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10.4103/jacm.jacm_42_16

A study to assess the knowledge, attitude and practices of hand hygiene in a health-care setting

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Abstract:

CONTEXT: In the wake of a growing burden of health care associated infections (HAIs), health-care workers (HCWs) are advised to revert to simple tools like hand hygiene (HH).

AIMS: The aim of this study is to explore the existing knowledge, attitudes and practices with regard to HH, the total HH compliance and the various barriers to HH in our hospital so as to plan the strategies for bridging these gaps, thus improving patient care.

SETTINGS AND DESIGN: A cross-sectional study was conducted among 300 HCWs of Jubilee Mission Medical College and Research Institute, Thrissur, belonging to six different categories, for a period of 2 months.

MATERIALS AND METHODS: Knowledge, attitude and practices were evaluated using a validated WHO HH questionnaire, a self-structured attitude questionnaire and an observation checklist based on the concept of Five Moments of HH by WHO, respectively. Total compliance and the profile of missed opportunities were also assessed.

STATISTICAL ANALYSIS USED: SPSS was used for data analysis.

RESULTS: The knowledge on HH was good (190 out of 300, 63.3%), attitudes were poor with nursing staff having significantly better attitude than doctors ($P < 0.05$). In the observational study, physicians and nursing staff had better practice. Lack of time was the major barrier pointed out. The overall compliance was 46% among the HCWs of whom only 16% had proper HH practice. Rest of the 30% performed HH, but the technique was wrong.

CONCLUSIONS: The study highlights the need for reinforcing the existing HH training programmes to address the gaps in knowledge, attitude and practice and thereby improving the level of HH compliance and enhancing patient safety.

Keywords:

Attitude and practice, hand hygiene, health care associated infections, health-care worker, knowledge

Introduction

“First do no harm,” is a conventional medical oath, which is rarely violated intentionally by any health-care worker (HCW). In spite of this notion, patients receiving health care, are at risk of HAI ranging from 6% to 27% in the developing and resource-poor settings.^[1] The prevalence of HAIs due to poor hand hygiene (HH) is about 19%

in developing countries.^[2] Basically, HH depends on the attitude, behaviour and beliefs of an individual.^[3] Hence, this study strives to focus on the knowledge, attitude and practices, which are the three main determinants of HH in a tertiary health-care set up. By measuring the HH compliance and identifying the barriers, effective protocols for infection prevention can be designed, implemented and taught to improve health-care outcomes in the future.

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How to cite this article: Jose GE, Valsan C. A study to assess the knowledge, attitude and practices of hand hygiene in a health-care setting. *J Acad Clin Microbiol* 2017;19:93-100.

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Materials and Methods

Design

This is a descriptive type of study with cross-sectional study design conducted by the Infection Control team under the Department of Microbiology, Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India for 2 months; June and July, 2015.

Aim

To assess the knowledge, attitude and practice of HH in our hospital among the various categories of health-care workers.

The objectives of the study include:

1. Assess the knowledge of and attitude towards HH in senior and junior doctors, medical students, staff nurses, nursing students and housekeeping staff
2. Assess the compliance and to find out the profile of missed opportunities in HH.

Sample size

According to a study done by Pittet *et al.*, the average prevalence of HH was found to be 40% and hence using the formula $4pq/l^2$ a sample size of 300 was arrived at.^[4]

The study group consisted of senior and junior doctors, medical students, staff nurses, nursing students and housekeeping staff, with 50 samples from each category. As it was a short term and preliminary study to get an overall idea on the existing HH practise in our hospital, further categorisation of study groups such as intensive care units and high dependency units which may reflect a change in their priority towards HH was not done. In this three-tier study, the knowledge and attitude were assessed using the WHO's HH questionnaire for HCWs^[5] and a self-structured attitude questionnaire adapted from previous studies, respectively.^[6] Housekeeping staff were given a questionnaire in their language, omitting some of the questions which were not applicable to them. The responses were evaluated and knowledge was categorised as good ($\geq 75\%$), moderate (50%–75%) and poor ($\leq 50\%$) of the total score. The attitude statements were evaluated on the basis of a scale of 0–4, with 0 as “don't know” and 4 as “strongly agree.”^[7] Statistical analysis of the data was carried out using the Chi-square test.

