

Knowledge of Fourth Year MBBS Students about Protocols for Injections

Humayun Mirza, Ayesha Sohail, Muhammad Bin Amir, Seema Daud
Department of Community Medicine, Lahore Medical & Dental College, Lahore.

Abstract

Background: Injection safety is crucial for preventing infection transmission and ensuring patient safety. Adequate knowledge and adherence to protocols are vital for future healthcare professionals. Assessing medical students' knowledge can help identify educational gaps.

Objective: This study assessed the knowledge and practices related to injection safety among fourth-year MBBS students at Lahore Medical & Dental College, aiming to identify areas for curriculum improvement.

Study type, settings & duration: This cross-sectional study was conducted at Lahore Medical & Dental College, Lahore from July to September 2022.

Methodology: A total of 131 fourth-year MBBS students, who were also in clinical rotations, voluntarily participated. Data was collected using a structured questionnaire covering demographics and knowledge of injection protocols. Convenient sampling was used, and data analysis was conducted using SPSS version 22, with significance set at $p \leq 0.05$.

Results: The study found that 93.1% ($n=122$) of students were aware of blood-borne infection risks from unsafe injection practices, and 99.2% ($n=130$) recognized the importance of wearing gloves for patient and personal safety. Female students were more aware of glove use for patient safety (64.0% vs. 37.5%, $p = 0.0019$), wore gloves more often (75.0% vs. 51.2%, $p = 0.0016$), and were more diligent in checking expiry dates before administering injections (81.0% vs. 63.8%, $p = 0.015$) compared to male students.

Conclusion: A significant gap between theoretical knowledge and practical skills in injection safety was identified among fourth-year MBBS students. Female students demonstrated higher awareness and compliance with safety practices, highlighting the need for enhanced practical training in the curriculum.

Key words: Education, medical, infection control, injections, intramuscular, safety management.

Introduction

In the realm of healthcare, the administration of injections stands as a cornerstone in both the treatment of acute conditions and the prevention of diseases. Injections are integral to modern medicine, offering rapid delivery of therapeutic agents, ensuring compliance, and providing a critical means of immunization against various infectious diseases. Statistics reveal that a

substantial 90-95% of injections are employed for therapeutic purposes, with the remaining 5-10% allocated to immunization and other essential medical interventions.^{1,2} This widespread use underscores the vital role that injections play in patient care, particularly in settings where alternative routes of administration may not be as effective or feasible.

However, despite the undeniable benefits of injections, the persistent issue of unsafe injection practices mars the global landscape. These practices not only threaten the safety of patients but also pose significant risks to healthcare workers and the broader community.² Unsafe injections are a public health concern, with potential consequences that include the transmission of infectious diseases, environmental hazards from improper disposal of medical waste, and the perpetuation of medical and societal burdens.

One of the most pressing concerns is the unnecessary prescription of injections, especially in cases where oral medications are available and equally effective. This tendency towards over

Corresponding Author:

Humayun Mirza

Department of Community Medicine
Lahore Medical & Dental College, Lahore .
Email: humayunmirza@yahoo.com

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Authors Contribution

HM conceptualized the project and performed the statistical analysis. AS & MBA did the data collection. HM, AS & MBA did the literature search. Drafting, revision & writing of manuscript were done by SD.

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prescription is particularly troubling in rural and remote areas of Pakistan, where the reuse of injection equipment is alarmingly common. The reuse of syringes and needles, often driven by economic constraints and a lack of resources, exponentially increases the risk of transmitting infections such as hepatitis B, C and HIV. This practice not only endangers the patients receiving these injections but also puts healthcare workers and waste handlers at severe risk.¹

The Safe Injection Global Network (SIGN), an initiative led by the World Health Organization (WHO), has established clear guidelines for what constitutes a safe injection. According to SIGN, a safe injection is the one that does not harm the recipient and does not expose the health worker to unnecessary risk, and does not produce hazardous waste that could endanger the community.³ Adherence to these standards is crucial in mitigating the risks associated with injection use, yet in many parts of the world, including Pakistan, these guidelines are far from being universally applied.

