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Nurses Hand Hygiene Compliance: An Observational Study in Tamale Teaching Hospital, Ghana

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Abstract

Background: The hand of the healthcare worker is acknowledged as the highest route for the spread of exogenous infections mostly through invasive procedures.

Aim: To identify hand hygiene compliance among nurses and factors that predicted non-compliance.

Materials and Method: Descriptive cross-sectional study was adopted for this study in the pediatric department of Tamale Teaching Hospital. Data of the study was collected by using the method of observation. Data analysis was done using SPSS version 20. Variables associations were done using chi-square and binary logistics regression analysis.

Results: About 410 indications were observed, the hand hygiene compliance level was 80.2%. The ward of the participant predicted hand hygiene non-compliance, CEW (AOR = 0.4, 95%, C.I. 0.162 – 0.890). Also, duty shift predicted hand hygiene non-compliance, afternoon shift (AOR = 3.1, 95%, C.I. 1.172 – 7.980), night shift (AOR = 8.6, 95%, C.I. 3.147 – 23.359). The occupational of participants predicted hand hygiene non-compliance, RM (AOR = 53, 95%, C.I. 11.324 – 252.019) as compared to RGN. Finally, the type of hand hygiene indication predicted hand hygiene non-compliance. Comparing hand hygiene before touching patient, hand hygiene after fluid exposure (AOR = 0.05, 95%, C.I. 0.005 – 0.510), after patient touch (AOR = 0.06, 95%, C.I. 0.021 – 0.199) and after touching patient surroundings (AOR = 0.4, 95%, C.I. 0.161 – 0.941).

Conclusion: Compliance was good and the ward of the department, duty shift, the occupational category of the nursing category, and type of hand hygiene indicator predicted non-compliance.

Keywords: Hand, Hygiene, Compliance, Infection, Prevention, Tamale, Ghana

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Introduction

Hospital-acquired infection is one of the current public health problems the world is engulfed with, and the way forward is competent Infection Prevention and Control (IPC) compliance [1]. According to Trampuz and Widmer, thousands of people die every day in the world from nosocomial infections acquired through health care procedures through contaminated hands [2]. The influential factors involved in the menace of nosocomial infections in our healthcare backgrounds is poor hand hygiene compliance among healthcare providers [3].

According to Mathur's study, the most competent, easiest, and cost-efficient technique of infection prevention and control is hand hygiene compliance [4]. Even though hand hygiene compliance is the way for the prevention of nosocomial infection in our healthcare environment, studies have shown that healthcare workers inclusive nurses do not comply with hand hygiene half the number of times they are supposed to and this has contributed to HAI increase [5].

The hand of the healthcare worker is acknowledged as the highest route for the spread of exogenous infections mostly through invasive procedures [6]. Promoting hand hygiene compliance should be significant for health authorities and all healthcare facilities at all levels, in addition to the individual responsibility of each health provider [5]. The World Health Organization has recommended five key moments for hand hygiene in health practice: before contact with a patient, before an aseptic procedure, after contact with a patient, after contact with body fluids, and after touching a patient's surroundings [6].

Nakamura and Tompkins's study has revealed that about 5 to 10.0% of all admitted patients develop nosocomial infections and 70.0% of the identified pathogens are resistant to one or more of the antimicrobial medicine currently in use [7].

Sub-Saharan African countries including Ghana records a high prevalence rate of HAI, ranging from 2.0 – 49.0%; this is particularly high among critically ill patients admitted to the

critical intensive unit where the rate is projected to range from 21.2 - 35.6%. A survey in Ghana reported a national prevalence rate of 8.2% and 8.0% for Tamale Teaching Hospital [8].

A study by Labi, et al. on hand hygiene compliance among healthcare workers in the Northern Region (Kpandai and Tatale-Sanguli), indicated hand hygiene compliance of 49.6% for pre-intervention and final compliance of 67.9% after interventions such as such training on IPC [9]. The current emphasized need for hand hygiene practice due to the pandemic of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) commonly known as Covid-19 necessitated this study to assess hand hygiene compliance among nurses working in the paediatric department of Tamale Teaching Hospital. Since nurses form a major proportion of the health care providers and constitute the "nucleus of the health care system" [10,11]. Because they occupy more time with patients than any other healthcare provider, their compliance with hand hygiene guidelines gives the impression to be more vital in preventing nosocomial infection among patients.

