



Assessment of hand hygiene practices among nurses at a regional hospital in Kandahar, Afghanistan: A cross-sectional study based on the World Health Organization (WHO) 'Your 5 Moments for Hand Hygiene' guidelines

Abdul Qadeer Baseer^{1*}, Asmatullah Usmani¹, Shafiqullah Mushfiq¹, Mohammad Hassan Hassand¹, Bilal Ahmad Rahimi², Abdul Wahid Monib¹, Mohammad Salim Daqiq¹, and Parwiz Niazi¹

¹ Department of Biology, Faculty of Education, Kandahar University, Kandahar, Afghanistan

² Department of Pediatrics, Faculty of Medicine, Kandahar University, Kandahar, Afghanistan

Abstract

Background: Hand hygiene is a critical component of infection prevention and control (IPC) in healthcare settings, as emphasized by the World Health Organization (WHO). However, compliance with recommended hand hygiene practices remains suboptimal in many resource-limited settings, including Afghanistan. Despite its importance, limited research has been conducted on hand hygiene practices in Afghan healthcare facilities, highlighting the need for further investigation.

Objective: This study aimed to evaluate the self-reported hand hygiene practices of nurses at Mirwais Regional Hospital in Kandahar, Afghanistan.

Methods: A cross-sectional study was conducted among 141 nurses between August and October 2023. Self-reported hand hygiene compliance was assessed using WHO's "Your 5 Moments for Hand Hygiene" framework. Data on demographic characteristics, training, and compliance rates were collected. Descriptive statistics and logistic regressions were applied to analyze the data using SPSS version 26.0.

Results: The study found that 73.1% of nurses demonstrated good hand hygiene practices, while 26.9% had non-good compliance. Female nurses showed significantly higher compliance (87.5%) than their male counterparts (68.8%) with a p -value of 0.044, AOR = 1.15 (95% CI: 1.03–9.75). Nurses with a bachelor's degree had higher compliance (92.3%) compared to those with a diploma (59.4%) ($p = 0.046$, AOR = 2.1, 95% CI: 0.15–0.96). Nurses aged ≥ 30 years showed better compliance (96%) than those aged 20–29 years (75.3%) ($p = 0.006$, AOR = 2.1, 95% CI: 1.84–36.53). Hand hygiene training was positively associated with better compliance (88.3% vs. 61.9%, $p = 0.004$, AOR = 1.5, 95% CI: 0.07–0.6).

Conclusion: While overall compliance was relatively high, significant gaps persist, particularly among younger, less educated, and male nurses, as well as those in high-burden wards. Enhanced training programs, tailored strategies, and regular audits are essential for improving hand hygiene practices and strengthening infection prevention and control efforts, ultimately enhancing patient safety in resource-limited settings.

Keywords

Afghanistan; hand hygiene; nurses; resource-limited settings; hospitals; World Health Organization; demography; compliance

*Corresponding author:

Abdul Qadeer Baseer, BSc, MSc
Department of Biology, Faculty of Education,
Kandahar University, Kandahar, Afghanistan
Email: a.baseer@kdu.edu.af

Article info:

Received: 3 June 2024

Revised: 11 July 2024

Accepted: 13 November 2024



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E-ISSN: 2477-4073 | P-ISSN: 2528-181X

Background

In both developed and developing nations, healthcare-associated infections (HAIs) continue to represent a considerable challenge to public health. They result in increased healthcare expenses, unnecessary medical tests, prolonged hospital stays, and heightened use of medications

(Mu et al., 2016). Hand hygiene is widely acknowledged as the cornerstone of infection prevention and control (IPC) (Schmutz et al., 2023). Hand hygiene encompasses various practices, including handwashing with soap and water or the application of alcohol-based hand rubs (ABHR) and sanitizers to eliminate transient germs from hands (Nabavi et al., 2015). During healthcare procedures, hand contact is the primary channel for

germ transmission. Consequently, a significant number of individuals worldwide die daily from infectious diseases contracted in healthcare facilities (WHO, 2009a).

Studies suggest that more than 1.4 million individuals worldwide are affected by HAIs (Saleh et al., 2022). Furthermore, according to the World Health Organization (WHO), the prevalence of HAIs is approximately 40% in developing nations and nearly 5–10% in developed countries (Mohaithef, 2020). Most HAIs are transmitted between patients via the hands of healthcare workers (HCWs), influenced by heavy workloads and clinical procedures (Nabavi et al., 2015). Research has demonstrated that using ABHR or washing hands with soap and water effectively reduces the spread of infectious diseases (Mohaithef, 2020; Mu et al., 2016; Nabavi et al., 2015; Wang et al., 2022). The WHO recommends the use of ABHR for routine hand decontamination in clinical settings when hands are not visibly soiled. Additionally, alcohol-based hand hygiene requires less time than washing hands with soap and water, yet it remains effective against most pathogens (Marra & Edmond, 2014).

In 2009, WHO proposed the “Your 5 Moments for Hand Hygiene” framework to enhance global hand hygiene practices (Chou et al., 2012; Shen et al., 2017). These five crucial moments include actions before patient contact, before clean procedures, after exposure to body fluids, after patient contact, and after contact with patient surroundings (Shen et al., 2017). Over the past 15 years, the ‘five moments’ framework has gained traction, emerging as the standard practice in healthcare centers (Chou et al., 2012). This variation in adherence underlines the need for a comprehensive understanding of hand hygiene practices worldwide.

