



RESEARCH ARTICLE



A Comparative Analysis of Hand Hygiene Knowledge, Attitudes, and Practice Among Female Medical and Non-medical Students in Peshawar: A Cross-sectional Study

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Background: Hand hygiene is a fundamental component of infection prevention, control, and patient care. However, it is often perceived as merely a personal hygiene practice, as its wider implications for disease prevention and public health are not comprehended. Hand hygiene is not implemented in an optimal way, both by health professionals and the population. The study aimed to assess and compare the hand hygiene knowledge, attitudes, and practices of medical and non-medical students in Peshawar, Pakistan.

Methods: A cross-sectional study was conducted, and data was collected from female medical and non-medical students in Peshawar by means of a validated questionnaire using convenience sampling and snowball sampling techniques. SPSS version 20 was used for data analysis.

Results: The overall level of knowledge, attitudes, and practices of hand hygiene in both groups was good. More medical students associated damaged skin, jewelry, and artificial fingernails with germ colonization, believed in the adequacy of hand washing after environmental exposure, prioritized hand hygiene, and consistently washed their hands after handling garbage and bowel movements. On the other hand, more non-medical students believed that hand washing cleans both hands and food, recognized the protective role of hand cream, washed hands only when visibly dirty, and considered hand washing after coughing, sneezing, or blowing the nose and drying hands after washing necessary.

Conclusion: The findings suggest that it is imperative to make targeted interventions, create awareness, and educate the public regarding hand hygiene to effectively improve its compliance. Moreover, additional research is necessary to establish the extent of KAP concerning hand hygiene.



Introduction

Hand hygiene is a simple, easily implemented, and effective practice that can reduce the risk of infection (1). In the global effort to combat infectious diseases, hand hygiene stands as a fundamental pillar of disease prevention (2). To standardize hand hygiene

practices globally, the World Health Organization (WHO) released Guidelines on Hand Hygiene in Health Care and introduced 'My Five Movements for Hand Hygiene' (3,4). In a healthcare setting, adherence to proper hand hygiene protocols is non-negotiable, as

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poor compliance poses a risk for cross-infection (5,6). Hand washing with soap is the simplest, most affordable, and most cost-effective preventive intervention for reducing the burden of communicable diseases, including COVID-19 (7). Hand hygiene compliance was strongly influenced by attitudes, self-efficacy, and habits but was not associated with knowledge or risk perception (8). Inadequate hand hygiene facilities probably contributed to the poor compliance (9). Furthermore, hand hygiene practices are influenced by cultural and religious beliefs, which can impact adherence to hand hygiene protocols (10,11). In Pakistan, where the healthcare system faces significant challenges, hand hygiene practices are crucial for preventing the spread of infectious diseases. In a study conducted among medical students, it was found that they had a moderate level of knowledge and attitudes towards hand hygiene; there was no significant difference in practice between male and female students (12). But the non-medical students, being less exposed to formal hand hygiene education, might exhibit distinct views and habits shaped by their academic fields, way of life, and cultural standards. This cross-sectional study aims to investigate the knowledge, attitudes, and practice of hand hygiene among female medical and non-medical students in Peshawar, Pakistan. By understanding the factors that influence hand hygiene behavior, we can identify areas of deficiency and develop evidence-based interventions to promote adherence to recommended hand hygiene practices.

Materials and Methods

A cross-sectional study design was conducted among medical and non-medical students from different institutions in Peshawar. The period of study was from February 5th to April 30th, 2024. A non-probability sampling technique was used. More precisely, it was a combination of convenience sampling and the snowball technique. The core data was collected manually as well as digitally, with informed consent. In determining the sample size for the study, we employed the epitool package. We calculated a total sample size of 323 participants with a confidence interval (CI) of 95%. The population proportion (p) was assumed to be 50%, and we set a margin of error (MOE) of 5%. We used a validated questionnaire, which we obtained from (13) and (14).

The questionnaire was in English and consisted of closed-ended questions. It was mainly divided into two sections. The first section consisted of questions regarding demographics (name, age, gender, and field of study), and the second section was further divided into three sections, Section A consisted of 11 questions regarding knowledge of hand hygiene. Section B included eight questions regarding the practice of hand hygiene. We included female medical students and non-medical students from Peshawar in the social circles of the enrolled students, while individuals unwilling to participate in the study and foreign medical students were excluded. The data was analyzed using SPSS (statistical package for social sciences) version 20 and displayed on bar charts and graphs. Quantitative variables were compared using the Chi square test, which was used for calculating the P value (the chi-square test is a statistical test used to compare observed results). Through the use of this method, we were able to obtain valuable insights and draw meaningful conclusions from our research findings.

