

HAND HYGIENE COMPLIANCE IN CRITICAL AND SEMI-CRITICAL CARE AREA OF TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: The objective of the study was to study the hand hygiene (HH) compliance of critical care and semi-critical care centers in a tertiary care hospital.

Methods: Direct observation is meant to be a gold standard for evaluation of HH compliance in health care centers. A covert observer was used to make a direct observation to get purely true results out of the observation process. This study was conducted in critical (medical intensive care unit [MICU], neuro-ICU, and coronary care unit) and semi-critical care units (high dependency unit, surgical recovery, cardiac recovery, dialysis unit, and emergency). Doctors, nurses, general duty assistant/housekeepers (GDA/HK), and others (technicians, dieticians, and physiotherapists) were included as categories of healthcare workers (HCWs) in this study HH was observed during 5 moments of HH: Before patient contact, before aseptic procedure, after body fluid contact, and after patient contact, and after touching patient surroundings. The preference of hand wash and hand rub by HCWs was also observed in this study.

Results: The overall compliances of HH compliance were found out to be 40.32%, which is an average HH compliance value according to the World Health Organization and CDC. The maximum HH compliance was observed in Nurse (48.33%) while minimum was in doctors (27.12%). Of all HH actions performed, HR was mostly preferred by doctors (81.25%) and nurses (72.36%) while HW was mostly preferred by GDA/HK (54.79%). In semi-critical care areas, the compliance rate was found to be highest in nurses (43.19%) and least in doctors, but in critical care units, GDA/HK (53.95%) had highest compliance, and doctors (28.07%) had the least compliance.

Conclusion The HH compliance in hospital is found to be very low despite having all the facilities. In almost all the case the result for doctors is not up to the expectations as their compliance came out to be quite low as compared to other healthcare workers. As doctors are the seniors to all the HCWs, so their compliances were expected to be more than other HCWs. The thing which is concluded out of this study is attitude and behavior is the main reason for low compliance. As this hospital is JCI accredited, they are having all facilities, sufficient education, and awareness programs but still they lack in compliance due to the lack of positive attitude that HCWs are having toward HH compliance. There is a need to take few steps for the improvement of behavior and attitude of HCWs toward HH.

Keywords: Hand hygiene, Moments of hand hygiene, Steps of hand hygiene, Compliance among health care workers, Alcohol-based hand Rub, Hand washing, Direct observation, World Health Organization, Hospital-acquired infections.

INTRODUCTION

CDC states that hand hygiene (HH) is the primary way to prevent the spread of infections [1]. Nosocomial infection is a threat pervades in health care centers which can lead to long hospital stay, emotional, and financial burden on patients as well as their families. Hospital-acquired infection (HAI) is a global burden due to lack of reliable diagnostic data due to the complexity and lack of uniform criteria used for diagnostic purpose. Till now no country and institute can claim that they have solved it yet [2,14].

Resistance of hospital-acquired organisms to broad antibiotic spectrum makes them difficult to treat and patient to suffer. CDC, the World Health Organization (WHO) and various scientific evidences supported the fact that HH is effective on nosocomial infections such as cold, flu, and even hard to treat infections. These infections are most prominent in intensive care units (ICUs) due to weak immunity of patient, invasive procedures and frequent health-care practices transmit infectious agents to patients.

It's not only the case that only patients can get infected through healthcare-associated infections Healthcare workers can also get infected through these infections. HAIs transmit through direct contact, indirect contact, air, surroundings of patient, and common vehicles. About 10^6 squamous cells shed from skin daily. Hence, this means the pathogens present on patient's body shed into their

surroundings with their skin. Healthcare workers (HCWs) carry these pathogens with them on their hand while providing health care. Skipping of HH procedure can allow the pathogens to grow on their hands and transmit from their hands to another patient and even HCWs also [3,15].

