**Baseline assessment of hand hygiene knowledge perception: An observational study at a newly set up teaching hospital**

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**Abstract**

**Background:** Hand hygiene plays a crucial role in preventing health-care-associated infections (HCAIs) by reducing the spread of antimicrobial resistance. But, its compliance with optimal practices usually remains low at most of our health-care settings. **Aim:** This study focused on one of the primordial, basic and low-cost practice of infection control. **Materials and Methods:** A cross-sectional observational study was conducted among medical faculty, senior residents, postgraduates, nursing faculty, ward sisters/matron, and staff nurses at All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand. Data were collected on a pretested structured questionnaire distributed among the participants, which consisted of questions to assess the knowledge and perception toward hand hygiene. **Results:** A total of 171 health-care workers (HCWs) were assessed in this study. Overall response rate observed was 87.8% ± 11.6%. Majority of the participants were staff nurses. Approximately 55% of them had received formal hand hygiene training in the last 3 years. Overall correct knowledge seen among participants was 66.4% ± 27.5%. It was observed that in situations requiring hand hygiene, it was performed in approximately 70%–80% of the times. Alcohol-based hand rub was not available at every point of care, whereas single-use towel was not present at every sink. When monitored whether the HCW started hand hygiene activity or not, compliance was seen in only 32% of the total. **Conclusion:** It is now essential for developing countries to formulate the policies for implementation of basic infection control practices. As we are facing an era of multidrug-resistant pathogens that are rapidly increasing globally, and paucity of availability of new antimicrobials, it is been essential to look at the role of basic infection control practices at health-care settings and implement them at priority level.

**Keywords:** Hand hygiene, heath care associated infection, health-care worker

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**Introduction**

According to World Health Organization (WHO), “Hand hygiene is defined as a general term referring to any action of hand cleansing” Labarreque in the nineteenth century provided the first evidence of hand washing and documented that hand decontamination could reduce the incidence of puerperal fever and maternal mortality rates.¹ There have been many studies stating the fact that health-care workers (HCWs) hands play a crucial role in transmission of microorganisms within the health-care environment and ultimately to the patients.² Thus, hand hygiene (HH) is considered one of the most important procedures in preventing health-care-associated infections (HCAIs). It is being recommended that health-care personnel should wash their hands or perform hand rub before and after significant contact with any patient. HCWs

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can contaminate their hands by touching the patients’ skin, body secretions, or environment while performing routine care activities as patients’ skin may have colonizing pathogens that are being shed into surroundings leading environmental contamination.\[9\]

HCAIs are a major problem for patient safety and its surveillance and control must be of top priority for settings and institutions committed to making health-care safer. The impact of HCAI implies prolonged hospital stay, long-term disability, infection with multidrug resistant (MDR) pathogens, high costs for patients and their families, and thus a massive additional financial burden. Although the risk of acquiring HCAI is universal and a concern for every health-care facility, the actual global burden is still unknown because of the difficulty in getting reliable data. According to WHO, overall estimates indicate that more than 1.4 million patients worldwide in developed and developing countries are affected at any time.\[8\] Effective HH behavior compliance rates are quite low and have been reported from both developed and developing countries, rarely exceeding 40% of situations in which HH is indicated.\[8\]–\[10\] Variable reasons such as the lack of appropriate reagents, the cultural background, behavioral and even religious beliefs can be important hurdles in preventing good HH practices.\[8\]–\[10\] There are numerous factors that play a role in eventually determining the lack of compliance, perception, and knowledge of the transmission risk and of the impact of HCAI. Lack of hand-washing facilities and hand-rub availability (i.e., sinks, running water, and sewage systems) are major factors for implementation of HH practices.\[10\] It is being observed that interactive educational programs along with free availability of hand disinfectants significantly increase the HH compliance.\[12\]–\[14\]

There is a rapid global spread of MDR infections in health-care setups, which are the leading cause of HCAIs and there are well-documented studies that improved HH can reduce infection rates. Numerous hospital-based studies of the impact of HH on risk of HCAIs have already been published.\[15\]–\[17\] As WHO stresses on Clean Care is Safer Care as a primary initiative on patient safety programs, it is crucial to focus upon measures that can increase the basic knowledge and perception of HH and to formulate the much-needed policies for implementation of basic infection prevention practices in health-care setups.

