

A Study to Assess Hand Hygiene Knowledge and Practices among Health Care Workers in a Teaching Hospital in Ghana

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Abstract: **Background:** Despite widespread evidence that proper hand hygiene practices is the simplest and most-effective intervention to reduce transmission of hospital-acquired infections, healthcare workers adherence to proper hand hygiene practices remains poor. This study was to 1) assess the knowledge of proper hand hygiene among health care workers according to WHO guidelines, 2) to assess hand hygiene practices among healthcare workers at the hospital, 3) to assess any correlations between knowledge of hand hygiene and professional type; and department of health care provider and 4) to assess factors that hinder proper hand hygiene practices. **Methods:** The study was conducted at the Cape Coast Teaching Hospital from January, 2016 through April, 2016. A total of 130 healthcare workers participated in the study. A cross-sectional survey was conducted using a self-administered questionnaire based on the hand hygiene guidelines by the World Health Organization (WHO). **Results:** Majority of the respondents (51.2%) knowledge on hand hygiene was fair. Compliance to proper hand hygiene practices was hampered by heavy patient load (33.5%), forgetfulness (23.6%), inadequate water (21.9%), lack of clean towels (15.1%), absence of air dryer (14.0%). The techniques commonly used for hand hygiene reported were the use of cold running water (27.3%), use of alcohol-based hand rub (22.9%). Only 18 (5.3%) used warm running water. Hand drying technique used included: use of common towels (30.3%), use of personnel handkerchiefs (21.5%), allowing hands to dry on their own (19.3%), use of disposable towels (10.9%). Also there was a statistically significant correlation between healthcare workers professional status and knowledge on hand hygiene ($p=0.005$). **Conclusion:** This study showed that knowledge in hand hygiene practices was found to be fair, with heavy patient load, forgetfulness and unavailability of water and lack of clean towels being the major contributing factors hampering proper hand hygiene practices. Also low patronage for alcohol-based hand rubs was found. A hospital-wide awareness program aiming at healthcare workers and adoption of alcohol-based hand rubs at the point of care can help improve compliance to hand hygiene.

Keywords: Knowledge, hand hygiene, healthcare workers, Cape Coast, Ghana

1. Introduction

Hand hygiene has become a major issue in health care settings due to the high incidence of Health care associated infections (HCAIs), also known as nosocomial infections. Despite widespread evidence that hand hygiene is the simplest and most cost-effective intervention to reduce transmission of hospital-acquired infections (Pittet et al., 2000; Trick et al., 2007; Girou et al., 2006; Ho et al., 2012; Grayson et al., 2008; Grayson et al., 2011; Biddle et al., 2009), physicians' adherence to hand-hygiene practices remains consistently poor (Pittet et al., 2000; Danchaiyijtr et al., 2005; Harris et al., 2000; Patarakul et al., 2005). Notable factors for poor compliance include hand irritation (Akyol AD, 2007), inaccessibility or shortage of hand-washing equipments, dense working conditions, (Akyol AD, 2007; Sax et al., 2005; Pittet et al., 2004) and poor knowledge (Danchaiyijtr et al., 2005; Sax et al., 2005).

Health-care associated infections continue to pose a serious threat of increasing mortality and morbidity among hospitalized patients and World Health Organization reports that at anytime, over 1.4 million people world-wide suffer from infections acquired in health-care settings (WHO, 2005). In developed countries, HCAIs have been reported to affect 5%-15% of hospitalized patients and 9%-37% of those admitted to intensive care units (Vincent JL, 2003), while in developing countries where reliable data on HCAIs are limited, prevalence rates have been estimated to be between 14.8% and 19.1% (Gosling et al., 2003; Faria et al., 2007; Kallel et al., 2005; Jroundi et al., 2007).

Organisms that cause nosocomial infections are most commonly transmitted by the hands of healthcare workers (Kusachi et al., 2006). Hand hygiene practices may also vary among professional groups (Rao MH, 2006; Pittet et al., 2004; Suchitra & Devi, 2007). However, most relevant studies agree that type and availability of facilities have a significant effect on hand hygiene (Samuel et al., 2005; Boyce JM, 2000).

