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Comparative Evaluation of Hand Hygiene Adherence Among Nurses, Doctors, and Support Staff in a Tertiary Care Hospital: A Cross-Sectional Observational Study

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Abstract

Healthcare professionals still don't always wash their hands properly, even though it's a must for avoiding HAIs. Using World Health Organization (WHO) recommendations and SPSS, this 6-month cross-sectional study (January–June 2024) in a 1,200-bed hospital in New Delhi discovered 1,248 chances for 312 healthcare workers to practice good hand hygiene. In a total of 51.4% of cases, nurses were the most compliant (64.2%), while physicians were second at 48.7% and support workers at 40.9%. Following exposure to bodily fluids, compliance peaked, whereas it was lowest prior to patient interaction. The intensive care unit had the greatest compliance rate (71.8%), despite significant obstacles such as skin irritation, a lack of time, and a tremendous workload. Targeted training, easier access to hygiene products, and more institutional support are needed to decrease infection risks, as the results show that hand hygiene habits are still insufficient, especially among support personnel and doctors.

Keywords: hand hygiene; healthcare-associated infections; WHO 5 Moments; compliance; nurses; doctors; support staff; infection control.

1. INTRODUCTION

One of the biggest problems in contemporary medicine is healthcare-associated infections (HAIs). Infectious diseases are a common problem in healthcare facilities, affecting millions of patients each. These infections lead to unnecessary pain, lengthier hospital stays, higher treatment costs, and the development of antibiotic resistance. Worldwide, hundreds of millions of individuals experience healthcare-associated infections (HAIs) every single day, with low- and middle-income nations bearing a disproportionate share of this burden, according to the World Health Organization (WHO). Healthcare workers (HCWs) have access to a variety of infection control strategies, but the gold standard—practical, inexpensive, and supported by evidence—is hand hygiene. Hand hygiene has the potential to significantly decrease the occurrence of healthcare-associated infections (HAIs) by as much as half when practiced appropriately and at the appropriate times. Regardless of this substantial evidence, a number of studies in various nations and clinical settings have shown that healthcare workers' adherence to hand hygiene is disconcertingly poor, with total compliance rates frequently falling below 50%.

As part of its 2005 "Clean Care is Safer Care" campaign, the World Health Organization came up with the idea of "5 Moments for Hand Hygiene," a framework that pinpoints the five most crucial points in patient care when washing one's hands is absolutely necessary. There are five specific times when this rule must be followed: (1) prior to patient contact, (2) during a sterile or aseptic process, (3) following the risk of exposure to bodily fluids, (4) following patient contact, and (5) following patient contact with their environment. When it comes to gauging and enhancing hand hygiene compliance, this approach is now the international standard. There is a complex web of factors that contribute to healthcare workers' inadequate hand hygiene. Factors that contribute to the spread of infections include heavy workloads, insufficient access to facilities and supplies for hand cleanliness, skin irritation caused by hand rubs, a lack of leadership role models, insufficient training, and a weak institutional culture surrounding infection control. It is important to note that compliance rates might varied greatly among hospital professional groups. For example, nurses, doctors, and support workers may all encounter various challenges and show different degrees of adherence. In India, there is a dearth of research that compares the hand hygiene compliance rates of different groups of

people working in the same hospital or clinic over an extended period of time. Such studies might help fill this gap. Hospital infection control teams are unable to meet the unique requirements of different professions due to this information gap.

To that end, researchers at a big tertiary care hospital set out to use direct structured observation based on the World Health Organization's 5 Moments framework to gauge the degree to which medical professionals and support workers adhered to proper hand hygiene protocols. Additionally, we aimed to determine the main obstacles mentioned by each group and analyze how compliance varied across various hospital departments and time periods. The results could help shape evidence-based, actionable suggestions for enhancing the hand hygiene culture in other hospitals with comparable demographics.

2. LITERATURE REVIEW

Since the seminal work of Ignaz Semmelweis in the 1840s, when he showed that washing physicians' hands greatly decreased the mortality rate from puerperal fever in Vienna maternity hospitals, there has been a great deal of evidence linking hand hygiene with the prevention of healthcare-associated infections (HAIs). Ever since, a mountain of evidence has shown that the most important thing you can do to avoid getting sick is to always wash your hands thoroughly. Implementation of a multimodal promotion campaign led to an increase in hand hygiene compliance from 48% to 66%, which was significantly correlated with reductions in rates of healthcare-associated infections (HAIs) and methicillin-resistant Staphylococcus aureus (MRSA) transmission, according to a landmark multicenter study conducted across hospitals in Geneva. The World Health Organization's multimodal improvement plan was built upon this study.

