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Knowledge, Attitudes, and Practices of Hand Hygiene among Healthcare Workers in Jammu: Implications for Infection Control

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KEYWORDS

Attitudes and practices, Hand hygiene, Healthcare workers, Hospital-acquired infections, WHO guidelines.

ABSTRACT:

Background/ Aim: Healthcare workers' commitment to hand hygiene is still below ideal, even though it is essential for reducing hospital-acquired infections (HAIs). This study aimed to assess their awareness and expertise, identify compliance barriers, and provide solutions to enhance hospitals in Jammu's adherence to WHO standards.

Methodology: This cross-sectional observational study was conducted in two government and two private hospitals in Jammu, including 850 healthcare professionals such as doctors, nurses, and paramedical staff. Participants' knowledge, awareness, and practices with WHO hand hygiene guidelines were assessed using the Hand Hygiene Knowledge Questionnaire (HHKQ). Statistical analysis was used to determine significant associations, with a p-value of <0.05 considered statistically significant.

Results: Only 51.5% of the 850 healthcare professionals who were asked had received formal training in hand hygiene in the last three years. About half of the people knew the "Five Moments" of hand hygiene and how to wash their hands correctly, which was only modest. But many still had wrong ideas about how germs spread and how long and how to use alcohol-based hand rubs. There were also attitudinal barriers: more than 52% said they forgot to wash their hands, and 51.1% said they were irritated by having to wash their hands repeatedly. It seemed like there wasn't much institutional support, as only 46.8% said they got regular reminders from infection prevention teams. Overall, people didn't always follow the rules for hand hygiene, which shows that there were problems with teaching, behaviour reinforcement, and support from the organization.

Conclusion: The current research underscores a modest level of knowledge coupled with inconsistent hand hygiene habits among healthcare personnel in Jammu. To enhance compliance and lower healthcare-associated infections, it is important to improve training, deal with behavioral impediments, and provide institutional support.

Introduction

Hospital-acquired infections (HAIs) continue to pose one of the most significant challenges to healthcare systems all over the world, causing increased morbidity in patients, prolonging hospital stay, and increasing the mortality rate [1]. HAI appears at least 48 hours after admission to a hospital and is associated with invasive medical procedures, prolonged stays in hospitals, and inadequacy of infection control measures [2]. According to WHO statistics, HAIs affect around 7.6% of patients in high-income countries and around 10.1% in low- and middle-income countries, where usually the level of healthcare infrastructure and control measures for infection do not match up [3]. In and around developing countries such as India, overcrowding of hospitals, lack of resources, and ignorance toward hygiene practices create an added burden on HAIs [4].

Hand hygiene is the most effective and simplest way to prevent HAIs. The CDC (Centers for Disease Control and Prevention) estimated that in the USA, one out of 25 hospitalized patients contract HAI every year, with violation of hand hygiene by HCWs (Healthcare Workers) being the most important cause [5]. This notwithstanding, healthcare workers regularly fail to

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comply with recommended hand hygiene practices despite existing clear guidelines, especially in resource-limited situations. A study by Erasmus et al., (2010) found that compliance with hand hygiene among health workers was often below 40%, even in well-deserved health systems [6]. Similarly, Rao et al., (2015) demonstrated that hand hygiene interventions could reduce gastrointestinal illness by 31% and decrease respiratory infections by 21%, thus emphasizing its role in infection control [7]. Dat, (2020) investigated the prevalence of HAIs, reporting a range of 5.7% to 36.4%, with surgical site infections (SSIs), bloodstream infections (BSIs), and ventilator-associated pneumonia (VAP) being the most common types [8]. A recent study performed in Indian ICUs by Hammoud (2022) elaborated the finding of an 32.8% prevalence of HAI due to poor adherence to hand hygiene and infection control measures [9]. Performance of structured hand hygiene programs in an Indian tertiary care hospital was shown to reduce CA-BSI by 42% and VAP by 29% through work done by Motagi et al., (2014) [10]. Clearly, the reports call for an immediate need of more active institutional policies and educational interventions to enhance hand hygiene compliance [11].

To deal with these challenges, Iversen has instituted the framework "My Five Moments for Hand Hygiene," aimed at accrediting hand hygiene practice for health workers [12]. Nevertheless, these recommendations have not had much compliance owing to differences in health-care settings [13]. Studies done by Alshagrawi et al., (2024) and Alshehari et al., (2025) indicate that those in intensive care units (ICUs) comply less with hand hygiene than their counterparts in general wards. The authors attribute this difference to increased workloads and illness severity [14,15].