The observational study was conducted using a checklist based on the concept of “my five moments for HH” by the WHO^[8] and the observations were made by the principle investigator using the parameters in this checklist which included the time taken to use an alcohol based hand rub, presence of any infection carriers such as rings, watches and bracelets worn by HCWs and the various areas of hand covered while performing HH. As a part of the second objective, a single-blinded study to assess

the compliance and the profile of missed opportunities in HH was done using a set of 300 subjects (HCWs) who were selected randomly and observations were made using the checklist.^[8]

Results

A total of 300 HCWs were evaluated on their knowledge, attitude and practise of HH which consisted of senior and junior doctors, medical students, staff nurses, nursing students and housekeeping staff, with 50 samples from each category and this sample size was obtained using the formula $4pq/l^2$. Since this was a short-term and preliminary study to get an overall idea on the existing HH practise in our hospital, further categorisation of study groups such as intensive care units and high dependency units., which may reflect a change in their priority towards HH were not done.

Knowledge study

Out of 300 participants, 190 (63.3%) had a total knowledge score of more than 75% which pertains to the whole study group from all 6 categories. Thirty-seven (74%) of both senior and junior doctors had good scores (above 75%), whereas 33 (66%) of both medical and nursing students, 28 (56%) of staff nurses and 22 (44%) of housekeeping staff also got good scores [Figure 1]. None of the HCWs had poor scores (<50%) except one house keeping staff (2%). The scores obtained for each question by each category of HCW is shown in Table 1. Only 19 (38%) of senior doctors, 26 (52%) of junior doctors and 7 (14%) of medical students have received proper formal training in HH in the past 3 years. About 44 (88%) of the staff nurses and 37 (74%) of the senior physicians preferred to use the alcohol based hand rub routinely instead of hand washing with soap and water. While looking for the important gaps in the clinical knowledge based on the responses to the individual questions we found that only 29 (58%) senior doctors, 22 (44%) junior doctors, 24 (48%) medical students, 19 (38%) staff nurses and 17 (34%) nursing students knew the minimal time (20 s)

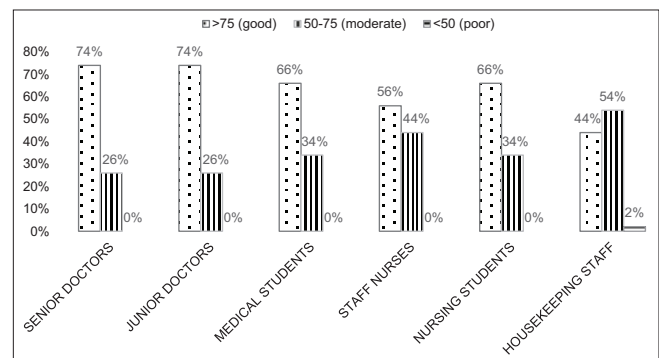


Figure 1: Comparison of total knowledge scores of hand hygiene among the six categories (the denominator is 50 HCWs in each of these categories)

