

Hand hygiene with interventions: an observational study from a tertiary care institute over 2 years

PREETI CHAUDHARY¹, VARSHA GUPTA¹¹ Department of Microbiology, Government Medical College and Hospital, Sector 32, Chandigarh, India

Keywords

Hand hygiene • Adherence rate • World health organization • Intensive care unit and wards

Summary

Background. Appropriate adherence to hand hygiene (HH) practices by health care workers (HCWs) reduces the transmission of pathogens and subsequently the incidence of hospital acquired infections (HAIs), in health care settings. Strict monitoring and auditing of this simple and cost-effective intervention is very important, as it significantly contributes in reducing the HAIs.

Material and methods. A retrospective observational study, evaluating the HH audits from June 2021 till May 2023 in a tertiary health care facility in North India. HH audits were conducted in the ICUs and wards daily, by the trained infection control nurses (ICNs), using direct observation method based on World health organization (WHO) hand hygiene observational forms. HH total adherence (HHTAR), partial adherence (HHPAR) and complete adherence rate (HHCAR) were analyzed in Microsoft Excel sheet. HHTAR rates were compared among different profession,

moments and the month wise trend was also observed over the period.

Results. A total of 24,740 HH opportunities were observed. The compliance rate for HHCAR, HHPAR and HHTAR were 20.3%, 41.5% and 61.4% respectively. Overall better compliance was reported from the ICUs, profession-specific compliance was highest among nurses (62.8%) and doctors (61.5%). Significant increase in adherence rate was appreciated post intervention 46.1% to 67.3%, (p value < 0.01).

Conclusions. Continuous monitoring and reinforcement with timely feedback for intervention and regular auditing is a necessity to improve and maintain the appropriate HH practices among the HCWs. Low- and middle-income countries need to focus more on this simple and promising measure to combat the increasing HAI rates.

Introduction

Unholy hands of “holy physicians” were the astute observation of the Hungarian obstetrician Ignac Semmelweis in the 19th century [1]. He pioneered the enforcement of hand hygiene (HH) among the physicians and medical students, foreseeing them to be responsible for the transmission of childbed fever. Hand washing with chlorine water was made compulsory for all the physicians and students, before entering the labor room for one year and at the end, the mortality rate dropped [1]. This was the first established evidence-based association between unclean hands and the disease transmission. Subsequently in 1975, Centre for Disease Control and Prevention (CDC) published the guidelines for hospitals highlighting the importance of Hand washing [2]. Further recognizing the growing burden of Hospital acquired infections (HAIs) with Multi-drug resistant organisms (MDROs), World health organization (WHO) launched a global campaign on HH in 2005 as a first Global patient safety alliance [3]. Presently 5th May is marked as HH day globally, to raise awareness and reinforce the importance of HH to combat the rising trend of HAIs globally.

HAIs had always been the matter of concern for the health authorities. HH being the basic fundamental component of Infection control practices (IPCs), it is important to ensure that HH is being followed meticulously. The

most effective quality indicator is the regular monitoring and auditing of the HH compliance. As per WHO the monitoring can be done by various methods including direct and indirect methods [3]. Indirect methods include measuring of hand rub/ antiseptic soaps, self-reporting by Health care workers (HCWs), use of automatic sinks or hand rub dispenses to monitor their use and also relating HH compliance with HAI surveillance data. Direct methods include direct observation by the trained auditors and lately surveillance with electronic devices and video monitoring is gaining importance. All these direct methods have their own drawbacks but still the direct observation is considered as the gold standard [3]. Apart from being most economic and feasible methodology in resource limited settings like India, direct observation also minimizes “Hawthorne effect”. Moreover, it also gives the detail compliance of various professionals and all the five moments of hand hygiene. Its major limitation is the requirement of the trained, certified staff for auditing and needs large efforts for data assessment.

Our study for the period of two years, includes the auditing of HH in a tertiary care center to evaluate HH compliance in both ICUs and wards. Simultaneously, the frequency of the activities related to the awareness of hand hygiene was increased and the result of these interventional activities were evaluated.

