

# Assessment of Hand Hygiene Compliance among Health Care Workers at selected Govt Hospital of Kashmir

Ulfat Amin<sup>1</sup>, Yasir Yousuf<sup>2</sup>, Rabia Ismail<sup>3</sup>, Rabia Khalil<sup>4</sup>,  
Salma Ramzan<sup>5</sup>, Iflah Rashid<sup>6</sup>, Aqeela Kausar<sup>7</sup>

## Abstract

*Hospital-acquired infections (HAIs) are a major contributor to death, morbidity, diminished quality of life, and growing healthcare expenditures. To protect patient health, it is crucial to reduce the risk of HAI by organising and putting into practice efficient preventative measures. The most important method of infection prevention generally agreed upon is hand cleanliness. Washing your hands can keep you healthy and stop the transmission of many respiratory and diarrheal illnesses. On any given day, 1 in 31 hospital patients develops an HAI while being treated. Hand hygiene is the simplest and effective method for the prevention of these. This study aimed to assess the hand-hygiene compliance among health care workers at GMC Anantnag and associated hospitals. A cross-sectional observational study was carried out among HCWs and 313 opportunities were observed using WHO tool for hand hygiene according to WHO “5 moments of hand hygiene.” The sampling technique adopted for selection of sample was non-probability convenience sampling. Out of total 244 opportunities of nurses, 181 (74%) had non-hand hygienic actions while 63 (26%) had hand hygienic actions. Out of total 59 opportunities of doctors, 29 (49%) had non-hand hygienic actions while 30 (51%) had hand hygienic actions. Out of total 10 opportunities of nursing aides, 9 (90%) had non-hand hygienic actions while 1 (10%) had hygienic actions. The overall hand hygienic observed among health care workers as per WHO Guidelines was 30 percent only. Nurses had an adherence rate of 26 percent, doctors 51 percent and nursing aids had 10 percent only. The present study showed low levels of adherence to best hygiene practices with overall compliance of 30 percent revealing that there is need to implement immediate strategies for infection control at GMC Anantnag and associated hospital.*

**Key words:** Hand Hygiene, Health care workers, Hospital-acquired infection

Hand washing's pivotal role in patient care dates back to the early 19th century when Labarraque's research underscored its ability to significantly reduce puerperal fever and maternal mortality. Recognised as the cornerstone of infection prevention, clean hands are essential, as they are the main vehicle for germ transmission in healthcare settings. Hospital-acquired infections, often transmitted via hands, pose a significant burden, with pathogens like *Staphylococcus aureus* and *E. coli* at play (Subbalakshmi et al, 2020; Labarraque, 1840).

The CDC advocates for alcohol-based hand sanitizers to maintain optimal hand hygiene, promoting compliance across healthcare settings. Hand washing, an accessible and cost-effective approach, is instrumental in reducing infections, including COVID-19 spread. Hand hygiene is particularly critical in resource-

limited settings, where the burden of hospital-acquired infections is disproportionately higher (Devaraj & Shivadasani, 2021; CAG London 2009)

Effective hand washing with soap can prevent respiratory and diarrheal illnesses in children, emphasising the importance of education on proper hand hygiene practices (Charles). Regarded as the primary defense against healthcare-associated diseases, hand hygiene protocols, including the use of non-antimicrobial soaps, are essential components of infection control measures.

The WHO's "SAVE LIVES: Clean Your Hands" initiative highlights the "My 5 Moments for Hand Hygiene" technique as pivotal in safeguarding patients, healthcare workers, and the healthcare environment (Kashyap et al, 2017). This approach emphasizes hand washing before and after patient contact, conducting sterile procedures, and handling bodily fluids, reinforcing the critical role of hand hygiene in

*The authors are: 1. Faculty, Islamic University of Science and Technology, Awantipora Kashmir, 2-7. BSc Nursing Intern, SMMC/NMT Islamic University of Science and Technology, Awantipora (J&K).*

preventing healthcare-associated infections (WHO Guidelines, 2010).

