



## Original Research Article

## Assessment of hand hygiene compliance among healthcare workers at tertiary care hospital in Gujarat

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## Abstract

**Background:** Hand hygiene is a critical component of infection prevention and control in healthcare settings. This study aimed to assess hand hygiene compliance among healthcare workers (HCWs) at a tertiary care hospital in Gujarat.

**Materials and Methods:** A cross-sectional observational study was conducted to assess hand hygiene compliance among HCWs in various departments of the hospital. Trained data collectors observed hand hygiene practices and recorded compliance rates using standardized protocols. Compliance rates were compared among different categories of HCWs and at various World Health Organization (WHO) defined moments of hand hygiene.

**Results:** A total of 576 hand hygiene opportunities were observed, with an overall compliance rate of 52.60%. Hand hygiene action with Alcohol-Based Hand Rub (ABHR) was noted in 55.44% of opportunities, while hand washing action was observed in 44.66% of opportunities. Compliance rates varied among different categories of HCWs, with medical students demonstrating the highest compliance 69.05% followed by laboratory technician 57.97%, nurses 56.38%, doctors 48.82%, and housekeeping staff 30.77%. WHO Moment 3 (After the procedure or body fluid exposure) had the highest hand hygiene compliance rate (60%) followed by WHO Moment 2 (Before aseptic procedure) with HH Compliance rate (58.82%).

**Conclusion:** The study highlights the importance of hand hygiene compliance among HCWs in preventing healthcare-associated infections. While compliance rates varied among different categories of HCWs and moments of hand hygiene, there is room for improvement across all areas. Strategies to enhance hand hygiene practices, including education, training, access to resources, and feedback mechanisms, are essential for promoting a culture of hand hygiene and ensuring patient safety in healthcare settings.

**Keywords:** Hand hygiene, Compliance, Hand washing, Hand rub, Infection Control, Health care worker

**Received:** 15-02-2025; **Accepted:** 12-05-2025; **Available Online:** 28-05-2025

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## 1. Introduction

Infection prevention and control are paramount in healthcare settings to mitigate the risk of healthcare-associated infections (HAIs) and uphold patient safety standards. Among the multifaceted strategies employed in infection control, hand hygiene remains foundational, recognized globally as a primary measure for preventing the transmission of pathogens in healthcare environments.

Hand hygiene is a critical aspect of infection prevention and control in healthcare settings<sup>2</sup>. Proper hand hygiene

practices significantly reduce the transmission of infections and promote patient safety.<sup>1</sup>

As part of a major global initiative to improve Hand hygiene in healthcare, the World Health Organization (WHO) launched a global campaign "SAVE LIVES: Clean Your Hands" in 2009<sup>1</sup>. As part of the campaign, WHO urges policymakers, administrators, infection control officers, healthcare workers, and other patient care groups to contribute towards the implementation of Hand hygiene as a keystone to improve healthcare quality.<sup>2</sup>

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Over the years, Hand hygiene compliance has been found to be low worldwide. Several studies from India have reported Hand hygiene compliance ranging from 20–85.5%.<sup>3,4,5</sup>

Mathur has reviewed the situation of HH around the globe and has listed a few factors responsible for low compliance in healthcare setup including physician status (rather than nurse), male sex, lack of role models, working during the week (or weekend), understaffing, patient overcrowding, insufficient time, HW agents causing dryness, and so on.<sup>6</sup>

Proper handwashing technique is a crucial component of effective hand hygiene. The WHO recommends a stepwise approach, including wetting hands with water, applying an adequate amount of soap or hand wash, scrubbing all surfaces of the hand. Step 1: palm to palm, Step 2: back to palm both sides, Step 3: interlaces in between web space, Step 4: back of the fingers on palms both side, Step 5: rotational rubbing of thumb both sides and Step 6: scrub the nails on palm both sides—for at least 40-60 seconds for hand wash, Step 7: rinsing thoroughly, and Step 8: dry the hand with single use paper towel. Step 9: Close the tap with same paper towel or with elbow if there is elbow handle. (**Figure 1**). For Hand rub first apply a palmful product of hand rub in a cupped hand covering all the hand then following steps are done. Step 1: palm to palm, Step 2: back to palm both sides, Step 3: interlaces in between web space, Step 4: back of the fingers on palms both side, Step 5: rotational rubbing of thumb both sides and Step 6: scrub the nails on palm both sides—for at least 20-30 seconds and air dry the hands completely. (**Figure 1**).<sup>7,8</sup>



