

# Impact of an Intervention on Hand Hygiene Practices among Various Categories of Healthcare Workers at a Tertiary Healthcare Teaching Institute in Lucknow, Uttar Pradesh, India

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## ABSTRACT

**Introduction:** Healthcare-associated infections are major burdens for patients, society, and healthcare management. An infection control program is considered efficient which, when used appropriately, restrict the spread of infection among patients and staff in hospital.

**Materials and methods:** The present study was conducted in a tertiary healthcare teaching institute from May 2017 to April 2018. The intervention program included following elements: administrative support, education and training, monitoring and feedback. Microsoft excels and Statistical Package for Social Sciences version 23 (SPSS 23) were used for statistical analysis.

**Observations and results:** The compliance with hand hygiene practices was observed to have been better by 24.37%, postintervention. And out of eight preidentified areas, the maximum 30% improvement in compliance with hand hygiene was found in neurosurgery ICU.

**Keywords:** Hand hygiene, Hospital acquired infection, Infection.

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## INTRODUCTION

Healthcare-associated infections are major burdens for patients, society, and healthcare management. An infection control program is considered efficient which, when used appropriately, restrict the spread of infection among patients and staff in hospital. Good infection control program also considerably reduces patients' morbidity and mortality, length of hospital stay, and cost associated with hospital stay. This is achieved by the prevention and management of infections through the applications of research-based knowledge to practices.<sup>1</sup> Infection prevention and control (IPC) is a practical, evidence-based approach preventing patients and health workers from being harmed by avoidable infections.

The origins of hand hygiene and the empirical use of disinfectants date back to as early as 800 BC when Homer reported the use of sulfur as a disinfectant in *The Odyssey*. It was Dr Oliver Wendell Holmes in Boston in 1843 and Dr Ignaz Semmelweis in Vienna in 1861, who advocated hand washing to prevent the transmission of infectious disease. *Streptococcus pyogenes* bacteria were then specifically implicated in puerperal sepsis, a serious form of septicemia that resulted in high mortality during or shortly after child birth. Both physicians independently concluded that disease was transmitted from patient to patient by physicians and nurses on their hands and clothing.<sup>2-4</sup> Standard precautions are the minimum infection prevention practices that apply to all patient care, in any setting where healthcare is delivered. Standard precautionary measures are a set of infection control practices used to prevent infection from the health personnel to the patients and caregivers and *vice versa*. This is an important issue that needs attention. When health professionals do not follow infection control measures, then the healthcare settings will be a source for infections and at times it may also be a cause for outbreaks in the community. Compliance with infection control precautions is internationally suboptimal.

Improvement of the behavior of healthcare workers is an important aspect of infection control in healthcare. Despite all the efforts of infection control professionals, infections remain a major unwanted

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side effect of healthcare, often causing serious harm to patients. The statement of Johan Peter Frank, director of the General Hospital in Vienna around 1800, does not belong only in the past: "Can there be a greater contradiction than a hospital disease: an evil that one acquires where one hopes to lose one's own disease?" The biggest problem is not the lack of effective precautions and evidence-based guidelines, but the fact that healthcare workers apply these measures insufficiently.<sup>5</sup>

To improve this negligent behavior of healthcare workers is a main aspect of infection control in healthcare. Interventions to improve adherence to infection control measures should incorporate an evaluation of barriers to and facilitators of change. Through this study, the compliances towards hand hygiene practices among nursing, technical and class IV groups in preidentified

areas of tertiary healthcare organization were assessed through an observation checklist to identify problem areas, barriers, and facilitators, and the deficits identified were corrected by means of successful intervention program.

## MATERIALS AND METHODS

The present study was conducted in a tertiary healthcare teaching institute (Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh) of India. It was coordinated by the Department of Hospital Administration and carried out from May 2017 to April 2018. All patient care areas of hospital may contribute to the burden of hospital-acquired infection (HAI); however, keeping in view the constraints of time, following few areas have been identified for the study, which fairly represent the spectrum of therapeutic areas of hospital. The intervention program included the following elements: administrative support, education and training, and monitoring and feedback.