**Need of the study:** WHO estimates that 1.4 million patients globally get hospital-acquired illnesses at any one time (WHO Guidelines, 2010). High morbidity and mortality are associated with HAIs; one in 31 hospital patients has HAIs while receiving care on any given day. The most dangerous antibiotic-resistant bacteria often produce HAIs, which may result in sepsis or death. Keeping your hands clean is a quick and easy technique to avoid illnesses. Cleaning your hands may stop the transmission of germs, especially those that are hard, if not impossible, to treat because of antibiotic resistance.

Research on the observance and knowledge of hand hygiene and disinfectant usage by healthcare personnel was undertaken in 2020 by Ahmed et al, which involved 212 participants. Before and after every patient engagement, 12.3 percent of participants were found to apply hand disinfectants, and 62.73 percent were aware of WHO hand hygiene guidelines. In many ICUs, healthcare-associated infections (HCAIs) remain a serious concern. Effective hand hygiene is the simplest and most reliable method to prevent them. Therefore, assessing reported hand hygiene compliance, identifying any gaps, and implementing corrective measures are essential to reduce HCAIs (Hammerschmidt & Manser, 2019). Poor hand hygiene can exacerbate patients' conditions, particularly among healthcare personnel who have frequent patient contact. During our internship at GMC hospital, we observed low adherence to hand hygiene protocols among medical staff, prompting the need for investigation.

## Objectives

The study aimed to assess the hand-hygiene compliance among health care workers at GMC and its associated hospitals.

## Review of Literature

Kamara et al (2022) conducted a cross sectional observational study on Hand Hygiene Compliance at two tertiary hospitals in Freetown, Sierra Leone. There were 10,461 possibilities for hand hygiene in total and 5086 (49%) of those opportunities led to hand hygiene acts.

Huang, et al (2021) conducted a study on behavioural change towards hand hygiene practices among health workers due to Covid-19 outbreak. This study utilised an automated hand hygiene recording system to gauge HCW hand hygiene when entering and exiting patient rooms throughout the Covid-19 pandemic. The HCW

hand hygiene rate decreased with time on room entry; on room exit, it climbed during the first wave of Covid-19 by 13.73 percent, decreased during post-lockdown period by 9.87 percent, and then increased again during the second wave of the epidemic by 2.82 percent.

Lahar et al (2021) conducted a cross sectional prospective study on hand hygiene compliance among health care workers at an academic hospital emergency department. Only 34.4 percent of people adhered to hand hygiene out of a total 477 possible hygiene opportunities.

Dwipayantari et al (2021) did a cross sectional online survey study on public perception and hand hygiene behaviour during Covid-19 pandemic in Indonesia; 896 persons participated in the study. During the covid-19 epidemic more men than woman (84.16% to 87.54%, respectively) reported often washing their hands.

Makhni et al (2021) conducted a study using an automated hand hygiene monitoring system; researchers looked at the rate of hand hygiene compliance during Covid-19 pandemic. The study examined compliance with hand hygiene from September 2019 to August 2020 at University of Chicago medical centers New Adult Hospital during which 1159 Covid-19 patients admitted to the hospital were the study were covered done. The average monthly compliance with hand washing in every unit was 54.5 percent. Daily compliance peaked during the epidemic in March 2020 to 92.8 percent compliance hit a daily low of 51.5 percent on August 20, 2020.

Mubarek Yesse et al (2021) conducted a cross sectional study on knowledge, attitude and practice toward Covid-19 and associated factors among health care workers in Silte zone, Southern Ethiopia. The survey comprised 379 healthcare practitioners in total. According to this study, there are accordingly 74.9 percent, 84.2 percent, and 68.9 percent more people who have enough knowledge, a positive attitude, and good practices.

Kiprotich et al (2021) carried out a cross-sectional study design to investigate, observe and self-report hand hygiene compliance and associated factors among health-care employees at a county referral hospital in Kenya. A total of 347 hand washing opportunities were observed among 55 healthcare professionals, and 132 of them completed the survey. A compliance rate of 23.9 percent was achieved among 83 out of 347 opportunities for hand hygiene was observed.

Agarwal et al (2021) conducted a cross-sectional a cross-sectional investigation to see if health-care personnel in the COVID-19 pandemic

are adequately following preventive strategies. The cross-sectional survey was done among HCWs involved in direct patient care across India using web-based questionnaires and telephonic interviews. In the study 956 health care workers were included. The findings showed that most health care workers washed their hands after coming into contact with the patients and their surroundings (67.89%). Only 52.82 percent of HCWs cleansed their hands for at least 20 seconds and adhered to the stages of hand hygiene (53.14%).