Despite increased awareness of barriers to hand hygiene compliance, challenges such as excessive workload, limited availability of hand hygiene facilities, and inadequate training opportunities persist [16]. Kamara et al., (2022) reported that, despite the availability of alcohol-based hand rubs in most hospitals today, their use is still inconsistent among healthcare workers [17]. Keller et al., (2018) found that under the new introduction of alcohol-based hand rubs, encouraging compliance, adherences still varied from hospital to individual awareness levels [18].

Thus, this study assessed the knowledge and awareness of hand hygiene practices by healthcare workers in hospitals across Jammu. This study identified gaps and barriers to compliance while also providing insight into current infection control practices and evidence-based recommendations for enhancing the safety of patients. Given the rising burden of anti-microbial resistance and HAIs, improving compliance with hand hygiene was among critical strategies for preventing infections and improving healthcare quality.

1. Materials and Methods

2.1 Study Design

This study adopted a cross-sectional descriptive quantitative research design to evaluate healthcare workers' awareness and knowledge about hand hygiene practices across various hospitals in Jammu. The study undertook both public and private hospitals and included the ICUs, OPDs, and wards for general admissions so that the maximum coverage of diverse healthcare settings could be represented.

2.2 Study Participants

The study included 850 healthcare workers (doctors, nurses, and technicians) from government and private hospitals in Jammu. A simple random sampling technique ensured unbiased selection. Participants with at least six months of experience were included, while administrative staff, those on extended leave, and those with recent hand hygiene training were excluded.

2.3 Data Collection Methods

The Hand Hygiene Knowledge Questionnaire (HHKQ), a validated tool based on WHO and CDC guidelines, was used for knowledge assessment, evaluating healthcare workers' understanding of correct handwashing techniques, WHO's Five Moments for Hand Hygiene, and self-reported compliance with institutional protocols. The self-structured questionnaire, developed following WHO guidelines, included close-ended and Likert scale-based questions to assess demographic details such as age, sex, profession, work experience, department, work shift, and prior hand hygiene training. It also measured awareness and compliances of infection transmission, hospital policies, and infection control protocols, with responses recorded on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

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2.3.1 Data Collection Procedure

The questionnaire was distributed to participants during hospital visits, ensuring voluntary participation and confidentiality. Responses were collected in a manner that minimizes response bias. Observational assessments were conducted without prior notice, using the WHO compliance checklist to ensure objective measurement. Observers systematically recorded adherence rates across different shifts and hospital units, ensuring consistency in data collection. The integration of self-reported and observational data provided a comprehensive assessment of both perceived and actual hand hygiene practices.

2.4 Ethical Considerations

The ethical clearance of the study was secured from the Institutional Ethics Committee as per the Indian Council of Medical Research (ICMR) Biomedical Research Guidelines (ICMR, 2017). Prior to data collection, all participants signed a written informed consent. Their responses were anonymized, and therefore confidentiality was ensured with them being informed that study withdrawal was possible at any time with no repercussions.

2.5 Statistical Analysis

Data analysis was conducted using SPSS version 26. Descriptive statistics, including frequency distributions and measures of central tendency, were used. A p-value of <0.05 was considered statistically significant, with confidence intervals reported for all estimates.

2. Results

3.1. Demographic characteristics

A demographic analysis of 850 healthcare workers in Jammu hospitals revealed a balanced representation across age groups, genders (50.5% male, 49.5% female), and professions (physicians 33.4%, nurses 31.1%, paramedics 35.5%). Most had 6–10 years of experience and worked varied shifts, enabling comparative analysis across timeframes. Key departments like surgery, emergency, ICU, and paediatrics were well represented. Notably, 58.9% had never received hand hygiene training, indicating a critical gap in infection control preparedness despite a diverse and experienced workforce (Table 1).