This study is guided by the World Health Organization's “Your 5 Moments for Hand Hygiene” framework, which delineates critical moments for hand hygiene to prevent infection transmission. This conceptual model highlights the study's design by focusing on pivotal instances of hand hygiene practice among nurses in clinical settings. The research explores the relationship between demographic variables—gender, education level, years of experience—and hand hygiene practices. Existing literature suggests that these factors may influence hand hygiene adherence (Mu et al., 2016; Nabavi et al., 2015). For instance, gender differences in hand hygiene compliance have been reported, with female healthcare workers often exhibiting higher adherence rates compared to their male counterparts (Marra & Edmond, 2014).

Hand hygiene practices have been extensively investigated globally (Mohaithef, 2020; Nabavi et al., 2015; Saleh et al., 2022); however, a comprehensive study specifically addressing hand hygiene adherence among healthcare workers (HCWs) in Afghanistan, particularly in Kandahar province, remains unknown. This highlights a significant gap in understanding hand hygiene adherence in this region and its healthcare facilities. Addressing the lack of data on hand hygiene practices in Kandahar is crucial for improving infection prevention strategies. This study aims to be the first to evaluate hand hygiene practices among nurses at Mirwais Regional Hospital in Kandahar, thereby contributing to the global body of knowledge on hand hygiene adherence.

The objective is to assess adherence to the “Your 5 Moments for Hand Hygiene” protocol among nurses at Mirwais Regional Hospital, a major public healthcare facility serving

approximately 7 million people in southwestern Afghanistan. Additionally, this study seeks to emphasize the critical role of hand hygiene adherence among nurses in preventing and controlling infectious diseases. The findings will enhance the scholarly understanding of hand hygiene practices among nurses and provide valuable data to healthcare authorities and policymakers in Afghanistan, supporting the development and implementation of effective hand hygiene policies and training programs tailored to the needs of HCWs in Kandahar. Ultimately, the publication of this research will provide essential data for healthcare authorities in Afghanistan, aiding in the formulation of effective hand hygiene policies and training programs to enhance patient safety and reduce healthcare-associated infections (HAIs).

Methods

Study Design

This was a descriptive cross-sectional study conducted at Mirwais Regional Hospital. This hospital was constructed in the late 1970s in Kandahar city, Afghanistan. It is the largest tertiary care hospital in the southwestern region of Afghanistan [see Figure 1, an original map created using GIS Software ArcGIS version 10.8.2 for this research (ESRI, 2020)]. This map was developed specifically for our study without any external sources. The hospital serves as the primary governmental healthcare facility for approximately 7 million people residing in the Kandahar zone, including the surrounding provinces of Helmand, Urozgan, and Zabul. The hospital has 1,000 beds, 1,567 healthcare workers (HCWs), and more than 13 clinical departments (International Committee of the Red Cross (ICRC), 2015).

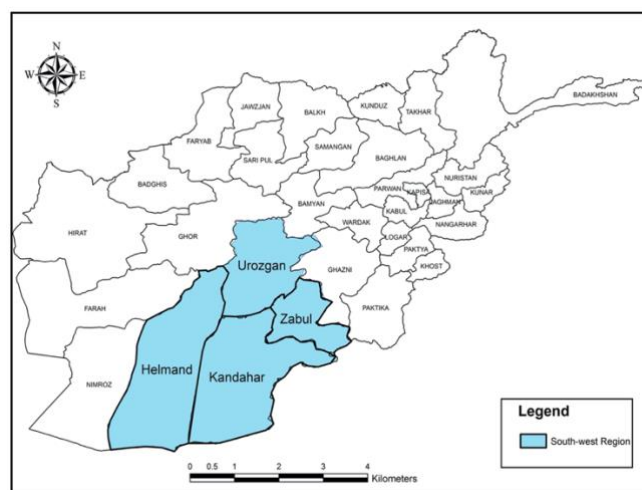


Figure 1 The southwest region of Afghanistan

Samples/Participants

In this study, only nurses who directly interact with patients at the hospital were targeted. Of the total nursing staff (222), 141 nurses across 13 clinical departments were selected for the study. The inclusion criteria were on-duty nurses (both male and female) aged over 18 years. The exclusion criteria included nurses who did not consent to participate in this study. The sample size was calculated using the Raosoft sample size calculator with a 95% confidence interval (CI) and a 5% margin of error. A minimum sample size of 141 was estimated. The Raosoft calculator was chosen for its

straightforward application and suitability for survey-based research, focusing on parameters such as margin of error, confidence level, and population size, which align well with the needs of this study. This tool is widely used in similar studies for its ease of use and reliability in ensuring representative samples. According to the Research Advisors' guidelines, Raosoft is recommended for its efficiency and accuracy in survey research (The Research Advisors, 2006).

Instruments

The questionnaire was designed in two parts based on the WHO's "Your 5 Moments for Hand Hygiene" framework (WHO, 2009a). Many studies have already used these guidelines, translated them into different languages, and published them in peer-reviewed journals (Alleganzi et al., 2013; Sax et al., 2007; Walaszek et al., 2018; WHO, 2009b). The English version of the questionnaire was translated into Pashto using the forward-backward translation method. One of the co-authors translated the questionnaire into Pashto, and it was later cross-checked by an English language lecturer from the Faculty of Literature at Kandahar University.