Semwal et al (2020) undertook a cross-sectional observational study on knowledge, attitude and perceived barriers among 36 doctors towards hand hygiene working in 8 indoor departments of a Govt. tertiary care Hospital. It was revealed that 53 percent of doctors are unaware of the “5 moments of hand hygiene”.

### Methodology

A descriptive cross-sectional observational study, based on feasibility and sample availability was conducted at associated hospitals. The target population comprised healthcare workers from the Govt Medical College and associated hospitals. Permission was obtained from the Institutional Ethical Committee (IEC) of IUST, as well as the principal GMC and medical superintendent of GMC. A total of 98 individuals were selected using non-probability convenience sampling, and they were observed for a total of 313 actions. Data collection took place from 13 June 2022 to 30 July 2022 (48 days), with approximately 6 days allocated to each ward. Observations on hand hygiene compliance were recorded from 10:30 AM to 3:30 PM using the WHO tool.

**Description of Tool:** WHO’s tool for hand hygiene compliance, based on WHO’s 5 moments of hand hygiene or indications was used.

### Data Analysis

**Descriptive statistics:** To describe the average hand hygiene compliance among health care workers and frequency of actions among different professional groups.

**Presentation of data:** The data obtained were entered in a master sheet for tabulation and statistical processing. The analysis of data is organised and presented under the following: Tabulation of category wise sample (HCW’s) studied; Tabulation of actions (category wise) performed by health care workers. This was further divided as per observation of actions performed by nursing professionals, doctors observed and nursing aides observed.

Table 1: Description of category wise sample (HCW’s) studied

| Category of Health Care Workers | No. of HCWs |
|---------------------------------|-------------|
| Nurses                          | 244         |
| Doctors                         | 59          |
| Nursing Aides                   | 10          |
| Total                           | 313         |

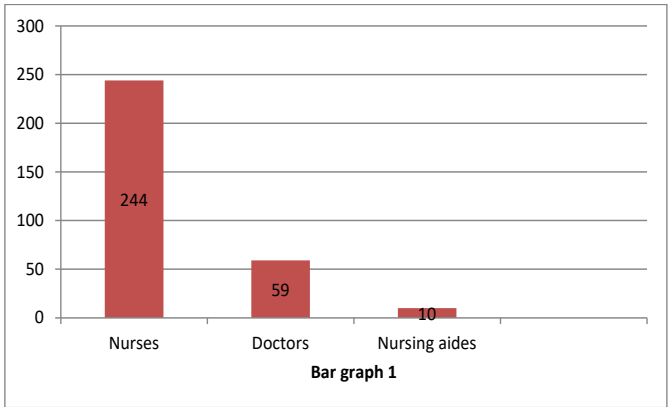


Fig 1: Categories of sample studied.

It was found that out of 313 sample sizes, 244 were nurses, 59 were doctors, and 10 were nursing aides Table 1, (Fig 1).

### Description of Actions (Hand Hygienic or Non-Hand Hygienic) Performed By Nurses

Table 2 and Fig 2 reveal that 181 (74.18%) nurses do not adhere to best level of hand hygienic actions while 63 (25.82%) adhere to best level of hand hygienic actions as per WHO guidelines.

Table 2: Actions performed by nurses

| Health care workers | Non hand-hygienic actions |              | Hand Hygienic actions |    |
|---------------------|---------------------------|--------------|-----------------------|----|
| Nurses              | Gloves                    | Missed       | HR                    | HW |
|                     | 164                       | 17           | 47                    | 16 |
| Total Actions=277   |                           | 181 (74.18%) | 63 (25.82%)           |    |

