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Panacea Journal of Medical Sciences

Journal homepage: https://pjms.in/

Original Research Article

An assessment of knowledge, attitudes, and practices on hand hygiene among medical students with in a healthcare facility

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Abstract

Background: Hospital-acquired infections (HAIs) are a significant concern globally. Horizontal transmission, where pathogens spread from one patient to another or from healthcare workers to patients, isa common route of transmission for hospital-acquired microbes. Factors such as inadequate hand hygiene, contaminated medical equipment, environmental contamination, and overcrowding can contribute to the spread of these pathogens within healthcare settings. Hand hygiene is one of the most critical meaure toprevent the spread of hospital-acquired infections. When performed effectively, it helps reduce the risk of healthcare-associated infections (HAIs) by removing harmful microbes from healthcare workers' hands, preventing the transmission of pathogens to patients and the surrounding environment.
Aim: To evaluate the understanding of hand hygiene practices and critical moments in its implementation among medical students of phase I,II, and III.
Materials and Methods: This study was done on a total number of 250 respondents who were enrolled in the MBBS curriculum in phases I,II and III in tertiary care hospital in India. A structured, self-administered questionnaire instrument was employed to evaluate hand hygiene, which consisted of three components: knowledge, attitude and self-reported practice regarding hand hygiene. The Z-test was applied to compare the percentage of correct responses between medical students, with a p-value of less than 0.05 regarded as statistically significant.
Result: A total 250 participants were surveyed to assess their knowledge, attitude regarding hand hygiene practices. The results revealed that majority (80.8%) of students had moderate knowledge regarding hand hygiene, with significant difference between the two groups. The study also revealed that the majority of students held poor attitudes towards hand hygiene. Phase II/III students had significantly better attitudes compared to phase I medical students however there wasa significant difference between the two groups regarding the confidence with respect to knowledge in hand hygiene. Of the participants, 56% demonstrated good hand-hygiene practice, 26.8% had moderate practices and 17.2% showed poor practice.
Conclusion: Evaluating students' knowledge, attitudes, and practices related to hand hygiene is essential for understanding their awareness and behavior in preventing the spread of infectious diseases. The present study emphasizes the need for conducting regular training sessions on hand hygiene practices for healthcare workers. To develop a knowledgeable attitude and effective practices towards hand hygiene, education on the topic should be introduced early in the curriculum, with continuous training provided at regular intervals.

Keywords: Hand hygiene, Health care associated infections (HCAI), Hand wash, Nosocomial infection, Hand disinfection.

Received: 01-09-2024; **Accepted:** 09-11-2024; **Available Online**: 19-08-2025

1. Introduction

Hospital-acquired infections, also known as healthcare-associated infections (HAI), are nosocomially acquired infections that are generally not present or might be incubating at the time of admission.[1] These infections are generally acquired after hospitalization and manifest 48 hours after admission to the sanitarium.[2] Hospital acquired infections remain a significant challenge in healthcare setting all around the world. Horizontal transmission, which refers to the spread of pathogens from one patient to another, is a major factor in the ongoing presence of nosocomial infections. Factors contributing to horizontal transmission include inadequate hand hygiene practices among healthcare workers, contaminated medical equipments, overcrowding and compromised immune system of patients. Healthcare worker's hand can serve as vehicles for the spread of healthcare-associated organisms, which can be highly

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https://doi.org/10.18231/pjms.v.15.i.2.450-457

