

Knowledge and Compliance to Hand Hygiene Among Anesthesiologists in the Operation Room in Sudan 2022

Farah Seif Aldein Ahmed Khalel^{1*}, Eltayeb GareebAlla Eltayeb AbdAlla², Mohamed Ali Hassabo³, Mohamed Osman Suliman Basher⁴, Rabaa Abdelwahab Mohamed⁵ and Omya Hassan Alamin Ahmed⁶

¹MBBS, Neelain University, 2015, SMSB, Sudan

²MBBS, Khartoum University, 2022, Sudan

³MBBS, Neelain University, 2014, MPH, MRCP Sudan

⁴MBBS, Neelain University, 2014, MRCS, MD, Sudan

⁵Associate Prof of Anaesthesia Faculty of Medicine Omdurman Islamic University

⁶MBBS khartoum university 2001 MD SMSB 2008

*Corresponding author

Farah Seif Aldein Ahmed Khalel, Neelain University, SMSB, Sudan.

Received: January 22, 2024; Accepted: February 02, 2024; Published: February 05, 2024

ABSTRACT

Objectives: This study aims to assess anesthesiology registrars' knowledge and compliance with Hand hygiene strategies in the operation room and ICU in Sudan in 2022.

Materials and Methods: This was a descriptive cross-sectional study conducted among anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care. Data was collected by the researcher using a self-administered Google form questionnaire assessing knowledge about patient prevention, self-protection, alcohol-based rubbing, hand washing using soap and water, and compliance with the WHO 5 moments hand hygiene practice, then analyzed by SPSS V 28 software.

Results: The study included 150 anesthesiology registrars with a mean age of 31 ± 4 years and a female majority of 67%. Overall, the majority 88% have a fair knowledge regarding hand hygiene, 12% have poor knowledge, and 65% were compliant with all the recommended 5 moments of hand hygiene. Analysis of Factors affecting participants' compliance with WHO 5 moments revealed that only experience was associated with the participants' compliance.

Conclusion: Many gaps in knowledge about hand hygiene were identified regarding patients and self-protection, and hand washing and rubbing, thus, anesthesiology registrars had poor to fair knowledge regarding hand hygiene. While 65% of them are compliant with the WHO 5 Moments hand hygiene. Compliance with the WHO 5 Moments hand hygiene was associated with participants' experience.

Introduction

Audits of infection prevention practices are uncommon, and not all hospitals have infection prevention and control policies that are specific to anesthetic treatment in the Operation Room (OR). Clinicians may not be aware of the necessary actions and procedures as a result [1] According to studies, anesthesia professionals engage in risky behaviors such as using multiple-dose vials for more than one patient, using gloves for airway management 100% of the time, failing to complete hand hygiene (HH) after removing gloves, and entering anesthesia cart drawers without doing HH [2-6].

A significant contributor to healthcare-associated infections (HAIs) is healthcare personnel's inconsistent observance of simple preventative measures like hand hygiene [7,8]. Failure to follow aseptic technique guidelines as well as inefficient equipment cleaning and surgical site preparation have been linked

to higher risks of surgical site infections, catheter-associated urinary tract infections, ventilator-associated pneumonia, and other HAIs [9]. Unsafe injection practices, inappropriate reuse of needles, syringes, and single-use devices, as well as an increase in multiple-drug resistant organisms, have all been linked to a rise in emerging infections [7].

Recent studies have reported low levels of adherence to hand hygiene best practices among healthcare workers [10-12]. Poor adherence to HH was attributed to poor knowledge and perception of hand hygiene were reported to have a positive impact on adherence to hand hygiene practice [12,13]. Moreover, barriers to HH practice included the lack of posters or written policies on HH and tools such as alcohol-based hand rubs [13-16]. HH compliance was higher when risk was perceived to be higher (i.e., in the emergency and wound dressing/treatment rooms and labor wards [16]. Additionally, the profession is also

Citation: Ahmed Khalel FSA, Abdalla EGE, Hassabo MA, Basher MOS, Mohamed RA, et al. Knowledge and Compliance to Hand Hygiene Among Anesthesiologists in the Operation Room in Sudan 2022. *J Clin Surg Anesth.* 2024. 2(1): 1-5. DOI: doi.org/10.61440/JCSA.2024.v2.05

thought to affect HH practice; as medical students were more likely to have better compliance [14]. while doctors had poor HH practices [16].

