



Knowledge and Compliance Among Nursing Staff Towards Hand Hygiene in General Ward Unit in Selected Hospitals

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ABSTRACT

INTRODUCTION

Hand hygiene is a practice that involves cleansing one's hands in a manner that significantly diminishes the presence of possible pathogens, which refer to hazardous germs, on the hands. This technique is widely recognized as a fundamental approach to mitigating the potential transmission of infections between patients and healthcare professionals (Centers for Disease Control and Prevention, 2023).

METHODS

The research is a quantitative and will utilize a descriptive-comparative research design. World Health Organization Hand Hygiene Questionnaire for Health Care Workers was administered to elicit information from the respondents which includes the general ward Nurses in selected Hospitals and analysis was done using the Jamovi Version 2.3.28. Variables were tested using Frequency, Percentage Distribution, Weighted Mean, Likert Scale, T-test, One Way Anova and Post Hoc Test Tukey.

RESULTS

Firstly, with regards to age we have a "Sig" value of 0.176 for the Level of Knowledge and 0.620 for the Level of Compliance. For the gender the "Sig" value of 0.194 on the Level of Knowledge with Equal Variance assumed and the "Sig" value of 0.873 on the Level of Compliance with Equal Variance Assumed which is greater than the $p \geq .05$. In regards with The hospital sector, the "Sig" value of 0.171 for the Level of Knowledge and 0.527 for the Level of Compliance which is greater than the 0.05 alpha level. It is all evident that there is no significant difference in the Level of Knowledge and Level of Compliance among staff nurses across different groups.

In terms of years of experience, the "Sig" value of the Level of Knowledge with 0.755 which is greater than the 0.05 alpha level while the "Sig" value for the Level of Compliance with the "Sig" value of 0.005 which is lesser than 0.05 alpha level denotes statistically there is a significant difference when group according to years of experience. The study reveals that while there is no significant difference in the Level of Knowledge, there is a significant difference in the Level of Compliance based on years of experience especially on the above 9 years of experience. The decision to accept the Null Hypothesis is supported by the T-TEST and the Post hoc Test Tukey.

CONCLUSION

The findings of this study provide valuable insights for healthcare organizations aiming to enhance hand hygiene practices among staff nurses. The results suggest the effectiveness of age-inclusive, gender-neutral interventions and the need for targeted strategies to address compliance variations among staff with different levels of experience.

INTRODUCTION

Infections caused by pathogens and other harmful elements commonly linked to hospital settings have been widely recognized as a significant emerging issue. Patients acquire healthcare-associated infections while obtaining treatment for various diseases, which can potentially occur in any healthcare facility (Sartelli et al., 2018). Healthcare-associated infections substantially hinder patient safety, extending hospital stays and increasing reliance on costly antibiotics. Consequently, this can contribute to developing additional health complications, disability, elevated healthcare expenses, and heightened mortality rates (Kleinpell et al, 2018). These factors collectively impose a significant economic burden on healthcare systems.

Centers for Disease Control and Prevention (2023) maintained that practicing proper hand hygiene safeguards both oneself and the others who are getting the treatment. Regularly practicing hand hygiene can effectively inhibit the transmission of pathogens, even antibiotic-resistant strains. Certain healthcare staff may be required to sanitize their hands up to 100 times during a single work shift. Maintaining optimal skin health and cleanliness on the hands is a problem that necessitates healthcare staff to possess comprehensive knowledge of hand care and appropriate hand hygiene practices.

The publication of recommendations by the World Health Organization (WHO) about hand hygiene in healthcare settings serves to endorse and facilitate the promotion and enhancement of hand hygiene practices within healthcare institutions on a global scale. The principles above are accompanied by the WHO Multimodal Hand Hygiene Improvement Strategy, the Guide to Implementation, and an implementation toolkit encompassing various readily applicable practical instruments (WHO, n.d.). The Centers for Disease Control and Prevention (CDC) offers training and educational materials about hand hygiene within healthcare environments (Centers for Disease Control and Prevention, 2023).

Hand hygiene is crucial in healthcare-associated infection prevention. This is supported by Malliarou et al. (2018), which emphasizes hand hygiene's significance among nurses. The methodology used involved doing a comprehensive examination of scholarly papers that were identified using specific keywords such as "hand," "hygiene," "contamination," "nurse," and "guideline." The findings of the study are as follows: infectious illnesses pose a specific threat to vulnerable populations, including infants, older adults, those with pre-existing medical conditions, and those with weakened immune systems. The act of nurses engaging in hand hygiene not only protects their health but also mitigates the potential transmission of infectious agents to others.

METHODOLOGY

Research Design

The research is quantitative and will utilize a descriptive-comparative research design. It is descriptive because it will determine the demographic profile, including age, sex, length of service, and hospital sector, whether government or private. Also, the paper will describe the extent of knowledge and compliance of general ward nurses in selected hospitals.

Furthermore, the study will also employ a comparative design as it will compare the knowledge and compliance among nurses in the general ward unit when grouped according to profile. Richardson (2018) suggests that comparative research design involves comparing two groups to reach a conclusion about them. In this instance, the researchers endeavor to ascertain and scrutinize resemblances and disparities among groupings.