virulent and multiple antimicrobial resistant strains. Healthcare workers come into contact with a variety of microorganisms during patient care, and if appropriate hand hygiene practices are neglected, these pathogens can readily be transmitted from one case to another, resulting in the spread of infections. Hand hygiene is a broad term that encompasses any system of hand sanctification, including the use of water and soap and/or alcohol-based hand antiseptic, aimed at removing ephemeral microbes from hands.[2] There is revelatory increase in morbidity, mortality and expenses related to healthcare globally due to acquisition of infections acquired in health service settings.[3] In low- and middle-income countries, the prevalence of healthcare-associated infections can be as high as 19%, creating a significant burden on healthcare systems.[4] Among the various infection control strategies, proper hand hygiene remains one of the most effective and cost-efficient methods for preventing the spread of these infections[5] and also acknowledged as an accessible to be a convenient and expenditure effective means of precluding communicable diseases.[6] Although substantiation highlights the simplicity and effectiveness of hand hygiene in curbing the dissemination of virulent and multiple drug resistant organisms, ensuring congruous adherence among healthcare workers continues to be a major challenge, despite ongoing educational efforts.[7] The failure to provide sufficient training, foster awareness and apply mindfulness of hand hygiene protocols among hospital personnel can lead to unintentional neglect which directly impacts patients safety & leads to spread of preventable healthcare-associated infections.[8]

The current study was undertaken to offer valuable perceptivity into the current the level of knowledge and comprehensions surrounding hand hygiene practices among healthcare trainees, with the goal of identifying main areas where improvements are needed and correlating them with informed targeted interventions. Furthermore, this research can provide the foundation for more effective training programs, continuous education, and policy adjustments aimed at cultivating a culture of infection control that prioritizes safety and quality care.

2. Materials and Methods

2.1. Study approach

This study was done on a total number of 250 respondents who were enrolled in the MBBS curriculum in phases I,II and III in RKDF Medical College hospital & research centre, Bhopal, India for a period of four months. The study utilized a quantitative research design to systematically evaluate individual's knowledge, attitude and practices concerning hand hygiene techniques, focusing on different techniques and the critical moments when hand hygiene is necessary. This method allowed for the collection of measurable data to identify specific gaps or strengths in hand hygiene practices within the target population.

2.2. Study design

A cross sectional study was employed for its ability to capture a representation of participants' behaviors and attitudes at a single point in time. Prior to data collection, the study was reviewed and approved by the Institutional Ethics Committee to ensure that ethical standards were met, particularly in terms of participant confidentiality and informed consent. Participants were fully informed about the purpose of the study and procedures involved, ensuring transparency and ethical conduct. Verbal consent was obtained from those who volunteered to participate, reinforcing the study's commitment to respecting participants' autonomy. They were then asked to complete a paper-based survey. To ensure confidentiality, no personal identifiers, including names, were used throughout the study.

2.3. Data collection tools

Self structured, self administered hand hygiene questionnaire instrument consisted of three scales: knowledge, attitude and self-reported practice regarding hand hygiene. A demographic section was added to the questionnaire to elicit information on participants' age, gender, level of education completed and questions on if participants have had formal training on hand hygiene. Medical students based on their exposure to hand hygiene (HH) education in their curriculum were divided into two groups: Phase I students are those who haven't received formal education on hand hygiene, while Phase II/III students have been taught about it as part of their curriculum. Participant's knowledge was evaluated using the Hand Hygiene Knowledge Questionnaires for Health Care Workers developed by the WHO. The questionnaire consisted of 27 questions, including multiple choice and yes/no items, providing clear assessment of both specific knowledge and broader understanding. A scoring system was implemented where participants received one point awarded for each correct answer to knowledge questions and zero points for incorrect responses. Sum of the points obtained from all knowledge items was used to calculate the total knowledge score (KScore) for each participant. Measurement process for assessing attitudes and practices regarding hand hygiene was done using a questionnaire consisted of 10 questions to measure attitudes and 6 questions to assess practices. Participants rated their level of agreement with each statement on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The attitude towards hand hygiene (HH) was assessed using a 10-item scale, while HH practice was evaluated through a six-item self-reported scale. Each item had a maximum score of 5, yielding total possible scores of 50 for the attitude scale and 30 for the practice scale. A score of 75% or higher was considered good, a score between 50-74% was categorized as moderate, and a score below 50% was considered poor. Microsoft Excel was used to analyze and manage data and appropriate statistical tests were applied wherever necessary. The results were

considered statistically significant when p-value came less than 0.05.