Research Design

A descriptive cross-sectional study was adopted for this study, using the method of observation for quantitative data.

Study Participants and Setting

The study participants of this study were all nurses working in the pediatric department of Tamale Teaching Hospital. At the time of the study the average number of nurses for the department was 107 with average patient population of 130. Serious variation in patient count is affected by seasonal variation. The total number of nursing staffs are divided across the days and various shifts. Also, staff's duty offs and leaves affects the total staff strength. Tamale Teaching Hospital is a major referral teaching hospital in the northern regional capital of Ghana. It serves as the main referral hospital for five northern regions of Ghana, including the neighboring countries to the north of Ghana.

Data Collection Tool

The world health organization checklist for five moments of hand hygiene in the healthcare facility was adopted for this study. The checklist was adopted and modified to suit the objectives of the study. The checklist was divided into demographic characteristics of the participants, such as ward of the observation, day shift of the observation, category, or rank of nurse observed. Moment of hand hygiene opportunity, hand hygiene action (handwashing, hand rub, or missed opportunity).

Data Analysis

Data analysis was done using SPSS version 20. Categorical variables like respondents' sex, and practice level analysis were presented as frequencies and percentages using tables and figures. The hand hygiene compliance level in the department was calculated by dividing the number of present hand hygiene actions (handwashing, hand rub with hand sanitizer, and both) by total hand hygiene indications and multiplying it by 100. The bivariate analysis was done using Chi-square to determine factors associated with hand hygiene compliance and multivariate analysis for prediction done using binary logistics regression.

Results

Demographic characteristics of study participants

The study recorded a total of 410 observations. From the observation majority (51.0%) of the study observations were females and most (69.0%) of them were within the age bracket of 30 – 39 years. In terms of occupational categorization, most (85.1%) of the observations were on registered general nurses. The majority (38.3%) were from the neonatal intensive care unit (NICU), 32.0% from the children's emergency ward (CEW), and 29.8% from the main pediatric ward. Most of the observations were done during the working day of the week and most (46.8%) were done during the morning shifts (**Table 1**).

Hand hygiene compliance level

Out of the 410 indications for hand hygiene compliance, hand hygiene was present or done for 329 indications and not done for 81 indications. Hence the hand hygiene compliance level recorded from observation was 80.2% and 19.8% for no compliance.

The dominant (47.3%) hand hygiene action was hand washing; hand washing was high (68.4%) when it came to after touching a patient indication. The second most (17.3%) hand hygiene action was hand rub with hand sanitizer, hand rub was high (39.3%) after touching patient surroundings. Hand hygiene action missed was high (40.2%) before touching the patient's surroundings.

From observation, gloves were used in 77.8% of the indications. The observation indicated that hand hygiene was only practiced 8.8% before glove use and 96.9% after glove use.

Factors associated with hand hygiene compliance

Chi-square analysis revealed a statistically significant relationship between the professional nursing category and hand hygiene compliance, $\chi^2(2, 410) = 49.76, P \leq 0.001$. However, with age and sex, there was no significant relation to hand hygiene compliance.

Chi-square analysis revealed statistical significant relationship between Wards of the pediatric department, $\chi^2(2, 410) = 12.24, P = 0.002$, day of the week, $\chi^2(2, 410) = 7.596, P = 0.006$, shift of the day, $\chi^2(1, 410) = 57.882, P \leq 0.001$ and presence of hand hygiene compliance (**Table 2**).

Indicators for hand hygiene and hand hygiene compliance

Chi-square analysis indicated a significant relation between WHO five moments hand hygiene indicators and actual hand hygiene compliance, $\chi^2(4, 410) = 63.307, P \leq 0.001$. Proportionally after body fluid exposure hand hygiene indicator recorded the highest (97.4%) hand hygiene compliance, next was after touching a patient (95.5%), then after touching the patient environment (83.3%), after that, was before the clean or aseptic procedure and finally and least (59.8%) complied indicator was before touching a patient (**Figure 1**).

Multiple logistics regression of factors associated with hand hygiene non-compliance

The ward of the participant predicted hand hygiene non-compliance, those in CEW were about 60% less likely to non-

Table 1: Demographic characteristics of study participants.