Research in nations with a high per capita income tends to show compliance rates of 35% to 65%, but studies in countries with a low or medium per capita income tend to show lower values, sometimes falling below 30%. Internationally, the percentage of hand hygiene compliance was about 38.7 percent, with the lowest rates seen in surgical wards and intensive care units, according to a systematic analysis published in Lancet Infectious Diseases. Concerning disparities between professional groups, numerous research and geographical locations have shown that nurses regularly exhibit higher levels of compliance than physicians. According to research done in Saudi Arabian tertiary hospitals, 65.3% of nurses and 43.1% of doctors followed protocol. In a similar vein, a Brazilian study involving multiple hospitals indicated that, compared to medical professionals, nursing staff attained 57.8% compliance. Some of the reasons why doctors don't wash their hands include that they think nurses should do it, because of power dynamics in the medical field, and because they don't feel accountable for their actions.

Hand hygiene studies often fail to include support staff, such as porters, housekeepers, and ward attendants, even though they come into intimate contact with patients, bed linens, medical equipment, and potentially contaminated surfaces on a daily basis. Based on what little research is out there, it seems that support workers have the lowest compliance rates of any HCW group. This is likely attributable to a combination of factors, including a lack of proper training, lower levels of education, and the widespread belief that hand hygiene is not an essential aspect of their job.

The use of observational and self-reporting approaches to study barriers to hand cleanliness has been widely done. The American Journal of Infection Control reported that among the most often mentioned obstacles by healthcare workers (HCWs) were a severe workload, skin irritation, and an absence of easily accessible hand hygiene stations. Inadequate support from hospital leadership and poor role-modeling by top clinicians were among the organizational and cultural concerns that were often brought up.

Depending on research design, observation methods, and clinical setting, there is a great deal of variability in the reported compliance rates in published studies from major tertiary

institutions in India, which range from 28% to 58%. Overall, only 32% of employees at a Mumbai government hospital were found to be compliant, with 43% of nurses and 19% of housekeeping staff being the most compliant. The effect of institutional dedication on results was highlighted in a more current research out of a Bengaluru private hospital that indicated increased compliance (58% after a year-long WHO-aligned multimodal program). Even though there is an increasing amount of literature on HCWs, there is a lack of comparison studies that evaluate all three major groups in the Indian tertiary care setting using the standardized WHO 5 Moments framework. This research set out to fill that need.

3. METHODS AND MATERIALS

Study Design and Setting: The research ran from January 2024 through June 2024 and was a direct observational study with a prospective design. An Indian tertiary care teaching hospital with 1,200 beds that receives funding from the government was the site of the study. The hospital provides a wide variety of clinical services, such as general medicine, surgery, obstetrics and gynecology, pediatrics, and critical care, and it serves around 3,000 outpatients and 400 inpatients every day. Based on their patient volume and infection risk profiles, the study's three clinical departments—the Surgical Ward, the General Medicine Ward, and the Medical Intensive Care Unit (MICU)—were chosen for participation. The purpose of selecting these units was to provide a cross-section of clinical settings, from intensive intensive care to standard inpatient treatment.

Study Population and Sampling: All healthcare staff directly involved in patient care or the patient care environment in the specified departments were studied. Registered nurses, staff nurses, and nursing assistants; resident doctors, postgraduate trainees, and attending physicians; and support staff—ward attendants, housekeeping staff, and medical laboratory assistants assigned to these departments—were included.

The study comprised 312 HCWs, 104 from each professional category. This sample size was estimated using a 50% predicted compliance rate, a 5% margin of error, and a 95% confidence interval, allowing for multi-group comparative design effects. Purposive sample by shift (day, evening, and night) ensured representativeness across working hours.

Data Collection Instrument and Procedure

The WHO-validated Hand Hygiene Observation Form was used to observe hand hygiene compliance. Each shift participant was watched for 30 minutes. Four trained Infection Control Officers (ICOs) who had completed the WHO Hand Hygiene Observer Training Program and achieved 90% inter-rater reliability in pilot sessions before the main data collection phase conducted observations. All participants and sessions reported 1,248 hand hygiene opportunities. Opportunities were categorized by one of the five WHO Hand Hygiene Moments. Compliance was soap-and-water handwashing or alcohol-based hand rub (ABHR) within 10 seconds of the indication.