2.4. Inclusion criteria

Indian Medical Graduates from part I, II, & III who volunteered to participate were included in the study.

2.5. Exclusion criteria

Students who chose not to participate were excluded.

3. Results

A total of 250 surveys collected from participants were included in the data analysis. 40.0% of participants were in phase I of MBBS curriculum and rest 60% were Phase II & III. 60 % of students had received a formal training on hand hygiene. Please refer to **Table 1** for additional demographic data.

Table 2 presents the participants' responses to the hand hygiene knowledge questionnaire for healthcare workers.

Table 1: Demographic profile of participants (N=250)

Description	**N**	**N%**
Sex		
Male	100	40%
Female	150	60%
Level of education		
Phase I	100	40
Phase II & III	150	60
Have you previously received formal training on hand hygiene?		
Yes	150	60
No	100	40

Table 2: Hand hygiene knowledge questionnaire - Comparison of knowledge in Phase I & Phase II/III students. Source: WHO monitoring tools[9]

Knowledge question		**Phase I students (n=100)**		**Phase II / III students (n=150)**		**Total % (n=250)**	***P***
K1	Which of the following is the primary method through which potentially harmful germs are transmitted between patients (unclean hands of healthcare workers)?	75	75.0%	120	80%	78%	NS
K2	What is the primary source of germs that contribute for health care associated infections? (Germs already present on or within the patient)	28	28%	70	46.6%	39%	**.**00308
What is the optimal time for performing hand hygiene to prevent the transmission of germs to the patient?							
K3	Prior to making physical contact with a patient (yes)	95	95%	147	98%	96.8%	NS
K4	Directly after the potential exposure to bodily fluids (yes)	94	94%	148	98.6%	96.8%	NS
K5	After coming into contact with the immediate surroundings of a patient (no)	30	30%	45	30%	30%	NS
K6	Right before performing a clean or aseptic procedure (yes)	90	90%	143	95.3%	93.2%	NS
What is the ideal time to perform hand hygiene to avoid the transmission of germs to the healthcare worker?							
K9	After physical contact with a patient (yes)	98	95%	150	100%	98%	NS
K10	Directly after the potential exposure to bodily fluids (yes)	96	96%	147	96%	97.2%	NS
K11	Right before performing a clean or aseptic procedure (no)	48	48%	92	61.3%	56%	*0.03
K12	After coming into contact with the immediate environment around a patient (yes)	80	80%	128	85.3%	83.2%	NS

Which of the following statements about alcohol-based hand rubs and hand washing with soap and water are accurate in context of hand cleansing?							
K13	Hand rubbing is quicker than hand washing for cleaning hands (true).	94	94%	147	98%	96.4%	NS
K14	Hand rubbing leads to more skin dryness compared to hand washing (false).	20	20%	47	31.3%	26.8%	NS
K15	Hand rubbing is more effective than hand washing at eliminating germs (false).	28	28%	127	84.6%	62%	0.0001
K16	Hand washing and hand rubbing should be done in succession (false).	11	11%	21	14%	21.3%	NS
K17	What is the minimum duration required for an alcohol-based hand rub to effectively eliminate most germs on your hands? (20 seconds)	20	20%	132	88%	60.8%	0.0001
Which hand hygiene method should be used in the following situations?							
K18	Before palpating the abdomen (hand rubbing)	22	22%	129	86%	60.4%	0.0001
K19	Prior to administering an injection (hand rubbing)	96	96%	147	96%	97.2%	NS
K20	After disposing of a bedpan (hand washing)	80	80%	128	85.3%	83.2%	NS
K21	After taking off examination gloves (hand rubbing/hand washing)	55	68.8%	120	80%	70%	0.0001
K22	After adjusting a patient's bed (hand rubbing)	12	12%	45	30%	22.8%	0.0009
K23	After visible contact with blood (hand washing)	76	76%	128	85.3%	81.6%	NS
Which of the following should be avoided because it is linked to a higher likelihood of harmful germs colonizing the hands?							
K24	Wearing accessories or adornments like jewelry.	76	76%	128	85.3%	81.6%	NS
K25	Compromised or broken skin (yes)	80	80%	128	85.3%	83.2%	NS
K26	Use of artificial nails (yes)	94	94%	148	98.6%	96.8%	NS
K27	Frequent use of hand cream (no)	22	22%	129	86%	60.4%	0.0001