Material and methods

This is a prospective observational 2-year study, analyzing the Hand hygiene auditing from the ICUs and wards of a tertiary care hospital in North India. The auditing at our institute was initiated as a part of the multicenter study, with approval from the ethical committee. Hand hygiene auditing had been an essential part of routine IPC practices in various areas of the hospital including all the critical areas, ICUs and wards. The auditing was done by the trained Infection control nurses (ICNs) as per the observational form provided by World Health Organization (WHO) for auditing [4]. The ICNs were trained in the direct observation method using the WHO audit guidelines and observation form. They were assessed using dummy audit programs and case scenarios, to evaluate their competency. Along with the initiation of HH auditing in June 2021, the awareness and reinforcement classes of all the cadre of HCWs were also increased. Every cadre was taught separately to maintain the uniformity of the level of teaching. The classes were taken on weekly basis, including doctors, residents, nurses, technicians, class 3 and 4, students of every section (MBBS, nursing, BSC *etc.*), kitchen staff as well as the security guards.

On the daily basis, the HH auditing included at least two areas, one from the ICU and the other from the wards. Auditing was done randomly during routine HAI surveillance and environmental surveillance by the ICNs, to minimize the Hawthorne effect. Minimum of 20 opportunities were recorded, for a period of at least 20 minutes or more. All the five moments and the steps of Hand hygiene were observed as per WHO. The audit parameters were: (a) Hand hygiene complete adherence rate (HHCAR) when all the 6 WHO steps were followed for a duration of ≥ 20 seconds for hand rub or ≥ 40 seconds for the hand wash; (b) Hand hygiene partial adherence rate (HHPAR) ≥ 1 WHO HH steps were missed and/or the duration followed was not for appropriate duration. (c) Hand hygiene total adherence rate (HHTAR) = HHCAR + HHPAR [5].

In our analysis we evaluated the HHCAR, HHPAR, HHTAR, profession specific HHTAR and moment specific analysis, comparing the first and the second year of the study. Profession specific analyses were observed for doctors, nurses, ward attendants and others including allied staff and cleaning staff of the hospital. Moment (M) specific analysis included - Before touching the patient (M1), before aseptic procedures (M2), after body fluid exposure (M3), after touching the patient (M4), after touching the patient surroundings (M5). Month wise analysis of the trend of HHTAR was also observed to analyze the effect of the interventions (classes, feedback, bedside teaching *etc.*) focusing the importance of hand hygiene, in healthcare settings. The data collected were entered into Microsoft Excel for the analysis. The HHCAR, HHPAR, and HHTAR, monthly HHTAR, profession-specific and moment specific adherence rates were reported as percentages. The association between various parameters of HH compliance among ICUs and

wards, also between the year June 2021-May 2022 and June 2022-May 2023 were done with Chi-square test, using Openepi.com, p-value of < 0.05 was considered significant.

Results

Over the observation period of 2 years, total of 24,740 HH opportunities were available and only 5022 moments (20.3%) were completely followed. In our study HHCAR was 20.3% HHPAR was 41.5% and HHTAR was 61.9% during the 2-year period.

More opportunities were available from the wards during both the years, and the compliance of HHCAR, HHPAR and HHTAR was better in the ICUs, the difference in the HHTAR was significant (p-value < 0.0001). Various compliance parameters were compared between ICUs and Wards.

The hand hygiene adherence rate was calculated separately for all the five moments of HH as per the WHO. The overall adherence rate reported were M1 (39.5%), M2 (46.9%), M3 (89.5%), M4 (83.2%) and M5 (55.7%), over the period of two years. The compliance of moment 3 (after body fluid exposure) and moment 4 (after touching the patient) was maximum and the compliance was minimum for moment 1 (before touching the patient). Moment specific compliance separately for ICUs and wards, is shown in Figure 1 and for year 2021-22 and year 2022-23 in Figure 2.

Profession specific HHTAR was maximum among nurses (62.8%) and doctors (61.5%), followed by attendants (51.6%) and others (45%). Comparing the HHTAR for both years shows improvement in the second year of observation in all the parameters.