Results

This study investigated hand hygiene knowledge, attitudes, and practices among female medical students in their social circles. A high response rate (95%) yielded data from six participants, allowing for a comprehensive analysis of hand hygiene behavior among this population.

Knowledge of hand hygiene:

Both medical and non-medical students demonstrated a good foundational understanding of hand hygiene principles. The majority (>47%) recognized hand hygiene washing's importance in preventing germ transmission (Table 1).

However, medical students displayed significantly better knowledge regarding certain aspects. Notably, they were more likely to understand the association between damaged skin or jewelry and increased germ colonization. ($p = 0.001$) and the effectiveness of hand washing for cleaning utensils used for eating ($p = 0.024$). Medical students were more likely to view hand cream as a protective measure compared to non-medical students ($p = 0.001$). They believed hand rubbing was as effective as

hand hygiene ($p = 0.002$), and both medical and non-medical groups were worried about frequent washing and drying their skin (Table 1).

Table 1. Knowledge-Based Responses to Hand Hygiene (n = 306)

		Medical %	Non-medical %	Significant values
Damage skin wearing jewelry and using artificial fingernails are associated with increased likelihood of colonization of germs.	Yes	47.7	43.8	0.001
	No	51.6	6.9	
Hand washing is a process that helps to clean not only our hands but also everything that we eat with our hands from germs.	Yes	39.2	44.8	0.024
	No	10.1	5.9	
Use of hand cream is a good protective measure to be taken in home, college, university or hospital.	Yes	37.3	46.4	0.001
	No	12.1	4.2	
Hand washing after visible exposure to blood, dirt and infected material is safe for health.	Yes	47.7	43.1	0.001
	No	1.6	7.5	
Hand rubbing is more effective than hand washing against germs.	Yes	8.5	16.0	0.002
	No	40.8	34.6	