Population and Sampling Technique

The target respondents are all the nurses assigned to the general ward of selected hospitals. All of the respondents will be invited to participate in this study.

The total population of nurses that will be participating in the survey is 25 nurses in Tayabas Quezon, 16 nurses in Maimbung, Sulu; and 9 nurses in Agusan Del Sur. In summation, fifty individual respondents will be the study's respondents, considering their willingness and capability to participate.

- The researcher will observe the following step-by-step process in conducting this descriptive study: The researcher will send a letter of permission to conduct the study to the Program Chair of the Master of Arts in Nursing of St. Bernadette of Lourdes College. After the granted permission, a researcher-made questionnaire will be formulated first to gather data for this study. This questionnaire will be submitted for validation to three research experts.
- Once the validity and reliability of the researcher-made questionnaire are established, the researcher will commence with the actual data gathering, and a letter will be made to ask permission from the management of the selected hospitals.
- Next, the researcher will send a letter to the Human Resource Department of the health institution asking for permission and securing the approval to proceed with conducting the study.
- The respondents will be reached out personally. The researcher will hand over the questionnaires through Google form to the respondents, giving them ample time to answer intelligibly and truthfully.
- The data will then be collated, analyzed, and interpreted afterward. Based on the findings that will be generated, an intervention program will be formulated.

Research Instrument

The Researcher used an adopted researcher-made questionnaire for the variables to suit the context of the study. The gathered data from the discourse was correlated to the literature to aid in the questionnaire construction, which the panel of internal and external validators will validate. The respondents will be given a questionnaire that contains the participants demographic information and two sets of questionnaires to measure the knowledge and compliance among nurses in the general ward on hand hygiene in the selected hospitals.

Data Analysis

The collected data were analyzed using the Jamovi Version 2.3.28. Variables was tested using Frequency, Percentage Distribution, Weighted Mean, Likert Scale, T-test, One Way Anova and Post Hoc Test Tukey by the Statistician.

Ethical Considerations

The researchers ensured that throughout the search for persons who would be respondents in this study, the respondents were not compelled or pushed to go through the data collection process. As a result, the researchers respected the respondent's options to participate in the survey. Hence, the researchers also assured the following respondents of this study that the research itself is bounded by the Data Privacy Act or the Republic Act 10173, which aims to protect all forms of information, be it private, personal, or sensitive. It is meant to cover both natural and juridical persons involved in processing personal information.

Ethical Considerations cont.

The study used a formal letter of consent to the selected Hospitals to allow the researcher to let their healthcare workers participate in this study. This study does not intend to contradict other works or research.

The benefit of the study is that, it ultimately leads to a better prognosis and further curtailing of possible health harm such as infections while present in the institution and through this assessment, management may gauge, identify problems, plan, and develop regulations and standards to improve the institution's infection control and prevention efficacy.

RESULTS

1: Demographic Profile of General Ward Nurses in term of:

1.1 AGE

Table 1: Frequencies of AGE

AGE	Counts	% of Total
21 – 25 years old	7	14.0 %
26 – 30 years old	10	20.0 %
31 – 35 years old	17	34.0 %
36 years old and above	16	32.0 %

The table presents the distribution of participants across different age groups, providing a comprehensive overview of the age demographics in the studied population. The largest proportion of respondents falls within the age range of 31 to 35 years old, with frequency of 17 constituting 34.0% of the total sample. Following closely, the largest group comprises those aged 36 years and above, frequency of 16 representing 32.0% of the total, followed by individuals aged 26 to 30 years old account for frequency of 10 equivalent of 20.0% of the participants. The smallest group consists of participants aged 21 to 25 years old, making up frequency of 7 with 14.0% of the sample.

1.2 GENDER

Frequencies of GENDER

GENDER	Counts	% of Total
MALE	8	16.0 %
FEMALE	42	84.0 %

The table displays the distribution of participants based on gender, with a clear distinction between male and female respondents. The majority of the participants are female, constituting 42 equivalent to 84.0% of the total sample. In contrast, the male participants make up a smaller proportion, accounting for 8 equivalent to 16.0% of the overall population.

1.3 YEARS OF EXPERIENCE

Frequencies of Years of Experience

Years of Experience	Counts	% of Total
less than a year	11	22.0 %
1 - 3 years	7	14.0 %
4 - 6 years	9	18.0 %
6 - 9 years	8	16.0 %
More than 9 years	15	30.0 %

The table provides a breakdown of the participants based on their years of professional experience, offering insights into the distribution of expertise within the study population. The most prevalent group comprises individuals with more than 9 years of experience, constituting of 15 equivalent to 30.0% of the total sample. Following closely, participants with less than a year of experience make up of 11 equivalent to 22.0% of the population. The next two categories, namely 4-6 years and 6-9 years of experience, demonstrate a relatively balanced distribution, representing 9 or 18.0% and 8 or 16.0% of the respondents, respectively. The smallest group consists of individuals with 1-3 years of experience, contributing of 7 equivalent to 14.0% to the overall sample.

