized using descriptive statistics, and independent t-tests were performed to assess group differences. Overall, 661 final-year Pharm-D students from 28 institutes (8 public and 20 private) participated, for a response rate of 78.5%. Participants who had completed community- or hospital-based internships, as well as those attending universities in the provincial capital, achieved markedly higher competency scores. Mean scores did not differ significantly by gender or by the type of evaluation system employed in the Pharm-D curriculum. The three areas with the weakest performance out of the eleven competencies were “opioid overdose management,” “opioid monitoring,” and “therapeutic uses of opioids. ”Final-year Pharm-D students in Pakistan would benefit from more comprehensive education and practical training across multiple opioid-related domains to better protect patient safety in clinical practice. Updating pharmacy curricula and instructional methods is necessary to strengthen these competencies.

Keywords: Oid use, Opioid dispensing, Opioid competency, Pharmacy students, Pharmacy education

Introduction

Opioids form a category of potent analgesics designed to ease moderate to severe pain. Well-known members of this group include morphine, codeine, oxycodone, tramadol, hydrocodone, and fentanyl [1, 2]. These agents have long been employed in medical settings to control pain for individuals with cancer, those recovering from operations or injuries, and people living with ongoing painful disorders such as arthritis. Although highly effective for pain relief, extended consumption often brings hazards like physical dependence and tolerance, in which users need progressively larger amounts to obtain equivalent benefits [3]. As a result, the therapeutic value of opioids is commonly undermined by dangers including addiction, overdose fatalities, and substantial associated healthcare expenses estimated in the billions globally [4].

Misuse of opioids has grown considerably in recent times, triggering a sharp rise in dependency cases and lethal overdoses — a situation referred to as the “opioid crisis,” which continues to intensify [5]. Data from the 2019 World Drug Report indicated that roughly two-thirds of all drug-related fatalities in 2017 involved opioids [6]. By 2020, official records showed 68,849.25 opioid overdose deaths [6]. The problem spans many

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regions, including the United States, nearly all of Europe, Asia, and Africa. The United States experienced approximately 70,000 opioid-linked deaths in 2017 alone. The United Nations expressed alarm in 2022 over the increase in opioid consumption from 0.7% to 1.2%, noting Asia had the largest share of cases (around 5,790,000) during the previous ten years [6, 7]. Consequently, tackling the opioid epidemic remains an urgent priority within public health investigations [8].

As the fifth-largest country by population, Pakistan has experienced notable effects from the "imported opioid crisis" linked to neighboring nations such as China, Afghanistan, and India — areas that collectively house nearly one-third of the world's opioid users [9, 10]. Concerns are mounting over the broad abuse of prescribed opioids inside Pakistan. Reports from the United Nations Office on Drugs and Crime place the country among the ten nations with the most severe opioid addiction problems. A nationwide survey on substance use revealed 4.25 million individuals battling drug addiction, including 1.6 million who acknowledged opioid misuse. Furthermore, out of 7 million regular drug consumers, 4 million reported cannabis use and 2.7 million used opiates [11].

Among the important drivers of the crisis are improper dispensing practices and insufficient management of opioids within community pharmacies and hospital environments. Legitimate dispensing of these controlled substances demands involvement of a licensed pharmacist, a current prescription, and complete record-keeping that captures patient information, prescriber details, and quantities supplied [12, 13]. High-quality dispensing practices promote responsible opioid utilization and help curb excessive or inappropriate consumption [14]. Patients also require guidance on correct storage, preparation instructions for oral formulations, likely side effects, and the necessity of following treatment plans. In contrast, supplying opioids without proper authorization or through unqualified personnel heightens the likelihood of abuse, diversion, addiction, dependence, overdose incidents, and mortality [15].

Opioid dispensing competencies represent the essential knowledge, abilities, and expertise that pharmacy graduates should develop to foster proper opioid utilization and decrease non-medical use in the community [16]. A recent Australian investigation established 11 agreed-upon core competencies for pharmacists concerning opioid handling. These cover areas such as drug absorption and effects, unwanted reactions, possible medication interactions, proper storage and disposal procedures, understanding various pain mechanisms, stepwise pain treatment approaches, legal frameworks governing controlled drugs (including classification schedules), recognizing and tracking high-risk patients for misuse or overdose, performing necessary dosage modifications, patient education techniques, effective communication, and awareness of psychological and social factors tied to addiction [16].