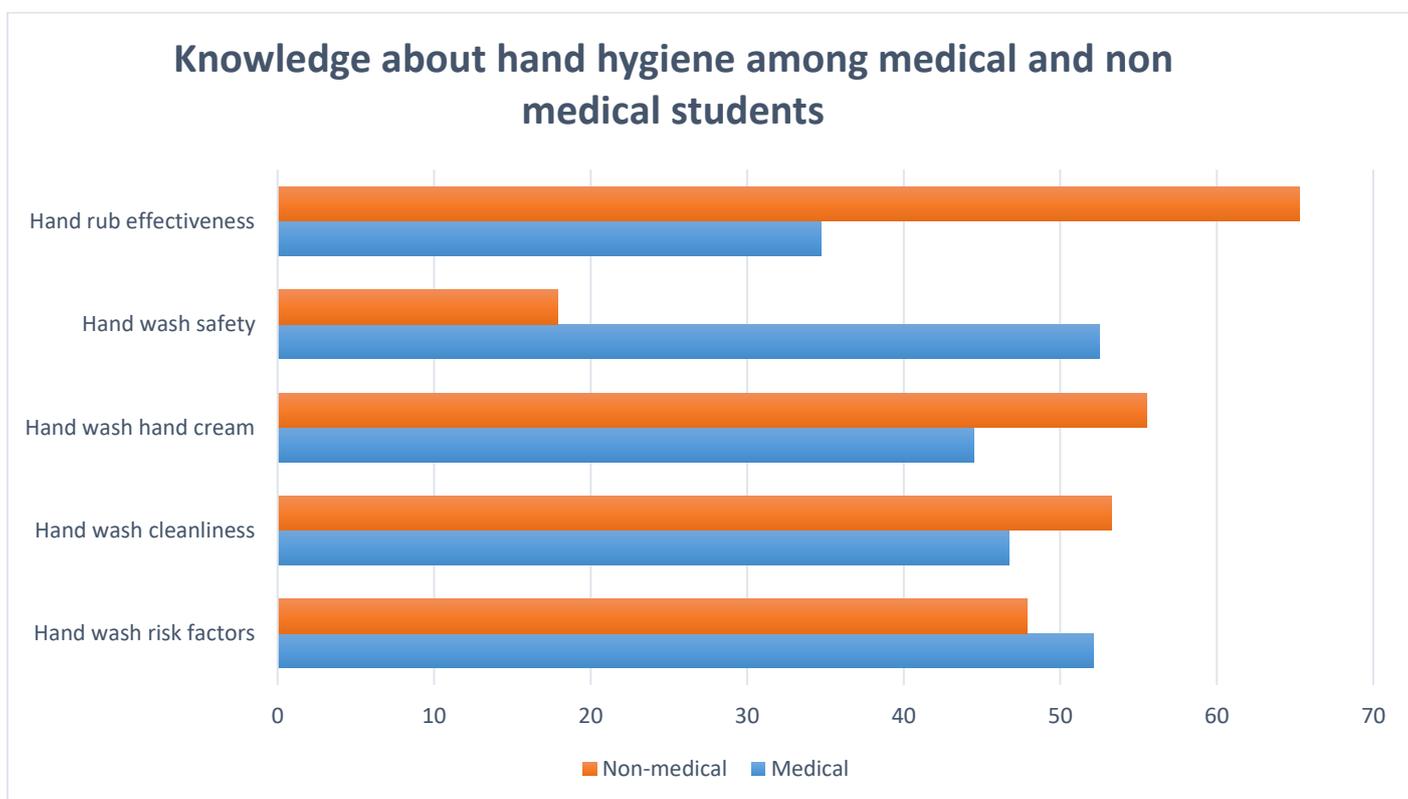


Figure 1. Knowledge about hand hygiene among medical and non medical students

Attitude towards hand hygiene

A positive attitude toward hand hygiene was observed among both groups. The majority of the students (>44%) acknowledge the importance of educating others about hand hygiene and reported experiencing guilt when they don't wash their hands. Notably, medical students demonstrated a significantly stronger commitment to hand washing; prioritizing it over other tasks ($p=0.001$). There was no significant difference in concern about hand washing damaging the skin or

difficulty finding soap or sanitizer between the two groups. (Table 2)

Table 2. Attitudes-based on hand hygiene (n=306)

		Medical %	Non-medical %	Significant values
Encourage family members or friends to wash or sanitize their hands.	Yes	46.7	2.6	0.340
	No	47.1	3.6	
Frequent hand washing damages my skin.	Yes	20.9	20.3	0.379
	No	28.4	30.4	
Sometimes, I have more important things to do than hand hygiene.	Yes	15.0	25.8	0.001
	No	34.3	24.8	
Have any difficulty finding soap and sanitizer in the hospital or at your home	Yes	15.4	19.3	0.124
	No	34.0	31.4	