The first section of the questionnaire covered demographic and occupational variables, including questions about hand hygiene training programs, age, gender, education, and job experience. The second part addressed hand hygiene practices, including before touching a patient, before a clean/aseptic procedure, after body fluid exposure risk, after touching a patient, and after touching the patient's surroundings (WHO, 2009a). This section also included additional questions related to hand hygiene practices, such as: before wearing gloves, after removing gloves, do you follow the WHO's handwashing procedure? Do you apply hand rub following the WHO procedure? Do you take care of your hands regularly using a protective hand cream or lotion? Do you wait for your hands to dry before putting on gloves after washing or hand-rubbing? Do you avoid wearing items like artificial fingernails, watches, and jewelry when in direct contact with patients?

Nurses took an average of 7–10 minutes to complete the 12-question questionnaire, with correct and incorrect answers scored as 1 and 0, respectively. If participants responded with 'sometimes,' it was marked as incorrect to minimize the influence of social desirability. Participants were classified into two groups based on their total scores ranging from 0 to 12. Those with scores below 9, indicating less than 75% adherence to hand hygiene practices, were classified as having non-good hand hygiene practices, while those with scores from 9 to 12, suggesting more than 75% adherence, were classified as having good hand hygiene practices (Mohaithef, 2020; Saleh et al., 2022).

Data Collection

From August to October 2023, the co-authors of this research team conducted in-person discussions at Mirwais Regional Hospital with each department's head nurse during their break times. The head nurses were provided with an overview of the research and assured that participation was entirely voluntary. Prior to data collection, informed consent was obtained from each participant. Additionally, the team emphasized that any data collected would be used solely for research purposes. The department heads then randomly distributed the

questionnaires to the nurses, and the completed questionnaires were collected on the spot by the co-authors.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 26 (Armonk, NY, USA) was used to analyze the data. Descriptive statistics, including frequencies and percentages, were used to summarize the hand hygiene practices of nurses. A logistic regression was conducted to assess the relationships between categorical demographic variables and hand hygiene practices, with statistical significance set at $p < 0.05$. Additionally, adjusted odds ratios (AOR) and 95% confidence intervals (CI) were calculated to measure the strength and direction of associations between variables (Altman & Bland, 2011; Engdaw et al., 2019; McHugh, 2013).

Ethical Consideration

The ethical approval was obtained from the ethics committee of Kandahar University, Kandahar, Afghanistan (No. 932/594, dated April 13, 2023). Moreover, formal authorization was obtained from the Public Health Directorate of Kandahar province and the head of Mirwais Regional Hospital to conduct this study (No. 245/762, dated May 25, 2023).

Results

Two hundred twenty-two nurses from Mirwais Regional Hospital were contacted, and 141 agreed to participate in this study, resulting in a response rate of 63.5%.

Table 1 Characteristics of the participants ($N = 141$)

Variable	f (%)
Gender	
Male	109 (77.3)
Female	32 (22.7)
Educational level	
Diploma degree holder nurses	128 (90.8)
Bachelor degree holder nurses	13 (9.2)
Age (years)	
20-29	99 (70.2)
30+	42 (29.8)
Work experience (years)	
<5	70 (49.6)
5-10	29 (20.6)
>10	42 (29.8)
Department (wards)	
General Medical Ward	15 (10.6)
Medical Emergency Ward	15 (10.6)
Ear, Nose, and Throat Ward	6 (4.3)
Male Intensive Care Unit	16 (11.8)
Orthopedic Ward	6 (4.3)
Surgery Ward	6 (4.3)
Communicable Diseases Ward	6 (4.3)
General Pediatric Ward	20 (14.2)
Infectious Diseases Ward	6 (4.3)
Covid-19 Ward	12 (8.5)
Surgery Out Patient Ward	16 (11.3)
Ophthalmology Ward	4 (2.8)
Genecology Ward	13 (9.2)
Attend a formal training course about hand washing	
Yes	120 (85.1)
No	11 (7.8)
Not sure	10 (7.1)

Table 1 displays the general demographic characteristics of the research participants. Among the participants, 109 out of 141 (77.3%) were male, while 128 out of 141 (90.8%) were diploma nurses. Additionally, 99 out of 141 participants (70.2%) were aged 20–29 years, while 42 out of 141 (29.8%) had more than 30 years of clinical experience. Most participants (120 out of 141, or 85.1%) had completed an official hand-washing course.

The answers provided by participants to the hand hygiene practice questionnaire are summarized in **Table 2**. The highest hand hygiene compliance before touching patients was reported by 62.4% of males and 19.1% of females, while 73.0% of males and 22.7% of females strictly adhered to hand hygiene before clean procedures. Approximately 74.5% of males and 22.7% of females followed hand hygiene compliance after exposure to body fluids, with 68.8% of males

and 21.3% of females consistently maintaining hand hygiene after patient contact. Following contact with patient surroundings, 64.5% of males and 17.7% of females practiced hand hygiene rigorously, while the percentage before wearing gloves was 58.9% of males and 21.3% of females.