Table 1: Comparison of knowledge of hand hygiene among the 6 categories

Questions	Senior doctors (%)	Junior doctors (%)	Medical students (%)	Staff nurses (%)	Nursing students (%)	House-keeping staff (%)
1 Name of the department						
2 Did you receive formal training in HH in the last 3 years? (yes)	19 (38)	26 (52)	7 (14)	45 (90)	38 (76)	22 (44)
3 Do you routinely use an alcohol based hand rub for HH? (yes)	37 (74)	31 (62)	22 (44)	44 (88)	26 (52)	15 (30)
4 Which of the following is the main route of transmission of potentially harmful germs between patients? (health care workers hands when not clean)	40 (80)	28 (56)	27 (54)	27 (54)	23 (46)	20 (40)
5 What is the most frequent source of germs responsible for health care associated infections? (germs already present on or within the patient)	43 (86)	37 (74)	36 (72)	38 (76)	37 (74)	35 (70)
6 Which of the following HH actions prevent transmissions of germs to the patient?						
6a Before touching a patient (yes)	47 (94)	47 (94)	48 (96)	46 (92)	41 (82)	NA
6b Immediately after risk of body fluid exposure (yes)	44 (88)	44 (88)	35 (70)	43 (86)	41 (82)	NA
6c After exposure to immediate surroundings of a patient (no)	19 (38)	18 (36)	18 (36)	11 (22)	17 (34)	NA
6d Immediately before a clean or aseptic procedure (yes)	44 (88)	47 (94)	44 (88)	47 (94)	41 (82)	NA
7 Which of the following HH actions prevents transmission of germs to the health care worker?						
7a After touching a patient (yes)	50 (100)	49 (98)	50 (100)	47 (94)	46 (92)	NA
7b Immediately after risk of body fluid exposure (yes)	46 (92)	48 (96)	49 (98)	45 (90)	43 (86)	NA
7c Immediately before a clean or aseptic procedure (no)	23 (46)	19 (38)	23 (46)	17 (34)	19 (38)	NA
7d After exposure to immediate surroundings of a patient (yes)	39 (78)	47 (94)	43 (86)	41 (82)	46 (92)	NA
8 What is the minimal time needed for alcohol based hand rub to kill most germs on your hand? (20 s)	29 (58)	22 (44)	24 (48)	19 (38)	17 (34)	11 (22)
9 Which type of HH method is required in the following situations?						
9a Before palpation of the abdomen (rubbing)	36 (72)	33 (66)	31 (62)	26 (52)	34 (68)	NA
9b Before giving an injection (rubbing)	48 (96)	48 (96)	46 (92)	49 (98)	49 (98)	NA
9c After emptying a bed pan (washing)	48 (96)	48 (96)	44 (88)	49 (98)	50 (100)	32 (64)
9d After removing examination gloves (rubbing/washing)	46 (92)	50 (100)	47 (94)	48 (96)	50 (100)	21 (42)
9e After making a patient's bed (rubbing)	46 (92)	46 (92)	43 (86)	50 (100)	49 (98)	25 (50)
9f After visible exposure to blood (washing)	47 (94)	48 (96)	44 (88)	48 (96)	41 (82)	40 (80)
10 Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?						
10a Wearing jewelry (yes)	47 (94)	42 (84)	35 (70)	47 (94)	45 (90)	10 (20)
10b Damaged skin (yes)	48 (96)	47 (94)	46 (92)	40 (80)	44 (88)	14 (28)
10c Artificial fingernails (yes)	42 (84)	46 (92)	43 (86)	45 (90)	42 (84)	16 (32)
10d Regular use of a hand cream (no)	26 (52)	18 (36)	22 (44)	18 (36)	24 (48)	14 (28)

NA: These questions were not given to the house keeping staff; HH: Hand hygiene

which was needed for an alcohol based hand rub to kill most germs on the hand

Attitude study

While assessing the attitudes among the HCWs, nurses seemed to have significantly better attitudes when

compared to rest of the study population ($P < 0.05$). Respondents found that emergencies and other priorities often make it difficult for them to adhere to HH at all times and they often feel frustrated when they omit HH. As per the scoring system, both these statements scored an average above 3.5. Overall 78% (236/300)

and 83.33% (250/300) of HCWs commented that they strongly agree (score 4) that infection prevention team has a positive influence on their HH and infection prevention notice boards remind them to perform HH, respectively.

Barriers to hand hygiene as suggested by the health-care workers

The survey showed that lack of time was the major barrier for 163 out of 300 HCWs (54.3%) [Figure 2]. Other barriers highlighted include lack of adequate facilities such as hand-wash, hand-rub and washbasin 137 (45.6%), staff shortage 133 (44.3%) and lack of awareness 98 (32.6%).

Observational study

Among the different moments of HH, moment V (after touching the patient’s surroundings) was missed by 216 HCWs (72%) followed by moment I (before touching a patient) which was missed by 162 (54%) [Figure 3]. While performing HH, the wrist, fingertips and webs were frequently missed in (135) 45%, (111) 37% and (99) 33% of the HCWs, respectively. One hundred and forty-two of the total study population (47.3%) were found to wear infection carriers such as rings, watches and bracelets. The minimum recommended time for HH using an alcohol-based hand rub as described by WHO is 20 s. Only 51 HCWs (17%) performed HH in 20 s or more,

whereas the rest took less than the time recommended raising concerns of adequacy of the task done.