		Frequency	Percentage
Sex	Male	201	49.0
	Female	209	51.0
Estimated age group	18 - 29 years	107	26.1
	30 - 39 years	283	69.0
	40 - 49 years	10	2.4
	50 - 59 years	10	2.4
Category of nurse	RGN	349	85.1
	RM	29	7.1
	Enrolled nurse	32	7.8
Ward	Paediatrics ward	122	29.8
	CEW	131	32.0
	NICU	157	38.3
Day of the work	Working day	350	85.4
	Weekend	60	14.6
Duty shift	Morning	192	46.8
	Afternoon	132	32.2
	Night	86	21.0

Source: an observational study, 2020.

Table 2: Chi-square analysis of factors and hand hygiene compliance.

		Observed hand hygiene compliance				X ²	df	P-value
		Present		Absent				
Sex	Male	157	78.1%	44	21.9%	1.133	1	.287
	Female	172	82.3%	37	17.7%	-	-	-
Estimated age group	< 30 years	86	80.4%	21	19.6%	0.02	1	.969
	≥ 30 years	224	79.2%	59	20.8%	-	-	-
Category of nurse	RGN	290	83.1%	59	16.9%	49.769	2	.000
	RM	9	31.0%	20	69.0%	-	-	-
	Enroll nurse	30	93.8%	2	6.2%	-	-	-
Ward	Paediatrics	85	69.7%	37	30.3%	12.244	2	.002
	CEW	111	84.7%	20	15.3%	-	-	-
	NICU	133	84.7%	24	15.3%	-	-	-
Day of the work	Working day	273	78.0%	77	22.0%	7.596	1	.006
	Weekend	56	93.3%	4	6.7%	-	-	-
Duty shift	Morning	181	94.3%	11	5.7%	57.882	2	.000
	Afternoon	100	75.8%	32	24.2%	-	-	-
	Night	48	55.8%	38	44.2%	-	-	-
Hand hygiene materials available	Water and Soap	78	68.4%	36	31.6%	13.923	1	.000
	Water and soap plus hand sanitizer	251	84.8%	45	15.2%	-	-	-

Source: an observational study, 2020.

comply with hand hygiene as compared to those in the pediatric ward (AOR = 0.4, 95%, C.I. 0.162 – 0.890). Also, the shift of the day predicted hand hygiene non-compliance, those on the afternoon shift were three times likely to non-comply with hand hygiene as compared to those on the morning shift (AOR = 3.1, 95%, C.I. 1.172 – 7.980). And those on the night shift were almost nine times likely to non-comply with hand hygiene as compared to those on the morning shift (AOR = 8.6, 95%, C.I. 3.147 – 23.359). The occupational of participant predicted hand hygiene non-compliance, registered midwives were about 53 times likely to non-comply with hand hygiene as compared to registered general nurses (AOR = 53, 95%, C.I. 11.324 – 252.019). Finally,

the type of hand hygiene indication predicted hand hygiene non-compliance. Comparing hand hygiene before touching patient, non-compliance with the other hand hygiene indicators were less likely, hand hygiene after fluid exposure (AOR = 0.05, 95%, C.I. 0.005 – 0.510), after patient touch (AOR = 0.06, 95%, C.I. 0.021 – 0.199) and after touching patient surroundings (AOR = 0.4, 95%, C.I. 0.161 – 0.941) (**Table 3**).

The logistic regression model appropriately explained the outcome variable (hand hygiene compliance) since the Hosmer-Lemeshow goodness-of-fit test *p*-value was more than 0.05, (X²(8) = 14.297, *p* = 0.074) (Table 3), hence the model fits the study data (Table 3).