1.4 YEARS SECTOR OF HOSPITAL

Frequencies of Sector of Hospital (Government or Private)

Sector of Hospital (Government or Private)	Counts	% of Total
Government	16	32.0 %
Private	34	68.0 %

The table outlines the distribution of participants based on the sector of the hospital where they are employed, providing a comprehensive overview of the representation of government and private healthcare institutions within the study. The majority of respondents work in private hospitals, constituting of 34 equivalent to 68.0% of the total sample. In contrast, the government sector represents a smaller proportion, with frequency of 16 equivalent to 32.0% of participants indicating employment in government hospitals.

2: Level of knowledge among nurses towards hand hygiene practices

No	DESCRIPTION	MEAN	RANK
1	Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?	1.8	6
2	What is the most frequent source of germs responsible for healthcare-associated infections?	1.5	8
3	Which of the following hand hygiene actions prevents transmission of germs to the patient	1.9	3.5
4	Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?	2.0	1
5	Which of the following statements on alcohol-based handrub and hand washing with soap and water are true?	1.4	9
6	What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?	1.7	7
7	When is the best time to do hand rubbing in the following situations?	1.9	3.5
8	When is the best time to do hand washing in the following situations?	1.2	10
9	Which of the following should be avoided, as associated with a likelihood of colonisation of hand with harmful germs?	1.9	3.5
10	How do you do hand washing?	1.9	3.5
	Average Weighted Mean	1.72	

The above table shows the level of knowledge among nurses towards hand hygiene practices. Base on the above question no. 4 “Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?” most nurses got it correct which shows that they have knowledge towards hand hygiene practices with a mean score of 2.0 as rank 1, while others got rank 3.5 which includes questions no. 3, 7, 9 & 10. The least among the 10 questions about hand hygiene practices based on knowledge are question no. 5 “Which of the following statements on alcohol-based handrub and hand washing with soap and water are true?” rank 9 & question no. 8 “When is the best time to do hand washing in the following situations?” as rank 10.

3: Level of compliance among nurses towards hand hygiene practices

No	DESCRIPTION	MEAN	RANK
1	I wash my hands after removing used gloves.	3.78	4
2	I wear gloves when exposure of my hands to body fluids is anticipated.	3.92	1
3	I avoid 'foreign' objects on my hands, such as wearing rings, watches, bracelets, etc.	3.50	10
4	I wash my hands after removing the IV line of my patient.	3.80	3
5	I wash my hands before the preparation of medication for my patient.	3.72	6
6	After touching the wound with a gloved hand, I wash my hands with antiseptic soap.	3.86	2
7	I wash my hands with antiseptic soap and apply alcohol hand rub before and after blood sugar extraction.	3.58	9
8	I ensure to sanitize my hands after touching wards' surfaces.	3.76	5
9	I adhere to hand hygiene before taking vital signs.	3.70	7
10	I practice hand hygiene after handling food packages in the patient room.	3.68	8
	Average Weighted Mean	3.73	

The above table shows the level of compliance among nurses in which item no. 2 got the highest mean of 3.92 wam as rank 1 "I wear gloves when exposure of my hands to body fluids is anticipated", followed by item description No. 6 with 3.86 wam as rank 2 "After touching the wound with a gloved hand, I wash my hands with antiseptic soap". However the least among the 10 items is item description No. 3 "I avoid 'foreign' objects on my hands, such as wearing rings, watches, bracelets, etc." got 3.50 wam as ranked 10.

Table 1

One Way ANOVA to determine the significant difference between the Level of Knowledge and the Level of Compliance when group according to age.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Level_of_Knowledge	Between Groups	.131	3	.044	1.720	.176
	Within Groups	1.169	46	.025		
	Total	1.300	49			
Level_of_Compliance	Between Groups	.256	3	.085	.598	.620
	Within Groups	6.569	46	.143		
	Total	6.825	49			

Table 1 shows the significant difference between the Level of Knowledge and Level of Compliance when grouped according to age. It shows statistically NOT significant based on the "Sig" value of 0.176 for the Level of Knowledge and 0.620 for the Level of Compliance which is greater than the 0.05 alpha level and therefore the decision is to accept the Null Hypothesis that there is No significant difference in the Level of Knowledge and the Level of Compliance when grouped according to age.

Findings suggest that all ages from 21 up to 36 years old and above had no significant difference in the level of knowledge and compliance to hand hygiene adherence in the workplace. This is also supported by the Post Hoc Test using Tukey HSD Multiple Comparison presented in Table 2 showing the "Sig" results of all ages categorized from 1-4 full rotation had a greater value than 0.05 alpha level which means that there is no significant difference in the level of knowledge and level of compliance when grouped according to age.