They are even efficient in reducing site-specific infections include device-related bloodstream and urinary tract infections, surgical site infection, and ventilator-associated pneumonia [3]. Clean care is safer care a global patient safety challenge was launched in October 2005 by the WHO to promote HH globally. In 2009, the WHO highlighted various guidelines and tools for HH and they also highlighted the importance of HH based on next phase of patient safety "save lives: Clean your hands" [3].

MATERIALS AND METHODS

This study was carried out in a 350 bedded tertiary care hospital to check HH compliance among HCW's in critical and semi-critical care areas. "Direct observation" a standard tool recommended by the WHO was used to make observations in this study. The areas selected for this study were divided in to two: Critical areas and semi-critical areas. The critical areas include medical ICU 1 (MICU1), MICU2, neuro-ICU, and coronary care unit (CCU) while semi-critical areas include emergency (EMR), surgical recovery (SR), cardiac recovery (CR), high dependency unit (HDU), and dialysis unit. In all these selected

areas HCWs were observed for their HH compliance. The HCWs were categorized into 4 groups as follows: Doctors, nurses, general duty assistant (GDA)/housekeepers (HK), and others include therapist, technician, dietician, students, and other health-related professionals. Observation was made by a single covert observer because normally, HCWs already aware about overt observer, so the rate of compliance of HH changes in front of them. To observe accurate HH compliance in hospital, the covert observers made the observations for this study. HCWs were unaware of this study and the observer. Observer visited various critical and semi-critical areas to made the observation. The 5 moments of HH (patient contact, before aseptic procedure, and after exposure to body fluids, after patient contact, and after touching patient surroundings) and 7 steps of HH during the action of HH were observed by the observer. If the 7 steps were followed during HH practice, then "+" sign was marked otherwise "-" sign was marked. Side by side the preference of HR/HW while performing HH action was also noted on the observation form. After collecting this data, the data were evaluated as follows:

1. Compliance among the HCWs in critical and semi-critical care area.
2. Preference of type of HH (HR/HW) by HCWs.
3. Compliances of HCWs in critical and semi critical care unit.
4. Moment wise HH compliance of HCWs.
5. Detection of microbial load on hands of HCWs and from various other sites.

RESULTS

As direct observation method was used by a covert observer to observe 5 moments and 7 steps of HH compliance in critical and semi-critical areas. The data obtained by direct observation method for HH compliances from critical care and semi-critical care areas were evaluated as follows.

Compliances among healthcare workers in critical and semi-critical care center

A total of 1198 observations were made by a covert observer in various critical care and semi-critical care areas for a specific period of time. Of these 1198 opportunities, 483 times, the action of HH was performed which showed the overall compliance of HCWs was 40.32%. From these 483 actions of HH, the 7 steps of HH were performed 303 times by HCWs which showed that the overall compliances for 7 steps of HH came out to be 62.73%.

The opportunities for Doctors, Nurses, GDA/HK, other came out to be 236, 509, 172, and 281. Out of these opportunities compliance for HCWs are as follows.

Of 64 actions of doctors, 246 of nurses, 73 of GDA/HK, and 100 of others health -care professionals, the compliance for 7 steps of HH followed by HCWs came out to be as followed.

The compliance for 7 steps of HH was highest in nurses while minimum in other health-care professionals.

Preference of type of action for HH (HR/HW)

As out of 483 actions performed by HCWs during 5 moments of HH, the HR was preferred 334 times, and HW was performed 157 times. Hence, the HH compliance with HR came out to be:

If we calculate compliance of HCWS individually in critical and semi-critical care units then, GDA showed maximum and doctors showed minimum compliance in the critical care unit. However, in semi-critical care unit Nurses showed maximum compliance while doctors showed minimum compliance.

$$\text{Compliance (\%)} \text{ with HR} = \frac{334 \times 100}{483} = 69.15\%$$