Monthly HHCAR, HHPAR and HHTAR are plotted in figure 3, to appreciate the difference, with continuous HH reinforcement activities in the hospital. Though variation were reported every month, but progressive increase was observed during these 2 years of observation. Initially in June 2021 HHTAR was 46.1% and in May 2023 it was observed to be 66.5%. Maximum HHTAR was documented in the April 2023 *i.e.*, 67.5%, though the HHTAR was reported to be more than 65% since November 2022 till May 2023. The improvement in HHTAR (June 21 & May 23) is significant (p-value < 0.0000001).

Discussion

We started HH auditing in June 2021 as a part of a multi-centric project initiated by JIPMER Pondicherry, with trained ICNs. The data compilation in this study is also as per the project parameters calculating HHCAR, HHPAR and HHTAR. The partial adherence rate was calculated to highlight the fact that though the HH was followed but most of the times incompletely, which does not reduce the rate of HAIs. It helped to further emphasize that all the 5 moments of HH as per WHO have equal importance and contribution in reducing HAIs. Further poor complete

Fig. 1. Comparing the HH compliance and the adherence rate in ICUs and wards.

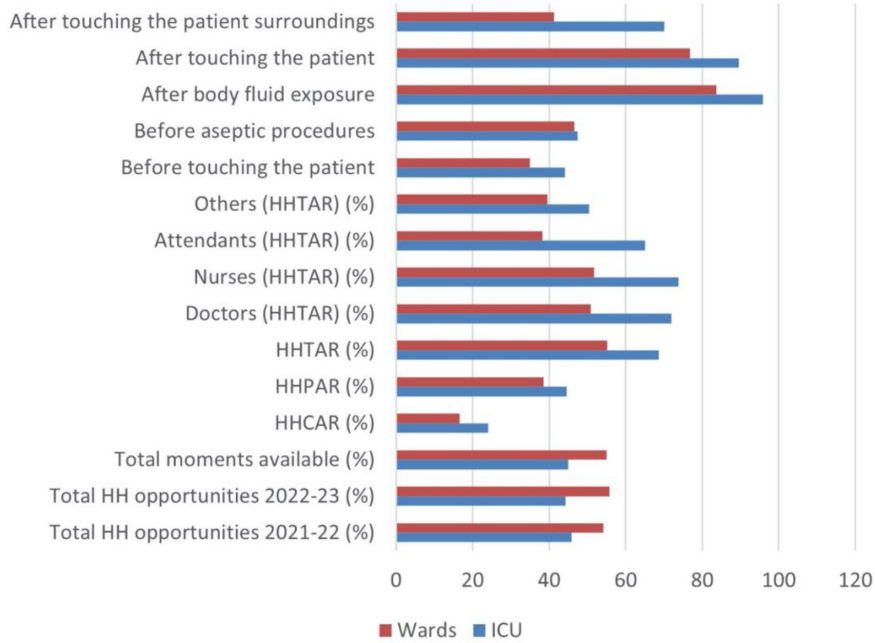
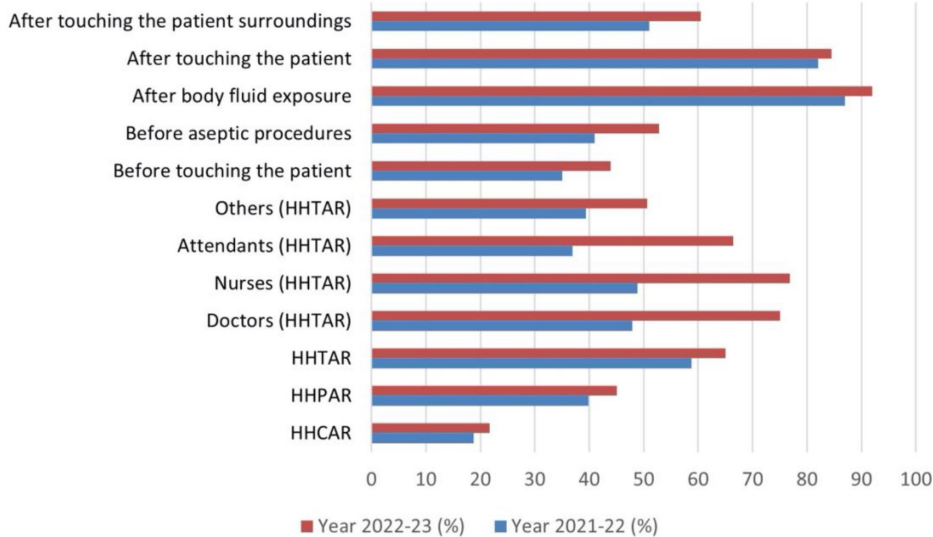