Table 2

Post Hoc Tukey HSD to determine which part of the variables played a significant difference

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Level_of_Knowledge	1.00	2.00	-.17429	.07856	.133	-.0351	.3837
		3.00	.07899	.07159	.689	-.1118	.2698
		4.00	-.10179	.07224	.500	-.0908	.2943
	2.00	1.00	-.17429	.07856	.133	-.3837	.0351
		3.00	-.09529	.06353	.446	-.2646	.0740
		4.00	-.07250	.06426	.674	-.2438	.0988
	3.00	1.00	-.07899	.07159	.689	-.2698	.1118
		2.00	.09529	.06353	.446	-.0740	.2646
		4.00	.02279	.05552	.976	-.1252	.1708
	4.00	1.00	-.10179	.07224	.500	-.2943	.0908
		2.00	.07250	.06426	.674	-.0988	.2438
		3.00	-.02279	.05552	.976	-.1708	.1252
Level_of_Compliance	1.00	2.00	.22000	.18623	.642	-.2764	.7164
		3.00	.17059	.16971	.747	-.2818	.6229
		4.00	.21250	.17125	.604	-.2440	.6690
	2.00	1.00	-.22000	.18623	.642	-.7164	.2764
		3.00	-.04941	.15060	.988	-.4508	.3520
		4.00	-.00750	.15233	1.000	-.4135	.3985
	3.00	1.00	-.17059	.16971	.747	-.6229	.2818
		2.00	.04941	.15060	.988	-.3520	.4508
		4.00	.04191	.13162	.989	-.3089	.3928
	4.00	1.00	-.21250	.17125	.604	-.6690	.2440
		2.00	.00750	.15233	1.000	-.3985	.4135
		3.00	-.04191	.13162	.989	-.3928	.3089

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
Level_of_Knowledge	1.00	42	1.7071	.16732	.02582
	2.00	8	1.7875	.12464	.04407
Level_of_Compliance	1.00	42	3.7143	.36664	.05657
	2.00	8	3.8125	.42237	.14933

Table 3

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Level_of_Knowledge	1.732	.194	-1.287	48	.204	-.08036	.06242	-.20585	.04514
			-1.573	12.381	.141	-.08036	.05107	-.19126	.03054
Level_of_Compliance	.026	.873	-.678	48	.501	-.09821	.14477	-.38929	.19286
			-.615	9.122	.554	-.09821	.15969	-.45872	.26229

T-TEST to determine the significant difference between the Level of Knowledge and Level of Compliance when Group according to Sex (Gender)

Table 2 shows the comparison of the significant difference in the response of both (Sex) male(2) and female (1) as to the Level of Knowledge and Level of Compliance. , It shows statistically NOT significant based on the “Sig” value of 0.194 on the Level of Knowledge with Equal Variance assumed and the “Sig” value of 0.873 on the Level of Compliance with Equal Variance Assumed which is greater than the $p \geq .05$. Therefore, the decision is to accept the Null Hypothesis that there is no significant difference in the Level of Knowledge and the Level of Compliance when group according to sex (Gender). However, t value -1.287 for the Level of Knowledge and t value -.678 for the Level of Compliance denotes similarity in the response between male and female.

This served only as a guide:

RULES: if Levene’s test “Sig” or $p \geq .05$, then report the “Equal variances assumed” t-test results. otherwise, report the “Equal variances not assumed” t-test results.

Greater than p value of .05 are **not statistically significant**.

In addition

- Larger t scores = more difference between groups.
- Smaller t score = more similarity between groups.

Table 4

One Way ANOVA to determine the significant difference between the Level of Knowledge and the Level of Compliance when group according to Years of Experience.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Level_of_Knowledge	Between Groups	.053	4	.013	.474	.755
	Within Groups	1.247	45	.028		
	Total	1.300	49			
Level_of_Compliance	Between Groups	1.874	4	.469	4.259	.005
	Within Groups	4.951	45	.110		
	Total	6.825	49			

Table 4 shows the significant difference between the Level of Knowledge and Level of Compliance when grouped according to years of experience. It shows statistical NOT significance based on the “Sig” value of the Level of Knowledge with 0.755 which is greater than the 0.05 alpha level while the “Sig” value for the Level of Compliance with the “Sig” value of 0.005 which is lesser than 0.05 alpha level denotes statistically significant difference when group according to years of experience. Therefore, the decision is to accept the Null Hypothesis that there is a significant difference in the Level of Compliance when groups according to years of experience. Post Hoc Tukey HSD Multiple comparison is suggested to determine in which category will define the significant difference based on years of experience.

Findings suggest that all staff nurses respondents had no variance in the level of knowledge in adherence to hand hygiene when grouped according to years of experience. However, it shows that there is a significant difference in the level of compliance to hand hygiene adherence when group according to years of experience. This is supported by the Post Hoc Test using Tukey HSD Multiple Comparison presented in Table 5 showing the “Sig” results of item 5 (with more than 9 years of experience) with a lesser value than 0.05 alpha level which means that there is a significant difference in level of compliance when grouped according to years of experience as to “Sig” value for item 5 (with more than 9 years of experience) against item 1 (1-3 years) with “Sig” value 0.011, item 2 (4-6 years) with “Sig” value 0.040, item 3 (7-9 years) with “Sig” value 0.036. See table 5. This denotes that most staff nurses with higher years of experience have variation in the level of compliance to adherence to hand hygiene. Probably because of their area of assignment.