Table 1: Compliance of HH during 5 moments of HH by HCWS

S.NO	HCWs	Opp.	Actions (HW/HR)	Compliance (%)
1.	Overall	1198	483	40.32
2.	Doctors	236	64	27.1
3.	Nurses	509	246	48
4.	GDA/HK	172	73	42
5.	Others	281	100	35.6

HH: Hand hygiene, HCWs: Healthcare workers, GDA/HK: General duty assistant/housekeepers

Table 2: Compliance of 7 steps followed during 5 moments of HH by HCWS

S.no	HCWs	Opp.	Actions (HW/HR)	Compliance (%)
1.	Overall	483	303	62.73
2.	Doctors	64	36	56.25
3.	Nurses	246	168	68.29
4.	GDA/HK	73	45	61.64
5.	Others	100	54	54

HH: Hand hygiene, HCWs: Healthcare workers, GDA/HK: General duty assistant/housekeepers

Table 3: Preference of HR/HW by HWs

S.No	HCWs	Action	HR	Preference (%)	HW	Preference (%)
1	Doctor	64	52	81.25	11	17.19
2	Nurses	246	178	72.35	67	27.23
3	GDA/HK	73	37	50.68	40	54.79
4	Others	100	63	63	37	37

HCWs: Healthcare workers, GDA/HK: General duty assistant/housekeepers

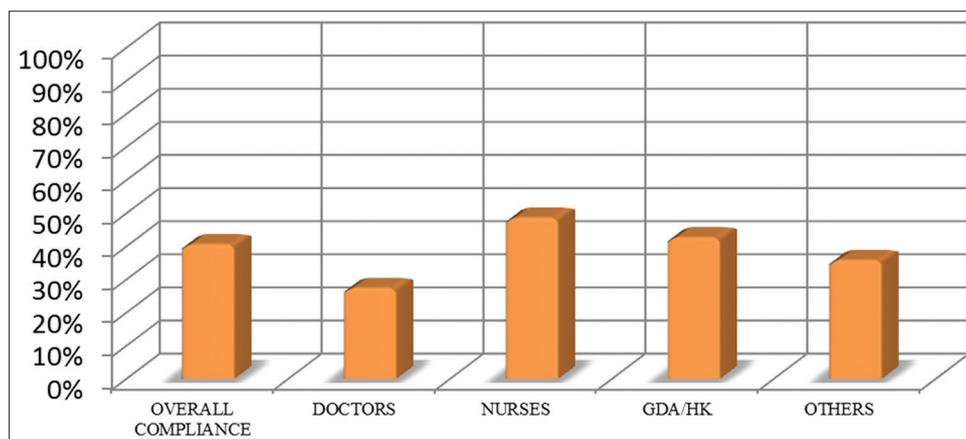


Fig. 1: Compliance of healthcare workers during 5 moments of hand hygiene

And HH compliance with HW came out to be:

$$\text{Compliance (\%)} \text{ with HW} = \frac{157 \times 100}{483} = 32.50\%$$

Compliances of HCWS in critical and semi-critical care unit

As the care centers are divided into two categories: Critical care areas and semi-critical care areas. The critical areas include: MICU1, MICU2, Neuro-ICU, and CCU. Semi-critical areas include EMR, SR, CR, HDU, and dialysis unit.

Of 527 opportunities in the critical area, the compliances came out to be 229. Hence, the compliance (%) for critical care units is:

$$\text{Compliance (\%)} \text{ for critical care unit} = \frac{229 \times 100}{527} = 43.45\%$$

And for semi-critical care units, the compliance was 244 of 661 opportunities. The compliance percentage for semi-critical care unit is:

$$\text{Compliance (\%)} \text{ for Semi - Critical Care Unit} = \frac{244 \times 100}{661} = 36.91\%$$

If we calculate compliance of HCWS individually in critical and semi-critical care units then, GDA showed maximum and doctors showed minimum compliance in the critical care unit. However, in semi-critical care unit Nurses showed maximum compliance while doctors showed minimum compliance.