**Materials and Methods**

Approval from ethics committee was obtained. Date of approval is 14 Dec 2016. This was a cross-sectional observational study conducted in 2019 among medical and nursing faculties, senior residents, postgraduates, ward sisters/matron, and staff nurses at All India Institute of Medical Sciences (AIIMS), Rishikesh. This is an 800-bedded, tertiary care, government hospital situated in Rishikesh, Uttarakhand. Its catchment area includes the whole of Uttarakhand and neighboring states of Uttar Pradesh, Himachal Pradesh, and Delhi. The study population included all HCWs including staff nurses, medical faculties, senior and junior residents, and were fully informed about the design and purpose of the study. Participation in this study by health-care staff was on voluntary basis.

A written informed consent was obtained from each participant and anonymity of the participants was maintained throughout the study. To assess the knowledge and awareness regarding HH practices, a pretested structured questionnaire was distributed among all the participants. Baseline profile regarding gender, age, or name was included in the questionnaire.

**Results**

A total of 171 HCWs were included in this study. Among the total participants, staff nurses (56%), medical faculties (24%), junior residents (13%), and senior residents (7%) were included. Response rate observed was 87.8% ± 11.6% (range: 32.2%–99.4%), whereas correct knowledge was 66.4% ± 27.5% (range: 23.6%–95.9%). It was found that 55% HCWs had received formal HH training in previous 3 years but majority of them (93%) were using alcohol-based sanitizers for HH. Majority of the participants were males (53%) as compared with females (47%). Most of them who responded belonged to age group 20–30 years (71%) followed by age group 31–40 (21%) and >40 years (8%), respectively. A total of 49 questions were asked in the form, of which 12% were on basic profile, 51% on knowledge assessment, and 37% were perception-based questions.

In knowledge-based questions, variable responses were observed from participants [Tables 1–6]. A total of 152 participants responded to the main route of cross-transmission of potentially harmful germs between patients in a health-care facility, of which 134 (88%) correctly responded as unclean hands of health-care workers. Others responded air, environmental exposure, and sharing noninvasive objects as the main route of transmission. A total of 166 participants responded to the question regarding

| Table 1 | Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? |
|---------|----------------------------------------------------------------------------------------------------------|
| Unclean hands of health-care workers | 87% |
| Air circulating in the hospital | 3% |
| Patients’ exposure to colonized surfaces (i.e., beds, chairs, tables, floors) | 2% |
| Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients | 8% |

| Table 2 | What is the most frequent source of germs responsible for health-care-associated infections? (response given by 96.5%) |
|---------|-------------------------------------------------------------------------------------------------------------|
| The hospital’s water system | 1.2% |
| Hospital air | 4.2% |
| Germs already present on or within the patient. | 23.6% |
| The hospital environment (surfaces) | 40.9% |
minimal time needed for alcohol-based hand rub to kill most
germs on your hands, of which 90 (54%) knew the right duration
and correctly answered 20 s.

Similarly, in baseline perception assessment a wide range of
variable results were observed. The average percentage of
hospitalized patients was 41% ± 26% (range 0%–100%), and who
will develop a health-care-associated infection was answered by
only 60% of participants. Eighty-nine participants responded that
69.5% ± 30% (3%–100%) average number of times that HCWs
do HH. However, 149 participants responded that they usually
do HH in 78% ± 20.4% of situations requiring HH. Baseline
perception-based answers are shown in Tables 7–10. Questions
on structural assessment are shown below Table 11 and12.