According to Hamza Umar Et al 2022. In this study, work experience was one of the factors that had a significant association with the hand hygiene compliance of nurses. Those who had 6–10 years of working experience had 1.71 times more hand hygiene compliance than those who had ≤ 5 years of experience. Having training on hand hygiene was also one of the factors that was significantly associated with compliance. The result reveals that those who were trained on hand hygiene had 0.45 times more practice on hand hygiene compliance than those who did not have training.

Table 5

POST HOC TEST – TUKEY HSD

Tukey HSD								
Dependent Variable	(I) Years_of_Experience	(J) Years_of_Experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval		
						Lower Bound	Upper Bound	
Level_of_Knowledge	1.00	2.00	-.05409	.05220	.679	-.15922	-.04895	
		3.00	.04141	.07494	.981	-.1712	.2541	
		4.00	-.06364	.07737	.922	-.1562	.2035	
		5.00	.03697	.06609	.990	-.1506	.2246	
		6.00	-.06444	.07020	1.000	-.2039	.1950	
	3.00	1.00	-.10649	.06050	.679	-.2302	-.1222	
		2.00	-.06508	.06391	.608	-.2035	-.1733	
		4.00	-.04296	.06617	.667	-.2077	.2020	
		5.00	-.06452	.07621	.891	-.2061	.1470	
		6.00	-.04141	.07494	.981	-.2041	.1712	
	4.00	1.00	-.06364	.07737	.922	-.2035	.1960	
		2.00	.04296	.06617	.667	-.2020	.2077	
		3.00	-.02222	.06090	.999	-.2521	.2077	
		5.00	-.02667	.07269	.956	-.2336	.1605	
		6.00	-.06697	.06609	.900	-.2346	.1508	
Level_of_Compliance	1.00	2.00	.00519	.16037	1.000	-.4505	.4509	
		3.00	.03535	.14908	.999	-.3863	.4590	
		4.00	.11591	.15412	.943	-.3220	.5038	
		5.00	.45091*	.13167	.011	.0768	.8250	
		6.00	-.00519	.16037	1.000	-.4609	.4508	
	3.00	1.00	.03016	.16716	1.000	-.4446	.5051	
		2.00	.11071	.17167	.967	-.3771	.5886	
		4.00	.44571*	.15183	.040	.0143	.8771	
		5.00	-.03535	.14908	.999	-.4590	.3863	
		6.00	-.03016	.16716	1.000	-.4651	.4446	
	4.00	1.00	.09095	.16117	.967	-.3774	.5395	
		2.00	.41596*	.13966	.036	.0162	.8129	
		3.00	-.11071	.17167	.967	-.4609	.3771	
		5.00	-.09095	.16117	.967	-.4674	.3774	
		6.00	.33900	.14521	.162	-.0776	.7476	
5.00	1.00	-.11591	.15812	.943	-.4530	.3220		
	2.00	-.11071	.17167	.967	-.4609	.3771		
	3.00	-.09095	.16117	.967	-.4674	.3774		
	4.00	.33900	.14521	.162	-.0776	.7476		
	6.00	-.45091*	.13167	.011	-.8250	.0768		
6.00	1.00	-.44571*	.15183	.040	-.8771	-.0143		
	2.00	-.41596*	.13966	.036	-.8129	-.0162		
	4.00	-.33900	.14521	.162	-.7476	.0776		

*. The mean difference is significant at the .05 level.

Legend:

Code	Row Labels	Count of Years of Experience
1	1 - 3 years	7
2	4 - 6 years	9
3	6 - 9 years	8
4	less than a year	11
5	More than 9 years	15
	Grand Total	50

Table 6

T-TEST to determine the significant difference when group according to Sector of Hospital as to Government or Private.

Group Statistics

	Sector_Hospital	N	Mean	Std. Deviation	Std. Error Mean
Level_of_Knowledge	1.00	16	1.7063	.14361	.03590
	2.00	34	1.7265	.17287	.02965
Level_of_Compliance	1.00	16	3.7000	.34059	.08515
	2.00	34	3.7441	.39173	.06718

Table 6 shows the significant difference between the Level of Knowledge and Level of Compliance when grouped according to hospital sector. It shows statistically NOT significant based on the "Sig" value of 0.171 for the Level of Knowledge and 0.527 for the Level of Compliance which is greater than the 0.05 alpha level and therefore the decision is to accept the Null Hypothesis that there is No significant difference in the Level of Knowledge and the Level of Compliance when grouped according to the hospital; sector.

Findings suggest that staff nurses both government and private hospital have the same level of knowledge and compliance to hand hygiene adherence in the workplace.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
										Lower	Upper
Level_of_Knowledge	Equal variances assumed	1.929	.171	-.406	48	.687	-.02022	.04981	-.12036	.07992	
	Equal variances not assumed			-.434	35.027	.667	-.02022	.04656	-.11474	.07430	
Level_of_Compliance	Equal variances assumed	.407	.527	-.387	48	.701	-.04412	.11414	-.27361	.18538	
	Equal variances not assumed			-.407	33.574	.687	-.04412	.10846	-.26463	.17640	

RECOMMENDATION

Based on the findings of the study, the recommendations can be tailored to guide healthcare organizations in enhancing hand hygiene practices among their staff.