Table 1: Demographic Characteristics of Study Participants (N = 850)

Parameters	Frequency (n)	Percentage (%)
Age		
20–29 years	216	25.4%
30–39 years	212	24.9%
40–49 years	193	22.7%
≥ 50 years	229	26.9%
Gender		
Male	429	50.5%
Female	421	49.5%
Profession		
Doctors	284	33.4%
Nurse	264	31.1%
Paramedical/ Technician	302	35.5%

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Work Experience		
6 years	275	32.4%
6–8 years	298	35.1%
9-10 years	277	32.6%
Work Shift		
Morning	274	32.2%
Evening	302	35.5%
Night	274	32.2%
Prior Hand Hygiene Training		
Yes	409	48.1%
No	441	58.9%
Department		
Internal medicine	82	9.6%
Surgery	100	11.8%
Intensive care unit	86	10.1%
Mixed medical/surgical	72	8.5%
Emergency unit	97	11.4%
Obstetrics	70	8.2%
Pediatrics	93	10.9%
Long-term/rehabilitation	78	9.2%
Outpatient clinic	90	10.6%
Other	82	9.6%

3.2. Knowledge among the participants about hand hygiene

➢ **Formal Training in Hand Hygiene**

Of the 850 healthcare professionals surveyed, 51.5% had completed formal hand hygiene training in the last three years, while 48.5% had not. This indicated that several individuals have not received recent training, highlighting the need for improved and more frequent instruction on hand cleanliness (table 2).

Table 2: Distribution of healthcare workers based on formal hand hygiene training received in the past three years

Question	Yes	No
Did you receive formal training in hand hygiene in the last three years?	438(51.5%)	412(48.5%)

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➢ **Routine Use of Alcohol-Based Hand Rub**

Of the 850 healthcare workers surveyed, 433 (50.9%) reported regularly using an alcohol-based hand rub for hand cleanliness. The remaining 417 (49.1%) did not. This almost uniform distribution suggests that individuals do not consistently adhere to the recommended hand washing protocols, even when alcohol-based solutions are accessible and effective (table 3).

Table 3: Frequency of routine use of alcohol-based hand rub for hand hygiene among healthcare workers

Question	Yes	No
Do you routinely use an alcohol-based handrub for hand hygiene?	433(50.9%)	417(49.1%)

➢ **Knowledge of Cross-Transmission Routes in Healthcare Settings**

Healthcare practitioners had varying perspectives on the primary mode of transmission of harmful microorganisms between individuals, as seen in Table 4. Of the 850 respondents, 217 (25.3%) identified patient exposure to colonised surfaces as the primary mode of transmission, whereas 215 (25.5%) considered air circulation as the secondary mode. Additionally, 210 (24.7%) cited the exchange of non-invasive items between patients, while 208 (24.5%) attributed the issue to healthcare professionals' filthy hands. The almost uniform distribution indicates that individuals do not fully comprehend the primary mode of disease transmission, highlighting the need to enhance educational efforts about this significant knowledge deficit.

Table 4: Healthcare workers' responses on the perceived main route of cross-transmission of harmful germs in healthcare facilities

Question	Health-care workers' hands when not clean	Air circulating in the hospital	Patients' exposure to colonised surfaces (i.e., beds, chairs, tables, floors)	Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients
Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?	208(24.5%)	215(25.5%)	217(25.3%)	210(24.7%)

➢ **Awareness of Common Sources of Healthcare-Associated Infections**

Among healthcare workers, the most frequently identified source of germs causing healthcare-associated infections was germs already present on or within the patient (28.2%), followed by hospital air (25.6%), hospital environment/surfaces (23.4%), and the hospital's water system (22.7%).

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Table 5: Healthcare workers' responses on the most frequent source of germs responsible for healthcare-associated infections				
Question	**The hospital's water system**	**The hospital air**	**Germs already present on or within the patient**	**The hospital environment (surfaces)**
What is the most frequent source of germs responsible for health care-associated infections?	193(22.7%)	218(25.6%)	240(28.2%)	199(23.4%)

➢ **Knowledge of Hand Hygiene Actions to Prevent Germ Transmission to Patients**

Among healthcare workers, 52.2% recognized that hand hygiene after exposure to a patient's immediate surroundings helps prevent germ transmission, followed by 50.8% for hand hygiene before a clean/aseptic procedure, 50.7% after a risk of body fluid exposure, and 50.2% before touching a patient. Nearly half of the respondents failed to identify these critical actions, indicating significant gaps in awareness of essential hand hygiene practices (table 6).