**Figure 1:** Steps of hand wash and Hand rub.<sup>7</sup>

The present project aims to assess hand hygiene compliance among healthcare workers at a tertiary care

hospital in Gujarat, India. Tertiary care hospitals serve as vital hubs for specialized medical services, catering to complex medical conditions and often acting as referral centres for patients from broader geographic regions. Given the diverse patient population, high patient turnover, and constant exposure to infectious agents in such settings, stringent adherence to hand hygiene protocols is imperative to mitigate the risk of HAIs and safeguard patient's well-being.<sup>9</sup>

This project seeks to evaluate the current state of hand hygiene practices among healthcare workers at the tertiary care hospital, with a focus on identifying existing strengths, areas for improvement. Through a comprehensive assessment encompassing observational studies, surveys, and data analysis, we aim to gather actionable insights that can inform targeted interventions and strategies to enhance hand hygiene practices within the healthcare facility.

By collaborating closely with hospital administration, infection control teams, and frontline healthcare workers, this project endeavours to contribute to ongoing efforts aimed at enhancing patient safety, reducing the incidence of HAIs, and upholding the highest standards of quality care delivery. By emphasizing the critical importance of hand hygiene and fostering a culture of collective responsibility for compliance, we aspire to create a safer and healthier environment for patients, healthcare workers, and the broader community.

## 2. Objectives

1. To determine the compliance rate of hand hygiene practices among healthcare workers (HCWs) in tertiary care hospital.
2. To compare hand hygiene compliance rates among different categories of healthcare workers, including doctors, nurses, laboratory technicians, housekeeping staff, and medical students.
3. To assess compliance rates at various WHO-defined moments of hand hygiene during patient care activities.

## 3. Materials and Methods

This cross-sectional observational study was conducted to assess hand hygiene compliance among healthcare workers (HCWs) at the tertiary care hospital Navsari in Gujarat From 1/4/24 to 30/4/24. The study was conducted at the designated tertiary care hospital Navsari in Gujarat, including various departments such as General Medicine, General Surgery, Obstetrics & Gynaecology, Orthopaedics, and Paediatrics. Within each department, observations were conducted in diverse clinical settings, such as the outpatient department (OPD), inpatient department (IPD), injection OPD, Procedure room, and intensive care unit (ICU). Various healthcare workers including doctors (physician, residents,) and medical students, nurses, housekeeping staff and

laboratory technicians working in the hospitals were included in this study.

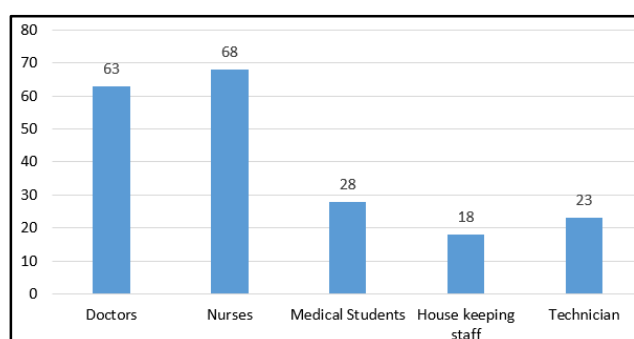
Direct observation of hand hygiene practices was conducted using World Health Organization (WHO) Hand Hygiene Observation Form. The observation form had predefined moments for hand hygiene, including before patient contact, before aseptic procedures, after body fluid exposure risk, after patient contact, and after contact with patient surroundings.