**Discussion**

The knowledge regarding good hand washing practices and
compliance of the same among HCWs is mandatory for
decreasing the health-care-associated infections and to improve
patient and provider safety. In this study, an attempt was made
to assess the knowledge and awareness regarding HH among
the medical residents and faculties along with the staff nurses
of a tertiary care teaching hospital in Uttarakhand. This was
in contrast to other studies conducted in different parts of
the country where HH compliance was measured in selective
locations of the hospital. It also determined the association
with some sociodemographic features and provided us with
significant findings. The existing knowledge and awareness were
assessed by administering a structured questionnaire as pretest
to all the participants. Majority of the study participants were
males and belonged to the age group of 21–30 years. In total,
87% respondents answered correctly when asked about the main
route of transmission of potentially harmful germs between
patients. In a study conducted by Sreejith Nair et al.,[18] 75.6%
and by Glad Mahesh et al.[19] 48.6% medical students were able to
acknowledge this fact. However, only 23% of participants knew
that the most frequent source of germs responsible for HCAIs
were the germs already present on or within the patient, which
was similar to study by Shinde et al.[20] on nursing students (26%)
and by Kudavidnange et al.[21] on intensive care unit staff (25%).

As per WHO, alcohol-based hand rub is more effective for
antisepsis as it increases the compliance by making the process
faster and also due to the fact that it shows broad spectrum
microbicidal activity. But in majority of the hospitals these hand
rubs are either not available or are out of stock, thus making it
very difficult to adhere to. On the contrary, in our study, majority
of the respondents (67%) believed that hand wash is a more
effective way than hand rub to kill germs. Approximately 54%
were aware about the minimum time needed for effective for
HH as mentioned in the WHO guidelines. Compared to similar
studies in India, our participants had better knowledge.[22] The
participants answered above satisfaction level regarding type
of HH method required before palpation of abdomen (80%),
emptying the patient’s bed pan (89%), and after visible exposure
to blood (78%). They had poor knowledge regarding the
method to be used after removal of examination gloves (72%).
and before giving injection (48%). However, in general the
knowledge regarding the type of HH method desired in the
required clinical setting was disappointing and thus this study
helped us to identify gaps in their knowledge and areas needed
for further improvement. One of the reasons may be the
inaccessibility of hand-rub solutions and sink areas for hand
wash by soap and water for residents and staff nurses in the
wards and even in some of the outpatient departments of the
hospital.

It was seen that in 70%–80% of situations requiring HH do the
HCW actually perform HH either by hand rub or hand wash.
Educational sessions on HH were found to be the most effective
strategy to improve HH practices. Like in most previous studies,
our study showed that the overall compliance on HH by HCWs
was 32%.

This study is of great relevance in the current scenario
when the whole world is trying to control the severe acute
respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic.
Till date (March 11, 2020), 118326 confirmed cases have been
reported by WHO, of which 4292 deaths have occurred.[23] In
India alone, 60 cases of SARS-CoV-2 have been confirmed and
till now no deaths have been reported. WHO has assigned this
disease under “Very High Risk category.” It still has no definitive
treatment and vaccination except hope of some new antivirals.[24]
Therefore, prevention and control is the key to
fig this public
health problem. Role of proper HH cannot be overemphasized
in this context of prevention of transmission effectively but
implementation and adherence to HH is still lacking in health-care
setups due to various reasons. Thus, regular knowledge attitude
practice assessment with gap analysis and continual training is
pertinent to improve these health-care practices.

Limitations of study
HH training and its compliance study to correlate appropriate
results could not be conducted in this study, which could further
improve the results.