Table 6: Healthcare workers' responses on specific hand hygiene actions that help prevent transmission of germs to patients								
Question	**Before touching a patient**		**Immediately after a risk of body fluid exposure**		**After exposure to the immediate surroundings of a patient**		**Immediately before a clean/aseptic procedure**	
	Yes	No	Yes	No	Yes	No	Yes	No
Which of the following hand hygiene actions prevents transmission of germs to the patient?	427(50.2 %)	423(49.8 %)	431(50.7 %)	419(49.3 %)	444(52.2 %)	406(47.8 %)	432(50.8 %)	418(49.2 %)

➢ **Knowledge of Hand Hygiene Actions to Protect Healthcare Workers**

51.6% of healthcare personnel knew that washing their hands before a clean or aseptic treatment prevents germs from spreading. 51.3% did so after bodily fluid exposure, 52% after being around a patient, and 47.6% after touching a patient. Over half of healthcare professionals are unaware of hand hygiene moments that protect their health as shown in table 7.

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Table 7: Healthcare workers' responses on hand hygiene actions that prevent the transmission of germs to themselves								
Question	**After touching a patient**		**Immediately after risk of body fluid exposure**		**After exposure to the immediate surroundings of a patient**		**Immediately before a clean/aseptic procedure**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Which of the following hand hygiene actions prevents the transmission of germs to the health-care worker?	405(47.6 %)	445(52.4 %)	436(51.3 %)	414(48.7 %)	427(50.2 %)	423(49.8 %)	439(51.6 %)	411(48.4 %)

➢ **Knowledge of Hand Rubbing vs. Handwashing Practices**

Among healthcare workers, 50.4% correctly identified that hand rubbing is more rapid for hand cleansing than handwashing, while 49.6% disagreed. Only 47.9% believed that hand rubbing causes more skin dryness than handwashing, and 49.9% agreed that hand rubbing is more effective against germs than handwashing. Additionally, 48.7% thought that handwashing and hand rubbing should be performed in sequence. These findings reveal a lack of clear understanding regarding the comparative benefits and proper use of hand hygiene methods, with most responses nearly evenly split, indicating the need for better education on evidence-based hand hygiene practices.

Table 8: Knowledge of Healthcare Workers Regarding Hand Rubbing vs. Handwashing Practices								
Question	**Hand rubbing is more rapid for hand cleansing than handwashing**		**Hand rubbing causes skin dryness more than handwashing**		**Hand rubbing is more effective against germs than handwashing**		**Handwashing and hand rubbing are recommended to be performed in sequence**	
	True	**False**	**True**	**False**	**True**	**False**	**True**	**False**
Which of the following statements on alcohol-based handrub	428(50.4 %)	422(49.6 %)	407(47.9 %)	443(52.1 %)	424(49.9 %)	426(50.1 %)	414(48.7 %)	436(51.3 %)

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and handwashing with soap and water are true?								

➢ **Knowledge of Effective Duration for Alcohol-Based Handrub**

Only 24.4% of healthcare professionals knew that 20 seconds was the shortest amount of time needed for alcohol-based handrub to kill most pathogens. Most people didn't know, and the answers were almost equally divided between 1 minute (25.5%), 3 seconds (25.3%), and 10 seconds (24.8%). This showed that people don't know how long to wash their hands properly in table 9.

Table 9: Healthcare workers' responses on the minimal time required for alcohol-based handrub to effectively kill most germs

Question	20 seconds	1 minute	3 seconds	10 seconds
What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?	207(24.4%)	217(25.5%)	215(25.3%)	211(24.8%)

➢ **Appropriate Hand Hygiene Methods for Specific Clinical Situations**

Healthcare personnel's hand hygiene options for various clinical circumstances were almost evenly divided among rubbing, washing, and abstaining, reflecting a deficiency in clarity and consistency showed in table 10. 34.8% of people favoured hand stroking before abdominal palpation, while 32.8% selected "none." 34.9% of people picked rubbing before injecting, and 34.5% answered "none," showing that they weren't sure what to do even in sterile operations. After seeing blood, 35.8% incorrectly said "none," showing that there is a big gap in their understanding. The inconsistency and high proportion of erroneous answers in all situations show that hand hygiene instruction must be guided by clinical practice.

Table 10: Healthcare workers' responses on "Which type of hand hygiene method is required in the following situations?"