The compliance varies from area to area, as it was maximum in MICU1 (50.98%) and minimum in Emergency (24.62%). The compliances for doctors, nurses, GDA/HK, and others are shown in Table 5

Moment wise HH compliance among HCWs

As out of 1198 opportunities for all the 5 moments of HH, the moment wise opportunities came out as follows: 229, 44, 50, 325, and 550 for moment 1, 2, 3, 4, and 5. Out of which the actions performed are 69, 15, 16, 173, and 210 for moment 1, 2, 3, 4, and 5. Hence, the compliance for all the 5 moments of HH was found to be maximum in moment 4 which is after patient contact and minimum in moment 1 which is before patient contact.

Table 4: HH compliance in critical and semi-critical care area

S.No	HCWs	Critical care area			Semi-critical care area		
		Opp.	Act	Rate (%)	Opp.	Act	Rate (%)
1.	Doctors	114	32	28.07	122	32	26.22
2.	Nurses	242	125	51.65	257	111	43.19
3.	GDA/HK	76	41	53.95	96	32	33.33
4.	Others	95	31	32.63	186	69	37.10

HH: Hand hygiene, HCWs: Healthcare workers, GDA/HK: General duty assistant/housekeepers

Table 5: Compliance of HCWs in the different care unit

S. No	Areas	Overall compliance (%)	Doctor (%)	Nurses (%)	GDA (%)	Other (%)
1	MICU 1	50.98	43.85	54.87	68.57	33.33
2	MICU2	47.3	16.6	65.90	45.45	35
3	Neuro-ICU	41.18	5.8	57.5	50	34.48
4	CCU	30.47	13.6	36.84	28.57	25
5	HDUN	46.38	20	70	50	52.63
6	CS	34.28	100	14.28	50	33.33
7	SR	40.66	23.52	50	44.44	34.78
8	EMR	24.62	25	30	22.22	15.90
9	CR	40.37	25	50	23.07	32.69
10	Dialysis	45.94	0	0	5.88	61.53

HCWs: Healthcare workers, CCU: Coronary care unit, SR: Surgical recovery, Neuro-ICU: Neuro-intensive care unit, MICU: Medical intensive care unit, GDA: General duty assistant

DISCUSSION

The overall HH compliance in critical and semi-critical care areas of the hospital came out to be 40.32% which is considered to be an average HH compliance among HCWs. Similarly, a study conducted at Chitwan Medical College in 2013 showed the overall compliance of HCWs to be 43.68%, and they concluded that the training and awareness programs can promote the compliance among HCWs [5], while a study of turkey conducted in 2013 showed overall compliances to be 37%. According to the lack motivation and increase in workload is the main cause of low compliance among HCWs [1]. Few studies observed the increase of compliance after educating HCWs. A study of Kuwaiti by showed the increase of compliances in ICU from 42.9% to 61.4% in 7 months in pre- and post- intervention phase [7]. While a study conducted at Germany states the increase of compliance from 21% to 29% and finally to 45% in phase 1, 2, 3 respectively after the on work teaching including feedback process for all the HCWs [8]. However, few studies showed more compliance than others like a study conducted in Brazil in 2013 showed 70.7% of overall compliances. Hence, it depends on the factors affecting the HH compliance among HCWs.

According to our study, the compliance was found to be maximum in nurses (48.33%) and minimum in doctors (27.12%) which showed that nurses perform more HH ygiene practices during 5 moments of HHhand hygiene than that of doctors. However, doctors were seniors, so the expectations were more from doctors. If they will follow HH practices, then the rate of other HCWs will automatically increase. While out of the actions performed by HCWs, the compliance for the 7 steps of HH came out to be maximum in nurses (68.29%) and minimum in other health-care professionals (54%) may be because they concentrate on performing HH practice but not on the proper method required to perform HH. This shows that Nurses perform proper 7 steps of HH during disinfecting their hand as they are more concerned toward it.