The lack of knowledge and awareness regarding proper injection protocols among healthcare workers is a significant factor contributing to unsafe practices. The consequences of such ignorance are grave, with the potential for widespread transmission of life-threatening infections. For instance, the transmission of blood borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) remains a major concern. Globally, unsafe injection practices are responsible for approximately 40% of hepatitis C cases, 32% of hepatitis B cases, and 5% of HIV infections annually.^{4,5}

Regrettably, Pakistan is not immune to the dangers posed by unsafe injection practices. According to WHO estimates, out of the 12 billion injections administered worldwide each year, 50% are considered unsafe, and a staggering 75% are deemed unnecessary.^{6,7} The repercussions of these practices are far-reaching, leading to increased rates of patient injury, including pain, nerve damage, bleeding, accidental intravenous administration, and the formation of sterile abscesses. These adverse outcomes are often the result of inappropriate site selection and poor technique in administering intramuscular (IM) injections.^{8,9}

Despite extensive efforts to promote safe injection practices, the persistence of unsafe practices in Pakistan highlights a significant gap in healthcare delivery, particularly in rural and underserved areas. This study is crucial because it aims to identify the underlying factors contributing to the continued misuse of injections and the

prevalence of unsafe practices. By focusing on the knowledge, attitudes, and practices of healthcare workers and patients, this study seeks to develop targeted interventions that can reduce the incidence of unsafe injections and improve overall public health outcomes. The primary objective of this study was to assess the current state of injection practices in a selected region of Pakistan and evaluate the awareness and compliance with safe injection guidelines among healthcare providers, and recommend strategies to mitigate the associated risks.

Therefore, the primary aim of this study is to evaluate the understanding of injection safety and associated protocols among fourth-year MBBS students.

Methodology

This institutional-based cross-sectional study was conducted at Lahore Medical and Dental College (LMDC), Lahore, over a period of three months from July to September 2022. The target population consisted of students enrolled in the fourth-year MBBS class of 2022. The decision to include students from this cohort was based on the intent to capture a comprehensive understanding of the knowledge and practices regarding injection protocols among future medical professionals. Given the manageable population size, it was feasible to include willing participants, ensuring a sample that accurately reflects the entire fourth-year class.

The sample was selected using a non-probability, convenience-sampling technique, primarily due to ease of access and to ensure maximum participation within the limited timeframe. The sample size of 131 was calculated using a 95% confidence level, a 10% margin of error, and an assumed baseline proportion of 50% with 30% non-response rate.

Data collection was carried out using a structured questionnaire that comprised two main sections: one focusing on demographic and background information, and the other specifically addressing knowledge and practices related to safe injection protocols. The questionnaires were distributed during regular class sessions, with responses collected anonymously to promote honest and accurate reporting.

Data entry, cleaning, and analysis were conducted using the Statistical Package for Social Sciences (SPSS), version 22. Descriptive statistics were used to summarize the data, and bivariate analysis was performed to examine the relationships between different variables. The

results are presented in tables and graphs, with a significance level set at $p \leq 0.05$ to determine the statistical significance of the observed associations.

The ethical approval was obtained from the Ethical Review Committee of Lahore Medical & Dental College, Lahore vide letter no. LM&DC/13444-45.

Results

The study included 131 fourth-year MBBS students, with 60 (45.8%) male and 71 (54.2%) female participants. A majority of the students, 108 (82.4%), had an FSC background, while 21 (16%) had completed A Levels, and only 2 (1.5%) were from the American Board.

In terms of knowledge about blood borne viral infections transmitted through injections, 43 (33%) of the students were aware, whereas 88 (67%) lacked this knowledge. Specifically, 73 (56%) knew that HIV and Hepatitis B are blood borne infections, while 58 (44%) were unaware of this fact. Furthermore, 122 (93%) had correctly identified that HIV, Hepatitis B, and C are blood borne infections due to injections, but 9 (7%) did not have this knowledge.

Regarding the knowledge of the reasons for wearing gloves, 66 (50%) students understood that gloves are for personal protection against needle stick injuries, while 65 (49%) were unaware of this. The belief that gloves are only for patient safety was held by 65 (49%) students, whereas 66 (50%) disagreed, understanding that gloves are not solely for patient safety. Notably, 130 (99%) students were aware that gloves are worn for both patient and personal safety, with only 1 (0.8%) lacking this knowledge.

Table-1 reveal that a majority of fourth-year MBBS students possess a commendable level of knowledge regarding essential practices such as hand washing before administering injections. This includes aspects like wearing gloves, verifying the expiry date on ampoules or vials, awareness of cleaning the injection site, utilizing syringes from unopened packs, adhering to advice on promptly

destroying used syringes with a hub cutter, avoiding needle recapping, and employing color-coded boxes for immediate disposal of waste after procedures.