The Study was conducted during specified observation periods, covering different shifts. Observations was conducted discreetly to minimize interference with normal workflow. Multiple observations were made for each healthcare worker to capture variability in hand hygiene compliance across different patient care interactions and moments, ensuring a comprehensive assessment of compliance levels

Ethical approval was obtained from institutional ethics committee of University of Hyderabad. Informed consent was obtained from healthcare workers participating in the study, and confidentiality of data was maintained throughout the study process

#### 4. Result

A total 200 healthcare workers were observed for compliance with hand hygiene practices. Which includes Medical Doctors (n=63, 31.50%), Nurses (n=68, 34%), Medical Students (n=28, 14%), Laboratory Technician (n=23, 11.50%), Housekeeping staffs (n=18, 9%). (**Figure 2**)

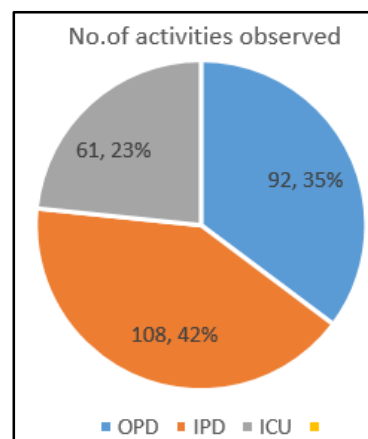


**Figure 2:** Hand hygiene assessment among healthcare worker

**Table 1:** Hand hygiene compliance rate by WHO moment

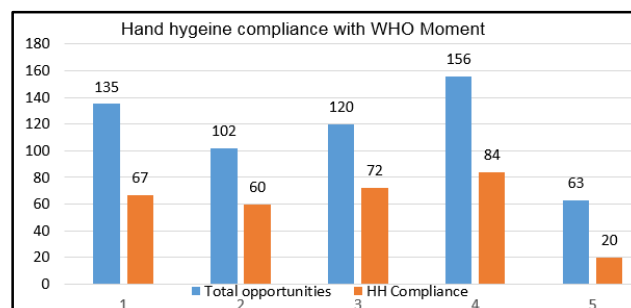
WHO Moment	Total opportunities	HH Compliance	HH compliance Rate
1	135	67	49.63%
2	102	60	58.82%
3	120	72	60.00%
4	156	84	53.85%
5	63	20	31.75%
Total	576	303	

We observed total of 261 different patient care activities in different locations of the hospital. (OPD-92 activities, IPD -108 activities, ICU -61 activities) (**Figure 3**)



**Figure 3:** Activities observed in different locations

Total 576 opportunities were observed for Hand hygiene. Overall Compliance was 303/576. (52.60%). WHO Moment 3 (After the procedure or body fluid exposure) had the highest hand hygiene compliance rate (60%) followed by WHO Moment 2(Before aseptic procedure) with HH Compliance rate (58.82%). (**Figure 4** and **Table 1**)



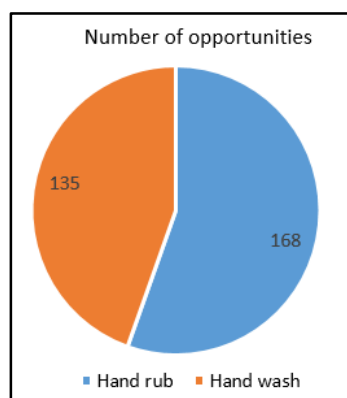
**Figure 4:** Total opportunities and hand hygiene compliance with WHO moment

Hand hygiene compliance among medical students was highest 69.05% followed by laboratory technician 57.97%, nurses 56.38%, doctors 48.82%, and housekeeping staff 30.77 %.(**Table 2**)

**Table 2:** Hand hygiene compliance rate by profession

Profession	Total Opportunities	HH Compliance	HH Compliance Rate
Doctor	170	83	48.82%
Nurses	188	106	56.38%
Medical students	84	58	69.05%
Housekeeping staff	65	20	30.77%
Technician	69	40	57.97%

Out of 303 opportunities Alcohol-Based Hand Rub (ABHR) was used for 168 opportunities (55.44%) and hand washing was used for 135 (44.55%) opportunities. (**Figure 5**)

**Figure 5:** Number of opportunities and method of hand hygiene.

## 5. Discussion

Hand hygiene compliance among healthcare workers is essential for preventing healthcare-associated infections and ensuring patient safety. In this study, we observed a total of 200 healthcare workers from various categories, including medical doctors, nurses, laboratory technicians, housekeeping staff, and medical students. Our findings revealed variations in hand hygiene compliance across different healthcare worker categories, with implications for infection control practices and patient care outcomes.