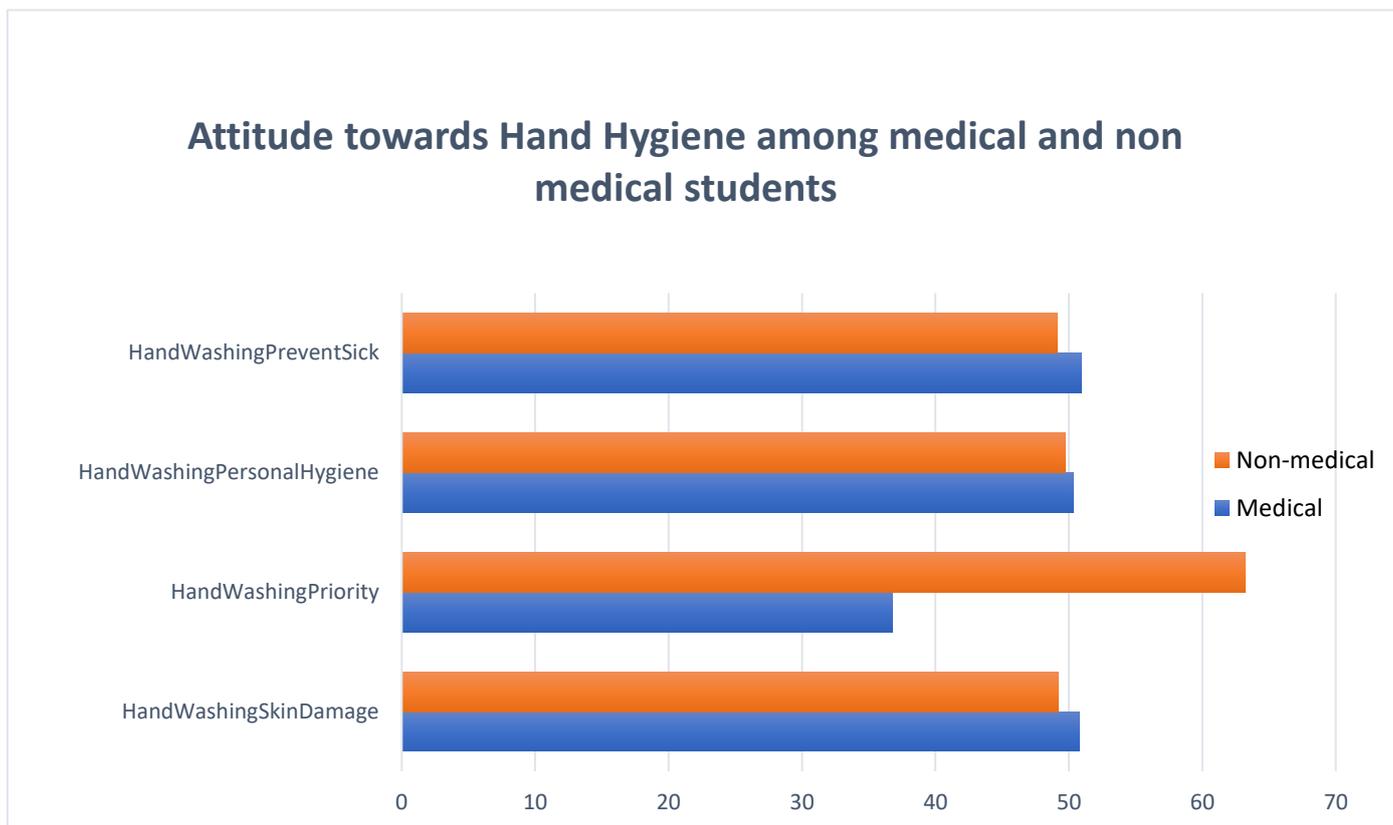


Figure 2. Attitude towards Hand Hygiene among medical and non medical students

Practices of hand hygiene

While a significant portion of students reported washing hands after visible contamination, some students admitted not washing hands as often as recommended or being influenced by others not washing their hands. Both groups reported similar practices regarding hand washing before meals and after using the washroom. Medical students showed a higher adherence to hand washing after coughing or sneezing and drying their hands after washing compared to non-medical students. Only a small percentage of students reported washing hands based solely on visible dirt (Table 3).

Table 3. Practices of hand hygiene (n=306)

		Medical %	Non-medical %	Significant values
Do you wash your hands after handling garbage/rubbish?	Yes	48.4	46.4	0.010
	No	1.0	4.2	
I may not wash my hands if I see that others are not washing their hands when they should.	Yes	5.2	13.1	0.001
	No	44.1	37.6	
I wash my hands after a bowel movement.	Yes	49.0	46.1	0.001
	No	0.3	4.6	
I wash my hands after coughing, sneezing and blowing my nose.	Yes	26.8	39.2	0.001
	No	22.5	11.4	
Is it necessary to dry your hands after washing?	Yes	28.1	34.6	0.026
	No	21.2	16.0	
I only wash my hands when they are visibly dirty.	Yes	5.2	14.7	0.001
	No	44.1	35.9	

