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Level of Hand Hygiene Compliance and Its Associated Factors Among Health Care Workers at Eka Kotebe General Hospital, Addis Ababa, Ethiopia

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ABSTRACT

BACKGROUND: Poor hand hygiene is an important source of infection, but maintaining hand hygiene is the most important measure to prevent infections. Hand hygiene compliance and its associated factors are not well recognized in Ethiopia. Therefore, this study was intended to determine hand hygiene compliance and its associated factors among health care workers in Eka Kotebe General Hospital.

METHODS: A cross-sectional study was conducted among health care workers at Eka Kotebe General Hospital. A self-administered questionnaire supplemented by a World Health Organization Hand Hygiene Technical Reference Manual was used to collect data. Data was entered using Epi Info 7.2.0.1 and exported to SPSS 23 for analysis. The data were analyzed using descriptive and inferential statistics. Statistical significance was determined using a *P*-value of ⩽.05 with a 95% confidence interval.

RESULTS: Hand hygiene compliance among healthcare workers was 22.2%. Hand hygiene training (AOR = 2.9, 95% CI: 1.13-7.52), presence of hand hygiene indication poster (AOR = 3.38, 95% CI: 1.18-9.66), hand hygiene promotion by IPC team (AOR = 4.2, 95% CI: 2.53-8.58)), working experience ⩾5 years of a health care providers (AOR = 3.96, 95% CI: 1.12-13.9), being midwife (AOR = 17.1, 95% CI: 2.8-10), being nurse (AOR = 5.3, 95% CI: 2.09-7.8) by profession, and presence of water (AOR = 2.50, 95% CI: 2.20-11.78) were significantly associated factors to hand hygiene compliance.

CONCLUSION: The level of hand hygiene compliance among health care providers was found to be low. Training about hand hygiene, the presence of hand hygiene indication posters, hand hygiene promotion by the IPC team, working experience of health care providers, being a nurse and midwife, and the presence of water were independent predictors of hand hygiene compliance. Health care workers need to be given training on hand hygiene as well as hand hygiene facilities shall be installed and supplied by the hospital in a sustained manner.

KEYWORDS: Hand hygiene, compliance, health care worker, Eka Kotebe General Hospital, Addis Ababa

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Introduction

Hands play a major role in the transmission of infection in healthcare institutions, in industrial settings such as the food industry and also in community and domestic settings.[1,2] Hand hygiene is an important component for the prevention of Health-Care-Associated Infections (HCAIs), which constitute a major hindrance to hospital care and the spread of antibiotic resistance.[3] Hand hygiene compliance in health institutions will stop the spread of HCAIs from patients to the community, patients to health care providers, and health care providers to patients and their caregivers.[4] The importance of hand hygiene in the control of infection cannot be overemphasized. Recognition of the importance of hand hygiene in the control of the spread of infectious diseases is reflected in the increased number of publications in the medical literature.[5]

Despite proper use of hand hygiene is a critical to the prevention of infections, approximately 5% to 10% of hospitalized patients in the developed world get infected, and the burden of disease is even higher in developing countries, but compliance among health care workers is often below 40%.[6,7] Infection prevention efforts in poorer countries are either non-existent or underfunded,[8] and nosocomial infection and colonization by Methicillin-resistant *Staphylococcus aureus* have become more prevalent in recent years. Poor hand hygiene in the healthcare setting has been related to an unacceptable degree of morbidity, death, and healthcare expenses. The magnitude of healthcare-associated infections has been shown to be as high as 19% in underdeveloped nations.[9]

In Ethiopia, the pooled prevalence of healthcare-associated infection estimated from 18 studies was 16.96%.[10] The possible reasons for high prevalence in this study might be very low hand hygiene practice by physicians and resource constraints,[11] low adherence to infection prevention practice,[12] poor job satisfaction,[13] and also less attention given to HCAIs.[14]