Overall compliance

The overall compliance among the HCWs to adhere to correct HH practices were noted to be 46% (138 of 300), with again high rates of compliance seen among staff nurses 78% (39 of 50) and nursing students 64% (32 of 50) when compared to the rest of the study population. Fifty-four percent of HCWs (162 of 300) omitted HH in the indicated situations whereas 46% (138 of 300) performed the act of HH. Among them, only 48 (16% of 300) had proper HH practice which is the true compliance of this study, whereas rest 90 (30%) performed HH poorly.

Discussion

The medical community all over the world witnessed a tandem unprecedented advancement in the understanding of pathophysiology of Hospital Acquired Infectious (HAI) diseases due to its increasing influence on the magnitude of problems such as morbidity, mortality and hospital economy. Compliance with HH guidelines has been considered to be the most important strategy to reduce the transmission of HAIs in health-care settings for many years.^[4] In spite of the overwhelming evidence demonstrating the negative consequences

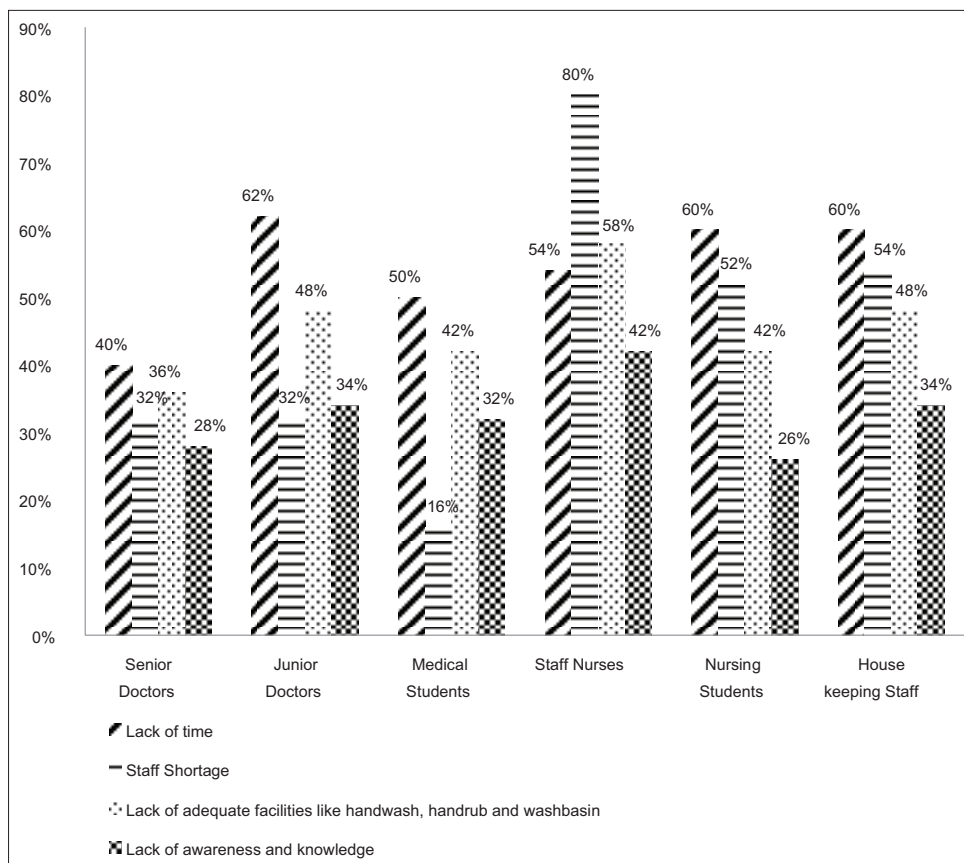


Figure 2: Comparison of barriers to hand hygiene among the various categories

of HAIs and on-going education emphasising the importance of performing HH, low HH compliance rates among the HCWs continue to prevail.

In our study, knowledge of HH seemed to be good with 63.3% (190 HCWs) having more than 75% score when compared to a similar Indian study where in 74% of the study population, the knowledge was between 50% and 75% of total score.^[6] Majority of the study population still calls on the need for formal training in HH which was strongly evident in their response to the question of whether they had received any formal training in HH in the last 3 years. Only 38% of senior doctors, 52% of junior doctors and 14% of medical students had received proper formal training in HH in the past 3 years. Forty-four (88%) of the staff nurses and 37 (74%) of the senior physicians preferred to use the alcohol-based hand rub routinely instead of hand washing with soap and water. This practice of using alcohol based hand rub has been recommended strongly by the WHO in the past few years, as it is a less cumbersome procedure with more residual effect and very useful in a hospital setting where uninterrupted water availability is a question. However, there were some gaps in the clinical knowledge, of which an important finding was that only a minority of the population knew the minimal time (20 s) needed for an alcohol-based hand rub to kill most germs on the hand. It was known to only 29 (58%) of senior doctors, 22 (44%) of junior doctors, 24 (48%) of medical students, 19 (38%) of staff nurses and 17 (34%) of nursing students.