Moreover, 62.4% of males and 20.6% of females meticulously followed hand hygiene after glove removal, and 64.5% of males and 21.3% of females regularly applied the WHO's handwashing procedure. Regarding hand care, 50.4% of males and 17.0% of females regularly utilized hand cream or lotion. Notably, only 14.2% of males and 10.6% of females patiently waited for their hands to dry before wearing gloves, while the majority, 58.2% of males and 19.1% of females, consciously avoided wearing items like artificial nails, watches, and jewelry when in direct contact with patients.

Table 2 Descriptive statistics of compliance of hand hygiene practices among nurses ($N = 141$)

Hand Hygiene Practices	Gender	Compliance and Non-Compliance			Total f (%)
		Yes f (%)	No f (%)	Sometimes f (%)	
1. Do you practice hand hygiene in the following situation?					
a. Before touching a patient	Male	88 (62.4)	4 (2.8)	17 (12.1)	109 (77.3)
	Female	27 (19.1)	3 (2.1)	2 (1.4)	32 (22.7)
	Total	115 (81.6)	7 (5.0)	19 (13.5)	141 (100)
b. Before clean or aseptic procedure	Male	103 (73.0)	1 (0.7)	5 (3.5)	109 (77.3)
	Female	32 (22.7)	0 (0.0)	0 (0.0)	32 (22.7)
	Total	135 (95.7)	1 (0.7)	5 (3.5)	141 (100)
c. After body fluid exposure risk	Male	105 (74.5)	0 (0.0)	4 (2.8)	109 (77.3)
	Female	32 (22.7)	0 (0.0)	0 (0.0)	32 (22.7)
	Total	137 (97.2)	0 (0.0)	4 (2.8)	141 (100)
d. After touching a patient	Male	97 (68.8)	3 (2.1)	9 (6.4)	109 (77.3)
	Female	30 (21.3)	1 (0.7)	1 (0.7)	32 (22.7)
	Total	127 (90.1)	4 (2.8)	10 (7.1)	141 (100)
e. After touching patient surroundings	Male	91 (64.5)	10 (7.1)	8 (5.7)	109 (77.3)
	Female	25 (17.7)	4 (2.8)	3 (2.1)	32 (22.7)
	Total	116 (82.3)	14 (9.9)	11 (7.8)	141 (100)
f. Before wearing gloves	Male	83 (58.9)	13 (9.2)	13 (9.2)	109 (77.3)
	Female	30 (21.3)	1 (0.7)	1 (0.7)	32 (22.7)
	Total	113 (80.1)	14 (9.9)	14 (9.9)	141 (100)
g. After removing gloves	Male	88 (62.4)	6 (4.3)	15 (10.6)	109 (77.3)
	Female	29 (20.6)	1 (0.7)	2 (1.4)	32 (22.7)
	Total	117 (83.0)	7 (5.0)	17 (12.1)	141 (100)
2. Do you follow the WHO's handwashing procedure?	Male	91 (64.5)	3 (2.1)	15 (10.6)	109 (77.3)
	Female	30 (21.3)	0 (0.0)	2 (1.4)	32 (22.7)
	Total	121 (85.8)	3 (2.1)	17 (12.1)	141 (100)
3. Do you apply hand rub following the WHO procedure?	Male	91 (64.5)	4 (2.8)	14 (9.9)	109 (77.3)
	Female	29 (20.6)	0 (0.0)	3 (2.1)	32 (22.7)
	Total	120 (85.1)	4 (2.8)	17 (12.1)	141 (100)
4. Do you take care of your hands by regularly using a protective hand cream or lotion?	Male	71 (50.4)	18 (12.8)	20 (14.2)	109 (77.3)
	Female	24 (17.0)	4 (2.8)	4 (2.8)	32 (22.7)
	Total	95 (67.4)	22 (15.6)	24 (17.0)	141 (100)
5. Do you wait for your hands to dry before putting on gloves after washing or hand rubbing?	Male	20 (14.2)	75 (53.2)	14 (9.9)	109 (77.3)
	Female	15 (10.6)	9 (6.4)	8 (5.7)	32 (22.7)
	Total	35 (24.8)	84 (59.6)	22 (15.6)	141 (100)
6. Do you avoid wearing items like artificial fingernails, watches, and jewelry when in direct contact with patients?	Male	82 (58.2)	6 (4.3)	21 (14.9)	109 (77.3)
	Female	27 (19.1)	1 (0.7)	4 (2.8)	32 (22.7)
	Total	109 (77.3)	7 (5.0)	25 (17.7)	141 (100)

According to the self-reported answers provided by the participants in the hand hygiene questionnaire, **Figure 2** illustrates the distribution of respondents based on their hand hygiene practices. Among the participants, 73.1%

demonstrated good hand hygiene practices (with more than 75% of their responses aligning with the recommended hand hygiene practices). Additionally, 26.9% exhibited non-good hand hygiene practices and did not meet the standard (with

less than 75% of their responses aligning with the recommended hand hygiene practices).