Before palpation of the abdomen	Rubbing	296(34.8%)
	Washing	275(32.4%)
	None	279(32.8%)

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Before giving an injection	Rubbing	297(34.9%)
	Washing	260(30.6.1%)
	None	293(34.5%)
After emptying a bedpan	Rubbing	291(34.2%)
	Washing	281(33.1%)
	None	278(32.7%)
After removing examination gloves	Rubbing	281(33.1%)
	Washing	286(33.6%)
	None	236(33.3%)
After making a patient's bed	Rubbing	290(34.1%)
	Washing	275(32.4%)
	None	285(33.5%)
After visible exposure to blood	Rubbing	275(32.4%)
	Washing	271(31.9%)
	None	304(35.8%)

➢ **Awareness of Factors Increasing Hand Colonization Risk**

Only 28.1% of people correctly recognised artificial nails as a risk factor. Also, 25.4% for wearing jewellery, 24.4% for using hand lotion regularly, and 22.5% for having damaged skin. These results indicate significant deficiencies in understanding personal hygiene aspects that lead to microbial contamination, underscoring the need for further training in infection control techniques beyond fundamental handwashing.

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Table 11: Healthcare workers' responses on practices associated with increased risk of hand colonization by harmful germs

Question	Wearing jewelry		Damaged skin		Artificial fingernails		Regular use of a hand cream	
	Yes	No	Yes	No	Yes	No	Yes	No
Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?	216(25.4 %)	194(22.8 %)	191(22.5 %)	230(27.1 %)	239(28.1 %)	199(23.4 %)	207(24.4 %)	219(25.8 %)

3.3. Attitudes Toward Hand Hygiene

Healthcare workers' (HCWs') self-reported hand hygiene behaviours and attitudes are all well covered by the data in Table 12. A slight majority (51.1%) of respondents expressed irritation over the frequency of handwashing, indicating that physical discomfort may diminish adherence to regulations. Moreover, 52.4% of healthcare professionals reported often neglecting to wash their hands, suggesting a behavioral lapse that might undermine infection control efforts. The responses to the impact of crises and competing priorities on regular handwashing were almost divided. 50% of individuals said that these characteristics impede frequent handwashing, demonstrating the impact of clinical workload on hygiene compliance. It is noteworthy that just 49.5% of individuals reported consistently washing their hands properly, but a little greater number (50.5%) did not. This indicated a concerning deficiency in proper hand hygiene practices. Nevertheless, 52.0% of healthcare professionals expressed discomfort upon seeing their colleagues neglecting hand hygiene, indicating their awareness of its significance and accountability for their conduct.

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Table 12: Healthcare Workers' Responses to Hand Hygiene Practices and Perceived Barriers		
Questions	**Yes**	**No**
Do you feel irritated by washing your hands again and again?	434(51.1%)	416(48.9%)
Do you often simple forget to wash your hands?	445(52.4%)	405(47.6%)
Do you think emergencies and other priorities make hand washing more difficult to manage?	433(50.9%)	417(49.1%)
Do you ensure correct hand washing at all times?	421(49.5%)	429(50.5%)
Do you feel bad when often other staff omit hand hygiene?	442(52.0%)	408(48.0%)

3.4. Practice Based Questions

Healthcare staff don't always practise excellent hand hygiene, as seen in Table 13. Many participants (50.6%) adhered to the seven handwashing phases (50.6%), cleansed their hands before putting on mittens, and maintained cleanliness before and after patient contact (50.5%). Nevertheless, only 48.4% of respondents reported that they consistently used antiseptic detergent and sanitizer to cleanse their hands, and only 46.8% reported that infection prevention teams consistently reminded them, which suggests some apprehension. On spotless hands, 50% of individuals preferred alcohol-based hand massages to antiseptic detergent. 49.5% of individuals did not consistently cleanse their hands, while only 52.1% ensured that they were clean before interacting with patients.

Table 13: Healthcare Workers' Self-Reported Compliance with Hand Hygiene Protocols and Institutional Support		
Questions	**Yes**	**No**
Do you wash your hands before wearing the gloves?	430(50.6%)	420(49.4%)
Do you ensure effective hand washing by using antiseptic soap followed by hand sanitizer?	411(48.4%)	439(51.6%)
Do you follow the proper 7 steps of hand washing?	430(50.6%)	420(49.4%)
Do you prefer alcohol-based hand rub over antiseptic soap on unsoiled hands?	427(50.2%)	423(49.8%)
Were you being instructed properly about hand hygiene in your training and orientation?	430(50.6%)	420(49.4%)
Were you being instructed properly about hand hygiene in your training and orientation?	430(50.6%)	420(49.4%)
Do you maintain hand hygiene before and after physically handling the patients?	429(50.5%)	421(49.5%)
Do you maintain hand hygiene only before physically handling the patients?	443(52.1%)	407(47.9%)
Do infection prevention teams and their activities always remind you to maintain hand hygiene?	398(46.8%)	452(53.2%)
Are you right-handed or left-handed?-+594	432(50.8%)	418(49.2%)