In this study, a bivariate analysis was done using the Chi-square test to determine the association between gender and various knowledge and practice-related variables regarding injection safety. A p -value of ≤ 0.05 is considered statistically significant. The bivariate analysis conducted on knowledge and practices regarding injection safety revealed several noteworthy findings. Statistically significant gender differences was observed in some practices. Knowledge of reasons for wearing gloves for patient safety showed a significant difference between male and female students ($p = 0.0019$), with females more frequently identifying patient safety as a reason for glove use. Wearing gloves during procedures was also significantly different between genders ($p = 0.0016$), with a higher percentage of females reporting glove use. Other variables, such as washing hands before giving an injection ($p = 0.851$) and using a cutter to open ampoules ($p = 0.689$), did not demonstrate significant gender differences. These findings highlight areas where gender differences may influence practices and knowledge in injection safety.

The bivariate analysis Table-2 have been divided into two tables for clarity. Table-2.1 presents the knowledge-related variables, while Table-2.2 focuses on practice-related variables.

Discussion

In this study, fourth-year MBBS students demonstrated varying levels of knowledge concerning blood-borne viral infections. Specifically, 32.8% possessed knowledge of HIV, 55.7% of HIV and HBV, and 93.1% of HIV, HBV, and HCV. Comparing these findings to Salah R et al.'s study,¹⁰ which reported 78.3% knowledge of HBV, 62.9% of HCV, and 69.2% of HIV, our study indicated a comparatively superior understanding of blood-borne viral diseases.

Table 1: Different skills learned through observations and used regarding use of safety measures for giving injections.

Variable	Frequency (%)	
	Yes	No
<i>Skills used for injection practices</i>		
Washing of hand before giving the injection	127 (96.9)	04 (3.1)
Wearing of gloves during procedure	124 (94.7)	07 (5.3)
Checking expiry date before giving the injection	130 (99.2)	01 (0.8)
Using cutter to open the ampoule	116 (88.5)	15 (11.5)
Using syringe from unopened packet	125 (95.4)	06 (4.6)
Cleaned the site before giving the injection	131 (100)	00 (00.0)

Table-2 (2.1): Knowledge-related variables.

Variables	Gender	Yes n (%)	No n (%)	Total n (%)	p-value
Knowledge regarding blood-borne viral infections					
All of the above (HIV + HBV + HCV)	Male	50 (89.3)	6 (10.7)	56 (100)	1.0
	Female	59 (89.4)	7 (10.6)	66 (100)	
Knowledge of reasons for wearing gloves					
For personal safety	Male	27 (48.2)	29 (51.8)	56 (100)	0.071
	Female	73 (64.0)	41 (36.0)	114 (100)	
For patient safety	Male	21 (37.5)	35 (62.5)	56 (100)	0.0019
	Female	73 (64.0)	41 (36.0)	114 (100)	
Both personal & patient safety	Male	65 (60.7)	42 (39.3)	107 (100)	0.924
	Female	71 (62.3)	43 (37.7)	114 (100)	

Table-2 (2.2): Knowledge about practice-related variables.

Variables	Gender	Yes n (%)	No n (%)	Total n (%)	p-value
Skills used in injection practices					
Washing hands before giving injection	Male	50 (62.5)	30 (37.5)	80 (100)	0.851
	Female	60 (60.0)	40 (40.0)	100 (100)	
Wore gloves during procedure	Male	41 (51.2)	39 (48.8)	80 (100)	0.0016
	Female	75 (75.0)	25 (25.0)	100 (100)	
Checked expiry date before injection	Male	51 (63.8)	29 (36.2)	80 (100)	0.015
	Female	81 (81.0)	19 (19.0)	100 (100)	
Used cutter to open ampoule	Male	66 (82.5)	14 (17.5)	80 (100)	0.689
	Female	79 (79.0)	21 (21.0)	100 (100)	
Used syringe from unopened packet	Male	67 (83.8)	13 (16.2)	80 (100)	0.982
	Female	85 (85.0)	15 (15.0)	100 (100)	
Cleaned site before giving injection	Male	66 (82.5)	14 (17.5)	80 (100)	0.237
	Female	74 (74.0)	26 (26.0)	100 (100)	
Knowledge about practice done in healthcare establishment					
Pull back the syringe plunger	Male	52 (65.0)	28 (35.0)	80 (100)	0.504
	Female	59 (59.0)	41 (41.0)	100 (100)	
Recapped needle after giving injection	Male	63 (78.8)	17 (21.2)	80 (100)	0.085
	Female	66 (66.0)	34 (34.0)	100 (100)	

$p < 0.05$ indicates a statistically significant difference between male and female responses.