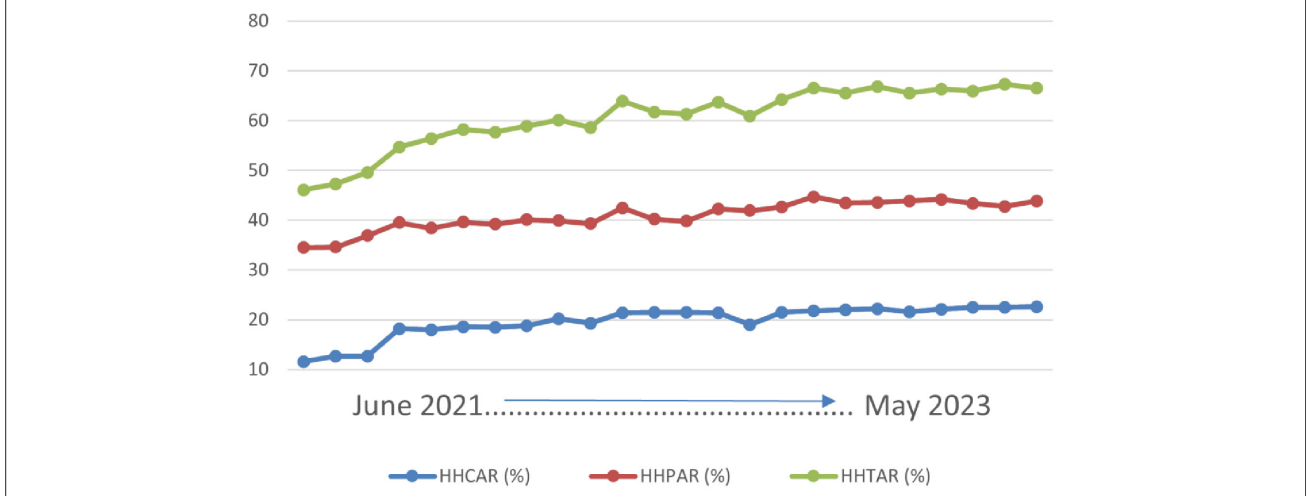
Fig. 2. Comparison of the parameters of Hand hygiene adherence rate (Profession specific and Moment specific) between 2 years (June 21-May 22 and June 22-May 23).



adherence rate may be disheartening, and HHPAR may encourage the HCWs to follow all the HH moments and HH steps, as per WHO targeting complete adherence. HH practices are reported to be very poor in low- and middle-income countries, this may be due to multiple reasons like limited availability of resources, lack of awareness and motivation among HCWs and overburden of work [6]. In our study a total of 24,740 opportunities were observed over the period of 2 years with average HHTAR, HHPAR and HHCAR of 61.4%, 41.5% and 20.3% respectively. The HH compliance rate reported in the literature has a wide range from 14% reported by Dalen et al. [7] to 73.17% by Abdo et al. [8]. The HH compliance reported from low- and middle-income countries ranges from 9-32% in

a systematic review, which is much lower than the high-income countries [9, 10]. A recent multi-centric study from India has reported HHTAR of 59.7% and HHCAR of 27.3%, the compliance from the northern zone was 19.9% (our institute also lies in northern India) [11]. Our results are comparable with these studies. Compliance rate was significantly more in the ICUs, owing to the fact that the nurse-to-patient ratio in ICUs is 1: 2/3 and it is around 1: 10-15 in wards, supporting the inverse relationship of more workload and multiple interventions with less HH compliance rate. Profession specific HH compliance rate has been reported to be more in nurses and doctors, in a number of studies. [5, 11, 12]. Among them the compliance in nurses is higher than the doctors, in most of the studies.