Table 3:

Level of hand hygiene knowledge (KScore)	**Low**	**Moderate**	**Good**
Percentage	12.2%	80.8%	6.8%
Number of respondants (n)	31	202	17

Table 4: Hand hygiene attitude questionnaire: Comparison of attitude in Phase I & Phase II/III students. Source: WHO monitoring tools[9]

	Attitude regarding hand hygiene	**Phase I students (n=100)**		**Phase II / III students (n=150)**		**Total % (n=250)**	***P* value**
A1	I consistently adhere to proper hand hygiene practices.	70	70%	121	80.6%	74%	NS
A2	I possess adequate knowledge and training regarding hand hygiene.	29	29%	115	76.6%	57.6%	0.00001
A3	I feel remorseful when I neglect hand hygiene.	60	60%	107	71.3%	66.8%	NS
A4	I feel uneasy when others neglect hand hygiene.	22	22%	50	33.3%	28.8%	NS
A5	In emergency situations, handwashing can be challenging.	20	20%	46	30.6%	26.4%	NS
A6	A health care personnel should act as a role model for others	75	75.0%	120	80%	78%	NS
A7	Healthcare staff should take part in regular training on hand hygiene practices.	80	80%	128	85.3%	83.2%	NS

A8	There are times when I have other priorities that feel more important than hand hygiene.	20	20.5%	46	30.6%	26.4%	NS
A9	Wearing gloves minimizes the necessity for hand hygiene.	25	25%	57	38%	32.8%	0.03
A10	Following hand hygiene practices is straightforward in the present arrangement.	27	27%	57	38%	33.6%	NS

Table 5: Practices related to Hand hygiene questionnaire - Comparison of practices among Phase I & Phase II/III students. Source: WHO monitoring tools[9]

Practices related hand hygiene questions		**Phase I students (n=100)**		**Phase II / III students (n=150)**		**Total % (n=250)**	***P* value**
P1	Occasionally, I overlook hand hygiene because I forget about it.	60	60%	70	53.8%	52%	0.03
P2	Hand hygiene is a crucial aspect of my responsibilities.	96	96%	147	98%	97.2%	NS
P3	Performing hand hygiene for every patient makes it challenging for me to perform it as frequently as required.	48	48%	72	48%	48%	NS
P4	The infection prevention team would have a beneficial effect on my hand hygiene practices.	88	88%	138	92%	90.4%	NS
P5	Posters and pamphlets on infection prevention remind me to maintain proper hand hygiene.	94	94%	144	96%	95.2%	NS
P6	I find it challenging to attend hand hygiene courses because of time constraints.	23	23%	21	14%	17.6%	NS

When the two groups where surveyed about the primary method through which potentially harmful germs are transmitted between patients in healthcare settings just 78% (n=195) correctly recognized that the unclean hands of healthcare workers were the main source. Regarding the main source of germs responsible for health care-associated infections, only 39% (n=98) of participants rightly identified that these pathogens are usually already present on or inside the patient. In contrast, 52% (n=130) incorrectly thought that the healthcare environment was the primary source. A significant difference in knowledge was observed between students in phase I and those given by students in phasesII/III ($p = 0.0038$).