While assessing the attitude statements, overall results were disappointing. Our findings suggest that nursing students and staff nurses have significantly better attitudes ($P < 0.05$) 78% and 84% when compared to all the other categories of HCWs, which was found to be similar with the reports from Cairo (96.0%) and Italy (86.2%).^[9] Lack of compliance due to forgetfulness can be countered by placing reminders such as posters, installing wash scans or digital screening of hands, through HH auditing with regular feedbacks and also by ongoing education processes. Among all HCWs,

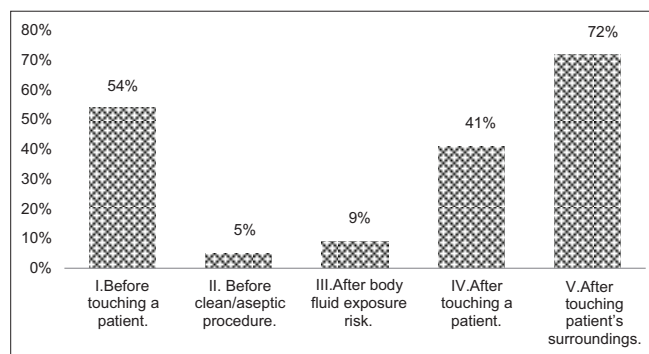


Figure 3: Profile of missed moments in hand hygiene (The denominator is 300 HCWs in each of these moments)

78% commented that infection prevention team has a positive influence on their HH and 83.33% of HCWs said that infection prevention notice boards remind them to perform HH. Lack of time (54%) has been highlighted as the major barrier for adequate performance of HH, especially by the nursing community in our study as was shown in a previous study by Barret and Randle also.^[10]

Like most of the previous studies, our study also showed that the overall compliance to HH by HCWs was <50%.^[11] The overall true compliance of this study based on method of doing HH, was just 16% (48 of 300), which was found to be low when compared to a study that showed a median HH compliance rate for all HCWs as 40%.^[12] All HCW categories have lower rates of HH compliance before contact with a patient (moment I) when compared to compliance rates after patient contact (moment V). The reason for this finding may be that those who performed HH were more likely to be motivated out of the concerns of their own safety rather than concern for the safety of the patients. While coming to the correct steps of hand washing and the different areas covered during the procedure, wrist, fingertips and webs were frequently missed in 45%, 37% and 33% of the cases where HH practice is performed. These findings are consistent with previous studies suggesting that often missed areas during HH are wrists and webs between the fingers.^[7]

An important limitation of our study was that further categorisation of the study groups into intensive care units, high dependency units etc., which may reflect a change in their priority towards HH, was not done. Hence, this warrants further follow up studies on individual units.

In the current study, in spite of the discrepancies in the high levels of knowledge and poor levels of attitudes and compliance, the nursing community is far ahead of the physicians [Figure 1]. This may be due to the longer time of interaction with the patients during their nursing procedures. Furthermore, infection control lessons are being taught in their nursing curriculum itself along with better exposure to proper HH techniques repeatedly right from a very early stage. Hence, we would like to highlight the importance of improving the current training programmes targeting HH practices among medical and nursing students and the commonly missed out category of housekeeping staff. Teaching of elementary HH practices along with coupling of lectures in the undergraduate curriculum can be done so as to prime the medical students to this basic necessity of performing HH.^[13] Mentor's attitude at bed side which has a strong influence in moulding the behaviour of young medical and nursing students should be exploited to serve as role models for them. Provision of adequate staff and facilities for hand washing with easy access should also be guaranteed.