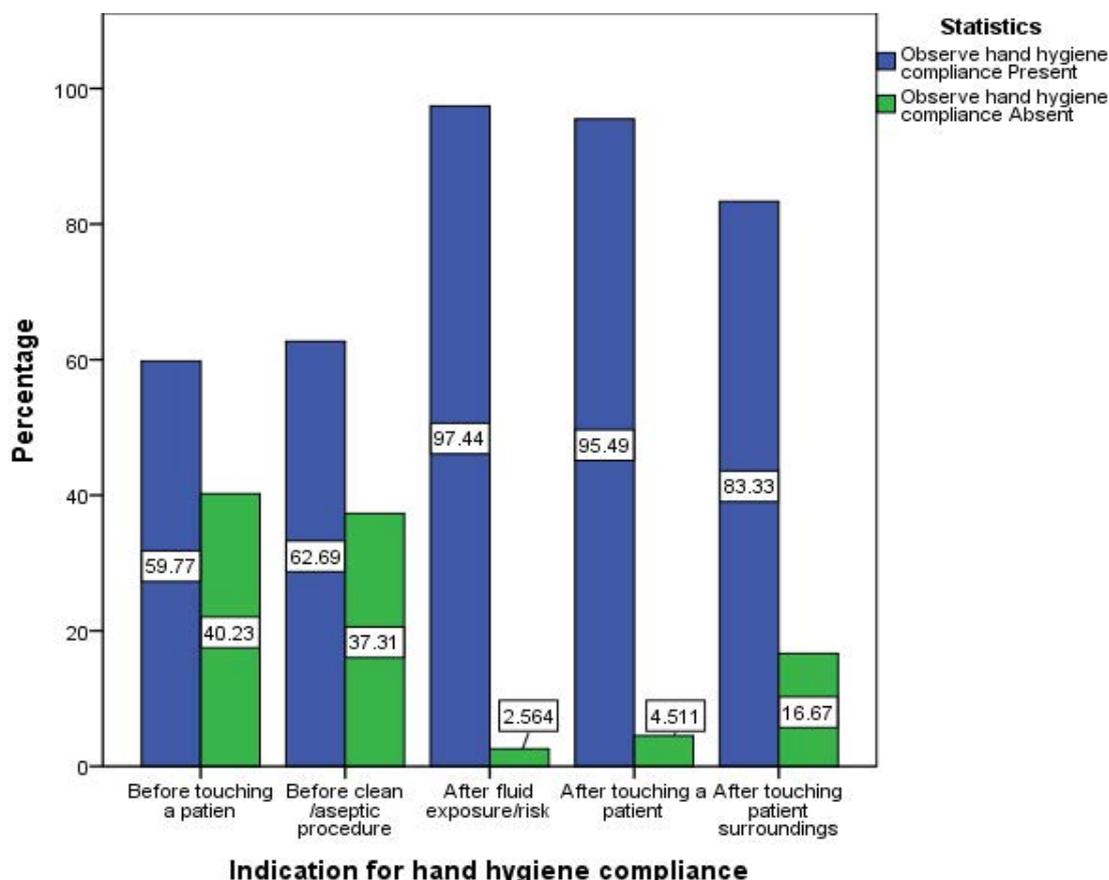


Figure 1 Hand hygiene indicators and hand hygiene compliance.
Source: an observational study, 2020

Table 3: Binary logistics regression for predictors of hand hygiene non-compliance.

	B	Wald	Sig.	AOR	H-L GOF test X2 (8)= 14.297, P =0.074 95% C.I. for AOR	
					Lower	Upper
Paediatrics ward			Ref			
CEW	-.969	4.968	.026	.379	.162	.890
NICU	-1.134	2.871	.090	.322	.087	1.195
Day of the Work (weekend / Working day)	-.572	.868	.352	.564	.169	1.881
Morning			Ref			
Afternoon	1.118	5.219	.022	3.058	1.172	7.980
Night	2.149	17.658	.000	8.574	3.147	23.359
RGN			Ref			
RM	3.978	25.264	.000	53.423	11.324	252.019
EN	-.384	.203	.653	.681	.128	3.622
Before touching a patient			Ref			
Before clean /aseptic procedure	-.364	.641	.423	.695	.285	1.694
After fluid exposure/risk	-3.014	6.365	.012	.049	.005	.510
After touching a patient	-2.750	22.583	.000	.064	.021	.199
After touching the patient surroundings	-.944	4.391	.036	.389	.161	.941
Hand hygiene material availability	-.530	1.917	.166	.589	.278	1.246

Source: an observational study, 2020.

Discussion

The study recorded a total of 410 observations, about 32.4% of them were on after touching a patient, then 21.2% were on before touching a patient, and least was on after body fluid exposure. The majority (47.3%) of actions taken for hand hygiene compliance was hand washing, then 17.3% for hand rub with hand sanitizer. About 15.6% of actions for hand hygiene were both handwashing and hand rub with hand sanitizer. However, there was a missed action of 19.8% for hand hygiene opportunities. Also in a similar study, the most (63.6%) preferred method of hand hygiene was washing with water and soap [12]. Healthcare workers ought to embrace either one procedure for hand hygiene, thus alcohol hand-rub or handwashing with antimicrobial or non-antimicrobial soap, but hand washing is recommended if the hands are dirty. The usage of both procedures concurrently is not endorsed, as it doubles both cost and time.