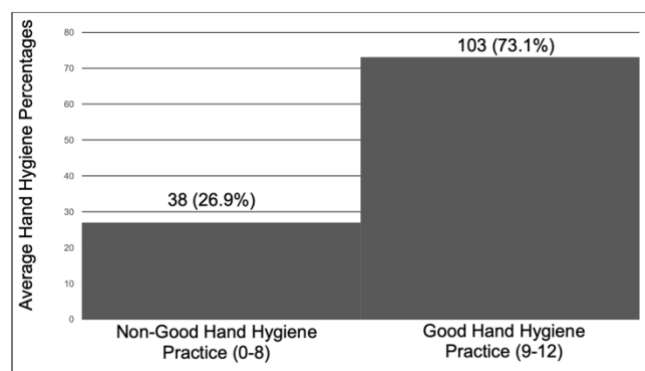


Figure 2 Distribution of nurses according to their compliance with hand hygiene protocols ($N = 141$)

The association between general demographic characteristics (gender, education level, age, work experience, and formal training) and nurses' hand hygiene practices, categorized as "Good" and "Non-good" hand hygiene practices, are presented in [Table 3](#). Among the gender groups, a significantly higher proportion of female nurses (87.5%) demonstrated good hand hygiene practices compared to male nurses (68.8%), with a p -value of 0.044, indicating statistical significance. The adjusted odds ratio (AOR) of 1.15 suggests that female nurses are 1.15 times

more likely to maintain good hand hygiene practices than male nurses; however, the wide confidence interval (CI) of 1.03–9.75 indicates some variability in this effect. Likewise, nurses with a bachelor's degree exhibited higher hand hygiene practice (92.3%) compared to those holding a diploma degree (59.4%) ($p = 0.046$, AOR 2.1, 95% CI: 0.15–0.96).

Age was also a factor influencing hand hygiene practices, with nurses aged 30 years and older exhibiting notably higher hand hygiene practice (96%) compared to those aged 20–29 years (75.3%) ($p = 0.006$, AOR 2.1, 95% CI: 1.84–36.53). In contrast, work experience was not significantly associated with hand hygiene practices ($p = 0.212$). However, hand hygiene practice rates were moderately higher among nurses with more than five years of experience (e.g., 86% compliance among those with 5–10 years of experience compared to 74% among those with less than five years). Additionally, nurses who received hand hygiene training demonstrated significantly higher hand hygiene practice (88.3%) than those without training (61.9%) ($p = 0.004$, AOR 1.5, 95% CI: 0.07–0.6).

Regarding department-specific compliance, participants from the Ear, Nose, and Throat Department, Male Intensive Care Unit, and COVID-19 Ward achieved a 100% rate of good hand hygiene practices. This was followed by the General Medical Ward (86.7%), Medical Emergency Ward (86.7%), Gynecology Ward (84.6%), Orthopedic Ward (83.7%), Surgery Ward (83.3%), and Communicable Diseases Ward (83.3%).

Table 3 The relationship between demographic characteristics and nurses' practices regarding hand hygiene ($N = 141$)

Variable	Hand Hygiene Practices Scores		p -value (Good vs Non-Good)	Adjusted OR (95% CI)
	Non-Good Practice n (%)	Good Practice n (%)		
Gender				
Male	34 (31.2)	75 (68.8)	0.044 (Significant)	AOR = 1.15 (1.03 – 9.75)
Female	4 (12.5)	28 (87.5)		
Education				
Diploma	52 (40.6)	76 (59.4)	0.046 (Significant)	AOR = 2.1 (0.15 – 0.96)
Bachelor	1 (7.7)	12 (92.3)		
Age				
20-29 years	22 (24.7)	77 (75.3)	0.006 (Significant)	AOR = 2.1 (1.84 – 36.53)
30+ years	2 (4)	40 (96)		
Work experience				
<5 years	18 (26)	52 (74)	0.212 (Insignificant)	AOR = 0.31 (0.83 – 2.22)
5-10 years	4 (14)	25 (86)		
>10 years	7 (16.7)	35 (83.3)		
Training				
Yes	14 (11.7)	106 (88.3)	0.004 (Significant)	AOR = 1.5 (0.07 – 0.6)
No	8 (38.1)	13 (61.9)		

Discussion

This study evaluated hand hygiene practices among nurses at Mirwais Regional Hospital in Kandahar, Afghanistan, using self-reported compliance with the WHO's "Your 5 Moments for Hand Hygiene" framework. The findings indicate that 73.1% of participants demonstrated good hand hygiene practices, while 26.9% fell into the non-good practice category. This result underlines a generally high level of compliance among nurses, although significant gaps remain in achieving universal adherence, particularly among specific demographic and professional subgroups.

Gender emerged as a significant factor influencing hand hygiene practices, with female nurses showing higher compliance (87.5%) compared to their male counterparts (68.8%). This finding aligns with previous studies indicating that female healthcare workers are generally more likely to adhere to infection prevention protocols, possibly due to differences in attitudes or perceptions of patient safety ([Ahmed et al., 2020](#); [Cruz & Bashtawi, 2016](#); [Suen et al., 2019](#)). However, the variability indicated by the wide confidence interval suggests that further research is needed to validate this association.

Education level also played a crucial role, with nurses holding a bachelor's degree demonstrating significantly higher

compliance (92.3%) compared to those with diploma qualifications (59.4%). This result emphasizes the importance of higher education in fostering an understanding of the critical role hand hygiene plays in infection control. Similar findings have been reported in other settings, where advanced education is associated with better adherence to evidence-based practices (Mohaithef, 2020; Nabavi et al., 2015).