Firstly, with regard to age (Table 1 and Table 2), it is evident that there is no significant difference in the Level of Knowledge and Level of Compliance among staff nurses across different age groups. Therefore, interventions aimed at improving hand hygiene adherence can be uniformly implemented for all age categories, from 21 years old and above. Specialized training programs or awareness campaigns may be designed to address the needs of all age groups collectively, fostering a consistent level of knowledge and compliance.

Regarding gender (Table 3), the study suggests that there is no significant difference in the hand hygiene practices between male and female staff nurses. Consequently, organizations may focus on implementing gender-neutral strategies for improving hand hygiene, such as regular training sessions, reminders, and feedback mechanisms

In terms of years of experience (Table 4 and Table 5), the study reveals that while there is no significant difference in the Level of Knowledge, there is a significant difference in the Level of Compliance based on years of experience. Therefore, healthcare institutions may consider targeted interventions, such as additional training or support, for staff nurses with more than 9 years of experience to address the observed variation in compliance. Post Hoc tests (Table 5) highlight specific comparisons, suggesting that staff nurses with more experience, especially those with more than 9 years, may benefit from tailored strategies to improve adherence to hand hygiene practices.

Finally, when considering the sector of the hospital (Table 6), there is no significant difference in the Level of Knowledge and Level of Compliance between government and private hospitals. This implies that standardized interventions can be implemented across both sectors to ensure a consistent level of knowledge and compliance with hand hygiene practices.

The study recommends implementing organization-wide strategies for improving hand hygiene practices that are age-inclusive, gender-neutral, and considerate of the specific needs of staff nurses with varying years of experience. Standardized interventions across government and private hospitals can contribute to a uniform and enhanced level of hand hygiene adherence in the workplace.

CONCLUSION

This study aimed to investigate the potential associations between age, gender, years of experience, and hospital sector with the Level of Knowledge and Level of Compliance regarding hand hygiene adherence among staff nurses. The results, as presented in Tables 1 to 6, indicate that there is no significant difference in the Level of Knowledge and Level of Compliance based on age, gender, and hospital sector.

Firstly, the analysis of age groups revealed that all ages from 21 up to 36 years old and above demonstrated no significant difference in the level of knowledge and compliance to hand hygiene adherence in the workplace. This was confirmed by the Post Hoc Test in Table 2, further supporting the acceptance of the Null Hypothesis. The study suggests that interventions for improving hand hygiene practices can be uniformly applied across various age groups.

Similarly, when examining gender differences, the study found no significant disparity in the Level of Knowledge and Level of Compliance between male and female staff nurses. The decision to accept the Null Hypothesis is supported by the T-TEST results in Table 3, suggesting that gender-neutral strategies may be effective in enhancing hand hygiene adherence.

Contrary to the lack of significance in the Level of Knowledge, the Level of Compliance exhibited a significant difference when grouped according to years of experience. Staff nurses with more than 9 years of experience showed a variation in compliance levels compared to those with fewer years of experience, as indicated in Table 5. This emphasizes the importance of targeted interventions for experienced staff to address the observed differences in compliance.

Lastly, the study examined the hospital sector and found no significant difference in the Level of Knowledge and Level of Compliance between government and private hospitals. This suggests that strategies to improve hand hygiene adherence can be standardized across both sectors. According to Nura Muhammed Abdella Et al (2014), Hand hygiene compliance among HCPs in Gondar University Hospital was found to be low. Good knowledge of Hand Hygiene Compliance, taking training, the presence of Alcohol Base Hand Rub in working area, the presence of individual towel or tissue paper in working area and Knew the presence of IP committees were found to be the independent predictors for Hand Hygiene Compliance in Gondar University Hospitals. It is better to give training on hand hygiene and provide necessary material like alcohol based hand rub and individual towel or tissue paper.

In summary, the findings of this study provide valuable insights for healthcare organizations aiming to enhance hand hygiene practices among staff nurses. The results suggest the effectiveness of age-inclusive, gender-neutral interventions and the need for targeted strategies to address compliance variations among staff with different levels of experience. Standardized approaches are recommended for both government and private hospitals to ensure a consistent level of knowledge and compliance with hand hygiene adherence in the workplace.

COMPETING INTEREST

No conflict of interest.

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AUTHORS CONTRIBUTION

The conceptualization, methodology, validation, formal analysis, inquiry, resources, writing-original draft preparation, writing-review and editing, and visualization were all equally contributed to by the writers. After reading the published version of the manuscript, each author gave their approval.