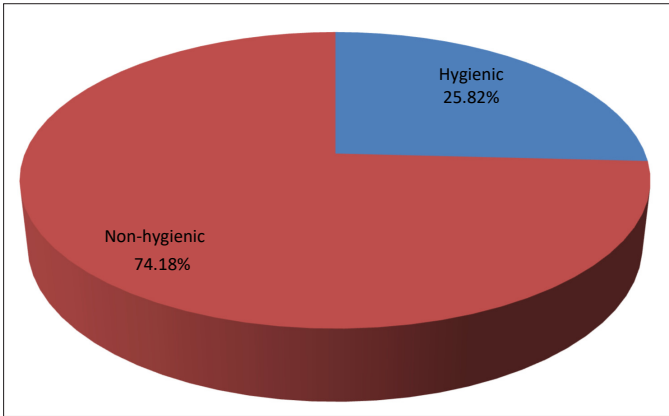


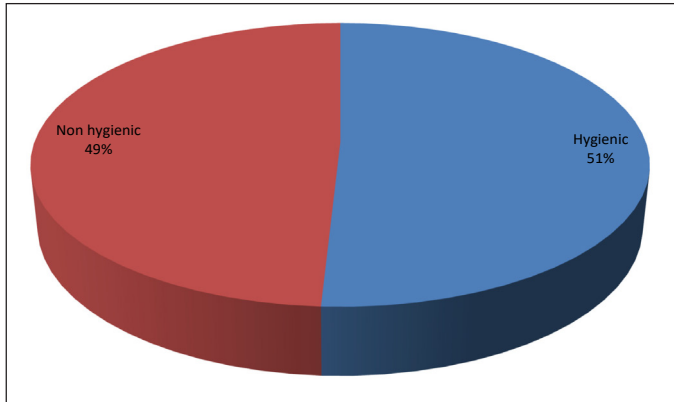
Fig 2: Nurses’ percentage of hand hygienic actions.

*Description of Actions (Hand Hygienic or Non Hand Hygienic) Performed By Doctor.*

Table 3 and Fig 3 reveal that 29 (49%) doctors do not adhere to best level of hand hygienic actions while 30 (51%) adhere to best level hand hygienic actions as per WHO guidelines.

**Table 3: Description of bon-hand hygienic & hygienic actions**

| Health care workers | Non hand hygienic actions |        | Hand Hygienic actions |    |
|---------------------|---------------------------|--------|-----------------------|----|
|                     | Gloves                    | Missed | HR                    | HW |
| Doctors             | 6                         | 23     | 30                    | 0  |
| Total Actions=59    | 29 (49%)                  |        | 30 (51%)              |    |



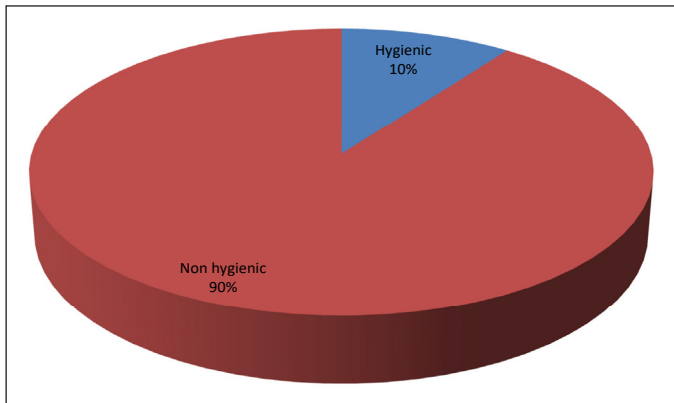
**Fig 3: Doctors' percentage of hand hygienic actions.**

*Description of Actions (Hand Hygienic or Non-Hand Hygienic) Performed By Nursing Aides*

**Table 4: Percentage of hand hygiene action among nursing aides**

| Health care workers | Non hand hygienic actions |        | Hand Hygienic actions |    |
|---------------------|---------------------------|--------|-----------------------|----|
|                     | Gloves                    | Missed | HR                    | HW |
| Nursing Aides       | 5                         | 4      | 1                     | 0  |
| Total Actions       | 9 (90%)                   |        | 1 (10%)               |    |

Table 4 and Fig 4 reveals that 9 (90%) nursing aides do not adhere to best hand hygienic actions



**Fig 4: Nursing aide's percentage of hand hygienic actions.**

while 1 (10%) adhere to best hand hygienic actions as per WHO guidelines.

**Discussion**

The study was intended to assess the hand hygiene compliance among HCWs in GMC. Data was collected by using standard tool for observation of hand hygiene given by WHO from 313 actions among health care workers of GMC.