This study aims to report knowledge and practices of hand hygiene in the operation room and the ICU among the anaesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care to provide information about the anaesthesiology department's compliance with hand hygiene. The findings of the study are thought to give insight into the implementation of universal guidelines in hand hygiene practice, and the factors affecting it, thus reflecting the situation and the need for interventions that improve patient outcomes, and ensure health workers' protection.

Materials and Methods

This was a descriptive cross-sectional institutional-based study. The study was conducted in Sudan, Council of Anaesthesia and Intensive Care among anaesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care. The study sample was calculated using the formula:

$$n = \frac{N}{1 + N * MOE^2}$$

n= Sample size

N= Total population (250)

MOE= margin of error (0.05)

The sample size was estimated to be 152

Convenient non-probability sampling was used to access the studied population.

Data was collected by the principal researcher using a pre-designed data collection sheet in the form of a self-administered Google form.

The questionnaire contains three sections:

- Section one is about participants' characteristics (age, gender, and experience).
- Section two is about participants' knowledge of hand hygiene
- Section three is about participants' practice of hand hygiene using the WHO '5 Moments of hand hygiene' which has been launched in 2009 in an attempt to reduce the burden of healthcare-associated infections.

Data was cleaned and entered into a Microsoft Excel data sheet and was analyzed using SPSS version 28 software. Categorical data was represented in the form of frequencies and proportions. The chi-square test was used as a test of significance for qualitative data. Continuous data was represented as mean and standard deviation. ANOVA test was used as a test of significance for quantitative data. MS Excel and MS Word were used to obtain various types of graphs such as bar diagrams. P value (Probability that the result is true) of <0.05 was considered statistically significant after assuming all the rules of statistical tests and level of confidence. Data was represented after analysis in the form of uni-variable tables, cross tabulation (bi-variable tables), figures, and narrative illustrations.

knowledge was scored by giving the correct answer a score of 1 and the wrong answer a score of 0. Total scores were calculated

and transformed into percentages; percentages from 0 to 50 were considered poor knowledge, percentages from 50 to 80 were considered fair knowledge, and percentages from 80 to 100 were considered good knowledge.

Compliance was scored by giving adherence to the recommended practice a score of 1, and non-adherence to the recommended practice a score of 0, total scores were calculated; a score of 5 was considered as compliant to the WHO 5 moments of hand hygiene, a score of less than 5 was considered as non-compliant to the WHO 5 moments of hand hygiene.

Results

The study included 150 anaesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care. The mean age of participants was 31± 4 years and a female majority of 67%. More than half of them have 2 to 5 years of experience (table 1).

Table 1: Demographic characteristics of anaesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care 2022 (n=150).

	Frequency/Mean± SD
Age	31± 4
Gender	
Male	49 (33%)
Female	101 (67%)
Experience	
less than 2 years	21 (14%)
2 to 5 years	77 (51%)
more than 5	52 (35%)

Knowledge of patients prevention among participants was assessed, the majority have known that hand hygiene prevents the transmission of germs to the patient before touching the patient 95%, Immediately after the risk of body fluid exposure 89%, and Immediately before clean/aseptic procedure 91%, however, only 16% knew that hand hygiene can prevent transmission of germs to the patient after exposure to immediate surroundings of the patient (table 2).

Regarding knowledge of self-protection, the majority have known that hand hygiene prevents the transmission of germs to the health worker after touching the patient 95%, Immediately after the risk of body fluid exposure 96%, and after exposure to immediate surroundings of the patient 94%, however, only 22% knew that hand hygiene can't prevent transmission of germs to the health worker after exposure to immediate surroundings of the patient (table 2).

Upon assessing knowledge of hand washing and rubbing, participants have known that rubbing is more rapid than washing 71%, and the minimal time needed for alcohol-based hand rub to kill most germs on your hands is 20 seconds 72%. Nevertheless, 24% knew that Hand rubbing does not cause skin dryness more than hand washing, 52% knew that Hand rubbing is not more effective against germs than hand washing, and 32% knew that there is no recommendation that Hand washing and hand rubbing are to be performed in sequence (table 2).

Table 2: Knowledge of HH among anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care 2022 (n=150).

