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KNOWLEDGE AND AWARENESS OF HIGH-ALERT MEDICATIONS AMONG PHARMACY STUDENTS

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Abstract

Background
High-alert medications (HAMs) are those medications that have a high likelihood of causing serious harm to patients when used incorrectly. Future health workers among Pharmacy students should acquire sufficient information and awareness about the safety of HAM to reduce the risk of medication errors and enhance patient safety.

Objective
To assess the knowledge of high alert medications among the students of pharmacy and their awareness of the same, and to study their perception of the safety training and preventive measures of high alert medications among the students of pharmacy.

Methodology
The method of the study was a descriptive cross-sectional study, and a structured self-administered questionnaire was used for the collection of data from the students of Pharmacy. The tool measured HAMs awareness, identification of high-alert medications, knowledge of safety precautions, experience of medication errors during internships, and preferred training methods. Descriptive statistics (frequency and percentage) were used to analyze the data.

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Results

Most students (85%) knew about high alert medications, and 67% had carried out an internship. The most common HAMs identified were insulin (34%) and opioids (23%). 76% correctly identified that if the HAMs are used incorrectly, they can cause serious harm, but only 11% identified ISMP as the organization that is responsible for them, and 44% identified WHO. Most (67%) had been trained before in HAM safety, and 77% had had a medication error during internship. The most common safety measures recognized were double-checking doses (44%) and proper labeling (34%). Most students strongly supported mandatory HAM training (82%), and lectures (45%) were the preferred learning method.

Conclusions

The findings were that the pharmacy students had average knowledge about high alert drugs, and there was a lack of knowledge about the regulatory bodies and advanced safety measures. Enhancing structured education, hands-on training, and simulation-based learning is crucial to ensure that future pharmacists have the necessary competency in medication safety.

INTRODUCTION

High Alert Medications (HAMs) are medications that, if administered improperly, offer a high risk of causing significant injury. The majority of drug mistakes that cause serious patient harm or death are caused by them. Because inappropriate HAM administration can have serious clinical repercussions, including deadly results, nurses are essential to the safe administration of HAMs(1, 2). The critical care unit (ICU), pediatric ward, medical ward, and emergency room (ER) all often employ high alert medications (HAMs). High Alert Medications (HAMs) have an increased risk of harming patients when taken improperly since they are utilized in emergency settings(3, 4).

Certain High Alert Medications (HAMs) have a limited therapeutic index, such as warfarin, which quickly results in the unwanted side effect of bleeding when administered incorrectly. Additionally, well-known chemotherapy drugs like vincristine need to be handled carefully and should be given as directed by the manufacturer(5, 6). According to the US Institute of Medicine, between 6% and 10% of hospitalized patients experience negative drug side effects. When high-alert medications are implicated in these unfavorable consequences, patients are more susceptible. of suffering a serious injury. Using safe practices while prescribing, distributing, and administering these medications can reduce patient risk(7).

The World Health Organization's (WHO) global goal is to cut drug mistakes by 50% during five years, according to the WHO's 2017 "Medications without Harm" Report. Improvements in the prescription, dispensing, administering, monitoring, and usage of medications are necessary to accomplish this goal (8). However, there may be a lack of understanding among medical experts on how to recognise HAM. For instance, a survey revealed that fewer than 70% of doctors, nurses, and chemists could describe HAM(9).

Implementing pharmaceutical safety-related HAM treatments in the healthcare context enhanced it(9). Educating and training medical workers on the use of HAM is one strategy. Leaders, doctors,

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nurses, chemists, quality leaders, and labour unions launched a HAM initiative to address pharmaceutical safety concerns and lessen medication-related harms. A standardised procedure for managing HAM, HAM education, and sustainability monitoring was all part of the program. For 23 months following the start of the program, a statistically significant decrease in medication mistakes was found. As a result, creating standardised procedures and educating and training medical personnel while managing HAM proved beneficial(10).

Pharmacists are crucial to the safety of medications. Leading, organising, and overseeing the safe use of medications are all included in this job. In particular, creating risk-specific HAM procedures, identifying and evaluating high-risk processes that require training, protocols, and attention, as well as One of the duties of chemists may be tracking and monitoring pharmaceutical mistakes (11). Therefore, in order to prepare students for pharmacy practice, where they will regularly examine prescription, dispensing, and administering practices of HAM, education and training about medication mistakes, particularly for HAM, must be enhanced in the existing pharmacy curriculum. To assess the knowledge of high alert medications among the students of pharmacy and their awareness of the same, and to study their perception of the safety training and preventive measures of high alert medications among the students of pharmacy.

Methodology

Study Design

A descriptive cross-sectional study was carried out to evaluate the knowledge and awareness of high alert medications (HAMs) among the students of pharmacy. The study design was chosen because it can be used to measure awareness, perception, and educational exposure to a specific population at one time and place.

Study Setting and Duration

The study was conducted with students of the Pharmacy institutions. Study period data collection was done through a questionnaire survey.

Study Population

The study population comprised undergraduate pharmacy students of professional pharmacy programs. Students who were interested in taking part in various academic years were included in the study.

