ORIGINAL ARTICLE

DRUG PRESCRIBING COMPETENCY AMONG FINAL-YEAR DENTAL STUDENTS, HOUSE OFFICERS, AND RESIDENTS AT A PUBLIC SECTOR UNIVERSITY HOSPITAL IN KARACHI, PAKISTAN

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ABSTRACT

OBJECTIVE: To assess drug prescribing competency and compare these competencies across the clinical levels at Sindh Institute of Oral Health Sciences (SIOHS), Jinnah Sindh Medical University (JSMU).

MATERIAL & METHODS: A cross-sectional study was conducted over 4 months involving final-year dental students, house officers, and residents of SIOHS, JSMU. Data were collected using a modified questionnaire and analyzed with IBM SPSS. Descriptive statistics summarized the demographic data. ANOVA was used to compare the means of competency across four domains: Information Gathering, Clinical Decision Making, Communication, and Monitoring/Review. Tukey's Post Hoc test was conducted to identify group-wise differences. A p-value of <0.05 was considered statistically significant.

RESULTS: About 102 participants responded. Most participants reported adequate knowledge of drug dosage, frequency, duration, and route. Residents (50.0–65.38%) and house officers (54.54–61.36%) showed higher prescribing competency than final-year students (9.37–31.25%).

CONCLUSION: When comparing prescribing competency, only the Information Gathering and Clinical Decision-Making domains were significant, with p-values of 0.018 and 0.042, respectively. Tukey's Post Hoc test showed that only the Information Gathering domain was significantly different between final-year students and house officers, with a p-value of .013. Seniors demonstrated greater confidence in prescribing practices than their juniors, likely due to increased clinical exposure.

KEYWORDS: Prescription writing, dental students, clinical competency, drug prescriptions

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INTRODUCTION

A prescription serves as a means of communication between the doctor and pharmacist. [1] Prescribing involves authorizing medications for treatment at their correct dosages and optimal intervals. An essential part of prescribing medications is understanding the drug to be prescribed, its interactions with other drugs, and its potential side effects. [2-4]

Dentists can prescribe medications for various reasons. The most commonly prescribed drug classes in dentistry include antibiotics, analgesics, anti-inflammatories, antifungals, anticonvulsants, and emergency medications. [5] However, antibiotics remain the most frequently prescribed medicines in dental practices. [6]

Knowing the correct drugs, their appropriate dosages, and duration is important for prophylaxis, especially in cases of infective endocarditis, which is a fatal condition commonly associated with bacteremia caused by dental procedures. [7]

Prescribing medication involves applying both theoretical and clinical knowledge. To prescribe drugs accurately, students need a clear understanding of clinical indications, contraindications, and side effects. Therefore, a dental graduate must have a solid understanding of pharmacological therapeutics principles, along with a basic knowledge of the prescribed drug's mechanism of action. [8]

Recently, concerns have increased about the quality and quantity of dental prescriptions. [9] Misuse of medications can cause serious side effects. [10] A recent USA study found that dentists prescribe up to 10% of antibiot-

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ics worldwide, with about 81% of these prescriptions being unnecessary. [9] Poor prescription practices have led to a sharp rise in antimicrobial resistance, which the World Health Organization (WHO) now recognizes as a serious public health threat and a danger to future generations. While antibiotic resistance is a natural response to antibiotics, excessive and inappropriate use of these drugs plays a major role. [11]

During their clinical years, dental students are exposed to a range of clinical conditions and are prescribed medications under supervision. [12] Dental students may make errors in prescriptions. [8, 13] Students and interns undergoing clinical training should be periodically assessed on their drug prescription skills to minimize any errors that may occur during prescription.[14,15,16]

Incomplete and improper prescriptions missing key data about a patient's allergies, overall health, and other co-morbidities can lead to inappropriate medication administration, which may worsen the patient's condition. [4, 17] Errors in prescriptions may even result in medico-legal problems. [18]

Traditional dental curricula teach pharmacology early but fail to connect it to real-world prescribing, promoting rote learning and limiting clinical application. [19, 20] This gap increases the risk of prescription errors. While other clinical skills in dentistry are emphasized, drug-prescribing skills remain overlooked. Existing literature lacks insights into how prescribing competence varies with academic level in clinical settings. To address this, a cross-sectional study was conducted to assess drug-prescribing competency across clinical dental academic levels (i.e., final-year students, house officers, and residents) and compare these competencies at Sindh Institute of Oral Health Sciences (SIOHS), Jinnah Sindh Medical University (JSMU), Karachi. Additionally, it aims to provide empirical insights for educational institutions to help improve their strategies for effective medication use in dental practice.