	Count (%)
Hand hygiene prevents the transmission of germs to the patient (patient prevention)	
Before touching the patient (Yes)	142 (95%)
Immediately after the risk of body fluid exposure (Yes)	134 (89%)
After exposure to the immediate surroundings of the patient (No)	24 (16%)
Immediately before the clean/aseptic procedure (Yes)	136 (91%)
Hand hygiene prevents the transmission of germs to the health worker (self-protection)	
After touching the patient (Yes)	142 (95%)
Immediately after the risk of body fluid exposure (Yes)	144 (96%)
Immediately before the clean/aseptic procedure (No)	33 (22%)
After exposure to the immediate surroundings of the patient (Yes)	141 (94%)
Regarding alcohol based rubbing and hand washing with soap and water	
Hand rubbing is more rapid for hand cleansing than hand washing (True)	107 (71%)
Hand rubbing causes skin dryness more than hand washing (False)	40 (24%)
Hand rubbing is more effective against germs than hand washing (False)	78 (52%)
Hand washing and rubbing are recommended to be performed in sequence (False)	48 (32%)
The minimal time needed for alcohol-based hand rub to kill most germs is 20 seconds (True)	108 (72%)
The type of hand hygiene method is required in the following situations	
Before palpation of the abdomen (Rubbing)	87 (58%)
Before giving an injection (Rubbing)	79 (53%)
After emptying a bedpan (Washing)	112 (75%)
After making a patient's bed (Rubbing)	51 (34%)
After visible exposure to blood (Washing)	112 (75%)
Before general anesthesia induction (Washing)	88 (59%)
Before giving a spinal anesthetic (Rubbing)	30 (20%)
Before attempting nerve block (Washing)	119 (79%)
Before cannulation (Washing)	65 (43%)
Before epidural insertion (Rubbing)	30 (20%)
Before arterial line insertion (Washing)	100 (67%)
Before central venous catheterization (Rubbing)	31 (21%)

Regarding the appropriate hand hygiene method, participants identified that rubbing is recommended Before palpation of the

abdomen 58%, Before giving an injection 53%, After making a patient's bed 34%, Before giving a spinal anesthetic 20%, Before epidural insertion 20%, and Before central venous catheterization 21%. And washing After emptying a bedpan 75%, after visible exposure to blood 75%, Before general anesthesia induction 58%, Before attempting nerve block 79%, Before cannulation 43%, and Before arterial line insertion 67% (table 2).

Overall, the majority 88% have a fair knowledge regarding hand hygiene, and 12% have poor knowledge (figure 1).

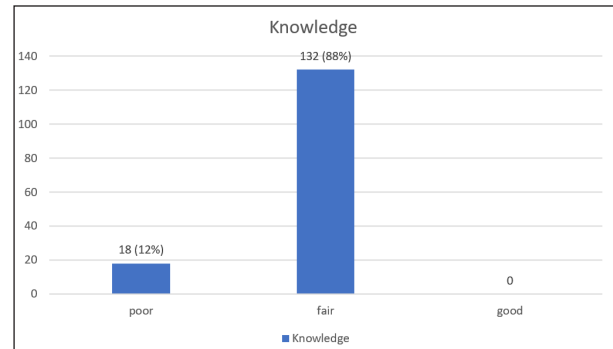


Figure 1: Overall knowledge of anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care 2022 (n=150).

Regarding participants' practice of the WHO 5 Moments hand hygiene, hand hygiene was least done Before touching a patient 77%, otherwise, the majority reported doing hand hygiene Before clean/aseptic procedures 91%, After bodily fluid exposure/risk 99%, After touching a patient 93, and After touching patient surroundings 89% (table 3). Overall 65% were compliant with all the recommended 5 moments of hand hygiene (figure 2).

Table 3: Practice of the WHO 5 Moments hand hygiene among anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care 2022 (n=150).

	Count	%
Before touching a patient	116	77%
Before clean/aseptic procedures	137	91%
After bodily fluid exposure/risk	149	99%
After touching a patient	139	93%
After touching the patient surroundings	134	89%

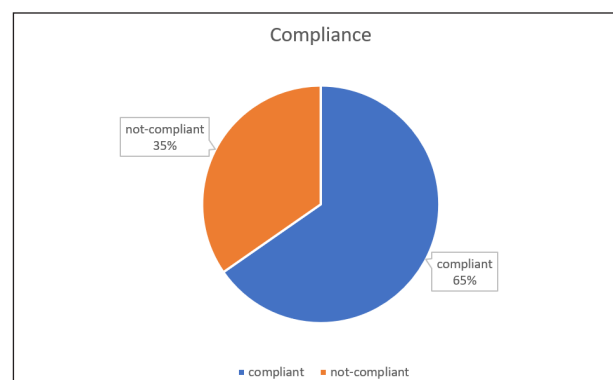


Figure 2: Compliance with WHO 5 moments hand hygiene among anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care 2022 (n=150).