Formal written guidelines on hand hygiene practices in hospitals have been developed by the Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO). According to the World Health Organization (WHO, 2005) the indications for hand hygiene can be merged into five (5) moments during health care delivery. Adequate knowledge and recognition of these moments are the pillars for effective hand hygiene. Therefore, it is possible to prevent health care associated infections by cross-transmission via hands if health care providers promptly identify these moments and comply with hand hygiene actions. These five moments that call for the use of hand hygiene include the moment before touching a patient, before performing aseptic and clean procedures, after being at risk of exposure to body fluids, after touching a patient, and after touching patient surroundings.

Hospital-acquired infection rates are also known to be highest in teaching hospitals (Samuel et al., 2005). In Ghana, a cross-sectional observational study at the Komfo Anokye Teaching Hospital in Kumasi by Owusu-Oforiet al (2010)

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indicated that the most commonly identified barriers to hand hygiene by health workers were limited resources and lack of knowledge on appropriate times to perform hand washing or rubbing. A study conducted in 2009, at the Neonatal Intensive Care Unit (NICU) of the Department of Child Health in the Korle-Bu Teaching Hospital, Ghana by Asare et al(2009) indicated that hand hygiene compliance of physicians and nurses in that unit was low. Another study in Ghana by Yawson and Hesse (2013) showed that care-related hand hygiene (HH) compliance of doctors and nurses was low and basic HH resources were deficient in all 15 service centres that were studied. In that study, care-related HH compliance among doctors ranged from 9.2% to 57% and 9.6% to 54% among nurses and HH compliance was higher when risk was perceived to be higher (*i.e.*, in the emergency and wound dressing/treatment rooms and labour wards). In that same study, facilities for HH, particularly alcohol hand rub and liquid soap dispensers were shown to be deficient. No such studies has been conducted at the Cape Coast teaching hospital, Ghana. Therefore, the aim of this study was to assess Hand Hygiene Knowledge and practices among health care providers at the Cape Coast teaching hospital, Ghana. The objectives of the study was to 1) assess the knowledge of proper hand hygiene among health care workers according to WHO guidelines, 2) to assess hand hygiene practices among healthcare workers at the hospital, 3) to assess any correlations between knowledge of proper hand hygiene and professional type; department of health care provider, 4) to assess factors that hinder proper hand hygiene practices.

2. Methodology

Setting

The study was conducted between January 2016 through April 2016 at the Cape Coast Teaching Hospital of Ghana. The Cape Coast teaching hospital is a tertiary health facility that provides a wide range of specialist services to the people in the Central region of Ghana as well as those in the neighboring region.

Study Population

Healthcare workers included in the study were: house-officers, medical officers, resident doctors, specialist/consultants, nurses, ward assistants, midwives, physiotherapist, anesthetists, x-ray technologist and laboratory scientists who works at the hospital at the time of the study. All the health care providers working at the hospital at the time of the study were eligible for participation in the study. Those health care providers who were on leave during the data collection period were excluded.

Study design

The research design was a cross sectional descriptive study.

Sampling method

Cluster sampling technique was used to recruit participants. Each ward in the hospital was visited thrice a week during the morning, afternoon and evening shift to distribute questionnaires to the health care workers on duty at that particular shift after obtaining informed consent. Departmental Clinical meetings were also used as clusters to

reach doctors, while the laboratory was also visited during the morning, afternoon and evening shift. Potential respondents were given questionnaires to be returned through a designated colleague.