### Study Population and Hospital Setting

SGPGIMS, Lucknow is a 1,001-bedded tertiary care superspecialty hospital and is a premier public medical research institute in Asia. The institute caters to approximately 3,00,000 outpatients and 35,000 inpatients per year. The institute is dedicated to quality tertiary care at an affordable cost. The institute's SGPGIMS Hospital Infection Control Committee (SHICOM) serves as an apex committee for all the issues, ranging from policy formulation to operational execution and management that pertains to hospital infection control. Preidentified areas included in the study comprise endocrinology and gastroenterology wards, endocrine surgery and surgical gastroenterology wards, gynecology OT and eye OT, neurosurgery ICU and sample collection room. The total population in preidentified area of the hospital was 221. A total 196 staff were observed, out of which 109 nursing staff, 14 technical staff (Lab, ICU, and OT technicians), and 70 class IV and 15 others were identified. The observations were carried out by interviews and physical inspection as per predesigned checklist.

### Study Design

It was an observational, prospective, intervention study and was accomplished in three phases: the preintervention, the intervention, and the postintervention. The domain under which compliance with hand hygiene was aimed at are: the 5 moments of hand hygiene, the right technique, the right agent (alcohol-based handrub or soap and water), and the right duration as per WHO guidelines.

### Data Acquisition and Interventions

#### Phase I

An appropriate tool (structured observation checklist) was drafted to ascertain the current status of hand hygiene practices as per selected NABH standards and objective elements. The elements used in the tool are: moments of HH—before patient contact, before aseptic task, after patient contact, after body fluid exposure risk and after contact with patient surroundings, 7 steps of hand hygiene, alcohol-based handrub or soap and water, handrub duration, hand wash duration, barrier to hand hygiene, availability of hand hygiene resources, and display of hand hygiene posters. These elements were aimed at finding the deficit(s) in compliance with hand hygiene practices among the staff of preidentified areas.

#### Phase II

The deficit(s) present in preidentified patient care areas as observed along the predesigned tool that need improvement were identified,

and interventions specific to the parameter was done as follows: (i) longitudinal training program (LTP), (ii) displays: IEC (posters/handouts), and (iii) one handrub per cubicle.

*Longitudinal in-service training program:* This program was conducted by Department of Hospital Administration for nursing staff, technical staff (Lab, ICU and OT technicians) and housekeeping staff from the preidentified areas for the duration of 6 months commencing from May 2017 to October 2017 to help them adopt the best practices for hand hygiene. Apart from the above training, interventions specific to this parameter was taken up for onsite training as well.

*IEC displays:* Upon approval to Hospital Infection Control Committee (HICCOM) of SGPGIMS, following posters—5 moments for hand hygiene “Steps of Hand Hygiene using Hand Rub”, and “Steps of Hand Hygiene using Soap and water”—were appropriately displayed at preidentified study area. These educational materials were detailed with the moments, techniques, agents and duration of hand hygiene.

*One handrub per cubicle:* It was made necessary for each wards of preidentified study area to place at least one handrub outside each cubicles. This helped in easy accessibility of hand hygiene, and the staffs were instructed of appropriate use for the same.

#### Phase III

Thereafter, the tool (same as pretraining) was used postintervention (10 days after training) to assess the impact in compliance and its sustenance in preidentified areas of the study by photo/videography. Based on the posttraining assessment, retraining if required was also done onsite by infection control nurses.

### Study Tool

To assess the impact of intervention, an observation checklist tool containing 14 objective elements of hand hygiene with maximum 140 scores was prepared. The assessment through checklist was conducted by direct observation (OB), staff interview (SI), and record review (RR). Compliance with hand hygiene elements was evaluated by obtaining scoring criteria of 0, 5 or 10 (score 0 for noncompliance, score 5 for partial compliance, and score 10 for full compliance).