Hand hygiene prevents both endogenous and exogenous infections in patients, contamination of the hospital environment with potential pathogens, and cross-transmission of micro-organisms between patients. When hand hygiene is used in conjunction with the appropriate protective equipment, it also helps to protect health care workers from the hazards of

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occupational infections.[7] Lack of suitable equipment, low staff-to-patient ratios, allergies to hand-washing products, insufficient understanding of procedures among staff, the time required, and careless attitudes among health care workers regarding bio-safety may all affect hand hygiene compliance.[15] There are few researches regarding hand hygiene among health-care workers after COVID-19 in Ethiopia. However, no single study was done on hand hygiene compliance and its associated factors in Eka Kotebe General Hospital. As a result, this study was intended to determine the level of hand hygiene compliance and its associated factors among Eka Kotebe General Hospital health care providers.

Methods

Study design, period, and study area

An institutional-based cross-sectional study was undertaken to investigate hand hygiene compliance and associated determinants from August to September 2021 among health care providers at Eka Kotebe General Hospital. Eka Kotebe Specialized Hospital is located in Addis Ababa, the capital city of Ethiopia. It has a 600-bed capacity with 16 dedicated ICU beds.[16] It has 5-floor building that provides mainly of mental health services and a 9 floor building for administrative works. During the study period, 785 health care personnel were actively working in the hospital.

Eligibility criteria

Inclusion criteria. All health care providers who had worked at least 6 months in the Eka Kotebe General Hospital were included in this study.

Exclusion criteria. Health care providers who were not present during the data collection time due to different reasons.

Sample size determination and sampling technique

Sample was calculated using a single population proportion formula with a proportion (p) of 14% using the proportion of hand hygiene compliance among health providers in central Gondar Zone,[17] a margin of error (4%), and a standard Z score of 1.96 corresponding to a 95% confidence interval.

$$n = \frac{z^2(p)(1-p)}{e^2} = 289$$

We deducted the sample size using the correction formula; because the overall population size was less than 10 000, that is, 785,

$$nf = \frac{n}{1+\frac{n}{N}} = 211$$

Finally, the final sample size was 216 by considering a 2.36% nonresponse rate from the pretest result.

Sampling Procedure

Stratified sampling technique was employed. The sample was proportionally distributed to each profession. After proportional allocation, a simple random sampling technique was applied to select participants from each profession category. Then, health care providers were chosen randomly using the registry of health personnel department of each profession.

Operational definition

Good hand hygiene compliance. Health care provider who comply to all of the hand hygiene moments of the World Health Organization (WHO) hand hygiene observational checklist.[18]

Poor hand hygiene compliance. Health care providers who do not comply to at least one of the hand hygiene moments of the WHO observational checklist.[18]

Data collection tools

A self-administered questionnaire and WHO Hand Hygiene Technical Reference Manual modified by several literature sources were used to collect data.[17,19,20] The English version of the questionnaire was translated into the local language (Amharic), and a third individual checked its coherence by translating it back into English. Pretest was done on 5% of the sample size (211). Data collectors and supervisors were provided a 2 days long training on data collection tools, questioning strategies, ethical issues, interview techniques, means of getting written consent, and how to communicate with respondents. To reduce biases in questionnaire response, neutrally worded questions, non-leading answer options, and anonymity of the survey was disclosed to study participants before giving the questionnaire to them. Nurses and environmental health professionals collected data under the supervision of 2 field supervisors.

Data processing and analysis

For completeness and consistency, the collected data was rechecked. Data were entered into Epi Info version 7.2.0.1, and then exported to SPSS 23 for analysis. Descriptive statistics like frequency, and percentage were used to describe hand hygiene compliance, socio-demographic characteristics, and other variables of respondents. Multiple variable logistic regression analysis was fitted to variables with P values of $\leqslant .25$[21] in bivariate logistic regression analysis to control the effects of confounders. The strength of association between the independent variables and the outcome variable were quantified using the adjusted odds ratio and the corresponding 95% confidence intervals, and statistical significance was declared at P-value $\leqslant .05$.