To decrease the Hawthorne effect—people changing their behavior while watched—observers were educated to be unobtrusive. Participants were only notified that a routine infection control audit was being conducted, not that compliance rates were the main outcome, to reduce this effect.

Barrier Assessment

All 312 participants were given a self-administered, pretested questionnaire to assess hand hygiene compliance barriers after the observation period. Workload variables, access-related issues, skin tolerance, knowledge and attitude, and institutional culture were covered by 18 Likert scale items (1 = Strongly Disagree to 5 = Strongly Agree). Responses 4 or 5 were agreed barriers.

Statistical Analysis: Data were entered and cleaned in Excel and analyzed using SPSS 26.0 (IBM Corporation, Armonk, NY, USA). Participant characteristics and compliance rates were summarized using frequencies, percentages, means, and standard deviations. The Chi-square

test compared group compliance. Independent non-compliance predictors were identified using binary logistic regression. A p-value under 0.05 was significant.

4. RESULTS

Participant Characteristics: A total of 312 healthcare workers participated in the study. The majority were female (58.7%), reflecting the nursing-heavy gender distribution in hospital settings. The mean age of participants was 31.4 years (SD 6.8). Nurses had the highest mean years of experience (7.3 years), followed by doctors (5.1 years) and support staff (4.8 years). Table 1 summarizes the demographic and professional characteristics of study participants.

Table 1. Demographic and Professional Characteristics of Study Participants

Characteristic	Nurses (n=104)	Doctors (n=104)	Support Staff (n=104)	Total (n=312)
Mean Age (years)	30.2 +/- 5.9	29.4 +/- 4.7	34.6 +/- 8.9	31.4 +/- 6.8
Gender: Female (%)	88 (84.6%)	51 (49.0%)	44 (42.3%)	183 (58.7%)
Mean Experience (years)	7.3 +/- 4.1	5.1 +/- 3.2	4.8 +/- 5.6	5.7 +/- 4.4
Formal IPC Training (%)	79 (76.0%)	68 (65.4%)	31 (29.8%)	178 (57.1%)
Working in ICU (%)	38 (36.5%)	36 (34.6%)	30 (28.8%)	104 (33.3%)

Overall Hand Hygiene Compliance

There were 641 hand hygiene compliances out of 1,248 observed opportunities, a 51.4% compliance rate. Professional groupings vary greatly in compliance. Nursing had the highest compliance rate at 64.2% (266/414 possibilities), followed by doctors at 48.7% (204/419 opportunities) and support workers at 40.9% (171/418 opportunities). Significant differences were observed (Chi-square = 47.3, $p < 0.001$). Table 2 shows WHO Moment and group compliance rates.

Table 2. Hand Hygiene Compliance Rates by Professional Group and WHO Moment

WHO Moment	Nurses (%)	Doctors (%)	Support Staff (%)	Overall (%)
1. Before Touching Patient	58.3%	41.2%	33.7%	44.4%
2. Before Aseptic Procedure	72.1%	63.4%	42.6%	59.4%
3. After Body Fluid Exposure	81.4%	74.6%	61.3%	72.4%
4. After Touching Patient	66.7%	51.3%	44.2%	54.1%
5. After Touching Surroundings	44.8%	31.9%	28.7%	35.1%
Overall Compliance	64.2%	48.7%	40.9%	51.4%

Compliance by Department: Compliance rates vary greatly amongst the three departments. The MICU had the highest compliance at 71.8%, followed by the Surgical Ward at 52.3% and the General Medicine Ward at 44.3%. Statistically significant difference seen in all three HCW groups ($p < 0.05$). The highest subgroup compliance rate in the research was 82.4% for ICU nurses.

Table 3. Compliance Rates by Department and Professional Group

Department	Nurses (%)	Doctors (%)	Support Staff (%)	Overall (%)
Medical ICU (MICU)	82.4%	68.3%	64.7%	71.8%
Surgical Ward	63.1%	51.2%	43.9%	52.3%
General Medicine Ward	47.2%	26.6%	14.1%	44.3%

Compliance by Shift: Compliance was highest at 57.3% during the day shift (08:00-16:00 hours), followed by 50.1% during the evening shift and 44.8% during the night shift. Compliance decreased for all three professional categories as day turned to night. The reduction was greatest among support personnel (31.4% night shift compliance) and least among nurses (54.6%).