### Data Analysis

Microsoft Excels and Statistical Package for Social Sciences version 23 (SPSS 23) were used for statistical analysis. Normality of data was tested, and a variable was considered normal when standard deviation (SD) was less than half mean value. For normally distributed data, descriptive statistics was presented in mean  $\pm$  SD. To compare the proportion among the groups, Chi square test/Fisher exact test as appropriate, was used. In case ANOVA test  $p$  value was found significant, *post hoc* test (multiple comparison) was used to find out pairs between mean differences was statistically significant ( $p < 0.05$  considered as statistically significant).

## OBSERVATIONS AND RESULTS

Out of total 196 study subjects, 52.55% were male while 47.44% were females. Majority (55.6%) of the study subjects belong to nursing group followed by class IV group (29.59%) and technical group (7.14%). Most of the study subjects had work experience of 3–7 years (31.12%) and greater than 13 years (31.12%) followed with experience of 8–12 years (19.38%) and others 1–2 years of experience. Almost 2/4th (43.87%) of study subjects were in the

age group of 30–44 years. Majority of the study subjects worked on rotation basis (60.71%), i.e., morning, evening, and night shifts, and rest (39.49%) of study subjects were on general duty. More than half (54.08%) of the study subjects worked as permanent employee (Fig. 1).

As per Table 1, a comparative observation in all the preidentified area of the study shows a significant increase in compliance with a median value of 62.50 during baseline to the mean value of 80.00 during round 3. Friedman test indicated that there was a significant difference in repeated observations among hand hygiene. Multiple comparison by Wilcoxon signed rank test indicated that out of six combination (HB-H1, HB-H2, HB-H3, H1-H2, H1-H3 and H2-H3) in five combination namely HB and H1,

HB and H2, HB and H3, H1 and H3 and H2 and H3 was statistically significant ( $p$  value < 0.05).

Department-wise compliance is shown in Figure 2 wherein maximum (93.57%) compliance with hand hygiene was found in GH eye OT and GH gynecology OT. Highest (30%) change in improvement in compliance with hand hygiene (Fig. 3) was seen in neurosurgery ICU. Overall, preintervention compliance with hand hygiene was 50.44%, and postintervention compliance was 74.82% (HH% change = 24.37).

### DISCUSSION

There are increasing efforts in developing effective measures to improve hygiene and to reduce infections in hospital settings in India. In the past, HH has not received close attention and the HH facilities were essentially lacking in our hospital; some HCWs were not aware of HH requirements and regulations. To the best of our knowledge, the present study represents the first attempt in SGPGIMS to develop an interventional approach to improve compliance with HH in a hospital setting. In the present study, the mean of overall HH compliance rate improved from 50.44% in baseline phase to 74.82% in the intervention phase. Mu et al.<sup>6</sup> reported that the mean overall HH compliance rate improved from 37.78% in the baseline phase to 75.90 in the intervention phase, which is similar to our study. The demand for IEC posters and hand hygiene materials was observed to be increased significantly.

The overall compliance with hand hygiene practices was only 50.44% during preintervention and postintervention compliance was 74.82% (HH% change = 24.37) (Table 2). It was observed that preintervention, highest (71.43%) compliance was found in eye OT and gynecology OT of general hospital and lowest (35.71%) was found in sample collection room. But postintervention compliance with hand hygiene was maximum (93.57%) in both the operation