MATERIALS AND METHODS

A cross-sectional study was conducted at SIOHS, JSMU, over a period of 4 months, from November 2025 to March 2026, after receiving approval from its Institutional Review Board (reference no. JSMU/IRB/2025/1073). Final-year dental students, house officers, and residents of SIOHS, JSMU, aged 18 or above, were approached using non-probability convenience sampling. Students from all religions and socioeconomic backgrounds were included. Only individuals willing to participate and who gave their verbal and written consent were included.

1st- to 3rd-year dental students were excluded from the study due to their limited clinical training and pharmacological knowledge. Postgraduate dental faculty, demonstrators, and lecturers were excluded because of their active involvement in clinical training.

The participants were told that their anonymity would be preserved throughout the study. No personally identifiable information was gathered. Data was always accessible to the main author and co-author.

The total target population at SIOHS, JSMU, was calculated as 138. While maintaining a margin of error of 5% and a confidence level of 95%[17], a sample size of 102 was calculated using the reputable online calculator provided by Open Epi.

A modified structured questionnaire was distributed to collect data from participants after obtaining their consent. The questionnaire comprised of two sections. The first section gathered demographic information about the participants, including age, gender, ethnicity, and academic level. The second section included 14 closed-ended questions related to drug prescribing competency, developed based on the four-stage prescribing model by Coombes et al. (2011), covering Information Gathering, Clinical Decision-Making, Communication, and Monitoring/Review, ensuring a comprehensive assessment of prescribing skills across all clinical levels. [21] In this section, the first five questions used a five-point Likert scale ranging from 'Always' to 'Never,' while the remaining questions were closed-ended. Additionally, the questionnaire was pilot-tested on 10% of the study population to evaluate the clarity, reliability, and validity of the questions. Data from the pilot study were not included in the final analysis.

Data was entered and analyzed using IBM SPSS Statistics (version 27). Descriptive analysis was performed for the demographic data, with continuous variables reported as means and standard deviations (SD), and categorical variables as frequencies and percentages. To compare mean competency scores for each domain (Information Gathering, Clinical Decision Making, Communication, and Monitoring & Review) across three academic levels (Final Year, House Officers, and Residents), an ANOVA test was used. Each competency domain score was calculated by combining responses from multiple related questionnaire items. Tukey's Post Hoc test was conducted after ANOVA to identify group differences. A p-value of <0.05 was considered statistically significant.

RESULT

The questionnaire was completed by 102 participants, with the majority (69.6%) being female, and a mean age of 24.4 years, as shown in Table 1, which displays the key demographic data of the respondents.

Table 2 shows a breakdown of participant responses. Prescribing competency increased with clinical experience, with higher confidence among residents (50.0–65.38%) and house officers (54.54–61.36%) compared to final-year students (9.37–31.25%). Most final-year students (46.87%), house officers (54.54%), and residents (50%) often used the WHO prescribing guidelines when

Table No 1: DEMOGRAPHIC DATA (Frequencies and Percentages)

VARIABLES	FREQUENCIES (%)
Age	
Mean (SD)	24.42 (2.41)
Gender	
Female	71(69.6)
Male	31 (30.4)
Ethnicity	
Urdu	53 (52.0)
Sindhi	37 (36.3)
Punjabi	8 (7.8)
Pathan	4 (3.9)
Position	
Final Year	32 (31.4)
House officer	44 (43.1)
Resident	26 (25.5)

prescribing medications. Most participants reported having adequate knowledge of drug dosage, frequency, duration, and route (≥75% "always/often"). Dental caries (50–54.54%) and pain (42.30–50%) were the most common conditions treated. Paracetamol (36.36–46.87%) and diclofenac (38.63–43.75%) were frequently prescribed, while Augmentin was the most common antibiotic (73.07–100%), and drug interactions were the most frequently reported error (47.72–73.07%). Confidence in explaining prescriptions (96.15–100%) and including essential elements (81.25–88.63%) were high, whereas follow-up (40.6–72.7%) and Adverse Drug Reaction monitoring (56.25–69.23%) were relatively lower.According to Figure 1, only the Information Gathering and Clinical Decision Making domains were significant, with p-values of 0.018 and 0.042, respectively, when comparing drug prescribing competency across academic levels using ANOVA. Tukey's Post Hoc test showed that only the Information Gathering domain was significant between final-year and