Total 576 opportunities were observed for Hand hygiene. Overall Compliance was 303/576. (52.60%). Anandam S. et al conducted a study in a tertiary care hospital, reporting an overall hand hygiene compliance rate of 67.88%. This rate is higher than the 52.60% observed in our study. The higher compliance in Anandam S. et's study could be attributed to more rigorous hand hygiene training programs, a stronger institutional focus on infection control, or differences in observational methodologies.<sup>10</sup>

In private tertiary care teaching hospital Vithiya et al. reported a complete hand hygiene compliance rate of 29.91% and partial compliance rate 45.3%. This lower rate compared to our findings might reflect differences in the healthcare environment, patient load, lack of administrative sanctions for noncompliance, and attitude of healthcare personnel.<sup>11</sup>

Kim et al. investigated hand hygiene compliance among various healthcare professional groups in South Korea and found an overall compliance rate of 52%. This rate is comparable to our study's 52.60%, suggesting similar challenges and practices across different regions and professional settings. Jaewoong et al. also highlighted that compliance was higher post-patient contact, which aligns with our finding that WHO Moment 3 had the highest compliance.<sup>12</sup>

According to the World Health Organization's global report on hand hygiene compliance, average compliance rates worldwide range from 40% to 60%. Our study's findings fall within this range, indicating that the compliance observed in our healthcare facility is consistent with global trends.<sup>13</sup>

WHO Moment 3 (After the procedure or body fluid exposure) had the highest hand hygiene compliance rate (60%) followed by WHO Moment 2(Before aseptic procedure) with HH Compliance rate (58.82%). This is lower than the study by Anandam S., Khelgi A et in that study Compliance rates were 77.9% for WHO moment 2, 79.2% for WHO Moment 3 and 70.2% for Moment 4.<sup>10</sup>

In our study, hand hygiene (HH) compliance was higher among nurses (56.38%) than among doctors (48.82%). This is consistent with the study by Y. Krishnamoorthy et al. which found that compliance rates were generally higher among nurses compared to doctors.<sup>14</sup> However, the compliance rate among doctors is higher in Anandam S. et al.<sup>10</sup> This difference may suggest that the knowledge and practice of HH is improving among doctors over time.

The hand hygiene compliance rate among doctors (48.82%) observed in our study is a point of concern, particularly considering their central role in direct patient care, invasive procedures, and clinical decision-making. This suboptimal compliance not only increases the risk of healthcare-associated infections (HAIs) but may also undermine the hand hygiene culture within the healthcare facility, as physicians are often seen as role models by other healthcare workers. Multiple studies, including those by Erasmus et al.<sup>15</sup> and Whitby et al.,<sup>16</sup> have consistently reported lower compliance among physicians compared to nurses, citing reasons such as time pressure, forgetfulness, and underestimation of the importance of hand hygiene.<sup>19, 20</sup> Given that doctors frequently move between patients and departments, lapses in hand hygiene can lead to widespread microbial transmission.

The comparatively high compliance rates observed among medical students (69.05%). The high compliance amongst students might also be due to close supervision by trainers and to recent curriculum modifications, where IPC and HH have been introduced as a new module taught to the students. For instance, a study conducted by Allegranzi and Pittet found that compliance was higher among healthcare workers who had recently undergone training or were in a learning phase, like students.

The findings indicate that hand hygiene action with Alcohol-Based Hand Rub (ABHR) was more frequently observed compared to hand washing action among healthcare workers. Specifically, there were 168 instances of hand hygiene action with ABHR, accounting for 55.44% of the total opportunities observed. In contrast, hand washing action was noted 135 times, representing 44.66% of the total opportunities.