Conclusions

HCWs are being asked to return to the basics of infection prevention by adhering to simple measures like HH. The present study identified good rates of HH knowledge; while attitudes and practices of HH were found to be unsatisfactory on the whole. Hence, we highlight the urgent need for introducing and upgrading the existing measures to improve the knowledge, attitude and practise of HH among the HCWs. Moreover, institutional support for providing necessary incentives for adhering to HH should also be guaranteed in every hospital setting.

Acknowledgement

We wish to extend our heartfelt gratitude to the Indian Council of Medical Research (ICMR), New Delhi for recognising our work and for providing us with grants.

Financial support and sponsorship

ICMR.

Conflicts of interest

There are no conflicts of interest.

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Questionnaire for the Assessment of Knowledge^[5]

1. Department (please write the department to which you belong):
2. Did you receive any formal training in hand hygiene in the last three years? Yes No
3. Do you routinely use an alcohol-based hand rub for hand hygiene? Yes No
4. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (*tick one answer only*)
 - a. Health-care workers' hands when not clean
 - b. Air circulating in the hospital
 - c. Patients' exposure to colonised surfaces (i.e., beds, chairs, tables, floors)
 - d. Sharing noninvasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients
5. What is the most frequent source of germs responsible for health care-associated infections? (*tick one answer only*)
 - a. The hospital's water system
 - b. The hospital air
 - c. Germs already present on or within the patient
 - d. The hospital environment (surfaces)
6. Which of the following hand hygiene actions prevents transmission of germs to the patient?

a. Before touching a patient	Yes No
b. Immediately after a risk of body fluid exposure	Yes No
c. After exposure to the immediate surroundings of a patient	Yes No
Immediately before a clean/aseptic procedure	Yes No
7. Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?

a. After touching a patient	Yes No
b. Immediately after a risk of body fluid exposure	Yes No
c. Immediately before a clean/aseptic procedure	Yes No
d. After exposure to the immediate surroundings of a patient	Yes No
8. What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? (*tick one answer only*)

a. 20 s	b. 30 s	c. 1 min	d. 10 s
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9. Which type of hand hygiene method is required in the following situations?

a. Before palpation of the abdomen	Rubbing	Washing	None
b. Before giving an injection	Rubbing	Washing	None
c. After emptying a bedpan	Rubbing	Washing	None
d. After removing examination glove	Rubbing	Washing	None
e. After making a patient's bed	Rubbing	Washing	None
f. After visible exposure to blood	Rubbing	Washing	None
10. Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?

a. Wearing jewellery	Yes No
b. Damaged skin	Yes No
c. Artificial fingernails	Yes No
d. Regular use of a hand cream	Yes No

Questionnaire for the Assessment of Attitude^[6]

-
- 1 I adhere to correct hand hygiene practices at all times
 - 2 I have sufficient knowledge about hand hygiene practices
 - 3 Sometimes I have more important things to do than hand hygiene
 - 4 Emergencies and other priorities make hand hygiene more difficult at times
 - 5 Wearing gloves reduces the need for hand hygiene
 - 6 I feel frustrated when others omit hand hygiene
 - 7 I am reluctant to ask others to engage in hand hygiene
 - 8 Newly qualified staff has not been properly instructed to in hand hygiene in their training
 - 9 I feel guilty when I omit hand hygiene
 - 10 Adhering to hand hygiene is easy in the current set up
 - 11 Sometimes I miss out hand hygiene simply because I forget it
 - 12 Hand hygiene is an essential part of my role
 - 13 The frequency of hand hygiene required makes it difficult for me to carry it out as often as necessary
 - 14 Infection prevention team has a positive influence on my hand hygiene
 - 15 Infection prevention notice boards remind me to do hand hygiene
 - 16 It is difficult for me to attend hand hygiene course due to time pressure
-

Hand Hygiene Observation Checklist^[8]

Category of the study group: _____

Serial number	Opportunity/ HH	Moment of HH	Areas covered					Presence of Accessories		Time spent
			Palms	Dorsum	Finger tips	Webs	Wrist	Yes	No	
1	O-H							Yes	No	
2	O-H							Yes	No	
3	O-H							Yes	No	
4	O-H							Yes	No	
5	O-H							Yes	No	

The moments of HH are as follows:^[9] I. Before touching a patient. II. Before clean/aseptic procedure. III. After body fluid exposure risk. IV. After touching a patient. V. After touching patient's surroundings. HH: Hand hygiene