Out of 85 actions among nurses in causality ward 67 performed Gloving, 14 HR, 3 HW and 1 Missed and the compliance rate was 20 percent as per WHO guidelines. Out of 55 actions among nurses in ENT ward, 36 performed Gloving, 14 HR, 5 HW and 0 Missed and the compliance rate was 34.5 percent as per WHO guidelines. Out of 43 actions among nurses in medical ward, 34 performed Gloving, 3 HR, 4 HW and 2 Missed and the compliance rate was 16.2 percent as per WHO guidelines; out of 12 actions among nurses in surgical ward, 10 performed Gloving, 1 HR, 1 HW and 0 Missed and the compliance rate was 16.6 percent as per WHO guidelines. Out of 21 actions among nurses in Antenatal ward, 15 performed Gloving, 3 HR, 3 HW and 0 Missed and the compliance rate was 28.5 percent as per WHO guidelines; out of 20 actions among nurses in Immunization, 11 performed HR and 9 Missed and the compliance rate was 55 percent as per WHO guidelines. Out of 4 actions among nurses in Paediatric ward, 1 performed HR and 3 Missed and the compliance rate was 25 percent as pe3r WHO guidelines, Out of 4 actions among nurses in postnatal ward, 2 performed Gloving and 2 Missed and the compliance rate was 0 percent as per WHO guidelines.

The findings are consistent with the descriptive cross-sectional study conducted by Kashyap et al (2017) to examine the knowledge and compliance with hand hygiene among staff nurses working in community health centres in Gujrat. The results found that majority of staff nurses 70 percent had an average level of compliance with hand hygiene, while 22 percent had a good level of compliance and 8 percent had a low level of hand hygiene compliance.

Out of 16 actions among doctors in causality ward, 2 performed Gloving, 4 HR and 10 Missed and the compliance rate was 25 percent as per WHO guidelines, out of 34 actions among doctors in ENT ward, 4 performed Gloving, 22 HR and 8 Missed and the compliance rate was 64.7 percent as per WHO guidelines; out of 9 actions among doctors in medical ward, 4 performed HR

and 5 Missed and the compliance rate was 44.4 percent as per WHO guidelines.

The findings are consistent with the observational study conducted by Ines Moued (et al) 2021 to study hand hygiene compliance at a trauma hospital in Iraqi Kurdistan. The hand hygiene compliance rate among doctors was 4.3 percent. Out of 4 actions among nursing aides in causality ward, 1 performed Gloving, 1 HR and 2 Missed and the compliance rate was 25 percent as per WHO guidelines, Out of 2 actions among nursing aides in ENT ward, 1 performed Gloving and 1 Missed and the compliance rate was 0 percent as per WHO guidelines, Out of 1 action among nursing aides in surgical ward, 1 performed Gloving and the compliance rate was 0 percent as per WHO guidelines, Out of 3 actions among nursing aides in medical ward, 2 performed Gloving and 1 Missed and the compliance rate was 0 percent as per WHO guidelines.

Upon reviewing the question, we conclude that the question meant what is the significance of 7/10 of a standard deviation i.e. about  $p(-0.7 < x < 0.7) = 0.51607$ . In other words, 51.6 percent of the data points will be between -0.7 standard deviation and 0.7 standard deviation.

The overall findings are consistent with the cross-sectional observational study conducted by Manodeep Sen, Meenakshi Sharma, Anupam Das, Amit Kumar Singh (2018) on hand hygiene compliance among health care professionals in an ICU unit of a tertiary care super speciality centre. Ten healthcare workers, including one non-PG resident, five Grade II nurses, three outsourced nurses, and one housekeeping staff member placed in the ICU, were observed for 50 hours over the course of a month to collect data on hand hygiene. 535 HH possibilities were available overall during the study period. The actual number of HH acts carried out by the HCW was 498, and the study group's overall compliance was calculated to be 93.1 percent.

**Limitations:** The samples were selected only from GMC Anantnag, and were limited to those present at the time of study.

### Recommendations

- The HCWs of GMC Anantnag should be monitored periodically.
- Educate and train staff on proper hand washing techniques.
- Introduction of infrastructural changes such as improvement in hand care product accessibility and hand washing resource availability.

- Nurse-patient ratio should be carefully assessed and a proper work load on HCWs should be introduced to avoid excess work load on HCWs.
- Introduce penalties for non-compliance; and reminder system in the workplace.