These results suggest that healthcare workers may prefer or find it more convenient to use ABHR over traditional hand washing with soap and water. Alcohol-based hand rubs are known for their rapid efficacy, convenience, and ease of use, which may contribute to higher compliance rates compared to hand washing. Additionally Alcohol-Based Hand Rub is recommended by the World Health Organization (WHO) as the preferred method for routine hand hygiene in healthcare settings, further supporting its widespread use.<sup>1</sup>

Various reasons for non-compliance found in our study included the inconvenient placement of hand hygiene (HH) stations, making it difficult for healthcare workers (HCWs) to access them quickly and easily, hands not being visibly dirty, heavy workload, and lack of awareness, especially among housekeeping staff.

We noted that regular training was conducted for nursing staff, and regular monitoring done by the Infection Control Nurse (ICN) led to good awareness about hand hygiene among the nursing staff.

After COVID-19, hand hygiene awareness has improved among all healthcare workers because multiple training sessions were provided to all healthcare staff. The organization continues to conduct these trainings regularly, which is a positive development.

Despite the increased awareness and regular training on hand hygiene (HH), some challenges still persist in achieving full compliance among healthcare workers (HCWs) includes.

1. Persistent High Patient Load: Even with training, the continuous high volume of patients can make it challenging for HCWs to adhere to HH protocols consistently due to time pressure.
2. Training Gaps: While training is regular, it may not always address practical barriers or be effectively tailored to different HCW roles and settings.

3. Knowledge Retention: HCWs may not retain all information from training sessions, especially if the sessions are not interactive or practical enough.

## 6. Conclusion

This study aimed to assess the hand hygiene compliance among healthcare workers (HCWs) at a tertiary care hospital in Gujarat. The observational study involved trained data collectors who recorded hand hygiene practices across various departments, including General Medicine, General Surgery, Obstetrics & Gynaecology, Orthopaedics, and Paediatrics, in different clinical settings such as the outpatient department (OPD), inpatient department (IPD), injection OPD, procedure room, and intensive care unit (ICU).

A total of 576 hand hygiene opportunities were observed, with an overall compliance rate of 52.60%. Hand hygiene action with Alcohol-Based Hand Rub (ABHR) was noted in 55.44% of opportunities, while hand washing was observed in 44.66% of opportunities. Compliance varied among different categories of HCWs, with medical students showing the highest compliance rate at 69.05% followed by laboratory technician 57.97%, nurses 56.38%, doctors 48.82%, and housekeeping staff 30.77%.

WHO Moment 3 (After the procedure or body fluid exposure) had the highest hand hygiene compliance rate (60%) followed by WHO Moment 2 (Before aseptic procedure) with HH Compliance rate (58.82%). These findings highlight significant differences in compliance among various HCW groups and across different moments of hand hygiene.

Various reasons for non-compliance found in our study included the inconvenient placement of hand hygiene (HH) stations, making it difficult for healthcare workers (HCWs) to access them quickly and easily, hands not being visibly dirty, heavy workload, and lack of awareness, especially among housekeeping staff.

Despite the increased awareness and regular training on hand hygiene (HH), some challenges still persist in achieving full compliance among healthcare workers (HCWs) includes Persistent High Patient Load, Training Gaps, knowledge retention

The study concludes that while there are areas of good compliance, overall hand hygiene practices need improvement. The variation in compliance rates suggests a need for targeted interventions, including education, regular feedback, and improved access to hand hygiene resources. Promoting a culture of hand hygiene through continuous education and institutional support is essential for reducing healthcare-associated infections and ensuring patient safety.

## 7. Limitations

The study may be subject to observer bias due to the presence of data collectors in the clinical environment. The findings may be influenced by the Hawthorne effect, where healthcare workers modify their behaviour due to being observed. The study design was cross-sectional, limiting the ability to establish causal relationships between factors and hand hygiene compliance.

## 8. Source of Funding

None.

## 9. Conflict of Interest

None.

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**Cite this article:** Patel HK, Mangukiya JD, Dharsandia MV, Soni PD, Gandhi VP, Patel PH. Assessment of hand hygiene compliance among healthcare workers at tertiary care hospital in Gujarat. *IP Int J Med Microbiol Trop Dis*. 2025;11(2):195-200.