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3. Discussion

Hand hygiene is a fundamental aspect of infection prevention and control, especially in hospital environments where the likelihood of pathogen transmission is elevated. Healthcare workers (HCWs) frequently don't follow good hand hygiene procedures, even though they are very important. This is because of things including their knowledge, attitudes, and the surroundings. The current research provides a comprehensive overview of healthcare workers (HCWs) knowledge, attitudes, and practices regarding hand hygiene in hospital across Jammu. Despite a demographically balanced and professionally diverse cohort, the findings point to substantial gaps in infection prevention awareness and compliance.

The demographic data revealed a near gender distribution and a wide representation across age groups and professional roles allowing for balanced interpretation across experience levels and departments. However, the fact that 58.9% of participants reported never receiving formal training in hand hygiene underscores a critical weakness in institutional infection control infrastructure. This aligns with Kamara et al. (2022) who reported low formal training rates (53.2%) among HCWs [19]. Further, Motagi et al., (2014) demonstrated that structured hand hygiene education in Indian hospitals reduced central line associated bloodstream infection by 42%, emphasizing the significance of ongoing training programs [20].

Knowledge assessments further revealed inconsistencies in understanding fundamental aspects of hand hygiene. For instance, although 51.5% had received formal training in the past three years, only 50.9% reported regular use of alcohol-based hand rubs. This is consistent with keller et al., (2018), who found approximately 48% compliance even when hand rubs were readily available [21]. Moreover, 50.9% of respondents cited competing clinical priorities as barrier to hand hygiene adherence, similar to Alshehari et al., (2025) and Alshagrawi et al., (2024), who linked reduced compliance to ICU workload and contextual challenges [22,23].

Only 24.5% correctly identified healthcare workers' unclean hands as the main route of germ transmission, a finding aligned with Erasmus et al., (2010) who attributed low compliance/practice to limited comprehension of infection transmission guidelines [24]. Additionally, only 28.2% correctly recognized patients' own flora as the principal cause of healthcare-associated infections, consistent with Dat (2020) who noted misperception about ambient or airborne transmission sources among HCWs [25].

Positive aspects were also noted. Over 50% of participants correctly identified WHO's "Five Moments" of hand hygiene—for example, 52.2% knew the importance of hand hygiene after patient contact. However, only 50.6% adhered to the full seven-step technique, mirroring Hammoud (2022), who attributed inconsistent hand rub use to lack of monitoring and inadequate behavioral interventions [26].

Behavioral barriers were prominent among participants, with 52.4% admitting to frequently forgetting to wash their hands, and 51.1% expressing irritation due to the repetitive nature of hand hygiene- often citing skin dryness and fatigue. These findings mirror the WHO's 2018 report, which highlighted both physical and psychological discomfort as significant deterrents to regular hand hygiene compliance [27].

In terms of practice implementation, 50.5% washed their hands before and after seeing a patient, whereas 52.1% only did so before. Such selective compliance indicates a limited comprehension of complete infection management, corroborating Rao et al., (2015) findings that partial adherence elevates risks evidenced by a 31% rise in gastrointestinal illnesses associated with irregular hand hygiene [28].

Institutional support appeared inadequate. Only 46.8% of healthcare workers are acknowledged receiving consistent reminders from infection control teams regarding hand hygiene protocols. This supports observations by Ruffing (2015), who emphasized that the absence of proactive administrative oversight and regular reinforcement can hinder effective implementation of infection control measures, particularly in high-pressure healthcare environments [29].

4. Conclusion

This research underscores significant discrepancies in hand hygiene knowledge and implementation among healthcare personnel in Jammu. While a moderate level of knowledge and perceived importance exists, the inconsistency in application underscores significant systemic and behavioral limitations. Notable gaps include insufficient formal training, partial adherence to

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critical hygiene steps, limited recognition of transmission routes, and poor institutional support in the form of reminders and supervision. These limitations suggest that current infection control strategies are inadequate to ensure consistent compliance. To address these deficiencies, hand hygiene interventions must go beyond basic awareness campaigns and adopt a multifaceted approach including structured, frequent training; real time monitoring; feedback loops; and active administrative engagement. Without addressing these core limitations, healthcare settings-especially in resource constrained environments-remain vulnerable to preventable healthcare associated infections.

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