Mastery of these competencies is especially relevant for pharmacy trainees in Asian nations such as Pakistan, where new pharmacists frequently serve as the primary healthcare contact for people seeking pain relief in retail and institutional settings [17, 18]. Overdoses create considerable strain on health services, yet many incidents can be avoided by careful refill oversight and limiting supply without prescriptions [11]. It is therefore crucial that students graduate prepared to detect and interrupt potential misuse while being capable of responding to overdose emergencies. In response to the growing problem, American pharmacy schools have begun embedding targeted opioid training within Pharm-D programs [18, 19]. A recent review summarized various educational efforts on this topic for US pharmacy students [20]. Nevertheless, the extent to which final-year students in developing countries such as Pakistan possess these capabilities has received limited attention. Moreover, as clinical recommendations for opioid management continue to advance, it is necessary to determine whether existing pharmacy training in Pakistan aligns with current standards and adequately readies graduates for real-world challenges [21].

Despite the clear dangers the opioid crisis presents to Pakistan's population, research assessing the preparedness of future healthcare providers remains scarce. Although some earlier work has surveyed opinions on opioid use among medical, nursing, and pharmacy trainees, focused investigations into Pharm-D students within Pakistan are notably absent [20, 22, 23]. Accordingly, the present research was undertaken to evaluate opioid dispensing competencies among final-year Pharm-D students in Punjab, Pakistan.

Materials and Methods

Study design, setting, and sample

This research adopted a multicenter cross-sectional design to gather information from final-year Pharm-D

students across Punjab province and the Islamabad Capital Territory (ICT) in Pakistan. According to official records dated 15 November 2022, Pakistan had 152 institutions (26 public and 126 private) providing Pharm-D programs. Within Punjab and ICT specifically, 95 institutes (10 public and 85 private) held accreditation from the Pharmacy Council of Pakistan (PCP) to deliver the Pharm-D degree [24].

To determine the appropriate sample size, the study used Raosoft, a reliable and user-friendly online calculator, with a 95% confidence interval. The investigation targeted final-year students from 28 accredited institutions in Punjab and ICT. Of the 95 accredited institutes, 62 lacked a final-year class at the time of the survey (being newly established), and five others declined to participate because students were preparing for or taking examinations. This left 28 institutes for data collection. Assuming each institute enrolled the maximum permitted intake of 200 students per class as allowed by the PCP, the estimated total population across these 28 institutions was 5,600 students (28 × 200). Using these parameters, the minimum required sample size was calculated to be 360 students, with a 50% anticipated response rate, a 5% margin of error, and a 95% confidence level. To account for possible non-response and strengthen the study's validity, a larger target sample was deliberately chosen. Additionally, institutions were purposefully selected from all nine administrative divisions of Punjab to achieve broader geographic representation and capture variations in educational experiences across different regions.

Inclusion and exclusion criteria

Participation was limited to final-year students enrolled at PCP-accredited pharmacy institutions in Punjab or the Islamabad Capital Territory. Institutes without a final-year class were excluded. Consequently, of the 95 accredited institutes in the region, 62 newly established private ones were excluded due to the absence of final-year students. This resulted in 33 eligible institutes with final-year classes being contacted. These were distributed across various divisions including Lahore (the provincial capital), Sargodha, Multan, Faisalabad, Bahawalpur, Rawalpindi, Sahiwal, and Islamabad Capital Territory. Five of these institutes ultimately declined to participate because their students were on preparatory leave or sitting for exams, reducing the final number of participating institutions to 28.

Students from non-accredited institutions, those outside Punjab/ICT jurisdiction, or those not in their final year of the Pharm-D program were excluded. Incomplete survey responses were also removed from the final analysis.

Survey instrument

The questionnaire was constructed around the framework of 11 core opioid competencies, with individual items developed after a thorough review of existing literature [10, 25-30]. These competencies originated from the Opioid Working Group of the Association of Faculties of Pharmacy of Canada (AFPC) [31] and were further refined through expert consensus in an Australian study focused on pharmacists' opioid dispensing roles [16].

The instrument consisted of two primary parts: a demographic section and a section assessing core opioid competencies. The demographic portion collected information on respondents' gender, age, type of institution (public or private), and location. It also inquired about students' views on the quality and usefulness of the existing pharmacy curriculum regarding opioid use, crisis management, and related topics. The second part addressed the 11 core competencies, with each competency evaluated through five statements. Respondents selected the single correct answer from five mutually exclusive choices. One point was awarded for each correct response. A summative scoring approach was applied to calculate mean scores and compare them across variables such as gender, institute type, location, and the assessment system used in the Pharm-D program.