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Ethical consideration

Ethical clearance was obtained from the ethical review committee of the Kea-Med Medical College (Ref No: Eka/150/5/117). The authorization letter was written from the Eka Kotebe General Hospital. Verbal informed consent was agreed with the health care providers before the interview and observations were undertaken based on the written consent of the hospital's examination. The respondents were informed that any personal identity or personal description could not be recorded about them and their activities. Strict confidentiality and anonymity of study participants were maintained during data analysis. The respondents' right to resign from the interview if any uncomfortable condition has occurred was ensured.

Result

Socio-demographic characteristics

A total of 198 health care providers were evaluated, with a response rate of 91.67% out of 216 intended health care providers for the study. Of these, 66.2% were males. The median age of the respondents was 33.31. The majority, 59.5% (118), health care providers were between 26 and 35 age category. The number of nurses outnumber all the rest professional categories (56, 28.28%) (Table 1).

Table 1. Socio-demographic characteristics of health care providers at Eka Kotebe General Hospital, Addis Ababa, 2021 (n = 198).

VARIABLES	CATEGORY	FREQUENCY (N)	PERCENT (%)
Sex	Female	67	33.8
	Male	131	66.2
Age	⩽25	9	4.54
	26-35	118	59.59
	36-45	63	31.82
	⩾46	8	4.05
Marital status	Married	123	62.63
	single	75	37.37
Level of education	Diploma	26	13.13
	Bachelor	126	63.64
	Second degree and above	46	23.23
Unit of work	Out patient	41	20.70
	Emergency	25	12.62
	In patient	27	13.64
	Laboratory	21	10.61
	Operation room	29	14.65
	Gynecology-obstetrics	35	17.68
	Triage	20	10.10
Experiences in years	<4	78	39.40
	5-6	73	36.86
	>7	47	23.74
Profession	Medical doctor	39	19.70
	Nurse	56	28.28
	Midwifery	25	12.63
	Laboratory	24	12.12
	Pharmacy	22	11.11
	Others	32	16.16
Monthly income	<7000 birr	62	31.30
	7000-9000	61	30.80
	>9000	75	37.90

Others: Health officer, Radiography, Anesthesia, Optometry.

Environmental factors

The majority of health care providers in Eka Kotebe General Hospital were working in the wards without availability of running water (89.4%), soap (81.32%), and towels (98.99%). About 81.32% of health care providers were supplied with a soap/detergent. More than half (55.56%) the respondent had taken hand hygiene training. Almost all (90.4%) of the study participants have no hand hygiene indication posters (Table 2)

Hand hygiene compliance

All overall hand hygiene compliance was 22.2% (95% CI: 16.7, 28.3). The proportions of "my 5 movements" of hand hygiene: before patient contact, before aseptic procedure, after body fluid contact, after patient contact and after touching patient surrounding were 91.4% (95% CI: 87.6-94.7), 36.9% (95% CI: 29.84-43.4), 14.6% (95% CI: 9.6-19.7), 13.6% (95% CI: 9.1-18.7) and 17.2% (95% CI: 16.6-522.2) respectively (Figure 1).

Factors associated with hand hygiene compliance

In bivariate logistic regression; variables with *P* values of ⩽.25[21] were fitted in multivariable logistic regressions to examine the association with hand hygiene compliance. After fitting these variables in multivariable logistic regressions: hand hygiene training, presence of hand hygiene indication poster, work experience of health care providers, being midwifery, being nurse by profession, and presence of water were found significantly associated with the hand hygiene compliance.

Study participants who had taken training about hand hygiene were 2.9 times more likely to have good hand hygiene compliance than those who had not taken training (AOR = 2.9, 95% CI: 1.13-7.52). The odds of having good hand hygiene

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Table 2. Environmental characteristics among selected health care providers at Eka Kotebe General Hospital, Addis Ababa, 2021 (n = 198).