Table No 2: DRUG PRESCRIBING COMPETENCY VARIABLES (Frequencies & Percentages)

1. Do you use the WHO prescribing guidelines while writing a prescription?					
	Always	**Often**	**Sometimes**	**Rarely**	**Never**
Final Year	3 (9.37%)	15 (46.87%)	10 (31.25%)	3 (9.37%)	1 (3.12%)
House officer	12 (27.27%)	24 (54.54%)	5 (11.36%)	2 (4.54%)	1 (2.27%)
Resident	8 (30.76%)	13 (50.0%)	3 (11.53%)	2 (7.69%)	0 (0.0%)
2. Are you confident in determining the correct drug dosage for patients?					
	Always	Often	Sometimes	Rarely	Never
Final Year	5 (15.62%)	14 (43.75%)	10 (31.25%)	2 (6.25%)	1 (3.12%)
House officer	17 (38.63%)	21 (47.72%)	5 (11.36%)	1 (2.27%)	0 (0.0%)
Resident	15 (57.69%)	8 (30.76%)	2 (7.69%)	1 (3.84%)	0 (0.0%)
3. Do you know the correct frequency (e.g., once daily, twice daily) for common drug prescriptions?					
	Always	Often	Sometimes	Rarely	Never
Final Year	10 (31.25%)	16 (50.0%)	6 (18.75%)	0(0.0%)	0 (0.0%)
House officer	27 (61.36%)	14 (31.81%)	3 (6.81%)	0 (0.0%)	0(0.0%)
Resident	17 (65.38%)	7 (26.92%)	1 (3.84%)	1 (3.84%)	0 (0.0%)
4. Do you know the correct duration for which the drug should be prescribed?					
	Always	Often	Sometimes	Rarely	Never
Final Year	10 (31.25%)	15 (46.87%)	7 (21.87%)	0 (0.0%)	0 (0.0%)
House officer	27 (61.36%)	15 (34.09%)	2 (4.54%)	0 (0.0%)	0 (0.0%)
Resident	15 (57.69%)	6(23.07%)	3 (11.53%)	1 (3.84%)	1 (3.84%)
4. Do you know the correct route of drug delivery (oral, IV, topical, etc.) for commonly prescribed drugs?					
	Always	Often	Sometimes	Rarely	Never
Final Year	10 (31.25%)	14 (43.75%)	6 (18.75%)	2 (6.25%)	0 (0.0%)
House officer	24 (54.54%)	14 (31.81%)	6 (13.63%)	0 (0.0%)	0 (0.0%)
Resident	11 (42.30%)	11 (42.30%)	3 (11.53%)	1 (3.84%)	0 (0.0%)
5. What are the most common health conditions you treat in dental practice?					
	Dental caries	Dental pain	Tooth sensitivity	Others	None
Final Year	16 (50.0%)	16 (50.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
House officer	24 (54.54%)	19 (43.18%)	0 (0.0%)	1 (2.27%)	0 (0.0%)