Validity and reliability of the survey instrument

The questionnaire was adapted from a prior study with permission. Items were formulated based on an extensive literature review. Face and content validity were assessed by six academic experts (two professors, two associate professors, and two lecturers), as described by Mubarak *et al*. [29].

Data collection and reporting

Four research associates (qualified Pharm-D graduates) and four final-year Pharm-D students received training on data collection procedures, strictly adhering to the predefined inclusion and exclusion criteria. Data collection occurred between 15 November 2022 and 10 December 2022 across various Pharm-D institutions in Punjab.

Prior approval and appointments were secured from institute administrations via telephone. Surveys were

administered during regular class hours. The research team used personal vehicles to travel efficiently across nine cities, including Faisalabad, Sargodha, Sahiwal, Multan, and Rawalpindi. Team members remained near the institutions to maximize flexibility. With prior permission from institutional heads, the team visited final-year classrooms directly. All present students who volunteered participated. Each session lasted approximately 45–50 minutes per institute, allowing coverage of multiple sites within the same city when possible. The study followed the STROBE reporting guidelines.

Data management and statistical analysis

Data were managed and analyzed using the Statistical Package for the Social Sciences (SPSS version 22, IBM, California, USA). Descriptive statistics summarized categorical variables, while independent t-tests were employed to compare mean competency scores between groups for various factors.

Ethics

Ethical approval was obtained from the Research Ethics Committee of Lahore Pharmacy College, Lahore Medical & Dental College (reference number LPC/ETH/25/09/22). Participation was entirely voluntary. Informed written consent was obtained within the survey itself after explaining the study's purpose, objectives, and data usage. Complete anonymity of both institutions and individual students was guaranteed; neither the researchers nor data collectors had access to any identifying information at any stage.

Results and Discussion

A total of 661 final-year Pharm-D students (62.3% female) from 28 educational institutions (8 public and 20 private) across 9 major divisions of Punjab completed the survey, yielding an overall response rate of 78.5%. The largest number of responses came from Lahore and ICT, reflecting the higher concentration of pharmacy institutes in these areas. Notably, the actual sample of 661 students substantially surpassed the minimum calculated requirement of 360, which was expected to improve the reliability and generalizability of the findings. **Table 1** shows the response rates by city.

Table 1. Survey participation and response distribution across cities.

Sr.	Location	Number of institutions	Students responded (b)	Students contacted (a)	Response percentage (%)
1	Lahore	16	303	359	84.4
2	Bahawalpur	1	39	51	76.5
3	Multan	1	52	59	88.1
4	Sargodha	1	34	44	77.2
5	Sahiwal	1	31	46	67.4
6	Rawalpindi	1	24	37	64.9
7	Islamabad	4	98	136	72.1
8	Faisalabad	2	49	73	67.1
9	Sialkot	1	31	37	83.8
	Total	**28**	**661**	**842**	**78.5**

A small proportion of respondents (18.9%) indicated that completing a community pharmacy internship was required as part of the Pharm-D curriculum at their institutions. However, more than half of the students (53.1%), largely from private-sector colleges, had undertaken some form of community pharmacy practical experience. **Table 2** presents the demographic profile of all participants involved in the survey.

Additionally, only 9.4 percent of students evaluated the training provided during their Pharm-D studies on handling patients who might be at risk of self-harm or suicide as "excellent." By comparison, nearly a quarter of the participants (24.7%) rated the instruction they received on recognizing individuals at risk of diverting opioid medications as "very poor." **Table 3** presents students' views on the overall quality of teaching and

preparation across different elements of opioid use and management.

Table 2. Demographic characteristics of 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)

Note: n= number.

Table 3. Students' perceptions of the quality of education/training on various aspects of opioid use.