Sidharth Chavali *et al.*, the compliances for Nurse came out to be 69% which were less than other HCWs (86.9%) [6]. While Randle *et al.* found that out of 823 opportunities compliance was 47% for doctors, 75% for nurses, 78% for allied health professionals, and 59% for ancillary, and other staff [6]. A study conducted by U Maharjan states that doctors have more compliance than nurses and other staff which is 48.6% in doctors, 42.3% in nurses, and 41.7% in others [5]. While study conducted in Turkey states that compliances in nurses (41.4%) are comparatively more than doctors (31.9%) [1]. Mona F. Salamaet *et al.* educating the HCWs the compliance in Nurses increases from 49.9% to 82.5% while in doctors, it increases 38.6% to 43.2%. According to them, the compliance increases by educating the HCWs about HH [7].

In this study, we found HH was more in critical care areas (43.45%) than semi-critical areas (36.91%). This shows that staff is more concerned about HH in critical areas and feel it essential to perform HH in critical care areas. We can also say as the chances of risk increases

then the rate of compliance among HCWs also increases. Doctors (28.07) had least compliance among all the HCWs in the critical area while compliance in GDA/HK (53.95%) was highest. This means GDA/HK are more concerned about HH compliance in critical care areas. However, in case of semi-critical care area, the maximum compliance was observed in nurses (43.19%) and again minimum in doctors (26.22%). Their values for compliance of emergency department are very low.

Alfred E.Yawson *et al.*, the overall compliance was higher when risk was perceived to be higher. This perception was demonstrated by a higher percentage of HH compliance in high-risk patient contact

Table 6: Moment wise HH compliance in HCWs

S.No.	MOMENT	Opp.	Action	Compliance (%)
1.	Before patient contact	229	69	30.13
2.	Before aseptic procedure	44	15	34.09
3.	After body fluid exposure	50	16	32
4.	After patient contact	325	173	53.23
5.	After touching patient surroundings	550	210	38.18
Total		1198	483	40.32

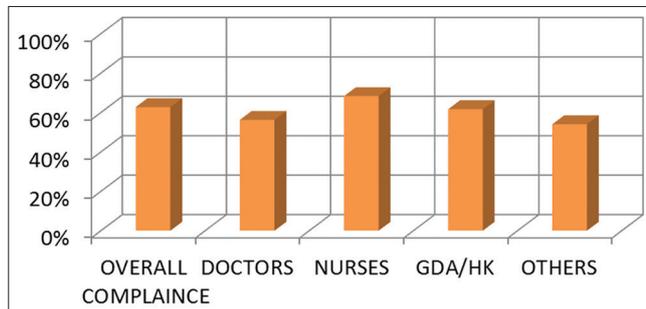


Fig. 2: 7 steps of hand hygiene followed by healthcare workers out of actions performed during 5 moments of hand hygiene