From observation, gloves were used in 77.8% of the indications. The observation indicated that hand hygiene was only practiced 8.8% before glove use and 96.9% after glove use. Appropriate hand hygiene is essential before wearing gloves, as trapped moisture under gloves can be a source of skin irritation and upsurge the harboring of bacteria.

A recent study in the surgical department of TTH by Alhassan et al. on hand hygiene and facemask compliance among healthcare providers reported a below-average number of participants complying with hand hygiene [13]. However, in this current hand hygiene compliance level recorded from observation was 80.2% and 19.8% for non-compliance. In Ghana, a study in Cape Coast Teaching Hospital indicated a low hand hygiene compliance thus, 27.3% [13]. Also, in Ethiopia, an observational study on hand hygiene compliance among healthcare workers revealed overall compliance of 22.0% among the health care workers [14]. This study finding is still very high when compared to another observational study in Istanbul, Turkey using a sum of 704 hand hygiene opportunities observed from the neonatal and pediatric intensive care units in Marmara University, Pendik Training and Research Hospital, from June 2013 to July 2013, rather a low hand hygiene compliance of 37.0% (261/704) among the healthcare workers [12].

The current study revealed a statistically significant relationship between the professional nursing category and hand hygiene compliance. Registered midwives predicted hand hygiene compliance for about 53 times likely as compared to registered general nurses, this is in line with another study where compliance varied by occupation [12]. However, in another study, there was no difference in hand hygiene compliance among professional groups [15,16].

This study revealed a significant relationship between wards of the department, those in CEW were about 60% less likely to non-comply with hand hygiene as compared to those in the pediatric ward. NICU and CEW are perceived to be busy wards of the department, so would have been expected that the higher workload will result in low hand hygiene compliance as compared to the pediatric ward. Since in a similar study in Ghana workload was a factor related to poor hand hygiene compliance [17].

Day of the week was significantly related to hand hygiene compliance; compliance was high (93.3%) during weekends as compared to 8.0% for working days. Even though this did not predict hand hygiene compliance at the multivariate analysis, this is expected as working days are usually the busy days hence the likelihood of non-compliance. The shift of the day was also related to compliance, those on the morning shift were more likely to comply with hand hygiene as compared to those on the night. Hand hygiene non-compliance was highly predicted by the night shift as those on the night were about nine times likely to non-comply as compare to those on the morning shift. Also, those on the afternoon shift were about three times likely to non-comply as compared to those in the morning. More compliance for the morning shift can be related to the fact that day time duties are usually associated with the availability of working materials. Meanwhile, in another study, there was no difference in hand hygiene compliance among different shifts of the day [15].

Finally, the study revealed a significant relation between WHO five moments hand hygiene indicators and actual hand hygiene compliance. Comparing hand hygiene before touching a patient, non-compliance with the other hand hygiene indicators were less likely. Hand hygiene non-compliance was only likely 0.05 times after fluid exposure. Hand hygiene non-compliance was likely only 0.06 times after patient touch. And after touching patient surroundings non-compliance was only likely for about 40%. In Ethiopia, an observational study on hand hygiene compliance among healthcare workers revealed hand hygiene compliance was higher after body fluid exposure 75.8% and better for after-patient contact 42.8%. However lower for before patient contact 2.4%, before a clean or aseptic procedure 3.6%, and after contact with patient surroundings 3.3% [15]. Also in study, the level of compliance relative to WHO five moments of hand hygiene was: overall compliance before patient contact was 43.2%, before a clean/aseptic procedure was 8.5%, after body fluid exposure was 18.1%, after contact with patients was 68.1%, and after contact with patient surroundings was 43.2% [12].

Limitation

This study is not without limits; the study was unable to explore all factors known to be associated with hand hygiene compliance.

Conclusion

The study recorded very good hand hygiene compliance among the nurses. The factor that predicted non-compliance included: the ward of the department, the shift of the day, the occupational category of the nurse observed, and the kind of hand hygiene indicator.

Ethical Consideration

Permission for data collection from the hospital-acquired through the research department of Tamale Teaching Hospital. Since this is an observational study participants were not informed. All sources for information used in this research were duly acknowledged to avoid any form of plagiarism.

Data Availability

All dataset related to the findings of this study is available with the submitting author.

Conflicts of Interest

There is no conflict of interest with this submission.

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