Resident	13 (50.0%)	11 (42.30%)	0 (0.0%)	2 (7.69%)	0 (0.0%)
6. What are the most common health conditions you treat in dental practice?					
	Dental caries	Dental pain	Tooth sensitivity	Others	None
Final Year	16 (50.0%)	16 (50.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
House officer	24 (54.54%)	19 (43.18%)	0 (0.0%)	1 (2.27%)	0 (0.0%)
Resident	13 (50.0%)	11 (42.30%)	0 (0.0%)	2 (7.69%)	0 (0.0%)
7. Which non-steroidal anti-inflammatory drug (NSAID) do you prescribe most commonly?					
	Paracetamol	Diclofenac	Aceclofenac	Others	None
Final Year	15 (46.87%)	14 (43.75%)	2 (6.25%)	1 (3.12%)	0 (0.0%)
House officer	16 (36.36%)	17 (38.63%)	0 (0.0%)	10 (22.72%)	1 (2.27%)
Resident	10 (38.46%)	11 (42.30%)	0 (0.0%)	5 (19.23%)	0 (0.0%)
8. Which antibiotic do you most commonly prescribe?					
	Amoxicillin	Augmentin	Metronidazole	Others	None
Final Year	0 (0.0%)	32 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
House officer	9 (20.45%)	34 (77.27%)	1 (2.27%)	0 (0.0%)	0 (0.0%)
Resident	6 (23.07%)	19 (73.07%)	0 (0.0%)	1 (3.84%)	0 (0.0%)
9. What is the most common error you think occurs during prescription?					
	Incorrect dosage	Drug interaction/			
incompatibility	Wrong drug name	Others	None		
Final Year	14 (43.75%)	18 (56.25%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
House officer	14 (31.81%)	21 (47.72%)	3 (6.81%)	2 (4.54%)	4 (9.09%)
Resident	4 (15.38%)	19 (73.07%)	1 (3.84%)	0 (0.0%)	2 (7.69%)
10. What is your primary source of information regarding drug prescription?					
	Textbooks	Professors	Colleagues	Others	None
Final Year	9 (28.12%)	14(43.75%)	6 (18.75%)	3 (9.37%)	0 (0.0%)
House officer	8 (18.18%)	24(54.54%)	2 (4.54%)	7 (15.90%)	3 (6.81%)
Resident	10 (38.46%)	4 (15.38%)	0 (0.0%)	12 (46.15%)	0 (0.0%)
11. Do you feel confident explaining prescription instructions (dose, duration, side effects) to patients?					
	Yes			No	
Final Year	32 (100%)			0 (0.0%)	
House officer	44 (100%)			0 (0.0%)	
Resident	25 (96.15%)			1 (3.84%)	
12. Do you usually include all essential elements (drug name, dose, frequency, duration, route) when writing a prescription?					
	Yes			No	
Final Year	26 (81.25%)			6 (18.75%)	
House officer	39 (88.63%)			5 (11.36%)	
Resident	23 (88.46%)			3(11.53%)	
13. Do you ask patients to return for follow-up after prescribing antibiotics/analgesics?					
	Yes			No	
Final Year	13 (40.6%)			19 (59.4%)	
House officer	32 (72.7%)			12 (27.3%)	
Resident	18 (69.2%)			8 (30.8%)	
14. Do you monitor or inquire about possible adverse drug reactions in your patients?					
	Yes			No	
Final Year	18 (56.25%)			14 (43.75%)	
House officer	27 (61.36%)			17 (38.63%)	
Resident	18 (69.23%)			8 (30.76%)	

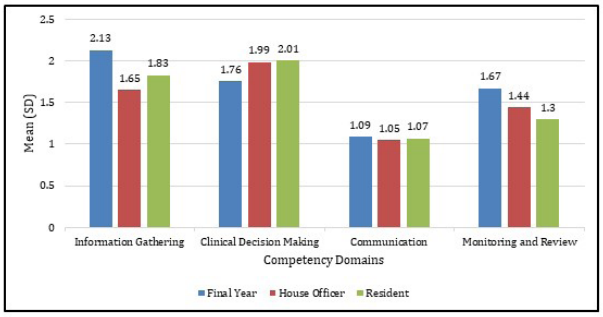

Fig 1: Comparison Of Drug Prescribing Competency Across Academic Levels

house-officer groups, with a p-value of .013.

DISCUSSION

Prescription writing is a skill essential for the effective management of diseases encountered in dentistry. This study examines the drug prescribing skills of final-year dental students, house officers, and residents—three clinical academic levels that differ significantly in their clinical exposure.