VARIABLES	FREQUENCY (N = 198)	PERCENT
Presence of water		
Yes	21	10.60
No	177	89.40
Presence of soap/detergent		
Yes	37	18.68
No	161	81.32
Presence of towel		
Yes	2	1.01
No	196	98.99
Taking training		
Trained	110	55.56
Never trained	88	44.44
Presence of WHO guideline hand hygiene manual		
Yes	35	13.1
No	165	17.7
Presence of hand hygiene brochures		
Yes	23	11.6
No	175	88.6
Presence hand hygiene poster		
Yes	19	9.6
No	179	90.4

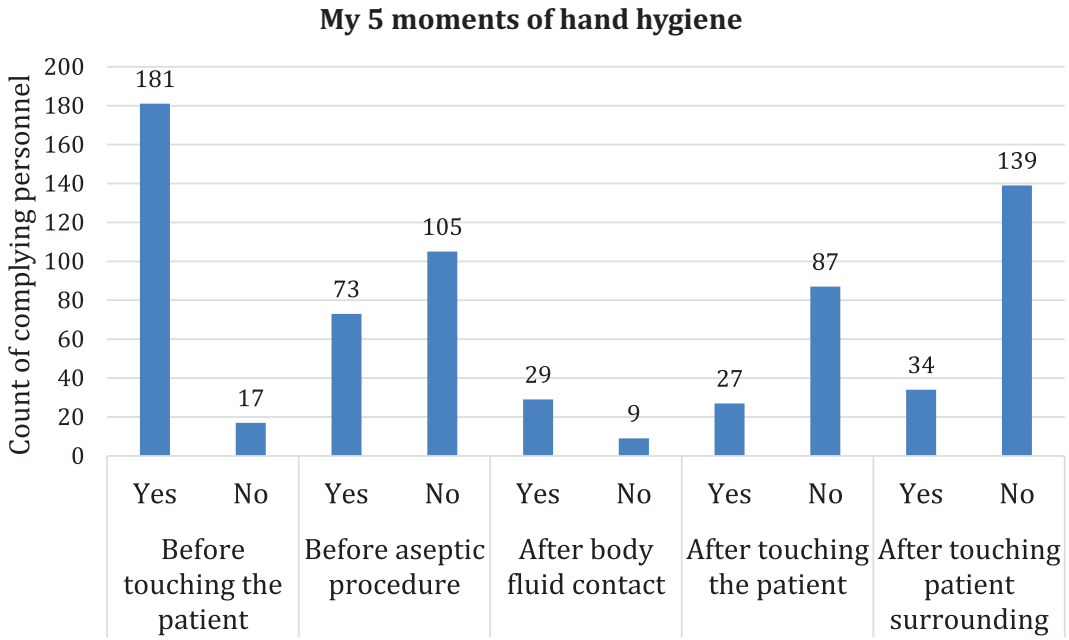


Figure 1. Percentage of hand hygiene through "My 5 moments" among healthcare workers at Eka Kotebe General Hospital, Addis Ababa, 2021 (n = 198).

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Table 3. Bivariate and multivariable logistic regression analysis between predictor variables and hand hygiene compliance among health care providers at Eka Kotebe General Hospital, Addis Ababa (n = 198).