Age was another significant determinant, with nurses aged 30 years and older having notably higher compliance (96%) compared to younger nurses aged 20–29 years (75.3%). This trend may reflect the impact of accumulated clinical experience and maturity on adherence to infection control practices. However, while older nurses performed better, the lack of significance in the work experience variable suggests that factors beyond experience, such as attitudes and training, may influence compliance (Allegranzi et al., 2013; Harun et al., 2022).

Formal hand hygiene training had a profound effect on compliance rates. Nurses who had received such training were significantly more likely to adhere to recommended practices (88.3%) than those without training (61.9%). This finding highlights the critical need for structured hand hygiene education programs tailored to healthcare workers in resource-limited settings like Afghanistan. Training not only increases knowledge but also fosters behavior change, as demonstrated in similar studies globally (Randle et al., 2006; Shinde & Mohite, 2014).

Departmental differences in compliance were also observed. Notably, 100% of nurses from the Ear, Nose, and Throat Department, Male Intensive Care Unit, and COVID-19 Ward reported good hand hygiene practices. This higher compliance in specialized departments may be attributed to greater awareness of infection risks and stricter monitoring of hygiene protocols in high-risk environments. By contrast, other wards, such as General Medical, Medical Emergency, and Gynecology, exhibited lower but still commendable compliance rates. These differences highlight the importance of targeted interventions and monitoring tailored to specific clinical settings to address disparities in hand hygiene adherence (Memon & Afghan, 2020; Sharif et al., 2015).

Despite the generally high compliance rates, certain aspects of hand hygiene practice remain suboptimal. For example, only a small proportion of participants (14.2% of males and 10.6% of females) waited for their hands to dry before wearing gloves, an essential step in preventing pathogen transmission. Similarly, only 58.2% of males and 19.1% of females consciously avoided wearing jewelry, artificial nails, or watches, which can harbor microorganisms and compromise hygiene. These lapses may reflect gaps in training or a lack of emphasis on specific hand hygiene elements in daily practice (Abd Elaziz & Bakr, 2009; Jang et al., 2010).

The overall hand hygiene compliance rate in this study is comparable to those reported in other developing countries, where rates typically range from 40% to 75% (Mohaithef, 2020; WHO, 2009b) (WHO, 2009b; Mohaithef, 2020). However, the disparity between male and female compliance and the variability across departments mirrors trends observed in both developed and developing nations. These findings reinforce the need for gender-sensitive and context-specific strategies to improve adherence (Suen et al., 2019).

Implications for Policy and Practice

The findings of this study highlight critical areas for improvement in hand hygiene practices and the urgent need for targeted interventions. Policies should prioritize enhancing hand hygiene training programs, particularly for younger, less educated, and male nurses, to address observed gaps. Hospital administrators should integrate regular, department-specific training sessions into institutional policies, ensuring that these programs include mandatory refresher courses in infection prevention and control (IPC). Specific lapses, such as allowing hands to dry before wearing gloves and the removal of jewelry, should be addressed through tailored training curricula and reinforced with periodic audits and feedback. Additionally, the higher compliance rates among female nurses suggest that gender-sensitive approaches may be effective in fostering better hand hygiene practices across various wards.

Strengths and Limitations

This study makes a significant contribution by addressing a critical gap in the literature on hand hygiene practices among healthcare workers in Afghanistan, particularly in Kandahar, where little data exists. By investigating hand hygiene compliance within the framework of WHO guidelines, the study adds valuable insights to the global body of research in the public health sector.

However, several limitations must be acknowledged. First, the reliance on self-reported data may have introduced social desirability bias, potentially inflating compliance rates. The relatively small sample size and gender imbalance (77.3% male and 22.7% female participants) further limit the generalizability of the findings. Additionally, the study does not fully explore inconsistencies in compliance with the WHO's "Your 5 Moments for Hand Hygiene." For instance, while 73.1% of nurses were categorized as having good hand hygiene practices overall, certain critical practices, such as allowing hands to dry before wearing gloves, showed much lower compliance, with only 24.8% adherence. A more detailed examination of the reasons behind such discrepancies could provide actionable insights for future interventions.

Conclusion

This study provides valuable insights into hand hygiene practices among nurses at Mirwais Regional Hospital, highlighting both strengths and areas for improvement. While overall hand hygiene compliance was relatively high, significant gaps persist, particularly among younger, less educated, and male nurses. Training programs were identified as crucial for fostering better practices, with formal education and targeted interventions significantly improving compliance. The findings underscore the need for targeted interventions, including education, training, and mentorship, especially for male nurses and those in high-burden wards such as surgical and pediatric units. The Afghanistan Ministry of Public Health should actively support hospitals in increasing good hand hygiene practices among nurses through regular supervision and monitoring of hand hygiene implementation in all wards. Further studies are necessary to assess hand hygiene practices among other personnel, including doctors, midwives,

and cleaners, to create a more comprehensive understanding. Expanding similar studies to public and private hospitals across all 34 provinces of Afghanistan will further enhance hand hygiene compliance and infection prevention nationally.

Declaration of Conflicting Interest

No conflicts of interest to declare.

Funding

No special grant was received from governmental or non-governmental funding agencies during this research.

Acknowledgment

We would like to express our sincere gratitude to the Kandahar Public Health Department and Mirwais Regional Hospital Directorate for their continuous and incredible support throughout this research.