$p \geq 0.05$ indicates no statistically significant difference between male and female responses.

Significant differences found for:

1. Knowledge of reasons for wearing gloves for patient safety.
2. Skills used in injection practices for wearing gloves during the procedure.
3. Skills used in injection practices for checking the expiry date before injection.

Ashish Naik et al.'s study¹¹ highlighted that 100.0% of health workers knew the importance of wearing gloves, a statistic closely mirrored in our study where 94.7% of students exhibited this knowledge. However, concerning the critical practice of not recapping needles after injections, our study revealed a concerning lack of awareness, with only 7.6% of students possessing this knowledge, contrasting with higher awareness among healthcare workers reported in Ashish Naik et al.'s study.¹¹

Regarding the rationale behind wearing gloves, our study indicated that 66 (50.4%) students recognized the importance for personal safety, 65 (49.6%) for patient safety, and a substantial 99.2% acknowledged wearing gloves for both personal and patient safety. These findings contrast with Ashish Naik et al.'s study,¹¹ where 60% wore gloves for personal safety, 25% for patient safety, and 15% for both. Additionally, our study highlighted that 90.1%

of students had the correct knowledge regarding the disposal of injection waste in yellow-coded bags.

Concerning safe injection practices, a high percentage (96.9%) of students acknowledged the necessity of handwashing before giving injections. However, there were discrepancies in the handwashing practices observed in comparison to other studies. Olademej Akeem et al.¹² reported only 20% of providers washing hands before and after injections, while Vincent E. Omorogbe¹³ recorded a higher percentage at 78.7%.

Our study revealed strong adherence to certain practices, such as checking expiry dates (99.2%) and using syringes from unopened packets (95.4%). However, misconceptions noted, including the mistaken belief that recapping needles (92.4%) and bending needles before disposal (82.4%) were correct practices. The knowledge of using needle cutters was high (82.4%), and 90.1% of students recognized the importance of disposing of sharps

waste immediately in yellow color-coded boxes. Nevertheless, 9.9% of students were unaware of this crucial disposal protocol.

In comparison to similar studies, our findings provide insights into the strengths and areas for improvement in the knowledge and practices of fourth-year MBBS students, emphasizing the importance of targeted educational interventions for enhancing safe injection practices.¹³⁻¹⁷

While this study provides valuable insights into the knowledge and practices of fourth-year MBBS students concerning blood-borne viral infections and safe injection practices, several limitations are there:

1. The study was conducted at a single institution with a relatively small sample size, which may limit the generalizability of the findings to other medical schools or regions.
2. The study focused on students' observations rather than direct practices of their behaviors. This approach may not accurately reflect the students' actual practices in clinical settings.
3. The study primarily focused on certain aspects of injection safety and knowledge of blood-borne viral infections. Other important factors, such as the influence of educational interventions or clinical training, were not explored in depth.

The baseline knowledge of the fourth-year MBBS students in this study demonstrated proficiency in certain aspects of injection safety, particularly in understanding diseases transmitted through unsafe injections. Notably, their knowledge was deemed satisfactory with respect to the opening of glass ampoules, post-needle stick injury precautions, and biomedical waste management. The data analysis indicates that female students generally have higher awareness and compliance rates regarding safe injection practices and knowledge of blood-borne viral infections compared to their male counterparts.

It is recommended to prioritize and enhance both theoretical and practical education and training for medical students. A comprehensive educational approach adopted to ensure that students gain proficiency not only in theoretical concepts but also in practical aspects related to injection safety. The continuous learning process during clinical placements, guided by clinical mentors, plays a pivotal role in shaping a safer and more efficient delivery of medication to patients. Continuous education and training programs are essential to ensure all healthcare students adhere to safety

standards to protect themselves and their patients from potential hazards.

Furthermore, there is a need for additional studies to assess the level of knowledge and practice among nursing students, as well as all other nursing professionals working across various levels of healthcare organizations, including primary, secondary, and tertiary care settings. This broader scope of research would contribute to a comprehensive understanding of injection safety practices among healthcare professionals, leading to the development of targeted interventions and improvements in overall patient care.

Conflict of interest: None declared.

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