Data collection

A structured, self-administered questionnaire with both open-ended and close-ended questions were used to collect data. The questionnaire had three sections: section one was on the personal data and work history of each participant; section two assess the knowledge of participants on hand hygiene; and section three assess the hand hygiene practices among participants and the facilities available for hand hygiene in the hospital and the factors influencing hand hygiene practice in the hospital. Knowledge was assessed using the WHO's hand hygiene questionnaire for health care workers. This proforma of 25 questions includes multiple choice and 'yes' or 'no' questions. The knowledge of hand hygiene was scored as follows: each correct response was given one (1) point and each wrong response given a score zero (0). The maximum score will be 25 marks. The total score for each respondent was expressed as a percentage of the maximum score. Respondents were then categorized into those with poor knowledge (<50%), fair knowledge (50-69.9%) and good knowledge (>70%). Hand hygiene practice was assessed by another self-structured questionnaire consisting of 13 questions.

Ethical Clearance

Ethical clearance was sought from the University of Cape Coast Institutional review board (UCCIRB/CHAS/2015/37). Approval was also sought from management of the Cape Coast Teaching hospital. Written informed consent was obtained from participants and confidentiality was ensured throughout the study.

Data analysis

Data obtained from the study was analyzed using the SPSS software version 20. Each completed questionnaire was checked visually for completeness before fed to the computer. Descriptive statistics was used to calculate percentages for each of the responses given. Chi-square test was used to compare the percentage of correct responses among health care providers, and department. A P value less than 0.05 was considered significant.

3. Results

3.1 Characteristics of Respondents'

A total of 130 healthcare workers filled out the questionnaire, the majority of which 54 (41.9%) were nurses, 21 (16.3%) were house officers, 13 (10.1%) were midwives and 10 (7.8%) were medical officers. Majority (66.4%) were within the 20-29 age-group and 62.3% were females and 37.7% were males. Majority of the respondents' were from the following departments: emergency (18), Paediatrics (18), OPD (18), Obstetrics (15), laboratory (11). Majority (65.9%) had 1-5 years of working experience and more than half of the respondents' (77.3%) have had training in hand hygiene.

3.2 Knowledge on Hand Hygiene by Respondents'

Table 2 and 3 demonstrates knowledge on hand hygiene by respondents' using the WHO hand hygiene questionnaire for healthcare workers. Only 10 (8.7%) of the respondents' knew that the minimal time needed for alcohol-based hand rub to kill germs should be at least 20s. Majority of the respondents' knew that hand hygiene should be performed before touching a patient (87.7%) and after touching a patient (89.4%) respectively.

Also majority (86.6%) knew that hand rubbing is not more effective against germs than handwashing. Less than half of the respondents' were aware of the hand hygiene method needed before giving an injection (39.4%) and after making a patient's bed (20.5%). Majority (>80%) were aware that the following should be avoided as is associated with increased likelihood of colonisation of hands with harmful germs: wearing jewellery, damaged skin and artificial fingernails. The overall knowledge score computed showed that 29.5% of the respondents had poor knowledge, 51.2% had fair knowledge and 19.3% had good knowledge.

3.3 Self-reported hand hygiene practices by Respondents'

Table 4 and 5 shows hand hygiene practices reported by respondents'. Less than half (31.1%) does not believe that infection prevention notices reminds them of hand hygiene. Also about 32.2% believes that wearing gloves sometimes reduces the need for hand hygiene. Majority of the respondents (>70%) always washes hands after defecating, before and after meals. Top four (4) factors influencing hand hygiene practices included: inadequate water (21.9%); lack of clean towels (15.1%); lack of air dryer (14.0%) and absence of detergent (13.0%). Top three (3) reasons for not practicing hand hygiene included: heavy patient load (33.5%); forgetfulness (23.6%) and lack of time (17.9%).

Techniques commonly used by respondents' for hand hygiene are the use of cold running water (27.3%), use of alcohol-based hand rub (22.9%). Only 18 (5.3%) were using warm running water. Hand drying technique used included: use of common towels (30.3%); use of personnel handkerchiefs 50 (21.5%); allow hands to dry on their own 46 (19.3%), use of disposable towels 25 (10.9%).