Authors' Contributions

All authors contributed equally to this research. AQB developed the research idea, guided it from concept to manuscript drafting, and handled the data design. AS and SM wrote the questionnaire and collected the data. BAR, AWM, and MHH analyzed the data and prepared the first draft of the manuscript, while PN and MSD revised the manuscript from the abstract to the references. Everyone read and approved the final draft of the article.

Authors' Biographies

Abdul Qadeer Baseer, BSc, MSc, is a Senior Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Asmatullah Usmani, BSc, MSc, is a Senior Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Shafiqullah Mushfiq, BSc, MSc, is a Senior Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Mohammad Hassan Hassand, BSc, MSc, is a Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Bilal Ahmad Rahimi, MD, PhD, is an Associate Professor at the Faculty of Medicine, Department of Pediatrics, Kandahar University, Kandahar, Afghanistan.

Abdul Wahid Monib, BSc, MSc, is a Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Mohammad Salim Daqiq, BSc, is a Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Parwiz Niazi, BSc, MSc, is a Lecturer at the Faculty of Education, Department of Biology, Kandahar University, Kandahar, Afghanistan.

Data Availability

The datasets generated during and analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

The authors used ChatGPT-4 to review English writing quality without creating content. They edited the text using the AI language model and took responsibility for the publication's content.

References

- Abd Elaziz, K. M., & Bakr, I. M. (2009). Assessment of knowledge, attitude and practice of hand washing among health care workers in Ain Shams University hospitals in Cairo. *Journal of Preventive Medicine and Hygiene*, 50(1), 19-25.
- Ahmed, J., Malik, F., Memon, Z. A., Arif, T. B., Ali, A., Nasim, S., Ahmad, J., & Khan, M. A. (2020). Compliance and knowledge of healthcare workers regarding hand hygiene and use of disinfectants: A study based in Karachi. *Cureus*, 12(2), e7036. <https://doi.org/10.7759/cureus.7036>
- Allegranzi, B., Gayet-Ageron, A., Damani, N., Bengaly, L., McLaws, M.-L., Moro, M.-L., Memish, Z., Urroz, O., Richet, H., & Storr, J. (2013). Global implementation of WHO's multimodal strategy for improvement of hand hygiene: A quasi-experimental study. *The Lancet Infectious Diseases*, 13(10), 843-851. [https://doi.org/10.1016/S1473-3099\(13\)70163-4](https://doi.org/10.1016/S1473-3099(13)70163-4)
- Altman, D. G., & Bland, J. M. (2011). How to obtain the confidence interval from a P value. *BMJ*, 343. <https://doi.org/10.1136/bmj.d2090>
- Chou, D. T. S., Achan, P., & Ramachandran, M. (2012). The World Health Organization '5 moments of hand hygiene': the scientific foundation. *Journal of Bone & Joint Surgery British*, 94(4), 441-445. <https://doi.org/10.1302/0301-620X.94B4.27772>
- Cruz, J. P., & Bashtawi, M. A. (2016). Predictors of hand hygiene practice among Saudi nursing students: A cross-sectional self-reported study. *Journal of Infection and Public Health*, 9(4), 485-493. <https://doi.org/10.1016/j.jiph.2015.11.010>
- Engdaw, G. T., Gebrehiwot, M., & Andualem, Z. (2019). Hand hygiene compliance and associated factors among health care providers in Central Gondar zone public primary hospitals, Northwest Ethiopia. *Antimicrobial Resistance & Infection Control*, 8(1), 190. <https://doi.org/10.1186/s13756-019-0634-z>
- ESRI. (2020). *ArcGIS Desktop: Release notes for version 10.8.2*. <https://www.esri.com/en-us/arcgis/products/arcgis-desktop/resources>
- Harun, M. G. D., Sumon, S. A., Mohona, T. M., Hassan, M. Z., Rahman, A., Abdullah, S. A. H. M., Islam, M. S., & Styczynski, A. (2022). Compliance and constraints of hand hygiene among healthcare workers in Bangladesh. *Antimicrobial Stewardship & Healthcare Epidemiology*, 2(S1), s46-s47. <https://doi.org/10.1017/ash.2022.145>
- International Committee of the Red Cross (ICRC). (2015). *The "Chinese Hospital" in Kandahar*. <https://www.icrc.org/en/document/afghanistan-chinese-hospital>
- Jang, T.-H., Wu, S., Kirzner, D., Moore, C., Youssef, G., Tong, A., Lourenco, J., Stewart, R. B., McCreight, L. J., & Green, K. (2010). Focus group study of hand hygiene practice among healthcare workers in a teaching hospital in Toronto, Canada. *Infection Control & Hospital Epidemiology*, 31(2), 144-150. <https://doi.org/10.1086/649792>
- Marra, A. R., & Edmond, M. B. (2014). New technologies to monitor healthcare worker hand hygiene. *Clinical Microbiology and Infection*, 20(1), 29-33. <https://doi.org/10.1111/1469-0691.12458>
- McHugh, M. L. (2013). The chi-square test of independence. *Biochemia Medica*, 23(2), 143-149. <https://doi.org/10.11613/BM.2013.018>
- Memon, M., & Afghan, S. (2020). An audit of hand hygiene practices in ICU's and wards of a tertiary care hospital. *Annals of PIMS-Shaheed Zulfiqar Ali Bhutto Medical University*, 16(2), 96-101. <https://doi.org/10.48036/apims.v16i2.310>
- Mohaithef, M. A. L. (2020). Assessing hand hygiene practices among nurses in the Kingdom of Saudi Arabia. *The Open Public Health Journal*, 13(1), 220-226. <http://dx.doi.org/10.2174/1874944502013010220>
- Mu, X., Xu, Y., Yang, T., Zhang, J., Wang, C., Liu, W., Chen, J., Tang, L., & Yang, H. (2016). Improving hand hygiene compliance among healthcare workers: An intervention study in a hospital in Guizhou Province, China. *Brazilian Journal of Infectious Diseases*, 20, 413-418. <https://doi.org/10.1016/j.bjid.2016.04.009>
- Nabavi, M., Alavi-Moghaddam, M., Gachkar, L., & Moeinian, M. (2015). Knowledge, attitudes, and practices study on hand hygiene among Imam Hossein Hospital's residents in 2013. *Iranian Red Crescent Medical Journal*, 17(10), e19606. <https://doi.org/10.5812/ircmj.19606>
- Randle, J., Clarke, M., & Storr, J. (2006). Hand hygiene compliance in healthcare workers. *Journal of Hospital Infection*, 64(3), 205-209. <https://doi.org/10.1016/j.jhin.2006.06.008>
- Saleh, A. M., Alrawaili, S. M., & Abdelbasset, W. K. (2022). Hand hygiene practices among Jordanian nurses in Amman. *African Health Sciences*, 22(3), 710-717. <https://doi.org/10.4314/ahs.v22i3.76>
- Sax, H., Allegranzi, B., Uckay, I., Larson, E., Boyce, J., & Pittet, D. (2007). 'My five moments for hand hygiene': A user-centred design approach to understand, train, monitor and report hand hygiene. *Journal of Hospital Infection*, 67(1), 9-21. <https://doi.org/10.1016/j.jhin.2007.06.004>
- Schmutz, J. B., Grande, B., & Sax, H. (2023). WHO 'My five moments for hand hygiene' in anaesthesia induction: A video-based analysis reveals novel system challenges and design opportunities. *Journal of*