Fig. 3. Monthly % rate of HHTAR, HHPAR and HHCAR over the period of 2 years.



We also reported higher compliance in nurses, closely followed by the doctors. Higher compliance in nurses may be due to their more interaction and patient care activities, making them habitual for the practice. The compliance in attendance and other group of HCWs is reported to be low in all the studies attributing to their low educational status, less awareness leading to poor attitude and acceptance to the HH practice.

The moment specific compliance of all the 5 moments of Hand hygiene, as per WHO was observed and evaluated separately. After moments (after body fluid exposure and after touching the patient) have significantly higher compliance (M3 89% and M4 83%) than before moments M1 (39%) and M2 (47%). The higher compliance in after moments have also been reported in multiple studies. [5, 13-15]. This reflects that may be the HCWs are more concerned about contacting or carrying infection from the patients, than transmitting infection to the patient. This data directed our efforts to emphasize more on, before moments during the reinforcement classes. Few studies have reported comparable compliance in moment before aseptic procedures (M2) also [16]. This owes to the awareness in HCWs regarding transmitting infection to the patient from the hospital environment.

In addition to the awareness classes, it was insured that the visual reminders for the steps and moments of hand hygiene as per WHO were displayed along every sink and hand washing area in the hospital. Bedside teaching and observation by the ICNs were also emphasized for motivation, incorrect techniques, misconceptions and poor availability of resources if any. To evaluate the effect of the increased and focused educational programs the data of two years was compared in Figure 2. The bars of the year 2022-23 were larger than 2021-22 in all the parameters, signifying improvement in overall rates, moment specific as well as in the profession specific compliance rates. Similar post interventions, results were reported in the literature also [7, 13, 17]. Monthly percentages of HHTAR, HHPAR and HHCAR were evaluated, though continuous increase was not appreciated but the overall

improvement in HHTAR was significant (p -value < 0.0000001). Further, the compliance was consistently more than 65% from November 2022 till May 2023.

The study had various limitations some due to the ongoing practical issues like shift variations. Auditing was done during the morning or afternoon hours, as auditing during evening and night hours was not feasible. The auditing included all the HCWs irrespective of their work experience, which could have been a bias, other limitations could be the area of work of the HCWs.

Conclusions

Concluding the study, it was observed that ICU settings and the hand moments after body fluid exposure and after touching the patients (M3 & M4) had better HH compliance rates, further profession specific compliance was observed to be better among Nurses and Doctors. Moreover, comparing these parameters for two years, second year (June 22-May 23) had improved compliance rates. Owing to the periodic feedback, given to the Nursing incharge of the particular area on monthly basis, by the ICNs and reinforcement of the HH practices among the HCWs during HH audits and training sessions. It was concluded that the behavioural changes among HCWs seems to be the only possible practical solution to achieve sustainable standards of HH, with the present workload and limited resources in a developing country like India. We target to increase the HH compliance as per the WHO recommendation with continuous awareness classes, monitoring and auditing of hand hygiene, further targeting to reduce the hospital associated infection rates.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

PC: manuscript writing, concept and design of study, data analysis and interpretation. VG: critical revision of the manuscript and approval for the final submission. The manuscript has been read and approved by all the authors, and the requirements for the authorship have been met, and each author believes that the manuscript represents honest work. The data of the study has not been presented anywhere and it was not a clinical trial.

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Correspondence: Varsha Gupta, Department of Microbiology, Government Medical College and Hospital, Sector 32, Chandigarh, India. Tel.: 9646121571 - E-mail: varshagupta_99@yahoo.com

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