3.4 Association between respondents' Professional status, their department and their hand hygiene knowledge score.

From table 6, the professional status of the healthcare worker was significantly associated with hand hygiene knowledge score ($P= 0.005$), but not correlated to their departments ($P=0.390$).

Table 1: Socio-demographic characteristics of respondents'

Characteristics	Frequency (N)	Percent (%)
Age		
20-29	73	56.2
30-39	36	27.7
40-49	17	13.1
50-59	2	1.5
60+	2	1.5
Gender		
Male	49	37.7
Female	81	62.3
Professional status		
Nurses	54	41.9
House officer	21	16.3
Midwife	13	10.1
Medical officer	10	7.8
Specialist/Consultant	3	2.3
Lab Scientist	9	7.0
Ward Assistant	6	4.7
Physiotherapist	4	3.1
Anaesthetist	2	1.6
Other	7	5.4
Departments		
Internal medicine	3	2.3
Surgery	12	9.2
ICU	5	3.8
Mixed Medical/Surgical	10	7.7
Emergency	18	13.8
Obstetrics	15	11.5
Paediatrics	18	13.8
Laboratory	11	8.5
Outpatient Department	18	13.8
Others	20	15.4
Years of working experience		
1-5 years	85	65.9
6-10 years	27	20.9
>10 years	17	13.2
Training on hand hygiene		
Yes	99	77.3
No	29	22.7

Table 2: Knowledge of Hand Hygiene Among Respondents'

<i>Knowledge on hand hygiene practices (correct responses in brackets)</i>	<i>No. of subjects with correct response</i>	<i>Percent (%)</i>
1. Which of the following is the main route of cross transmission of potentially harmful germs between patients in a health-care facility?		
(Health-care workers hands when not clean)	69	56.1
2. What is the most frequent source of germs responsible for health care- associated infections?		
(Germs already present on or within patient)	34	27.4
Which of the following hand hygiene actions prevent transmission of germs to the patient?		
3. Before touching a patient (Yes)	100	87.7
4. Immediately after risk of body fluid exposure (Yes)	84	83.2
5. Immediately before a clean/aseptic procedure (No)	93	91.2
6. After exposure to the immediate surroundings of a patient (Yes)	75	78.1
Which of the following hand hygiene actions prevents transmission of germs to the healthcare worker?		
7. After touching a patient (Yes)	101	89.4
8. Immediately after risk of body fluid exposure (Yes)	88	88.9
9. Immediately before a clean/aseptic procedure (No)	30	31.3
10. After exposure to the immediate surroundings of a patient (Yes)	75	78.1
Which of the following statements on alcohol-based hand rub and handwashing with soap and water are true		
11. Hand washing is more rapid for hand cleansing than hand rubbing (True)	59	50.9
12. Hand rubbing causes skin dryness more than hand washing (false)	35	29.7
13. Hand rubbing is more effective against germs than hand washing (false)	97	86.6
14. Hand washing and hand rubbing are recommended to be performed in sequence (false)	37	30.8
15. What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?		
(20 seconds)	10	8.7
Which type of hand hygiene method is required in the following situations?		
16. Before palpation of the abdomen (rubbing)	65	52.4
17. Before giving an injection (rubbing)	50	39.4
18. After emptying a bedpan (washing)	123	96.9
19. After removing examination gloves (rubbing/washing)	128	99
20. After making a patients bed (rubbing)	26	20.5
21. After visible exposure to blood (washing)	120	94.5
Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?		
22. Wearing jewellery (Yes)	104	84.6
23. Damaged skin (Yes)	101	84.9
24. Artificial fingernails (Yes)	120	96.8
25. Regular use of a hand cream (No)	77	64.7

Table 3: Overall Knowledge Score On Hand Hygiene by Respondents'

<i>Knowledge</i>	<i>Frequency</i>	<i>Percent (%)</i>
Good (>70%)	25	19.3
Fair (50-69.9%)	66	51.2
Poor (<50%)	38	29.5

Table 4: Self-reported Practices of Hand Hygiene by Respondents'