- Hospital Infection*, 135, 163-170. <https://doi.org/10.1016/j.jhin.2023.03.002>
- Sharif, A., Arbabisarjou, A., Balouchi, A., Ahmadidarrehshima, S., & Kashani, H. H. (2015). Knowledge, attitude, and performance of nurses toward hand hygiene in hospitals. *Global Journal of Health Science*, 8(8), 57-65. <https://doi.org/10.5539/gjhs.v8n8p57>
- Shen, L., Wang, X., An, J., An, J., Zhou, N., Sun, L., Chen, H., Feng, L., Han, J., & Liu, X. (2017). Implementation of WHO multimodal strategy for improvement of hand hygiene: A quasi-experimental study in a Traditional Chinese Medicine hospital in Xi'an, China. *Antimicrobial Resistance & Infection Control*, 6, 98. <https://doi.org/10.1186/s13756-017-0254-4>
- Shinde, M. B., & Mohite, V. R. (2014). A study to assess knowledge, attitude and practices of five moments of hand hygiene among nursing staff and students at a tertiary care hospital at Karad. *International Journal of Science and Research*, 3(2), 311-321.
- Suen, L. K. P., So, Z. Y. Y., Yeung, S. K. W., Lo, K. Y. K., & Lam, S. C. (2019). Epidemiological investigation on hand hygiene knowledge and behaviour: A cross-sectional study on gender disparity. *BMC Public Health*, 19, 401. <https://doi.org/10.1186/s12889-019-6705-5>
- The Research Advisors. (2006). *Sample size table*. <https://www.research-advisors.com/tools/SampleSize.htm>
- Walaszek, M., Gniadek, A., Kołpa, M., Ogórek-Tęcza, B., Szczypka, A., & Pustulka, B. (2018). Evaluation of nursing students' preparation for their first contact with the patient in terms of hand hygiene. *Nursing Problems/Problemy Pielęgniarstwa*, 26(2), 123-129. <https://doi.org/10.5114/ppiel.2018.78869>
- Wang, T., Xia, J., Wu, T., Ni, H., Long, E., Li, J.-P. O., Zhao, L., Chen, R., Wang, R., & Xu, Y. (2022). Handwashing quality assessment via deep learning: A modelling study for monitoring compliance and standards in hospitals and communities. *Intelligent Medicine*, 2(3), 152-160. <https://doi.org/10.1016/j.imed.2022.03.005>
- WHO. (2009a). *Hand hygiene: Why, how & when?* <https://www.who.int/publications/m/item/hand-hygiene-why-how-when>
- WHO. (2009b). *WHO guidelines on hand hygiene in health care* (9241597909). <https://iris.who.int/bitstream/handle/10665/44102/978?sequence=1>

Cite this article as: Baseer, A. Q., Usmani, A., Mushfiq, S., Hassand, M. H., Rahimi, B. A., Monib, A. W., Daqiq, M. S., & Niazi, P. (2025). Assessment of hand hygiene practices among nurses at a regional hospital in Kandahar, Afghanistan: A cross-sectional study based on the World Health Organization (WHO) 'Your 5 Moments for Hand Hygiene' guidelines. *Belitung Nursing Journal*, 11(1), 83-90. <https://doi.org/10.33546/bnj.3460>