A high level of awareness was observed regarding hand hygiene practices, with 96.8% of participants (n=242) recognizing the significance of cleaning hands before coming in contact with a patient, 93.2% (n=233) participants prior to carrying out a clean or aseptic procedure, and 96.8% (n=242) of study group understood significance following potential contact with body fluids. However, only 30% (n=75) of study group understood that practising hand hygiene after physical contact with patient's immediate surroundings does not prevent the spread of pathogens to the patient. On the other hand, greater awareness was recorded regarding other practices of hand hygiene such as 98% (n=245) knew the importance of cleaning hands after physical contact with a patient, 97.2% (n=243) recognized the need for hand hygiene following potential exposure to body fluids, and 83.2% (n=208) understood the need to clean hands after contact with a patient's surrounding environment. In contrast, only 56% (n=140) of study group participants were aware that performing hand hygiene prior to a clean or aseptic procedure does not prevent the spread of pathogens to medical care personnels, with a notable difference in knowledge between the two groups ($p = 0.03$). When evaluating hand hygiene practices more generally, 96.4% (n=241) believed that alcoholic hand sanitizers are quicker than handwashing with soap and water. Also, 62% (n=155) were aware that sanitizing hand solutions are not more effective than soap-water based hand hygiene in eliminating germs. Significant knowledge gaps were observed, particularly among students in phase I compared to those in phaseII/III. Moreover, 21.3% (n=32) out of the the study group understood that soap-water based hand hygiene and alcoholic hand sanitizing practices should not be carried out in that specific order. Furthermore, just 20% (n=20) of phase I medical students were aware of the minimum time needed for alcoholic sanitizers to effectively eliminate pathogenic organismd on hands, in contrast to 88% (n=132) of students in phaseII/III. When comparing knowledge between the two groups on the appropriate hand hygiene method for specific situations – such as before administering an injection, after disposing contents of a bed pan, and after visible contact with blood - no significant differences were noted. However, notable differences were observed regarding scenarios like palpation of patients abdomen, after adjusting a patient's bed, and after taking off gloves used for examination. Particpants also acknowledged that wearing jewelry (81.6%; n=204), having damaged skin (83.2%; n=208), and wearing artificial

fingernails (96.8%; n=242) increase the likelihood of hand contamination with harmful pathogens. Furthermore, 60.4% (n=151) rightly comprehended that using hand cream regularly does not elevate the risk of pathogen buildup on the hands, although there was a notable difference in knowledge between the two student groups regarding this issue.

The overall scores for the extent of knowledge on hand hygiene is provided in **Table 3**.

The responses of participants to the survey based on hand hygiene attitiude questionnaire for health-care workers are provided in **Table 4**.

Most of the students demonstrated poor attitudes regarding hand hygiene. Students in Phase II/III students exhibited notably more positive attitudes compared to phase I medical students. Additionally, out of the whole study population, 74% of the participants always followed proper hand hygiene practices consistently. Notably, 83.2% of respondents felt that they had not received adequate instruction on hand hygiene when they were in enrolled in medical school. They also agreed that if they omit hand hygiene practices they felt bad about it and even if others omit it they felt frustrated. A significant disparity was found between the two groups regarding their confidence about their knowledge of hand hygiene.

The responses of participants to the survey based on practices related to hand hygiene assessment for health-care workers are provided in **Table 5**.

Upon evaluating the participant's hand-hygiene practices, nearly half (56%) demonstrated good hand hygiene practices, while 26.8% exhibited moderate practices, and 17.2% had poor practices. A significant 97.2% of participants recognized hand hygiene as a crucial aspect of their responsibilities. However, 52% admitted to occasionally forgetting to practice hand hygiene. Additionally, 90.4% believed that having an infection prevention team would have positively impact their hand hygiene habits. The importance of reminders, such as display of posters and pamphlets for infection prevention, was acknowledged by 95.2% participants. On the other hand, 17.6% of the participants expressed time constraints made it challenging for them to attend hand hygiene courses and update their knowledge on the subject.

4. Discussion

The significance of hand hygiene in healthcare environment cannot be overstated, as it forms a foundation for infection prevention and control. The effectiveness of hand hygiene in reducing the transmission of harmful pathogens highlights its role as one of the simplest yet most powerful tools to protect both patients and healthcare workers. Adherence to established guidelines, such as those from the World Health Organization (WHO), ensures that healthcare facilities can minimize the spread of infections, reducing the risk of outbreaks and contributing to the overall well-being of patients. The findings of this study offer several key insights into healthcare workers' knowledge and practices related to hand hygiene, which are given below.