Analysis of Factors affecting participants' compliance with WHO 5 moments revealed that only experience was associated with the participants' compliance; compliance was 38% in less than 2 years of experience, 62% in 2 to 5 years of experience, and 81% in more than 5 years of experience (p-value 0.002). Compliance was higher in females vs. males (66% vs. 63%) and fair vs poor (66% vs. 61%) however without statistical significance (table 4).

Table 4: Factors affecting compliance with WHO 5 moments anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care 2022 (n=150).

Factors	Compliance		Total	p-value
	Not-compliant	Compliant		
Age	31± 5	31± 3	31± 4	0.3
Gender				0.7
Male	18 (37%)	31 (63%)	49	
Female	34 (34%)	67 (66%)	101	
Experience				0.002*
<2 years	13 (62%)	8 (38%)	21	
2 to 5 years	29 (38%)	48 (62%)	77	
More than 5	10 (19%)	42 (81%)	51	
Knowledge				0.6
Poor	7 (39%)	11 (61%)	18	
Fair	45 (34%)	87 (66%)	132	
Total	52	98	150	

Discussion

A major cause of healthcare-associated infections (HAIs) is the lack of consistent compliance by healthcare workers with basic prevention techniques such as hand hygiene [7,8]. To assess anesthesiologist knowledge, and compliance with Hand hygiene strategies, this study included 150 anesthesiology registrars registered in the Sudanese Council of Anaesthesia and Intensive Care with a mean age of 31± 4 years, a female majority of 67% and 2 to 5 years of experience 51%.

Anesthesiology registrars' compliance with hand hygiene guidelines is an important measure for healthcare-associated infection prevention [17]. The present study revealed that the majority of anesthesiology registrars have fair knowledge regarding hand hygiene, and few have poor knowledge, however, non have shown good knowledge regarding hand hygiene. This is explained by the gaps in participants' knowledge identified in many aspects such as patients prevention; only 16% knew that hand hygiene can prevent transmission of germs to the patient after exposure to immediate surroundings of the patient, and self-protection; only 22% knew that hand hygiene can't prevent transmission of germs to the health worker after exposure to immediate surroundings of the patient. Similarly, Patrick et al. reported that One or more knowledge deficits were identified among health workers in their multicenter study [17].

Knowledge gaps regarding hand washing and rubbing and their appropriate uses were also identified in the present studies, many participants thought that rubbing is more effective than hand

washing and few participants identified appropriate when to use rubbing (aseptic procedures) such as spinal anesthetic, epidural insertion, and central venous catheterization compared to those identified when to use hand washing (sterile procedures). Similarly, Sreejith et al. found that medical and nursing students had more knowledge gaps regarding rubbing use than hand washing, despite nursing students showing better knowledge than medical students this knowledge gap existed overall [18].

Two-thirds were compliant with all the recommended 5 moments of hand. Based on the WHO 5 Moments of hand hygiene, hand hygiene was least done Before touching a patient, otherwise, the majority reported doing hand hygiene Before clean/aseptic procedures, After bodily fluid exposure/risk, after touching a patient, and after touching patient surroundings. This is ways better than what was reported in Nigeria by Onyedibe et al in which the compliance rate was 31%, however, similarly hand hygiene was least applied before touching the patient [14]. another study in Nigeria reported a compliance rate of 30% [15]. Also, in Ghana, Care-related Hand Hygiene compliance among doctors and nurses in this large West African hospital was found to be low [16]. Furthermore, upon assessing the adherence to the different aspects of hand hygiene in the ICU, it was found that there were low levels of adherence to best hygiene practices [10].

In this study participants' experience was the only factor significantly affecting their compliance with hand hygiene practice; the more experience the higher the compliance. Despite that difference between males and females was reported but it didn't reach statistical significance. Similarly, it was reported that females had higher hand hygiene compliance compared to males [15]. Hand hygiene compliance was also found to be higher among participants with fair vs poor knowledge, however without statistical significance. Similarly, commonly identified barriers to Hand Hygiene were limited resources and lack of knowledge on appropriate times to perform Hand Hygiene [13].

Conclusion

Anesthesiology registrars had poor to fair knowledge regarding hand hygiene. Many gaps in knowledge about hand hygiene were identified regarding patients and self-protection, and hand washing and rubbing. Two-thirds of anesthesiology registrars were compliant with the WHO 5 Moments hand hygiene which was affected by their experience. Interventions such as lectures and courses in infection control could be done to improve participants' knowledge. Additionally, promotion for compliance with hand hygiene practices should be designed and introduced in all service centers.