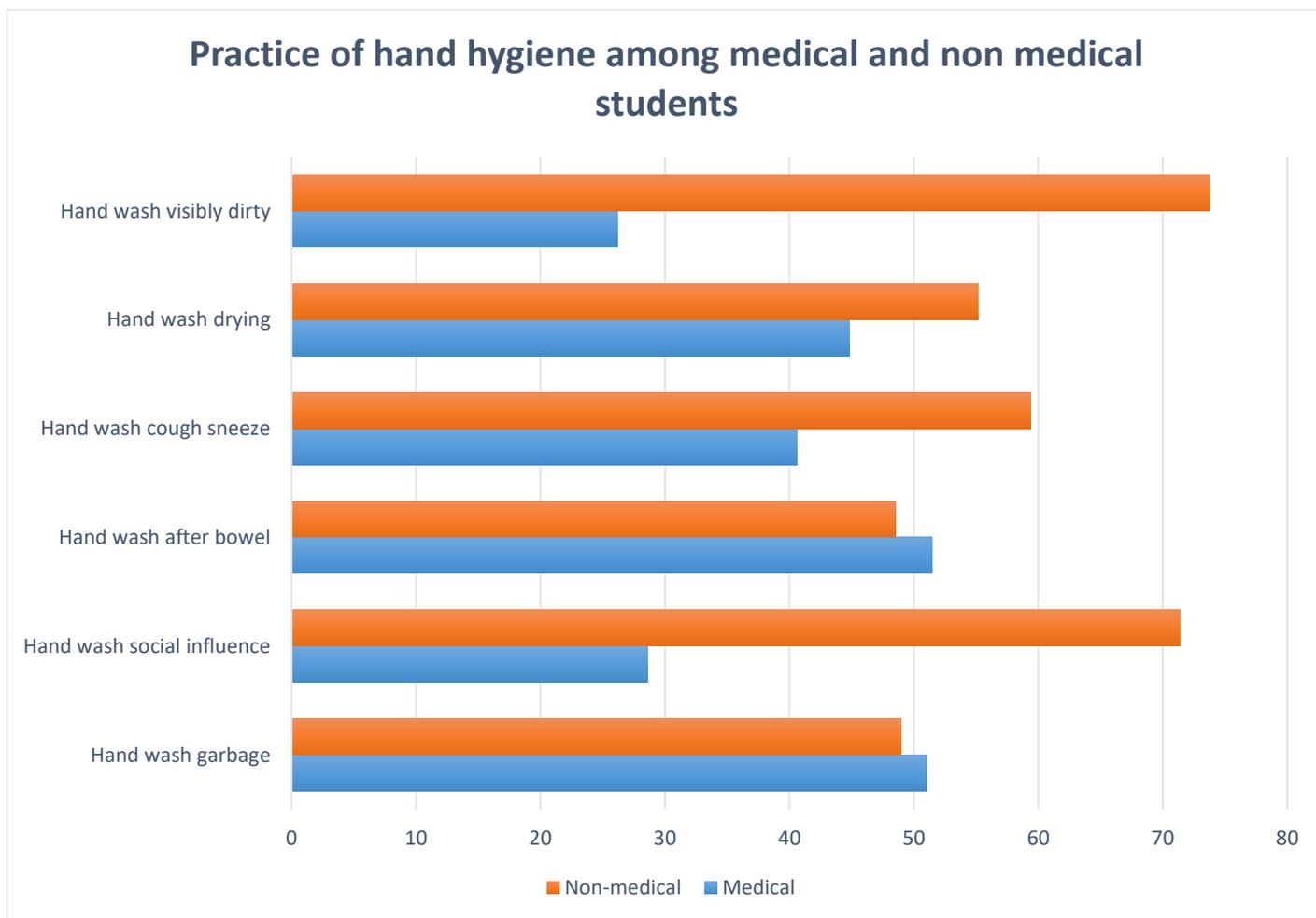


Figure 3. Practice of hand hygiene among medical and non-medical students

Discussion

The present study was aimed at filling the gap between medical and non-medical students' hand hygiene knowledge and practice and assessing the undergraduate medical students' knowledge and compliance regarding hand hygiene.

In our study, 48-49% of the positive indications for hand hygiene outlined in the questionnaire were correctly identified, and 61-62% of students were either unaware or not sure about these moments. This is comparable to the results of (15), which reported awareness among 56% of the students.

The public's knowledge of hand hygiene was almost equivalent to that of medical students, possibly due to public health efforts made globally to raise hand hygiene awareness (16).

Nonetheless, there remains a slight gap in knowledge between the two groups. This was signified by the responses between the two groups when asked if jewelry is necessary to remove before hand washing or if it increases the likelihood of the colonization of germs. Of the non-medical student groups, 43% replied correctly, while 47% of medical student participants answered correctly ($p < 0.05$).

These results still lagged when compared with other studies done in the past 5 years. 71% of public and 95% of medical students (16), 74% of medical and 78% of nursing students replied correctly, while 76% of medical and 44% of non-medical students responded correctly according to the literature (17). This shows the need for work to further close the gap and increase awareness among both groups.

The knowledge of medical students about the fact that hand rubbing is more effective than hand washing was satisfactory because only 8% of the students replied incorrectly in this regard. This is good in comparison to the results of a past study in which 26% of medical students replied incorrectly (18).