### Conclusion

The present study assessed the hand hygiene compliance among health care workers in GMC Anantnag. The overall percentage of HR performed by HCWs was 78 (25%), HW 16 (5%), Gloves 175 (56%) and Missed 44 (14%). Above results revealed that HCW's at GMC Anantnag had the minimum adherence to the best level of hand hygienic practices. The minimum adherence level to the best level of hand hygienic practices is due to unavailability of the resources for hand hygiene at the patient sides that hinders in the hand hygiene practices.

### References

1. Subbalakshmi A, Abirami P, Subramanian V, Sumitha A, Victor HK. Awareness of hand hygiene in hospital set up for infection control: Knowledge based questionnaire for health care workers in a teaching hospital. *Biomed Pharmacol J* 2020; 13:1773-9. <https://dx.doi.org/10.13005/bpj/2052>
2. Labarraque AG. Instructions and observations regarding the use of the chlorides of soda and lime, 1840. In: Porter J, ed. New Haven, CT: Baldwin and Treadway; 1829. <http://resource.nlm.nih.gov/62980020R>
3. Devaraj chandana, shivadasani jayasree. Assessment of hand hygiene compliance amongst health-care workers during Covid-19 pandemic in ICU. *Journal of the Academy of Clinical Microbiologist*. 2021; 23(2):59-62. [https://doi.org/10.4103/jacm.jacm\\_65\\_21](https://doi.org/10.4103/jacm.jacm_65_21)
4. Comptroller Auditor General Reducing HCAI's in hospitals in England HC 560 session 2008-2009. The stationery office, 2009. London <https://www.nao.org.uk>
5. Charles Huskins W, Donald A Goldmann. In Feigin and Cherry's Textbook of Paediatric Infectious Diseases (6th edn) 2009. <https://doi.org/10.1016/B978-1-4160-4044-6.50250-8>
6. Kashyap Bineeta, Gupta Kavita, Gomber Sunil, Gupta Neha, Bhardwaj Abhilasha, Singh NP, et al. Hand hygiene compliance among health care workers in paediatric oncology ward of a tertiary care hospital: A cross sectional observational study. *Indian Journal of Medical Specialities* 2017; 8 (4):197-199. <https://doi.org/10.1016/j.injms.2017.11.001>
7. WHO Guidelines on Hand Hygiene in Health Care. First Global Patient Safety Challenge. Clean Care is Safer Care [Accessed on August 24, 2010]. <http://www.who.int/patientsafety/en/>