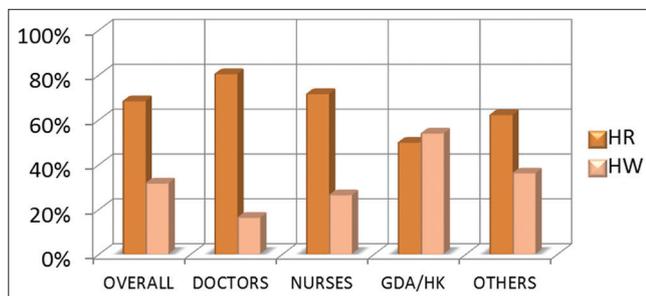


Fig. 3: Preference of HR/HW by healthcare workers

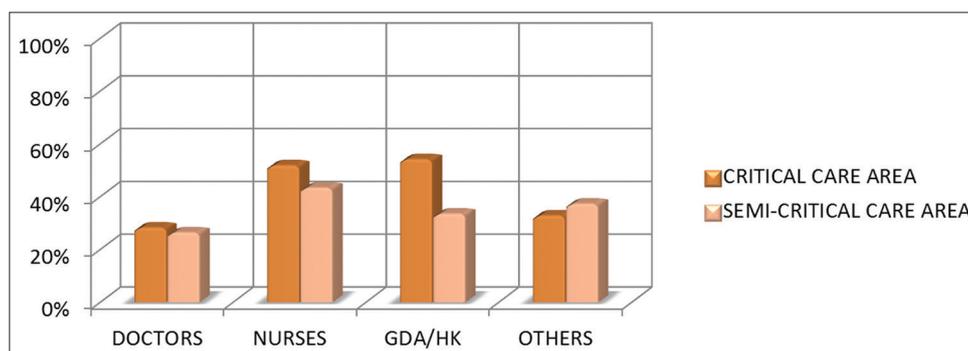


Fig. 4: Compliance in healthcare workers in the critical and semi-critical area by healthcare workers

service centers such as emergency, wound dressing/treatment room, and labor wards [9]. The general low HH compliance observed in this study agree with finding from multicenter baseline HH survey conducted in Southern Mediterranean region which found overall compliances rate was very low (27.6%) and was significantly higher where perceived risk is considered to be high [10]. Simone Scheithauer *et al.*, optimizing workflow practices seems to be a promising way to improve HH resents an efficient solution to improve the quality of patient care and outcome [11]. Karabey *et al.*, the frequency of hand washing was 12.9% among medical personnel in an ICU [12].

According to our study HR (69.15%) is preferred more for HH practices than HW (32.50%) by HCWs. HR is preferred more by doctors (81.25%) and least by others health professionals (63%). This can be because HR is more convenient and easy method of HH, so that is why it is performed more by doctors. Hand washing was preferred more by GDA/HK (54.79%) and least by doctors (17.19%). The hands of GDA/HK are more visibly dirty with dust or many other things which make them preferring HW more than HR As it is also recommended by WHO that during visibly soiled hands HW should be preferred than that of HR.

D. Sureshkumar *et al.*, hand rub was the principal mode of HH. Compliance for hand rub was 69% [8]. Lt V. Anargh *et al.*, the WHO guidelines regarding procedure were followed by 90% for hand washing with soap and water and 64% for the alcohol-based rub. The majority preferred hand washing with soap and water over hand rubbing with alcohol based solution [2]. A study was conducted in Turkey states that HCWs were more likely to use soap and water (63.6%) compared to waterless alcohol-based HH (36.3%) [1]. Simone Scheithauer *et al.* the number of HR needed for one patient care significantly decreases from 22 to 13 for non-surgical and from 17 to 7 for surgical patients due to improved workflow practices after implementation SOPs. In parallel, the number of HR performed increased from 3 to 5 for non-surgical and from 2 to 3 for surgical patients [11].

The compliance for moment 4 (53.23%) which is after patient contact came out to be highest among HCWs while for moment 1 (30.13%) which is before patient contact, the compliance is least which showed that HCWs are more concerned about themselves. They try to protect themselves from infection and they are less concerned about the patient may be that is why they neglect moment 1 more and prefer moment 4 more. It was also observed that during moment 2 and moment 3, HCWs prefer using gloves and after removing gloves, they perform less HH practices. This can be the reason that the compliance in moment 2 (34.09%) and moment 3 (32%) are also low.

Siddharth Chavali *et al.*, the compliance was find out to be maximum in moment 3 and minimum in moment 5. The compliances for moment 4 were 91%, while for moment 1 and 2, compliance was 63% and 39% which are much more than our study [6]. While a study conducted