The study shows that the majority of final-year students (46.87%), house officers (54.54%), and residents (50%) often use the WHO prescribing guidelines when prescribing medications. These findings align with the papers published by Vijaykumar et al. and Dali et al. [2, 17]

In this study, it was observed that while most residents (57.69%) reported being always confident in determining the correct drug dosage, final-year students (43.75%) and house officers (47.72%) reported that they 'often' felt confident but not always. This indicates that some clinical uncertainty remains among juniors when prescribing medicines. A study from Lahore showed similar results: only 56% of house officers reported being confident in their prescription skills, with 15% admitting they had little confidence in their prescription writing. [4] In another study, although most students answered most questions regarding medication knowledge correctly, about 27% of dental students did not feel confident in prescribing medications safely. Findings suggest that some students still feel uncomfortable prescribing medication even under supervision. [6] While the vast majority of house officers (61.36%) and residents (65.38%) answered that they always knew the correct frequency for commonly prescribed drugs, (50%) of final-year students were more uncertain, responding with 'often' rather than 'always,' showing a gap in their knowledge. This finding aligns with another study, which found that only 66.1% of BDS students felt confident in their knowledge of drug frequency. [8] In this study, most house officers (61.36%) and residents (57.69%) responded that they always know the correct duration for the drug they are prescribing. However, the majority of final-year students (46.87%) leaned towards 'Often,' suggesting they might not be as comfortable prescribing medications as their seniors. In contrast, an Australian study showed that 88% of dental students were confident in the appropriate dosage and timing.

When asked about the most common error encountered during drug prescription, all clinical levels in the study unanimously agreed that 'drug interaction/incompatibility' was the most frequent mistake. Conversely, Ashraf et al. found that failing to inquire about a patient's allergies resulted in incorrect dosages, and another study also reported that not asking about allergies led to wrong dosages. [22, 23] Additionally, one study highlights that approximately 28% of dental students believed the main barrier was 'not knowing the exact drug dose. [2]

In this study, all clinical students preferred Paracetamol and Diclofenac as the most common analgesics, whereas in other studies, most final-year students and house officers considered Ibuprofen to be the most frequently prescribed NSAID. [19] Almost all final-year students, house officers, and interns chose Augmentin as the most common prescribed drug, a view shared by Ashraf et al. [22] All three clinical levels agreed that dental caries was the most common dental condition treated in practice, though in the final years, dental caries and dental pain were treated equally. A study in Rawalpindi contradicts our findings, finding dental pain to be the most encountered condition by dentists. [22]

While most final-year students (43.75%) and house officers (54.54%) in the study consider professors the primary source of information about drug prescriptions, residents prefer textbooks and other methods for obtaining their information. This finding is supported by a study that alarmingly found a significant number of dental students and house officers relied on senior faculty for information. Only about a third of them considered the internet and books their main sources for prescriptions. [4]

A statistically significant difference was observed in the Information Gathering domain across academic levels ($p = 0.018$). Post hoc Tukey's test showed that final-year students scored higher than house officers ($p = 0.013$), while no significant differences were found among the other groups. This indicates that final-year students exhibit stronger theoretical preparation before transitioning into clinical practice. Compared to house officers, lower scores may suggest that increased clinical workload limits systematic information gathering during prescribing. Similarly, a key difference was identified in the Clinical Decision-Making domain ($p = 0.042$), where residents scored higher than their juniors, indicating progressive improvement in clinical reasoning with greater exposure.

This study offers a comprehensive evaluation of prescribing competence across various clinical levels and areas, employing appropriate statistical methods to improve the reliability of the results. However, a cross-sec-

tional design restricts causal conclusions. Self-reported data may lead to response bias, and convenience sampling limits how well the findings can be applied to broader populations. Factors that cannot be measured, such as clinical exposure and supervision, were not taken into account.

CONCLUSION

Drug prescribing competency varied across all clinical academic levels, especially in areas of information gathering and clinical decision-making. Residents and house officers expressed greater confidence in prescribing than final-year dental students, likely due to their increased clinical exposure. These findings emphasize the importance of structured pharmacologic training and supervision during early clinical years to improve rational prescribing and competency among future dental practitioners.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Shah H	✓	✓	×	×	✓	×
Muqri IA	✓	×	✓	✓	✓	×
Urooj I	✓	✓	×	×	×	✓
Kanwal K	✓	×	✓	✓	✓	×
Ayoub D,	✓	✓	×	×	×	✓
Mubasher A	✓	×	✓	✓	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This study was approved by the Ethical Review Board of Jinnah Sindh Medical University Vide No. JSMU/ IRB/2025/1073, Dated: 18/11/2025