Statement: How do you rate the quality of education/training (in your Pharm-D curriculum) on the management of:	Excellent n (%)	Good n (%)	Acceptable n (%)	Poor n (%)	Very Poor n (%)
Pain	79 (12.0)	202 (30.6)	221 (33.4)	90 (13.6)	69 (10.4)
Patient at risk of self-harm/suicide	62 (9.4)	149 (22.5)	213 (32.2)	150 (22.7)	87 (13.2)
Opioid prescription misuse	103 (15.6)	220 (33.3)	185 (28.0)	91 (13.8)	62 (9.4)
Opioid overdose	101 (15.3)	210 (31.8)	195 (29.5)	82 (12.4)	73 (11.0)
Statement: How do you rate the quality of education/training (in Pharm-D curriculum in Pakistan) on the identification of a patient at risk of:	**Excellent n (%)**	**Good n (%)**	**Acceptable n (%)**	**Poor n (%)**	**Very Poor n (%)**

Self-harm/suicide	50 (7.6)	120 (18.2)	213 (32.2)	186 (28.1)	92 (13.9)
Opioid prescription misuse	78 (11.8)	199 (30.1)	214 (32.4)	117 (17.7)	53 (8.0)
Opioid drug diversion	29 (4.4)	145 (21.9)	232 (35.1)	92 (13.9)	163 (24.7)
Opioids overdose	91 (13.8)	195 (29.5)	206 (31.2)	101 (15.3)	68 (10.3)

Note: n = number of participants.

No statistically significant differences were found in the overall mean competency scores when comparing students by gender or by the assessment system (annual vs. semester) used in their Pharm-D programs. In contrast, students who had completed either a community pharmacy or hospital pharmacy internship achieved noticeably higher overall mean competency scores than those without any internship experience. Likewise, participants from public-sector institutions and those studying in institutes located in the provincial capital (Lahore) obtained significantly better mean scores. **Table 4** presents the comparison of various factors against the total summative mean score across all core opioid competencies.

Table 4. Association of different variables with the summative mean score of all core opioid 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 Pharm-D 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 institute	Provincial capital	16.85 (5.906)	1.981 (0.048)*
	Other cities	15.87 (6.732)	
Completed community pharmacy internship?	Yes	16.79 (6.562)	2.025 (0.043)*
	No	15.79 (6.136)	
Completed hospital pharmacy internship?	Yes	16.92 (6.242)	2.031 (0.043)*
	No	15.90 (6.452)	

*Note: Independent t-test; P < 0.05 indicates statistical significance (bold values). SD = standard deviation.

Low overall mean scores across several opioid competencies suggest that Pharm-D programs in Pakistan suffer from substantial gaps in delivering essential knowledge on opioid use and dispensing—areas vital for preparing pharmacy graduates as frontline professionals in tackling the opioid crisis [32]. The limited preparation of students in opioid management stems from several underlying issues. A primary concern is the inadequate inclusion of topics related to opioid use, monitoring, and dispensing within the existing Pharm-D academic curriculum. This aligns with student perceptions that the quality of training on opioid-related matters was generally not viewed as "good." As a result, there is a clear need to expand coursework to cover "opioid overdose management" in greater depth (beyond basic antagonist names and doses), "opioid monitoring," "therapeutic uses of opioids," "pain management," "identification of self-harm and addiction," "opioid diversion," and prescribing guidelines. Given that addiction poses an ongoing, long-term risk to public health, education on this topic should form a core component of Pharm-D and other health professions training [32-34]. Evidence from multiple studies confirms that opioid-related training can be effectively enhanced at the undergraduate level. In response to the opioid epidemic, numerous pharmacy schools in the US have revised their curricula to better prepare future pharmacists for safe and responsible opioid use [21, 22, 35]. The American Association of Colleges of Pharmacy has stressed the importance of equipping Pharm-D students with relevant skills from the start of their program. A recent scoping review documented various approaches used by pharmacy institutions, including electives, skills laboratory courses, interprofessional activities, and post-training evaluations, to address the ethical, pharmacological, and psychosocial dimensions of opioid use [20, 36].

In Pakistan, the Pharm-D curriculum has remained unchanged since 2013, creating an urgent need for updates that reflect current developments and demands in

opioid use and monitoring [9, 37]. At present, most opioid-related instruction occurs in the third year, with minimal coverage in the fourth and final years. Since the same curriculum is followed nationwide under the oversight of the Higher Education Commission (HEC) and the Pharmacy Council of Pakistan (PCP), variations in student training largely depend on differences in teaching approaches and practical exposure [9, 37].

Additional contributing factors include superficial teaching methods and restricted opportunities for hands-on experiential learning during undergraduate studies. These shortcomings hinder students' ability to effectively advise physicians in hospital settings or counsel the public in community pharmacies. Students also demonstrated limited knowledge in disease-oriented pharmacology and therapeutics related to opioids [9, 37], consistent with earlier research findings [18, 38]. Closing these educational gaps is essential to ensure that future pharmacists possess the necessary expertise to handle opioids safely and effectively.