REFERENCES

Mainul Haque, Massimo Sartelli, Judy McKimm, and Muhamad Abu Bakar, 2018, Health care-associated infections – an overview ; <https://nml.nih.gov/pmc/articles/PMC6245375/Kleinpell, et al., 2018, CDC, 2018, Mathur, 2019, CDC, 2020>

Bio Vigil (2021) Hand Hygiene Guide ; [https://biovigil.com/hand-hygiene-guide/Centers for Disease Control and Prevention \(2023\) Chatfield et al. \(2018\)](https://biovigil.com/hand-hygiene-guide/Centers for Disease Control and Prevention (2023) Chatfield et al. (2018))

- Van Nguyen, Huy, et al. "Healthcare workers' knowledge and attitudes regarding the World Health Organization's "My 5 Moments for Hand Hygiene": Evidence from a Vietnamese central general hospital." *Journal of Preventive Medicine and Public Health* 53.4 (2020): 236.
- Saha, Tushar, Prakash Khadka, and Shyamal C. Das. "Alcohol-based hand sanitizer—composition, proper use and precautions." *Germes* 11.3 (2021): 408.
- Etheridge, Elizabeth W. *Sentinel for health: a history of the Centers for Disease Control*. Univ of California Press, 2023.
- Nisbar, Nur Dayana, et al. "Determination of ethanol, isopropyl alcohol and methanol in alcohol-based hand sanitiser to ensure product quality, safety and efficacy." *Scientific Reports* 13.1 (2023): 9478.
- Hammerschmidt, Judith, and Tanja Manser. "Nurses' knowledge, behaviour and compliance concerning hand hygiene in nursing homes: a cross-sectional mixed-methods study." *BMC health services research* 19.1 (2019): 1-13.
- Jemal, Suoud. "Knowledge and practices of hand washing among health professionals in Dubti Referral Hospital, Dubti, Afar, Northeast Ethiopia." *Advances in preventive medicine* 2018 (2018).
- Neme, A., M. Abera, and E. Fasika. "Nurses' Hand Hygiene Knowledge, Attitude and Practice in Jimma University Medical Center, Jimma Town, Oromia Regional State, South West Ethiopia. *J Community Med Public Health Care* 7: 075." of 9 (2020): 2381-1978.
- Martos-Cabrera, María B., et al. "Hand hygiene teaching strategies among nursing staff: a systematic review." *International journal of environmental research and public health* 16.17 (2019): 3039.
- Ohnuma, T., Chihara, S., Costin, B., Treggiari, M. M., Bartz, R. R., Raghunathan, K., & Krishnamoorthy, V. (2023). Association of appropriate empirical antimicrobial therapy with in-hospital mortality in patients with bloodstream infections in the US. *JAMA Network Open*, 6(1), e2249353-e2249353.
- Kim, Myung Sook, and Jin Sun Kim. "Predictors for standard precautions compliance in healthcare-associated infection control among nursing students." *The Journal of the Korea Contents Association* 17.12 (2017): 569-581.
- Grota, Patti G., and Patti S. Grant. "Environmental infection prevention." *Critical Care Nursing Quarterly* 41.1 (2018): 38-46.
- Krishnamoorthy, Yuvaraj, et al. "Compliance with hand hygiene practices and its appropriateness among healthcare workers during COVID-19 pandemic in public health facilities of Tamil Nadu, India." *Heliyon* 9.4 (2023).
- Jemal, S. "Knowledge and Practices of Hand Washing among Health Professionals in Dubai Referral Hospital, Dubai, Afar, Northeast Ethiopia. *Advances in Preventive Medicine*, 2018, Article ID: 5290797." (2018).
- Neme, A., M. Abera, and E. Fasika. "Nurses' Hand Hygiene Knowledge, Attitude and Practice in Jimma University Medical Center, Jimma Town, Oromia Regional State, South West Ethiopia. *J Community Med Public Health Care* 7: 075." of 9 (2020): 2381-1978.
- Martos-Cabrera, M. B., Mota-Romero, E., Martos-García, R., Gómez-Urquiza, J. L., Suleiman-Martos, N., Albendín-García, L., & Cañadas-De la Fuente, G. A. (2019). Hand hygiene teaching strategies among nursing staff: a systematic review. *International journal of environmental research and public health*, 16(17), 3039.
- Sundal, A., Weber, U., Brennwald, M., Ringrose, P., Flø, N., Johnsen, K., ... & Kipfer, R. (2018, October). Monitoring real time, in-line variations of noble gas concentrations during CO₂ capture operations by means of a portable mass spectrometer. In *14th Greenhouse Gas Control Technologies Conference Melbourne* (pp. 21-26).
- <https://www.sciencedirect.com/journal/american-journal-of-infection-control>
- D. Pittet et al. The WHO Clean Care is Safer Care programme: field-testing to enhance sustainability and spread of hand hygiene improvements *J Infect Public Health* (2008). <https://www.sciencedirect.com/science/article/pii/S1876034108000075>
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.
- Etzioni, A. (1961). *A Comparative Analysis of Complex Organizations: On Power, Involvement, and Their Correlates*. Free Press.
- Etzioni, A. (1964). *Modern Organizations*. Prentice-Hall.
- Etzioni, A. (1975). *A Comparative Analysis of Complex Organizations* (Rev. ed.). Free Press.
- Hodgson, V., & McConnell, D. (2019). Theorising learning networked identity: A situated perspective. In *Proceedings of the 10th International Conference on Networked Learning* (pp. 173-181).
- Reeves, T. D., Marbach-Ad, G., & Miller, K. R. (2016). Evaluation of a model of interteaching. *CBE—Life Sciences Education*, 15(2), ar22.
- Tiwari, A., Lai, P., So, M., & Yuen, K. (2006). A comparison of the effects of problem-based learning and lecturing on the development of students' critical thinking. *Medical Education*, 40(6), 547-554.
- Bleakley, A. (2000). Broadening conceptions of learning in medical education: the message from teamworking. *Medical Education*, 34(4), 281-287.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55, 591-621.