Inclusion and Exclusion Criteria

The study included students in the pharmacy program who were willing to give informed consent. Students who were unable to fill out the questionnaire or refused to participate were not included in the study.

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Sample Size and Sampling Technique

A total of 100 students from the medical science faculty of the university participated in the study as a group of pharmacy students. Participants were recruited using a convenience sampling technique because of the accessibility and willingness of the participants during the data collection period.

Data Collection Tool

A structured self-administered questionnaire was used to gather data and was designed based on the literature review conducted on the high-alert medications and medication safety. The questionnaire included closed-ended questions to measure awareness of HAMs, identification of high-alert medications, knowledge about medication safety precautions, exposure to medication errors during internships, and attitudes about HAM safety education/training.

Data Collection Procedure

A brief explanation of the study goals and purpose was given to the participants before distributing questionnaires. With informed consent, questionnaires were sent out to pharmacy students. The students were asked to fill in the questionnaire on their own, and confidentiality of responses was maintained during the study.

Data Analysis

Data collected were entered and analyzed by using the Statistical Package for Social Sciences (SPSS) version 25. Data was analyzed using descriptive statistics. The frequencies and percentages were obtained for all categorical variables and presented in a table and descriptive form.

Results

A total of 100 pharmacy students participated in the study assessing the knowledge and awareness of high-alert medications (HAMs) as shown in table 1. Of these, 67% of participants completed a hospital or community pharmacy internship, while 33% had no exposure to internships. As far as awareness, 85% of the students had heard of the term “High-Alert Medications,” and 15% had not heard of the term. The participants were asked to name medicines regarded as high alert medicines. Insulin (34%) was the most identified medication, and opioids (23%) were the second. Only 12% of students could identify heparin, and 10% could identify potassium chloride (KCl); and 10% could identify warfarin. A mere 7% identified concentrated electrolytes and 2% identified chemotherapy drugs as high alert medications. These results show that students had a better understanding of common high alert medications (e.g., insulin, opioids) compared with less common medications (e.g., chemotherapy agents). Most students (76%) identified the high-alert medications as drugs that have a high potential for causing harm to patients when administered inappropriately. But 15 percent of these respondents thought the medicines were mainly costly medicines, and 9 percent thought they were medicines that are seldom used.

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This shows that the general concept of HAMs was well understood by most of the participants, but their misconceptions still existed with some students. If asked, only 11% would identify the Institute for Safe Medication Practices (ISMP) as the organization that lists high-alert medications. By contrast, 44% answered the Food and Drug Administration (FDA), 12% the World Health Organization (WHO), and 33% said they did not know the answer. This discovery is evidence of poor knowledge about international medication safety organizations and official HAM safety guidelines. In terms of insulin safety, 61% recognized that insulin is a high-alert medicine and can cause too much hypoglycemia if it's not used correctly. But 13% thought insulin was high alert due to its cost, 17% said it was an imported drug, and 9% said it was not. Many participants (67%) indicated training had been provided about the management of HAM, and 33% reported no formal training related to HAM. The participants were questioned regarding precautions needed in the handling of HAMs. Double-checking the dose (44%) and proper labelling (34%) were the most common identified precautions. 14% of students said that independent verification would be recognized, and 6% said that they would choose to store medications separately. Just 2% said that they were not taking any extra steps. The results of this indicate that pupils had moderate knowledge about medication safety measures, which included checking and labelling medications. A significant portion of the participants (77%) indicated that they knew of or had been involved in a high-alert medication error during internship training, while 23% didn't. This points to a common problem with medication safety in the clinical setting, and the need for more effective teaching and prevention measures. Insulin was the top response (46%) when students were asked what they felt was the most dangerous, high-alert medication. 19% chose potassium chloride injection, 17% selected heparin, 10% selected opioids, and 8% selected chemotherapy medications. Results showed that insulin was the medication that was perceived to be the highest risk to patient harm among the students in the pharmacy program.

Most students (82%) felt that formal training in HAM safety should be compulsory for every student studying in a pharmacy. A further 10% agreed with this statement, and 5% were neutral, with only 3% disagreeing. Likewise, 75% strongly agreed that with the use of checklists and double-check systems, medication errors can be avoided in HAM. Additional 10% agreed, with smaller minority groups neutral (9%) and disagreed (6%). These results are indicative of positive attitudes of students with regard to medication safety education and preventive strategies. In terms of institutional educational support, 45% strongly agreed, and 30% agreed that their institution provided adequate education on high alert medications. But 20% were neutral, 3% disagreed, and 2% strongly disagreed. This means that while for many students an educational system in the institution was satisfactory, a significant percentage of the students still saw educational gaps in relation to HAM. Students indicated various preferred approaches to HAM safety education. The lectures were the most preferred method of education (45%), followed by practical demonstration (18%), online module (15%), workshop (14%), and simulation laboratory training (8%). The results indicate that students prefer the traditional teaching methods but also appreciate the practical and interactive teaching methods.