A notable finding of this study was significantly higher competency levels among students who had completed hospital or community pharmacy internships. Interestingly, most participating institutions treated such internships as optional rather than required for the Pharm-D degree. The positive association between internship experience and improved competency scores strongly supports making community and hospital pharmacy internships a mandatory component of the Pharm-D program across Pakistan. Students could also benefit from rotations in pain management or addiction clinics to acquire practical skills in recognizing and managing opioid misuse. Available evidence indicates that successfully addressing the opioid crisis relies heavily on the quality of undergraduate education, training, and skill development [17, 39]. This emphasizes the pivotal responsibility of academic institutions in delivering high-quality undergraduate pharmacy education.

In Pakistan, pharmacy students represent a key group for targeted educational initiatives aimed at building skills and confidence in opioid overdose response and pain management. It is equally important for them to strengthen interpersonal and communication abilities, which are vital for building patient trust, delivering accurate information on opioid therapy, and identifying individuals at risk of abuse, misuse, or self-harm. This is particularly relevant given Pakistan's longstanding role as a supplier of healthcare professionals to many developed nations.

Implications for policy, practice and further research

Drawing on the study's findings, the authors propose the following recommendations for policy, practice, and future research:

a. The competency gaps identified should receive priority attention in the Pharm-D curriculum. Pharmacy schools can integrate opioid dispensing competencies through measures such as:
   i. Offering experiential learning opportunities, including mandatory internships in community or hospital pharmacies, or rotations in pain management and prescribing clinics. These would allow students to develop practical skills in patient assessment for opioid therapy, ongoing monitoring, and responding to signs of misuse, abuse, or overdose.
   ii. Incorporating education on non-opioid pain management alternatives, including physical therapy, over-the-counter medications, and non-opioid prescription options.

b. Implementing periodic competency assessments for pharmacists via licensing examinations after graduation. These exams should include questions on pain management, addiction, and prescribing guidelines to assess knowledge and identify areas requiring further training. Such assessments are standard in many developed countries for license renewal. In light of rapidly evolving guidelines and advances in pain management and addiction care, regular evaluation helps maintain up-to-date professional knowledge. It also serves as a proactive step to safeguard patient safety and promote continuous professional development, ultimately enhancing overall healthcare quality.

c. Beyond classroom instruction and experiential learning, institutions should promote student involvement in community outreach initiatives focused on raising awareness about the risks of opioid abuse, overdose prevention, and opioid stewardship.

d. There is currently limited research evaluating the effectiveness of various teaching strategies for opioid dispensing competencies. Future studies should examine optimal pedagogical methods for delivering these competencies within the Pharm-D curriculum. Particular emphasis should be placed on

updating Pakistan's Pharm-D curriculum—for example, by integrating comprehensive modules on opioid use, diversion, addiction, and pain management into clinical pharmacy, forensic pharmacy, and pharmacology courses.

Strengths

a. To the best of our knowledge, this is the first study examining final-year Pharm-D students' competencies in managing the emerging opioid crisis, serving as an important call to action.
b. The study avoided recruitment bias by collecting data from educational institutions across diverse geographic locations in Pakistan, rather than limiting the sample to conveniently located institutes in Lahore.
c. It successfully pinpointed specific areas in opioid management requiring immediate additional education and training.
d. The findings can guide introspection and reforms in other Asian countries, encouraging stakeholders to establish experiential learning as a mandatory element of Pharm-D programs.

Limitations

a. The survey instrument was extensive, containing 55 items, which may have introduced respondent fatigue. Nevertheless, this level of detail was necessary to assess the 11 core opioid competencies comprehensively.
b. Data could not be gathered from five institutions where final-year students were either on preparatory leave or taking examinations. However, the high response rate and sample size exceeding requirements support the representativeness of the results.

Conclusion

This study demonstrates inadequate opioid dispensing and use competencies among Pharm-D students in Punjab, Pakistan. Key contributing factors include insufficient curriculum coverage of rational opioid use, the optional nature of community and hospital internships, and suboptimal teaching quality. The research underscores the pressing need to revise the Pharm-D curriculum with detailed content on pain management, identification of self-harm and addiction, opioid monitoring and diversion, and prescribing guidelines, while also making community and hospital internships mandatory. To help mitigate the growing opioid crisis as part of global healthcare workforce efforts, it is essential to equip Pakistani Pharm-D students with strong opioid stewardship competencies that promote rational opioid use. Curriculum updates must be mandatory and substantive—not merely formal—to meet evolving public health demands.

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