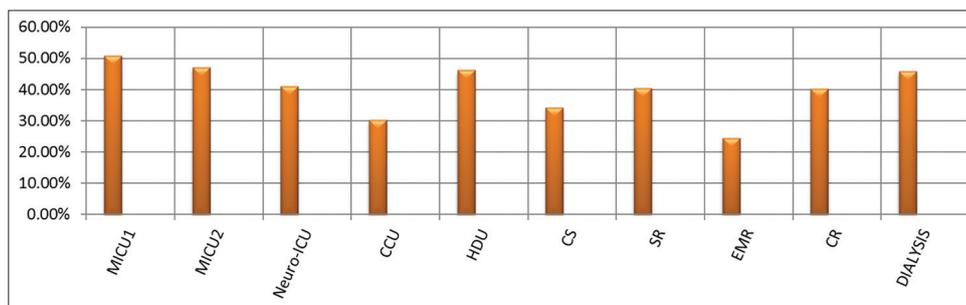


Fig. 5: Overall compliance of healthcare workers in different care areas

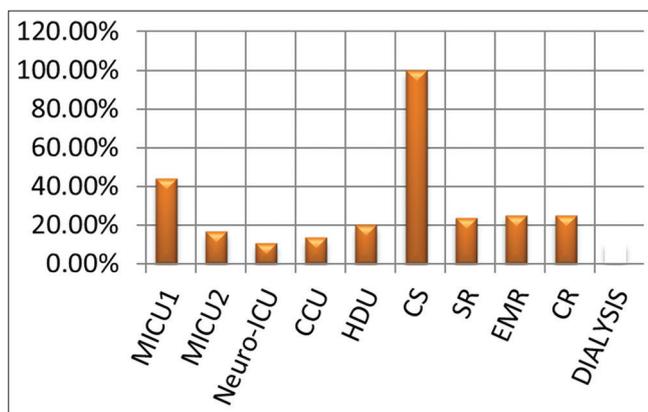


Fig. 6: Compliance of doctors in different care units

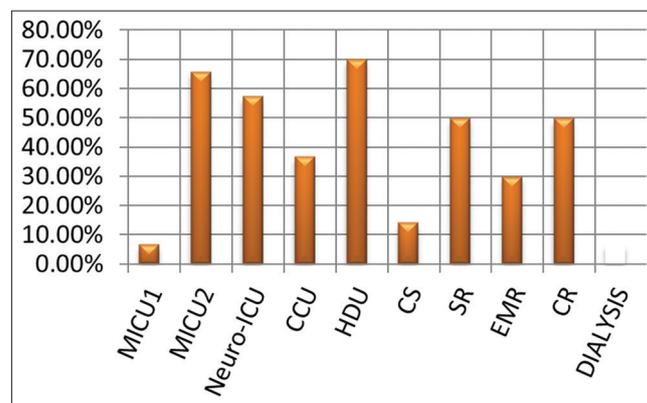


Fig. 8: Compliance of general duty assistant/housekeepers in the different care area