8. Sandbøl SG, Glassou EN, Ellermann-Eriksen S, Haagerup A. Hand hygiene compliance among healthcare workers before and during the COVID-19 pandemic. *American Journal of Infection Control*. 2022; 50 (7): 719-23
9. Ahmed J, Malik F, Memon ZA, Arif TB, Ali A, Nasim S, et al. Compliance and knowledge of healthcare workers regarding hand hygiene and use of disinfectants: A study based in Karachi. *Cureus* 2020 Feb 18; 12 (2): e7036
10. Hammerschmidt J, Manser T. Nurses' knowledge, behaviour and compliance concerning hand hygiene in nursing homes: A cross-sectional mixed-methods study. *BMC Health Services Research* 2019 Dec; 19 (1): 1-3
11. Kamara GN, Sevalie S, Molleh B, Koroma Z, Kallon C, Maruta A, et al Hand hygiene compliance at two tertiary hospitals in Freetown, Sierra Leone, in 2021: A cross-sectional study. *International Journal of Environmental Research and Public Health* 2022 Mar 3;19 (5): 2978
12. Huang F, Armando M, Dufau S, Florea O, Brouqui P, Boudjema S. COVID-19 outbreak and healthcare worker behavioural change toward hand hygiene practices. *Journal of Hospital Infection* 2021 May 1; 111: 27-34
13. Laher AE, Van Rooyen LR, Jawa A, Enyuma CO, Swartzberg KM. Compliance with hygiene practices among healthcare workers at an academic hospital emergency department. *African Journal of Emergency Medicine* 2021 Sep 1; 11 (3): 352-55
14. Dwipayanti NMU, Lubis DS, Harjana NP. Public perception and hand hygiene behavior during COVID-19 pandemic in Indonesia. *Frontiers in Public Health* 2021; 13:9:621800
15. Makhni S, Umscheid CA, Soo J, Chu V, Bartlett A, Landon E, et al Hand hygiene compliance rate during the COVID-19 pandemic. *JAMA Internal Medicine* 2021 Jul 1; 181 (7): 1006-08
16. Yesse M, Muze M, Kedir S, Argaw B, Dengo M, Nesre T, et al. Assessment of knowledge, attitude and practice toward COVID-19 and associated factors among health care workers in Silte Zone, Southern Ethiopia. *PloS One* 2021 Oct 5; 16 (10): e0257058
17. Kiprotich K, Wang H, Kaminga AC, Kessi M. Observed and self-reported hand hygiene compliance and associated factors among healthcare workers at a county referral hospital in Kenya. *Scientific African* 2021 Nov 1; 14: e00984
18. Moued I, Haweizy RM, Miran LS, Mohammed MG, von Schreeb J, Älgå A. Observational study of hand hygiene compliance at a trauma hospital in Iraqi Kurdistan. *J. 2021 Nov 22;4(4):794-802*
19. Mohaithef MA. Assessing hand hygiene practices among nurses in the Kingdom of Saudi Arabia. *The Open Public Health Journal* 2020 May 23;13(1) doi102174/1874944502013010220
20. Hoffmann M, Sendlhofer G, Gombotz V, Pregartner G, Zierler R, Schwarz C, et al. Hand hygiene compliance in intensive care units: An observational study. *International Journal of Nursing Practice* 2020 Apr; 26(2): e12789
21. Onyedibe KI, Shehu NY, Pires D, Isa SE, Okolo MO, Gomerep SS, et al. Assessment of hand hygiene facilities and staff compliance in a large tertiary health care facility in northern Nigeria: A cross sectional study. *Antimicrobial Resistance & Infection Control* 2020 Dec; 9 (1): 1-9
22. Al Mutairi SM, Alotaibi A, Kofi M, Alsuraimi A, Bawazir A. To what extent the hand hygiene among health care workers become the core of best practice in the Covid-19 era. *Int Arch Nurs Health Care* 2020; 6: 1-2
23. Novák M, Breznický J, Kompaníková J, Malinová N, Hudečková H. Impact of hand hygiene knowledge on the hand hygiene compliance. *Medicinski Glasnik* 2020 Feb 1; 17 (1)
24. Ojanperä H, Kanste OI, Syrjala H. Hand-hygiene compliance by hospital staff and incidence of health-care-associated infections, Finland. *Bulletin World Health Organization* 2020 Jul 7; 98 (7): 475
25. Le CD, Lehman EB, Nguyen TH, Craig TJ. Hand hygiene compliance study at a large central hospital in Vietnam. *International Journal of Environ Research and Public Health* 2019 Feb; 16 (4): 607
26. Vikke HS, Vittinghus S, Giebner M, Kolmos HJ, Smith K, Castrén M, et al. Compliance with hand hygiene in emergency medical services: An international observational study. *Emergency Medicine Journal* 2019 Mar 1; 36 (3): 171-75
27. Engdaw GT, Gebrehiwot M, Andualem Z. Hand hygiene compliance and associated factors among health care providers in Central Gondar zone public primary hospitals, Northwest Ethiopia. *Antimicrobial Resistance & Infection Control* 2019 Dec; 8 (1): 1-7
28. Agarwal A, Ranjan P, Saraswat A, Kasi K, Bharadiya V, Vikram N, et al. Are health care workers following preventive practices in the Covid-19 pandemic properly? A cross-sectional survey from India. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews* 2021; 15: 69e75
29. Semwal R, Yadav SK, Piyush AR, Nath B. Knowledge, attitude and perceived barriers of doctors towards hand hygiene in a govt tertiary care hospital. *Dermatology* 2019 Jul; 2 (1): 1
30. Faujdar SS, Kumar S, Mehrishi P, Solanki S, Sharma A, Verma S. Hand hygiene knowledge, attitude, practice and hand microflora analysis of staff nurses in a rural tertiary care hospital. *Journal of Family Medicine and Primary Care* 2020 Sep; 9 (9): 4969