Conclusion
HH is an important tool to prevent HCAI and HH should be
considered as a major patient safety issue. The HCWs need to
inculcate the simple, basic though effective practices of HH
in their day-to-day patient care activities. Effective support
by administration, continuous surveillance measures, routine

| Table 8 |
|----------------------------------|
| **In general, what is the impact of a health-care-associated infection on a patient’s clinical outcome?** |
| **What is the effectiveness of hand hygiene in preventing health-care-associated infection?** |
| **Among all patient safety issues, how important is hand hygiene at your institution?** |
| **Very low** | **Low** | **High** | **Very high** |
| 3.6 | 23.5 | 59.6 | 13.3 |
| 0.6 | 4.8 | 42.3 | 52.4 |
| 1.2 | 4.2 | 23.6 | 70.9 |

| Table 9 |
|----------------------------------|
| **% Effectiveness of various strategies to improve HH practices (response given by 95.5%)** |
| **1 (not effective)** | **2** | **3** | **4** | **5** | **6** | **7 (very effective)** |
| Support and promotion of HH by administration | 4.8 | 1.8 | 3 | 8.5 | 13.9 | 19.4 | 48.5 |
| Always available alcohol-based HR at point of care | 2.4 | 1.8 | 4.3 | 6.1 | 11 | 25 | 49.4 |
| Poster reminder | 5.5 | 5.5 | 5.5 | 16.0 | 9.8 | 19 | 38.7 |
| Education on HH | 5.5 | 4.2 | 1.2 | 9.7 | 12.1 | 14.5 | 52.7 |

| Table 10 |
|----------------------------------|
| **% Effectiveness of various strategies to improve HH practices (response given by 95.5%)** |
| **Clear and simple visible instructions** | 3.7 | 4.3 | 2.4 | 10.4 | 12.8 | 22 | 44.5 |
| **Providing regular Feedback** | 8 | 3.7 | 7.4 | 8.6 | 11.7 | 25.3 | 35.2 |
| **Good example as a role model** | 1.9 | 2.5 | 1.9 | 6.2 | 16.1 | 26.1 | 45.3 |
| **Reminder by patients** | 8.0 | 7.4 | 11 | 16.6 | 12.9 | 15.3 | 28.8 |

| Table 11 |
|----------------------------------|
| **Importance given by different person toward your optimal HH (response given by 96.7%)** |
| **Head of department** | 0.6 | 4.8 | 9.7 | 13.3 | 7.3 | 28.5 | 35.8 |
| **Colleagues** | 3.0 | 2.4 | 7.2 | 16.3 | 12.7 | 27.1 | 31.3 |
| **Patients** | 6.7 | 8.5 | 9.1 | 13.9 | 14.5 | 23.6 | 23.6 |

| Table 12 |
|----------------------------------|
| **Which of the following hand hygiene actions prevents transmission of germs to the health-care worker? (response given by 76.5%)** |
| **OPD IPD** | **Easy availability of alcohol-based HR** | 67% | Yes |
| **At every point of care** | No (at trolley) | Yes | Majority wards |
| **Sink availability** | Available: 8, not in: one (eye ward) | Yes | Majority wards |
| **Continuous supply of clean, running water** | Available: 6, not available in: 2 (Gen Medicine and Surgery) | Yes | Majority wards |
| **Soap at every sink** | 74% | Yes |
| **Single-use towels available at each sink** | No | No |
| **Sink to bed ratio** | 1:12.7 |
educational and interactive sessions with the staff, and taking feedback may improve effectiveness of HH measures. Emphasis on alcohol-based hand rubs for visibly nonsoiled hands and hand washing with soap and water for soiled hands also play a major role in preventing HCAIs. It should be mandatory to place alcohol-based hand rubs at every point of care.

There should be a well-developed and organized hospital infection control committee (HIICC) with adequate staff to give evidence-based demonstration to all HCWs at periodic intervals. Thus being simple, HH is most effective basic measure to control HCAIs, which should become a national priority to look upon. An effective strategy to implement knowledge into practices to enhance HH compliance is the need of the hour.

There are few challenges in improving HH: Dedicated trained staff for infection control committee and difficulty in time coordination to educate HCWs.

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Conflicts of interest
There are no conflicts of interest.

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