Barriers to Hand Hygiene Compliance: The barrier questionnaire was completed by all 312 participants. The most commonly reported barriers across all professional groups were heavy workload (68.3%), lack of time (59.6%), skin irritation from ABHR (41.2%), and inconvenient location of hand hygiene stations (36.7%). Support staff additionally cited inadequate training (54.8%) and language barriers on training materials (28.4%) as significant barriers. Table 4 presents the top barriers identified by each professional group.

Table 4. Perceived Barriers to Hand Hygiene Compliance by Professional Group

Barrier	Nurses (%)	Doctors (%)	Support Staff (%)	Total (%)
Heavy workload / too busy	71.2%	74.0%	59.6%	68.3%
Lack of time	63.5%	66.3%	49.0%	59.6%
Skin irritation from ABHR	52.9%	38.5%	32.7%	41.2%
Inconvenient station location	34.6%	41.3%	34.6%	36.7%
Feeling gloves make it unnecessary	18.3%	43.3%	15.4%	25.6%
Inadequate training received	22.1%	19.2%	54.8%	32.1%
Did not think it was necessary	8.7%	17.3%	27.9%	18.0%

5. DISCUSSION

A large tertiary care hospital's hand hygiene compliance was assessed using the WHO 5 Moments framework and direct observation by qualified infection control officers in this multi-group study. Our findings show 51.4% compliance, with nurses complying more than doctors and support workers. These findings are consistent with foreign literature but provide critical background for Indian healthcare. This study found 51.4% compliance, better than the national average in several preceding Indian studies but well below the WHO's 80% objective. Even nurses, the best-performing category, only obtained 64.2% compliance, highlighting the issue. This is not a critique of HCWs, but of institutional hurdles that make hand hygiene difficult in a crowded hospital. Several variables may explain nurses' increased compliance in this and other research. In India, nurses learn about and use hand hygiene facilities in the ward during their shifts and participate in infection prevention and control (IPC) programs. Nursing culture also prioritizes patient safety more than other professions. Compared to 65.4% of doctors and 29.8% of support personnel, 76.0% of nurses had formal IPC training.

The relatively low compliance among doctors (48.7%) is consistent with multiple international studies and has been attributed to a combination of factors: high cognitive load during clinical decision-making, a tendency to underestimate their role as vectors of cross-infection, resistance to behaviour change driven by seniority, and the Hawthorne effect. Notably, doctors in this study frequently cited glove use as a reason for not performing hand hygiene (43.3%), which represents a critical misconception that hand hygiene education programmes must specifically address.

The survey found that the compliance rate for support staff was the lowest at 40.9%. Because support workers come into close touch with potentially contaminated surfaces on a regular basis when performing duties including changing bed linens, emptying trash cans, and cleaning

patient settings, this discovery is of special concern. In this study, only 29.8% of support personnel had undergone formal IPC training, which is significantly lower than other groups of healthcare workers, despite the high risk of infection. There may be a basic disconnect in the way the institution's infection control culture conveys expectations to non-clinical employees, since the barrier data also showed that many support staff members did not consider hand hygiene an essential component of their job. This finding is in line with what has been found in the broader literature and across professional groups: compliance was highest at Moment 3 (after body fluid exposure risk), and lowest at Moment 1 (before touching a patient) and Moment 5 (after touching patient surroundings). When it comes to patient safety, compliance is typically lower than when it comes to workplace safety. It is suggested that teaching messages should address both worker self-interest and professional identity in addition to patient protection, as this self-protective motivational bias has been extensively studied.

Staff awareness and physical access to hand hygiene stations tend to be greater in intensive care units, which presumably explains why compliance rates in the MICU are substantially higher than in regular wards (71.8% vs. 44.3%). Perceived increased infection risk among intensive care unit staff may also increase their motivation to comply. These results point to the possibility of transferring aspects of the intensive care unit's culture of infection control to the general wards, such as staffing density, peer accountability, and the layout of the facility. There is therapeutic significance in the observation that compliance declines across shift times, especially during night shifts. Reduced supervision, increased weariness, and fewer workers on duty at night are all factors that can lead to decreased compliance rates. Night shift infection control monitoring and support may require special attention, as this tendency was most noticeable in support staff. All three groups of HCWs reported a heavy workload and a lack of time as their top obstacles, which is in line with the worldwide literature. Problems like the awkward placement of hand hygiene stations (a structural factor) and the misconception that gloves can substitute for hand hygiene (a knowledge factor) are easier to resolve with focused interventions, in contrast to these systemic factors that necessitate organizational-level solutions like optimal staffing levels and workflow redesign.