VARIABLES	HAND HYGIENE COMPLIANCE		COR (95% CI)	AOR (95% CI)	*P*-VALUE
	GOOD	POOR			
Hand hygiene training					
Not trained	15	71	1	1	
Trained	29	83	1.56 (0.82-3.85)	2.90 (1.13-7.52)	.027*
Presence of soap					
Yes	10	27	1.74 (0.80-5.01)	2.0 (0.89-4.87)	
No	34	127	1	1	
Presence of hand hygiene indication posters					
Yes	6	13	3.19 (1.29-7.88)	3.38 (1.18-9.66)	.023*
No	38	141	1	1	
Presence of hand hygiene brochures					
Yes	9	14	2.57 (0.99-6.31)	1.46 (0.56-6.77)	
No	35	140	1	1	
Hygiene promotion by IPC					
Yes	14	11	5.64 (1.21-10.55)	4.2 (2.53-8.58)	.001*
No	30	133	1.00	1.00	
Work experience of health care providers					
⩾5 years	94	20	1.88 (1.08-8.91)	3.96 (1.12-13.9)	.032*
<5 year	60	24	1.00	1.00	
Profession of health care provider					
Laboratory	7	17	1.00	1.00	
Medical doctor	11	28	1.05 (0.72-1.20.2)	(0.83-1.22)	
Midwifery	5	20	1.64 (1.03-12.60)	2.1 (2.8-10.0)	.002*
Nurse	8	48	2.47 (1.03-5.60)	5.3 (2.09-7.8)	.039*
Pharmacy	9	13	0.60 (0.44-0.95)	1.3 (0.97-1.98)	
Others	5	27	2.22 (1.55-12.87)	1.5 (0.64-8.4)	
Presence of water					
Yes	9	12	3.04 (2.75-12.43)	2.50 (2.20-11.78)	.011*
No	35	142	1.00	1.00	

Others: Health officer, Radiography, Anesthesia, Optometry, NB: The model adequately fit the data at a *P*-value = .905 (Hosmer Lemeshow goodness Chi-square of 2.77).
*Significant factors to hand hygiene at *P* value ⩽.05.

compliance among study participants with hand hygiene indication poster was 3.23 (AOR = 3.38, 95% CI: 1.18-9.66) than those who had not. Study participants who had water for hand washing were 2.5 (AOR = 2.50, 95% CI: 2.20-11.78) times more likely to have good hand hygiene compliance as compared to study participants who had not water for hand washing. Those who were promoted for hand hygiene by IPC committee were 4.2 (AOR = 4.2, 95% CI: 2.53-8.58) more likely to have good hand hygiene compliance than those who were not promoted. Furthermore, Study participants who were midwives and nurses were 2.1 (AOR = 2.1, 95% CI: 2.8-10.0) 5.3 (AOR = 5.3, 95% CI: 1.09-7.8) times more likely to have good hand hygiene compliance as compared to medical laboratory professionals (Table 3).

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Discussion

This study showed that hand hygiene compliance is low among health care providers in Eka Kotebe General Hospital. The overall hand hygiene compliance; compliance to all components in the "my 5 movements" continuum was 22.2% (95% CI: 16.7%-28.3%).

The level of hand hygiene compliance in this study was comparable to the study done Debre Birhan Referral Hospital (12%),[22] Hiwot Fana Specialized University Hospital (18.7%),[23] Dessie referral hospital (17.6%),[24] central Gondar zone (14.9%),[17] Mali (21.8).[25] But it was higher than the studies done in Wachamo University (9.2%),[26] Karachi (4.9%),[27] and Asella Teaching Hospital (9.18%),[28] and lower than studies done in Addis Ababa (50.4%)[29] Finland (76.4%-88.5%),[30] China; in pre-intervention (60.1%) and post-intervention (97.2%) periods,[31] Vietnam (43.6%-63%).[32] These differences might be due to the time period of the study; this study was conducted after commencement of COVID-19 pandemic in Ethiopia, and Eka Kotebe Specialized Hospital was one of the centers of treatment during the study. These reasons might increase the hand hygiene practice as health professional were provided with a better attention on training of donning and doffing, as well as fear of being contracted of the disease. It might also be due to implementation of WHO multimodal hand hygiene compliance intervention strategy in some hospitals,[28] difference in study settings, and study designs.