4.1. Knowledge on hand hygiene

First, the overall moderate knowledge level (80.8%) among participants is a positive indicator, suggesting that healthcare workers have a solid grasp of the importance of hand hygiene. However, the study also highlights areas where further education and improvement are needed. For instance, the fact that only 39% of study group of medical students rightly recognized that the most common source of germs causing healthcare-associated infections (HCAIs) are microorganisms already present on or inside the patient suggests that there may be gaps in understanding about the origins of infections. When questioned about the main method of transmission of harmful germs between patients, 78% of participants gave accurate responses.[10] This study's results are consistent with prior research, which found that 72% of participants were aware that the unclean hands of healthcare workers are the primary mode of transmission for healthcare-associated infections. However, just 39% of study group of medical students correctly recognized that the primary source of germs responsible for HCAIs is the microorganisms already present on or within the patient, this finding highlights a crucial knowledge gap in infection control. Interestingly, participants from Phase II/III demonstrated significantly higher awareness, with 46.6% of them correctly identifying this critical aspect. This disparity underscores the importance of progressive education throughout medical training to ensure all healthcare workers are well-informed about infection prevention and the various sources of pathogenic microorganisms. It's interesting to note that in the study, phase II/III students (62%), as compared to phase I students (28%) showed better knowledge regarding the effectiveness of alcoholic hand cleansers compared to handwashing. The variation in knowledge regarding the minimum time needed for effective hand hygiene, as specified in WHO guidelines, is notable, with 88% of Phase II/III students being knowledgeable compared to only 20% of Phase I students. This observation indicates that as students advance in their education and training, they acquire a comprehensive understanding of the hand hygiene principles and associated guidelines. These results are consistent with a study by Salati et al., Hand hygiene in medical students: performance, education and knowledge (Salati, 2012)[11] which found that medical students demonstrated a higher frequency of gaps in disinfectant knowledge compared to third-year students (82% vs, 60%; p = 0.02). In a similar study conducted by Khaled M (Abd Elaziz KM)[12] at Ain Shams University, Cairo, it was found that 23.2% of study group candidates demonstrated improper hand washing. This was primarily due to inadequate contact time (less than 30

seconds) and incorrect hand drying methods following washing. In our study both groups both groups displayed insufficient understanding regarding the appropriate hand hygiene method required during various instances like after making a patients bed only 22.8% responded correctly. The similarity to Ariyaratne et al.'s (Ariyaratne, 2015)[10] study, which found that 25% of respondents responded rightly, suggests that a substantial portion of healthcare workers, including students and practitioners, may not fully grasp the importance of hand hygiene in preventing cross-contamination in routine tasks. Overall, knowledge about the appropriate hand hygiene practices for specific clinical situation was inadequate. For example, only 60.4% of participants were aware of the correct hand hygiene method of choice before abdominal palpation. The significant difference observed between Phase I (22%) and Phase II/III (86%) medical students underscores the impact of clinical experience and education on knowledge of hand hygiene protocols. Phase II/III students, who typically have more experience to clinical settings and direct patient care, showed significantly greater awareness compared to Phase I students.