Declaration

The authors declare no conflict of interest.

Ethical approval for conducting this research was obtained from the ethical committee of the Sudanese Medical Specializations Board (SMSB)

Raw data are available upon request from the corresponding author

All authors contributed to formulating the research idea, designing the study, collecting data, data analysis, and writing this manuscript.

This research was not funded by any funding agencies in the public, commercial, or not-for-profit sector.

References

1. Munoz-Price LS, Bowdle A, Johnston BL, Bearman G, Camins BC, et al. Infection prevention in the operating room anesthesia work area. *Infect Control Hosp Epidemiol*. 2019. 40: 1-17.
2. Biddle C, Shah J. Quantification of anesthesia providers' hand hygiene in a busy metropolitan operating room: What would Semmelweis think? *Am J Infect Control*. 2012. 40: 756-759.
3. Jeanes A, Dick J, Coen P, Drey N, Gould DJ. Hand hygiene compliance monitoring in anaesthetics: Feasibility and validity. *J Infect Prev*. 2018. 19: 116-122.
4. Baier C, Tinne M, von Lengerke T, Gossé F, Ebadi E. Compliance with hand disinfection in the surgical area of an orthopedic university clinic: results of an observational study. *Antimicrob Resist Infect Control*. 2022. 11.
5. Reisinger HS, Yin J, Radonovich L, Knighton VT, Martinello RA, et al. Comprehensive survey of hand hygiene measurement and improvement practices in the Veterans Health Administration. *Am J Infect Control*. 2013. 41: 989-993.
6. Larson E. Monitoring hand hygiene: Meaningless, harmful, or helpful? *Am J Infect Control*. 2013. 41.
7. Siegel JD, Rhinehart E, Jackson M, Chiarello L. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. *Am J Infect Control*. 2007. 35.
8. Tarrac SE. Application of the updated CDC isolation guidelines for health care facilities. *AORN J*. 2008. 87.
9. Anderson DJ, Podgorny K, Berríos-Torres SI, Bratzler DW, Dellinger EP, et al. Strategies to Prevent Surgical Site Infections in Acute Care Hospitals: 2014 Update. *Infect Control Hosp Epidemiol*. 2014. 35: 605-627.
10. Musu M, Lai A, Mereu NM, Galletta M, Campagna M, et al. Assessing hand hygiene compliance among healthcare workers in six Intensive Care Units. *J Prev Med Hyg*. 2017. 58: 231-237.
11. Krediet AC, Kalkman CJ, Bonten MJ, Gigengack ACM, Barach P. Hand-hygiene practices in the operating theatre: An observational study. *Br J Anaesth*. 2011. 107: 553-558.
12. Irek EO, Aliyu AA, Dahiru T, Obadare TO, Aboderin AO. Healthcare-associated infections and compliance of hand hygiene among healthcare workers in a tertiary health facility, southwest Nigeria. *J Infect Prev*. 2019. 20: 289-296.
13. Owusu-Ofori A, Jennings R, Burgess J, Prasad PA, Acheampong F, et al. Assessing Hand Hygiene Resources and Practices at a Large African Teaching Hospital. *Infect Control Hosp Epidemiol*. 2010. 31: 802-808.
14. Onyedibe KI, Shehu NY, Pires D, Isa SE, Okolo MO, et al. Assessment of hand hygiene facilities and staff compliance in a large tertiary health care facility in northern Nigeria: A cross sectional study. *Antimicrob Resist Infect Control*. 2020. 9.
15. Omiye JA, Afolaranmi OJ, Ghazal ID, Yahya MB, Oduwale MO, et al. Hand Hygiene Practice Among Health Care Workers in a Tertiary Hospital in Sub-Saharan Africa (Handy Study). *West Afr J Med*. 2019. 36: 116-121.
16. Yawson AE, Hesse AAJ. Hand hygiene practices and resources in a teaching hospital in Ghana. *J Infect Dev Ctries*. 2013. 7: 338-347.
17. Fernandez PG, Loftus RW, Dodds TM, Koff MD, Reddy S, et al. Hand Hygiene Knowledge and Perceptions among Anesthesia Providers. *Anesth Analg*. 2015. 120: 837-843.
18. Nair SS, Hanumantappa R, Hiremath SG, Siraj MA, Raghunath P. Knowledge, Attitude, and Practice of Hand Hygiene among Medical and Nursing Students at a Tertiary Health Care Centre in Raichur, India. *ISRN Prev Med*. 2014. 2014: 1-4.