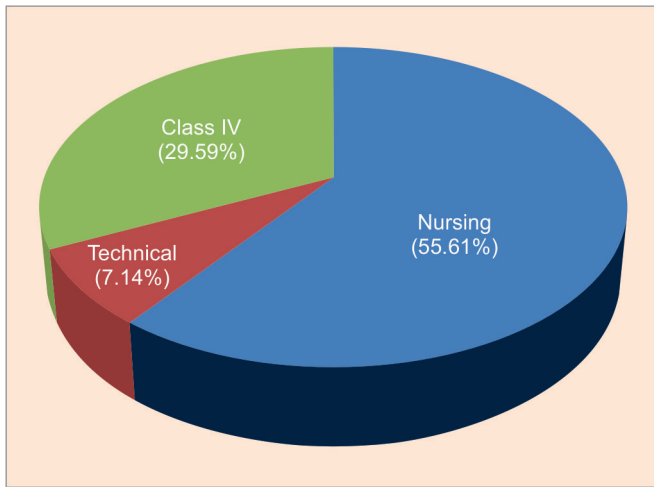


Fig. 1: Distribution of study groups

Table 1: Observation checklist analysis

S. no.	Parameters	Observation	Baseline (B)	Round (1)	Round (2)	Round (3)	p value	Multiple comparison
1	Hand hygiene (HH)	Median	62.50	72.50	70.00	80.00	0.001	HB-H1, HB-H2, HB-H3 H1-H2, H1-H3, H2-H3
		Q1	60.00	61.25	65.00	71.25		
		Q3	92.50	95.00	102.50	105.00		