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Table 1. Attitudes and training practices about knowledge of the high alert medications (HAMs) amongst pharmacy students

S. No.	Variable / Question	Response Options	Number (n)	Percentage (%)
1.	Have you ever been through a hospital or community pharmacy internship?	Yes	67	67%
		No	33	33%
2.	Have you heard of the term "High-Alert Medications"?	Yes	85	85%
		No	15	15%
3.	Which medications are considered high alert? (Select all that apply)	Insulin	34	34%
		Heparin	12	12%
		Warfarin	10	10%
		Opioids	23	23%
		Potassium chloride (KCl)	12	12%
		Concentrated electrolytes	7	7%
		Chemotherapy drugs	2	2%
4.	High-alert drugs are medications that are characterized by	High risk of causing serious harm to patients when used incorrectly	76	76%
		Are too expensive	15	15%
		Are rarely used	9	9%
5.	What is the name of the organization that lists High-Alert Medications?	ISMP	11	11%
		WHO	44	44%
		FDA	12	12%
		Don't know	33	33%
6.	Insulin is a high-alert drug because	It may result in excessive hypoglycemia	61	61%
		It is expensive	13	13%
		It is imported	17	17%
		Don't know	9	9%
7.	Have you been trained in the management of high-alert medications?	Yes	67	67%
		No	33	33%
8.	What are the precautions that HAMs need? (Select all that apply)	Double-checking dose	44	44%
		Proper labeling	34	34%
		Independent verification	14	14%
		Storing separately	6	6%
		No extra precautions were	2	2%

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	required		
9. Have you ever experienced a high-alert medication error during your internship?	Yes	77	77%
	No	23	23%
10. What do you consider the most potentially harmful of high-alert medications?	Insulin	46	46%
	Heparin	17	17%
	Chemotherapy medications	8	8%
	Opioids	10	10%
	Potassium chloride (KCl) injection	19	19%
11. Students of pharmacy are supposed to be obligated to undergo training on HAM safety	Strongly agree	82	82%
	Agree	10	10%
	Neutral	5	5%
	Disagree	3	3%
	Strongly disagree	0	0%
12. HAM errors can be prevented by the use of checklists or double-check systems	Strongly agree	75	75%
	Agree	10	10%
	Neutral	9	9%
	Disagree	6	6%
	Strongly disagree	0	0%
13.Your institution offers sufficient education on high-alert medication	Strongly agree	45	45%
	Agree	30	30%
	Neutral	20	20%
	Disagree	3	3%
	Strongly disagree	2	2%
14. What are the training approaches of your preference when learning HAM safety?	Workshops	14	14%
	Practical demonstrations	18	18%
	Simulation lab	8	8%
	Online modules	15	15%
	Lectures	45	45%

Discussion

In the present study, the knowledge and awareness of high alert medications were determined among the students of Pharmacy, and the result was moderate, with some important gaps in their knowledge and awareness. Many students were familiar with HAMs and recognized that these medications can have serious consequences on patients if used incorrectly. The discovery indicates that undergraduate students in a pharmaceutical university have basic knowledge and theory about safety concerns related to medicines.

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More common were the recognition of insulin and opioids as examples of high alert medications, reflecting the higher levels of familiarity with commonly used clinical medications. However, there was limited knowledge about other important HAMs like chemotherapy drugs and concentrated electrolytes(12). This shows a lack of understanding of the wide range of drugs that are deemed high alert drugs. It was noted that only a small proportion of students answered the questions about HAMs and the organization responsible for the listing correctly. There was a high number of participants who picked the wrong answer or who were unsure about the correct answer (which was WHO). This reflects a lack of knowledge of international medication safety guidelines and organizations.

Most students reported that they were trained in HAM-related skills and were very positive about the need for medication safety education to be compulsory. In addition, most participants felt double checking systems and checklists are effective ways to minimize medication errors. The results indicate that there are favorable views among the pharmacy students regarding the safety of drugs. A large percentage of students reporting exposure to HAM-related medication errors during internships underscores the need to reinforce the practical safety training in the clinical setting. Students might gain a newfound understanding of current issues in medication safety in the real world because of their internship experiences. Lectures were found to be the most preferred method of learning, while several others preferred practical demonstration or a simulation-based approach. This indicates that the integration of theory and practice could enhance the competence in the safe handling of high alert medications for students(13). In general, the results suggest the need for better curriculum integration of HAM safety, better practical training, and more attention to international standards for medication safety.

Conclusion

Overall, the study proved that pharmacy students have moderate levels of knowledge and awareness about high alert medicines. Although many students knew what the acronym HAMs meant and that it was important to educate students on medication safety, the students were not always knowledgeable about official organizations for medication safety or all the precautions that should be taken. Highly frequent exposure to medication errors reported among interns underscores the need for better patient safety education and hands-on training. Workshops, simulation labs, practical demonstrations, and structured clinical training in educational institutions to enhance HAM-related content in the pharmacy curriculum. Improving the competencies of pharmacy students in high alert medication safety can play a major role in minimizing medication errors and improving care outcomes in clinical practice in the future.

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