6. RECOMMENDATIONS

Based on the findings of this study, the following evidence-based recommendations are proposed for hospital infection control committees and healthcare administrators:

Targeted Education for Each Professional Group: Every profession has its own unique set of misconceptions and gaps in knowledge when it comes to standard hand hygiene training. A common misconception among medical professionals is that using gloves completely removes the need to wash one's hands before and after handling patients. Training should explicitly state the duties of non-clinical positions with regard to infection prevention, and basic infection prevention and control education for support personnel should be provided in regionally accessible languages and formats.

Environmental Redesign: Hand rub dispensers containing alcohol should have their placement and accessibility checked. Patients should be able to reach their ABHR at all times, preferably within arm's reach of healthcare workers, according to international guidelines. Healthcare workers should be supplied with bedside dispensers and portable ABHR bottles if they operate in areas without easy access to wall-mounted dispensers.

Multimodal Improvement Strategy: It would be wise to formally embrace and continuously apply the World Health Organization's multimodal strategy for improving hand hygiene. This strategy incorporates teaching, evaluation and feedback, reminders, institutional safety climate improvement, and system reform. Multimodal techniques outperform single-component therapies, according to the evidence.

Night Shift Monitoring: It is necessary to extend infection control monitoring and supervisory support beyond regular business hours due to the observed decrease in compliance during night and evening shifts. It is important to provide department heads with feedback reports that are particular to their shift.

Senior Leadership Role Modelling: Peer pressure and role modeling by esteemed senior figures are two of the most powerful motivators for healthcare workers to modify their hand hygiene practices, therefore it's important for senior doctors and hospital managers to set a good example.

Skin Care Programmes: In particular, nurses reported skin discomfort from ABHR as a significant obstacle. As part of their efforts to promote hand cleanliness, hospitals should purchase skin-friendly products and offer skin care services that moisturize the skin.

7. LIMITATIONS

It is important to note that this study did have some limitations. The Hawthorne effect, in which HCWs momentarily increase their compliance when they are aware or suspect that they are being watched, is the first limitation of direct observation. This effect cannot be entirely eradicated, despite efforts to limit it. The results may not reflect the actual levels of compliance in everyday practice.

Secondly, the results may not be applicable to other scenarios because the research only involved one type of hospital, one location, and one healthcare system (a tertiary care hospital in New Delhi). Compliance profiles and barrier landscapes may vary among community hospitals, primary health centers, and private sector hospitals.

Third, it's possible that subgroup analyses lacked the ability to identify tiny changes, even though the sample size was sufficient for the main study. The evidence base could be strengthened by conducting future studies with larger samples and using multi-center designs. Fourth, there is a possibility of social desirability bias in the data used for the barrier evaluation since it is based on self-reported information. Future study could supplement survey data with qualitative methods like focus groups or in-depth interviews.

8. CONCLUSION

This study shows that people at a big Indian tertiary care hospital still don't wash their hands often enough to prevent healthcare-associated infections. The findings reveal a widespread systemic challenge and the substantial inter-group variation that should guide the development of focused improvement strategies; the overall performance was 51.4%, with nurses performing the best (64.2%) and support staff performing the worst (40.9%). Results showed that compliance was consistently lower during patient-protective moments compared to worker-protective moments, indicating a need for educational message to enhance motivation. The significance of contextual conditions and supervisory oversight in affecting real compliance behavior is suggested by the fact that critical care settings exhibited better compliance and night shifts exhibited worse.

More than just a few training sessions here and there won't be enough to overcome this obstacle. Essential components include investing in physical infrastructure, providing role-specific education, demonstrating effective leadership, and continuously monitoring and providing feedback. Last but not least, support workers need special training and a place in the institution's safety culture to really make an impact on infection control programs. Hand hygiene must be left up to individual choice if healthcare organizations are to fulfill their responsibility to offer safe care. Every healthcare worker should be able to easily and consistently comply with all regulations since it is a basic professional duty that should be backed by systems, culture, and resources that make it so.

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