Surprisingly, non-medical students (44.8%) more frequently believed that hand washing helped clean both hands and foods compared to medical students (39.2%) ($p = 0.024$). Recognition of the protective role of hand cream was higher among non-medical students (46.4%) than medical students (37.3%) ($p = 0.001$), although the actual protective benefits of hand cream are not supported by evidence. Additionally, understanding that hand washing after visible exposure to blood, dirt and infected material is safe was more pronounced among medical students (47.7%) than non-medical students (43.1%) ($p = 0.001$). The majority of students had poor attitudes with regards to hand hygiene. In our study results, there was a significant difference ($p < 0.05$) in the responses of both groups when they were asked about if they had more important things to do than hand hygiene, 15% of medical students and 26% of non-medical students

replied 'yes'. The attitude of medical students has improved in this regard if we compare it with the results of study (17), in which 20% of medical students and 16% of non-medical students replied 'Yes'. Only 48% of both groups replied correctly when asked about hand washing being important for personal hygiene, the result was poor as compared to the study of (19) where 82% of participants answered correctly.

The study showed that there has been a recent significant change in hand hygiene practices. 48% of medical and 46% of non-medical students (overall 94% practiced hand washing after handling garbage) with a statistically significant p-value ($p < 0.05$) was a good response as compared to other literature's results for the same practice (19). Again, the percentage of hand hygiene practice before meals in both groups was significant (40% of medical and 43% of non-medical students with an overall percentage) as compared to the results found in other studies done in the last 5 years (77%, 58%). (2,4). Indeed, the use of soap or liquid hand washing by 44% of medical and 47% of non-medical (overall 91%) was found to be greater in comparison with other past studies' results (86.5%)(15). 26% of medical and 39% of non-medical students washed their hands after sneezing, coughing, or blowing their nose. While comparing with the results found in (16,20) medical students showed poor responses in this regard because 61% of medical students in (16) and 90% of medical students in (20) practiced hand washing after sneezing or coughing. Also, the results remarkably revealed that approximately 5% of medical and 14% of non-medical students washed their hands only when they were visibly dirty, which was good enough in accordance with previous studies (96%) (19).

49% of medical and 46% of non-medical students (overall 95%) showed the practice of hand washing after going to the toilet, which was significant as compared to the results of (21), in which 63% of participants responded yes to the practice. There were no such new findings in the present study in comparison with studies done in the last 5 years. As our study was conducted with a smaller number of participants, to assess the true difference in KAP between medical and non-medical students, there is a need for more studies involving a larger number of

participants throughout the province or all over Pakistan.

Conclusion

This study reveals significant differences in hand hygiene knowledge, attitudes, and practices among female medical and non-medical students in Peshawar, Pakistan. Medical students exhibited better understanding, especially regarding germ transmission and associated risks. Non-medical students, while generally aware, showed gaps in essential practices like washing hands after sneezing and overestimated the benefits of hand creams. The findings underscore the need for improved education, practical exercises, and access to hand supplies to enhance practices in both groups.

Recommendation

To improve hand hygiene among medical and non-medical students, it is recommended to integrate hand hygiene training into all areas of study, combining theory with practical exercise and interactive sessions. Faculty and students can act as role models, while social media and campus campaigns can help spread awareness. Ensuring free access to hand hygiene supplies is essential, as is regularly gathering feedback from students to continuously improve our strategies. Finally, further research into the factors influencing compliance and the effectiveness of interventions will help us refine our efforts.

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Conflicts of interest

There are no conflicts of interest declared by the author.

Authors contribution

S.H. contributed to the conception and planning of the research; acquisition of data and participation in designing the methodology; interpretation, analysis, and discussion of the findings; and critical review of the manuscript.

A.S. contributed to acquisition of data and participation in designing the methodology; interpretation, analysis, and discussion; and review of the manuscript.

S.B. contributed to acquisition of data and participation in designing the methodology; interpretation, analysis, and discussion; and review of the manuscript.

S.Ha. contributed to acquisition of data and participation in designing the methodology; interpretation, analysis, and discussion; and review of the manuscript.

R.A. contributed to acquisition of data and participation in designing the methodology; interpretation, analysis, and discussion; and review of the manuscript.

L.S. contributed to acquisition of data and participation in designing the methodology; interpretation, analysis, and discussion; and review of the manuscript.

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