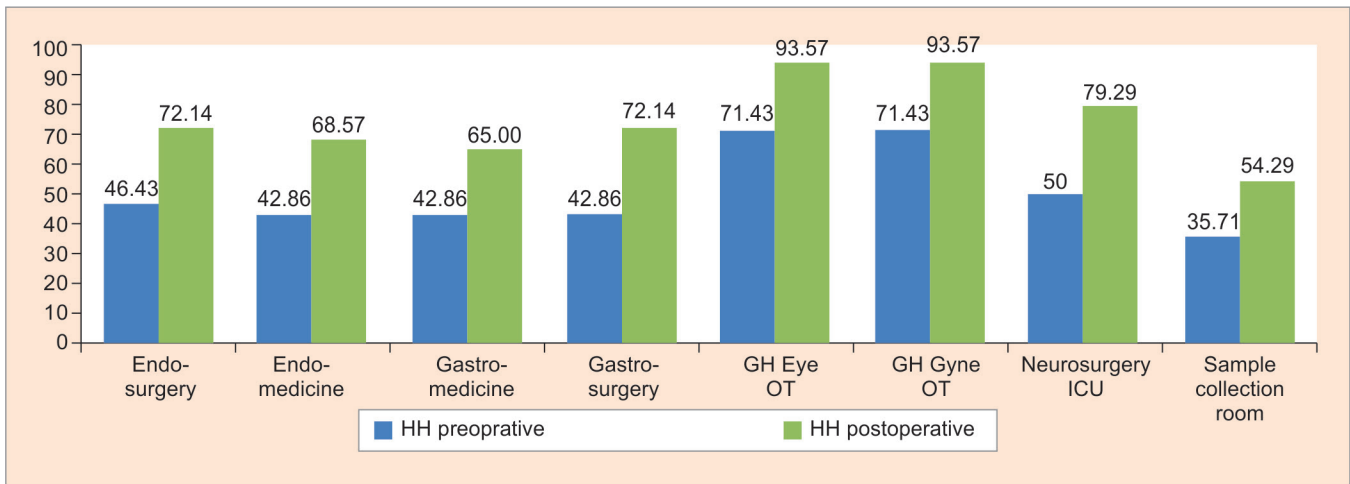


Fig. 2: Department-wise hand hygiene compliance

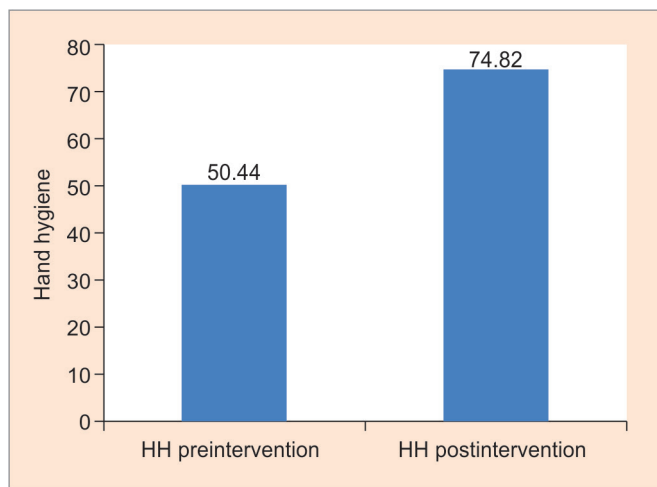


Fig. 3: Compliance with hand hygiene: pre- and postintervention

Table 2: Percentage change of compliance with hand hygiene parameters

S. no.	Checklist parameters	Mean percentage	Std. deviation	Percent change	p value
1	HH preintervention	50.44	13.56	24.37	0.00
	HH postintervention	74.82	13.60		

Paired t test,  $p$  value < 0.001

theatres followed by neurosurgery ICU (79.29%). Least (54.29) improvement was found in sample collection room.

A study conducted by Dey et al., in a tertiary care hospital of NEIGRIHMS, Shillong similarly reported that overall compliance of hand hygiene was 28.57%. Ophthalmology OT had the highest incidence of hand hygiene (57.89%).<sup>7</sup> In a study conducted by Chassin et al., in United States it was seen that baseline hand hygiene compliance was 47.5% across eight hospitals,<sup>8</sup> which was similar to another study conducted by Eldridge et al.<sup>9</sup> Suchitra et al. from Mysore, India, in her study concluded that overall hand hygiene compliance was 63.3%.<sup>10</sup>

Compliance of hand hygiene significantly changed due to multimodal strategies of interventions, and the above study findings validate the findings of present study with approximately similar results. In this study, postintervention compliance of hand hygiene was improved in all the preidentified areas but neurosurgery ICU and gastrosurgery ward had shown maximum (30% change) improvement in adhering to hand hygiene practice. This improvement in hand hygiene practices was due to experienced staff and active participation of staff.

The Department of Hospital Administration under the aegis of SGPGIMS Hospital Infection Control Committee developed a series of actions to improve the medical staff's HH compliance, including improvements in HH facilities, awareness of HH, training, education, assessment, and establishment of a quality evaluation system through monitoring and feedback. In order to improve the HH awareness in all wards, HH posters were affixed on HH dispenser according to WHO guidelines. Also, handrubs was made easily available by installing handrub stands at every cubicles of preidentified wards and ICUs.

The most frequently reported methods of measuring compliance with HH are direct observation of the practice, measurement of the consumption of products used for HH, and electronic counters for dispensers of ABHR.<sup>11,12</sup> In the present study,

direct observation through structured checklist was chosen, and it was useful to quantify the number of gaps in institutional settings and adherence to HH practices. Based on this direct observation checklist results, the interventions were planned accordingly to increase the compliance among healthcare workers.

Accompanying the intervention, there was an overall improvement of compliance with HH among the HCWs. However, repeated training and reminding is required for appropriate hand hygiene culture in healthcare settings. Timely and regular feedback might be an added factor in improving and maintaining the compliance rate. On-site training as required among preidentified areas had enhanced the compliance with HH. Although the method of direct observation of HH has several advantages, it has a major disadvantage, which is that only a very small portion of all HH opportunities are captured besides being labor-intensive and time-consuming. Additionally, the presence of an observer may produce the Hawthorne effect.<sup>13,14</sup>

In the present study, the direct observation was centered on 5MHH, right time and right duration and the tight technique to perform HH. The quality of HH relies on the correct operation of all procedures at the right time. If not performed correctly, the removal of transient microorganism from HCWs' hands cannot be achieved.<sup>15</sup> In future studies, the consumption of hand hygiene agents and installation of accessible HH instruments should be emphasized in observation and analysis.

In conclusion, our intervention program resulted in significantly increased compliance with HH in all categories of HCWs in our hospital. HH seems to be simple, but persistence of HH is difficult<sup>16,17</sup> and requires long-term commitment to change from the part of hospital administration and all HCWs and patients.