Cialdini, R. B. (2007). *Influence: The Psychology of Persuasion*. HarperCollins.

This book by Robert Cialdini is a classic in the field of social psychology and discusses principles of influence, including compliance.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.

Ajzen's Theory of Planned Behavior is often used to predict and explain human behavior, including compliance with certain practices.

Milgram, S. (1974). *Obedience to Authority: An Experimental View*. Harper & Row.

While Milgram's work focuses more on obedience, it can provide insights into compliance within authority structures.

Alquwez, N., Cruz, J. P., Alshammari, F., & Felemban, E. M. (2019). The Impact of Leadership Styles on Nurses' Compliance With the Saudi Medication Administration Safety Standards. *Journal of Patient Safety*, 15(1), 27-33.

Cruz, J. P., Felicilda-Reynaldo, R. F. D., & Lamigo, V. M. (2017). Nurses' advocacy in the Philippines: A phenomenological study. *Nursing Ethics*, 24(7), 878–889.

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. Psychology Press.

Arefian H, Hagel S, Fischer D, Scherag A, Brunkhorst FM, Maschmann J, Hartmann M. (2019) Estimating extra length of stay due to healthcare-associated infections before and after implementation of a hospital-wide infection control program. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0217159>

Vrijens F, Hulstaert F, Van de Sande S, Devriese S, Morales I, Parmentier Y. (2010) Hospital-acquired, laboratory-confirmed bloodstream infections: linking national surveillance data to clinical and financial hospital data to estimate increased length of stay and healthcare costs. *J Hosp Infect*. [https://www.journalofhospitalinfection.com/article/S0195-6701\(09\)00550-7/fulltext](https://www.journalofhospitalinfection.com/article/S0195-6701(09)00550-7/fulltext)

Glance LG, Stone PW, Mukamel DB, Dick AW. (2011). Increases in mortality, length of stay, and cost associated with hospital-acquired infections in trauma patients. *Arch Surg*. 2011;146(7):794–801. <https://jamanetwork.com/journals/jamasurgery/fullarticle/1107070>

Chen YY, Chou YC, Chou P. (2005). Impact of nosocomial infection on cost of illness and length of stay in intensive care units. *Infect Control Hosp Epidemiol*. 2005;26(3):281–7. <https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/abs/impact-of-nosocomial-infection-on-cost-of-illness-and-length-of-stay-in-intensive-care-units/7831E796FEA818DD0E78E9CB4E1D760F>

World Health Organization. (May 2005). Global report on infection prevention and control. <https://www.who.int/publications/i/item/9789240051164>

Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L, Pittet D. (2011). Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. *Lancet*. 2011;377(9761):228–41. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(10\)61458-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)61458-4/fulltext)

Cassini A, Högberg LD, Plachouras D, Quattrocchi A, Hoxha A, Simonsen GS, Colomb-Cotinat M, Kretzschmar ME, Devleeschauwer B, Cecchini M, et al. (2019). Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis. *Lancet Infect Dis*. 2019;19(1):56–66. [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(18\)30605-4/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(18)30605-4/fulltext)

Sickbert-Bennett EE, DiBiase LM, Willis TM, Wolak ES, Weber DJ, Rutala WA. (2016). Reduction of Healthcare-Associated Infections by Exceeding High Compliance with Hand Hygiene Practices. *Emerg Infect Dis*. 2016;22(9):1628–30. [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(18\)30605-4/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(18)30605-4/fulltext)

Allegranzi B, Pittet D. (2009). Role of hand hygiene in healthcare-associated infection prevention. *J Hosp Infect*. 2009;73(4):305–15. https://wwwnc.cdc.gov/eid/article/22/9/15-1440_article

Mouajou V, Adams K, DeLisle G, Quach C. (2022). Hand hygiene compliance in the prevention of hospital-acquired infections: a systematic review. *J Hosp Infect*. 2022;119:33–48. [https://www.journalofhospitalinfection.com/article/S0195-6701\(09\)00186-8/fulltext](https://www.journalofhospitalinfection.com/article/S0195-6701(09)00186-8/fulltext)

World Health Organization (2009). Result of the Hand Hygiene Knowledge Questionnaire for Health-Care Workers. [assets.researchsquare.com > files > rs-9664](https://assets.researchsquare.com/files/rs-9664)

KnE Social Sciences. June 2018. Occupants Conservation Attitudes on Energy Consumption: The Case in Isabela State University in Cabagan, Isabela. https://www.researchgate.net/publication/326260075_Occupants_Conservation_Attitudes_on_Energy_Consumption_The_Case_in_Isabela_State_University_in_Cabagan