4.2. Attitude and practices towards hand hygiene

The findings of this study highlighted that participants overall exhibited limited positive attitude toward different aspects of healthcare-associated infections. Students in Phase II/III, who had more direct clinical experience, displayed more favorable attitude towards hand hygiene compared to their Phase I counterparts. A significant portion of respondents (74%) acknowledged the need to consistently adhere to proper hand hygiene practices. Additionally, a significantly higher proportion of phase II/III students believed that health care professionals should be well trained in hand hygiene and regularly participate in training sessions (80% and 85.3% respectively). Furthermore, 66.8% of students expressed guilt when they neglected hand hygiene, reflecting a sense of responsibility and recognition of the importance of proper hand hygiene practices. This underscores the importance of fostering a culture of hand hygiene from the early stages of medical education and training. 26.4% respondents agreed that hand hygiene practices in emergency situations are not always possible. HCWs perceived it to be more important to perform their patient care task quickly rather than taking time to clean their hands.[13] In a study conducted by (A, 2000) Feather et al.[14] observed the practices of hand hygiene of 187 candidates during final examination, and their findings revealed that only 8.5% of candidates washed their hands after patient interaction, though this figure increased to 18.3% when reminders of hand hygiene such as signs were displayed. Similarly, in the present study, 95.2% of participants acknowledged that posters and pamphlets on infection prevention would effectively remind them to practice hand hygiene consistently, highlighting the potential value of simple educational tools in reinforcing proper hygiene behaviors. Additionally, previous education and training in hand hygiene protocols was found to be strongly linked to better participants' knowledge of hand hygiene, which aligns with the findings of Vaishnav B et (Vaishnav, 2016),[15] who reported a positive correlation between training and improved knowledge. This study emphasizes the critical importance of motivation, education, and training in fostering better hand hygiene practices among healthcare workers, with the accessibility of alcohol-based hand rubs playing a significant role in compliance. While medical students demonstrate a reasonable understanding of handwashing, their attitude toward consistently following proper hand hygiene practices remains insufficient. Attitude plays a crucial role in determining behavior, and a negative attitude toward hand hygiene can undermine the effectiveness of knowledge and training efforts. Similar observation was made in a study done by Navabi M et al,[16] where only 20% of participants were able to provide correct responses to the questions regarding hand hygiene attitudes across various categories. Nearly half of the students (48%) identified time constraints as the primary reason for not adhering to hand hygiene procedures. Overall, the study showed that levels of knowledge, attitude and practices of hand hygiene among students were moderate to low. Phase II/III students showed better KAP as compared to phase I students. To address this gap, it may be beneficial to incorporate comprehensive education on hand hygiene practices early in the curriculum for Phase I students and to provide ongoing reinforcement throughout their education. It ensures that they are not only knowledgeable about the importance of hygiene practices but are also equipped with the skills and confidence to consistently implement these practices in real-world settings. Notably Phase II/III students may have had more exposure to clinical settings and hands-on experience, which could contribute to their greater awareness of hand hygiene protocols. This highlights the importance of practical training and clinical experience in reinforcing knowledge and skills related to infection control practices. Education and training play pivotal roles in ensuring healthcare workers understand the importance of hand antiseptic practices and how to execute it effectively. When healthcare professionals undergo thorough training in hand hygiene protocols, they are more likely to understand the rationale behind the practices and the correct techniques for implementation. By providing regular and effective training sessions, healthcare institutions can empower their staff to prioritize hand hygiene and adhere to recommended protocols consistently.

5. Conclusion

While the practices of hand hygiene themselves are straightforward, achieving consistent compliance is a complex endeavor due to the behavioral nature of the issue. Altering human behavior, especially in the context of hand hygiene, presents significant challenges. Hand hygiene compliance requires forming a habit of regular handwashing or sanitizing. Changing established habits and ingraining new

ones takes time and effort. Closing the gap between awareness of importance of hand hygiene in preventing infections and its actual practice necessitates effective education and communication. This study emphasizes the significance of training sessions in providing healthcare professionals with current and accurate knowledge on proper hand hygiene techniques. These sessions play a key role in reinforcing best practices, which are crucial for preventing the transmission of infections in healthcare environments. By providing evidence-based information and practical demonstrations, training sessions enable students to adhere to recommended protocols effectively. Behavior change is an ongoing process, not a one-time occurence. Ongoing reinforcement and reminders are necessary to sustain improved hand hygiene practices.

6. Source of Funding

None.

7. Conflicts of Interest

There are no conflicts of interest.

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Cite this article: Sharma D, Sharma D. An assessment of knowledge, attitudes, and practices on hand hygiene among medical students with in a healthcare facility. *Panacea J Med Sci*. 2025;15(2):450-457.