## REFERENCES

1. Organization ICMR. Hospital Infection Control Guidelines 2016. Available at <https://icmr.nic.in/guidelines/Hospital%20Infection%20control%20guidelines-.pdf>; accessed on May 2, 2018.
2. Block SS. Historical review BlockSS Disinfection, sterilization and preservation. Philadelphia: Lea and Febiger; 1991. pp. 3–17.
3. Heselntine P. Why don't doctors and nurses wash their hands? Infect Control Hosp Epidemiol 2001;22(4):199–200. DOI: 10.1086/501888.
4. Risse GB, Semmelweis IP Dictionary of scientific biography. NY: Scribners & Sons; 1980.
5. Duerink DO, Hadi U, Sri Lestari ES, et al. A tool to assess knowledge, attitude and behaviour of Indonesian health care workers regarding infection control. Acta Med Indones 2013;45(3):206–215.
6. Mu X, Xu Y, Yang T, et al. Improving hand hygiene compliance among healthcare workers: an intervention study in a Hospital in Guizhou Province, China. Braz J Infect Dis 2016;20(5):413–418. DOI: 10.1016/j.bjid.2016.04.009.
7. Borah TJ, Dey S, Yunus Md, et al. Compliance of hand hygiene in the operation theatre in a tertiary care hospital: An observational study. Ann Int Med Dent Res 2017;3(Suppl 1):2395–2822. DOI: 10.21276/aimdr.2017.3.S1.16.
8. Chassin MR, Mayer C, Nether K. Improving hand hygiene at eight hospitals in the United States by targeting specific causes of noncompliance. Jt Comm J Qual Patient Saf 2015;41(1):4–12.
9. Eldridge NE, Woods SS, Bonello RS, et al. Using the six sigma process to implement the centers for disease control and prevention guideline for hand hygiene in 4 intensive care units. J Gen Intern Med 2006;21(Suppl 2):S35–S42. DOI: 10.1111/j.1525-1497.2006.00361.x.
10. Suchitra JB, Lakshmi Devi N. Impact of education on knowledge, attitudes and practices among various categories of health care workers on nosocomial infections. Indian J Med Microbiol 2007;25(3):181–187.

11. Magnus TP, Marra AR, Camargo TZS, et al. Measuring hand hygiene compliance rates in different special care settings: a comparative study of methodologies. *Int J Infect Dis* 2015;33:205–208. DOI: 10.1016/j.ijid.2015.02.016.
12. Chou DT, Achan P, Ramachandran M. The World Health Organization '5 moments of hand hygiene': the scientific foundation. *J Bone Joint Surg Br* 2012;94(4):441–445. DOI: 10.1302/0301-620X.94B4.27772.
13. Braun BI, Kusek L, Larson E. Measuring adherence to hand hygiene guidelines: a field survey for examples of effective practices. *Am J Infect Control* 2009;37(4):282–288. DOI: 10.1016/j.ajic.2008.09.002.
14. World Health Organization WHO guidelines for hand hygiene in health care; 2009.
15. Aldeyab MA, Baldwin N, McElnay JC, et al. Strategy for improving and maintaining compliance with adequate hospital hand hygiene practices. *J Hosp Infect* 2011;77(1):87–88. DOI: 10.1016/j.jhin.2010.09.016.
16. Mortell M, Balkhy HH, Tannous EB, et al. Physician 'defiance' towards hand hygiene compliance: is there a theory-practice-ethics gap? *J Saudi Heart Assoc* 2013;25(3):203–208. DOI: 10.1016/j.jsha.2013.04.003.
17. Michaelsen K, Sanders JL, Zimmer SM, et al. Overcoming patient barriers to discussing physician hand hygiene: do patients prefer electronic reminders to other methods? *Infect Control Hosp Epidemiol* 2013;34(9):929–934. DOI: 10.1086/671727.