In this finding the odds of having good hand hygiene compliance among trained health care providers was 2.91 times more likely than untrained health care providers. This finding was supported by other studies.[17,28,33-36] Training is an effective tool to increase the knowledge about hand hygiene actions for the prevention of nosocomial infections.[37] Training is essential to enhance awareness of microbial transmission by hands, emphasize the importance of hand hygiene and its indications, and demonstrate the correct procedures for hand rubbing and hand washing. Training and education is one of the multimodal strategies to hand hygiene; hence this finding emphasized its importance.[38]

Study participants working in a unit where hand hygiene indication poster was portrayed were 3.38 times more likely to comply to hand hygiene than study participants working in where hand hygiene indication posters was not portrayed. This finding is further supported by a case control study done at a public university in southern Spain among health science students.[39] This is because posters can be used to help raise awareness and help to recall healthcare providers about hand washing if placed in highly visible working areas. Posters and other visual aids highlighting the significance of hand hygiene need to be displayed in all the departments to sensitize the importance of hand hygiene.[38,40] This implies the importance of priming and nudges based on cognitive biases play a role in hand hygiene, and displayed as posters, could provide an easy, inexpensive measure to increase use of alcohol-based hand rub, and to change behaviors relevant to public health.[41,42]

Nurses and midwives were 5.3 and 2.1 times more likely to comply to hand hygiene compared with laboratory professionals. This finding is further strengthened by subgroup analysis by profession type; studies involving only nurses reported higher hand hygiene compliance compared to studies involving all types of healthcare workers.[35] This might be due to the nature of the work. Nurses are more prone to physical contact and for longer time in caring patients,[43] and hand hygiene is considered a primary measure for reducing the risk of transmitting infection among patients and health care personnel.[44]

The odds of complying to hand hygiene among respondents having ⩾5 years' work experienced were 3.96 times more likely to comply with hand hygiene than respondents who have a work experience of <5 years. The finding is enhanced by the finding of another study done in Tabriz teaching hospital among nurses.[45] This might be due to the fact that, as work experience increases, the probability of getting training, and the amount of responsibility, as well as belongingness to their work place, will increase. The evidence if further supported that educational level and *work experience* have an impact on the knowledge of nurses about *hand washing* practices.[10]

Presence of water had been found as an independent predictor of hand hygiene compliance among health care providers. Study participants who were interviewed in rooms where water was available had a 2.5 times more chance of complying to hand hygiene than participants in the absence of water. Studies have supported this evidence.[17,29] This is because hand hygiene is impossible if either water or Alcohol Based Hand Rub (ABHR) is not available. So, availability of water and Alcohol Based Hand Rub (ABHR) are the vital determinant for hand hygiene compliance which has to be supplied continuously.

Study participants who had been Hygiene promotion by IPC were about four 4 times more likely to comply to hand hygiene. This is further supported by a recommendation of monitoring and feedback as effective way of improving infection control practices.[46] This infers that Infection Prevention Committees (IPC) is required to support the health care providers in supplying infrastructure, equipment, and other resources.[28]

Limitation

The study was assessed up on limited health care providers due to shortage of budget.

Conclusion

This study assures hand hygiene compliance among health care providers was found to be low according to WHO hand hygiene compliance standard. Training about hand hygiene practice, presence of hand hygiene indication poster, work

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experience of health care providers, being midwifery and nurse by profession were independent predictors for hand hygiene compliance. This finding implies the need for health professionals to comply with WHO my 5 movements of hand hygiene to prevent healthcare-associated infections. Installing hand washing facilities and presenting soap and alcohol based hand rub near to each working unit as well as regular follow-up and training for health care providers are necessary.

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Author Contributions

All authors; MT, AS, ET have been involved in the study from the inception to design, acquisition of data, analysis, and interpretation and drafting of the manuscript. All authors read and approved the final manuscript.

Availability of Data and Materials

Data will be made available upon the reasonable request to the primary author.

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