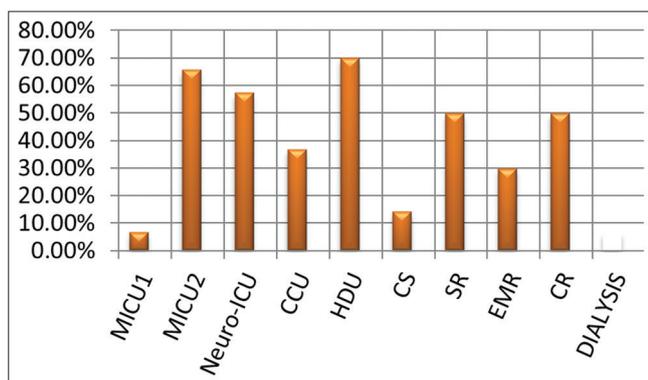


Fig. 7: Compliance of nurses in different care unit

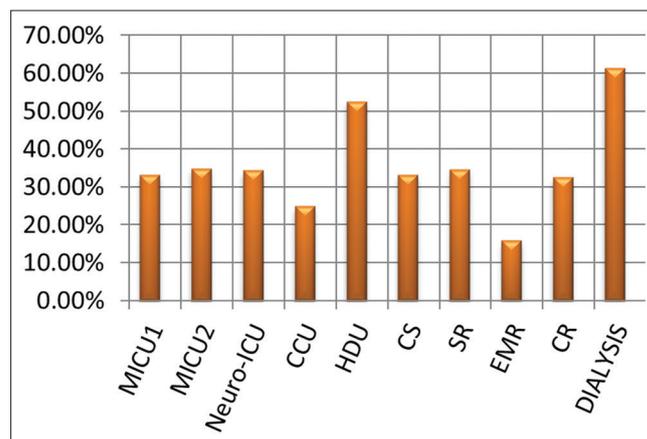


Fig. 9: Compliance of other healthcare workers in different care areas

by D. Sureshkumar had observed compliance only for moment 1 and 4. They did not included moment 2, 3, and 5 in their study [8]. While Sung-Ching Pan *et al.*, the compliance was coming out be maximum in moment 4 (42%) and minimum for moment 3 (5.5%) [13]. A study conducted in Ghana by Alfred E. Yawson showed higher compliance in moment 4 and 5. According to them Doctors showed low compliance in moment 1 (9.2%) and in moment 4 (21.7%) [9]. A study conducted by Ayse Karaaslan in Turkey showed highest compliance in moment 4 (68%) like our study and minimum in moment 2 (8.5%).

CONCLUSION

This study showed that the compliance is least in doctors and the overall compliance just reached up to average value despite of having all the facilities and knowledge to HCWs. Hence, the main reason behind this can be attitude and behavior of HCWs. As it is also stated by WHO that attitude and behavior matters a lot to improve HH compliances. The attitude of HCWs, not to follow HH during 5 moments of HH can be the main reason of low HH compliance. To improve HH the HCWS

have to improve their behavior and attitude and should take HH seriously. The low HH compliance showed the need of some strong steps toward the improvement of HH. As the attitude and behavior is a big stone which is not allowing the improvement of HH in hospital. Hospital had already adopted various methods recommended by the WHO such as continuous feedback, continuous observation, awareness programs, educational training, and many more but still the compliance is average. Hence, the continuous evaluation of microbial load on hands of HCWs is a step taken by infection control department to improve the compliance. This would make a fear among HCWs that they should not skip HH compliance otherwise they would be caught. As this will help HH to be taken seriously by HCWs. Doctors need to bring change in their compliance because as seniors, the expectations are more from them. As if the will follow HH practices, then other health care professionals will also follow these practices. HCWs should be more concerned about

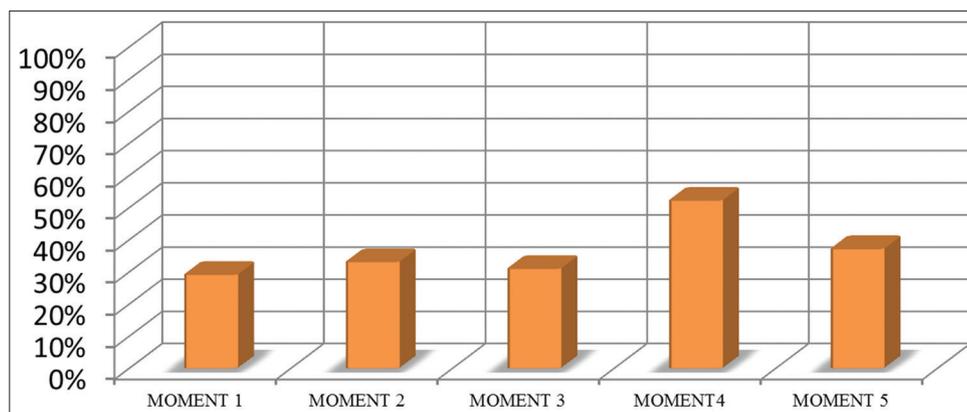


Fig. 10: Moment wise compliance of hand hygiene in healthcare workers

patients. They should also concentrate on HH compliance during other moments of HH.

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