<i>Variable</i>	<i>Always</i>	<i>Most of the time</i>	<i>Sometimes</i>	<i>Never</i>	<i>Total</i>
	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>N</i>
I miss out hand hygiene because I forget	0(0.0)	8(6.5)	64(52.0)	51(41.5)	123
Hand hygiene makes it difficult to carry it out	2(1.7)	15(12.4)	51(42.1)	53(43.8)	121
Infection prevention notices reminds us of hand hygiene	20(16.4)	20(16.4)	44(36.1)	38(31.1)	122
Have more important things to do than hand hygiene	1(0.8)	9(7.4)	31(25.4)	81(66.4)	122
Wearing gloves reduces the need for hand hygiene	3(2.5)	11(9.1)	39(32.2)	68(56.2)	121
Emergencies makes hand hygiene difficult	6(5.0)	23(19.0)	62(51.2)	30(24.8)	121
Washing hands after defecating	108(88.5)	6(4.9)	5(4.1)	3(2.3)	122
Hand washing before meals	108(88.5)	8(6.6)	4(3.3)	2(1.6)	122
Hand washing after meals	94(76.4)	10(8.1)	16(13.0)	3(2.4)	123

Table 5: Hand Hygiene Practices by Respondents'

Variable	Frequency (n)	Percent (%)
Factors influencing hand hygiene practices		
Inadequate water	86	21.9
Absence of detergent	51	13.0
Unavailability of sinks	25	6.4
Sink leakage	31	7.9
Sink too far	32	8.2
Lack of clean towels	59	15.1
Lack of hand lotion	45	11.5
Lack of air dryer	55	14.0
Others	8	2.0
Reasons for not practicing hand hygiene		
Lack of time	38	17.9
Forgetfulness	50	23.6
Heavy patient load	71	33.5
Non conducive atmosphere	31	14.6
Not knowledgeable in hand washing	17	8.0
Others	5	2.4
Techniques commonly used for hand hygiene		
Use of warm running water	18	5.3
Use of cold running water	93	27.3
Use of soapy water in a basin	14	4.1
Rubbing soap on wet hands for 20mins before rinsing	69	20.2
Use of alcohol-based hand rub	78	22.9
Personal hand sanitizer	69	20.2
Hand drying technique frequently used		
Allow hands to dry on their own	46	19.3
Use of common towels	72	30.3
Use of disposable paper towels	25	10.9
Use of personal handkerchiefs	50	21.0
Use of air dryer	34	14.3
None	10	4.2

Table 6: Association between Respondents' Professional status, Departments and their hand hygiene knowledge score

Variable	Good (>70%)	Fair (50-69.9%)	Poor (<50%)	Total Sample	Chi-square (X ²)	P-value
	n (%)	n (%)	n (%)	N		
Professional status						
Nurses	6 (11.1)	27 (50.0)	21 (38.9)	54	37.609	0.005
House officer	5 (23.8)	13 (61.9)	3 (14.3)	21		
Midwife	3 (23.1)	5 (38.5)	5 (38.5)	13		
Medical officer	6 (60.0)	4 (40.0)	0 (0.0)	10		
Lab Scientist	0 (0.0)	5 (55.6)	4 (44.4)	9		
Others	0 (0.0)	5 (71.4)	2 (28.6)	7		
Ward Assistant	0 (0.0)	3 (50.0)	3 (50.0)	6		
Physiotherapist	2 (50.0)	2 (50.0)	0 (0.0)	4		
Specialist/Consultant	1 (33.3)	2 (66.7)	0 (0.0)	3		
Anaesthetist	2 (100)	0 (0.0)	0 (0.0)	2		
Departments						
Emergency	4 (22.2)	7 (38.9)	7 (38.9)	18	18.454	0.390
Paediatrics	3 (16.7)	11	4	18		

		(61.1)	(22.2)		
Outpatient Dept.	3 (16.7)	8 (44.4)	7 (38.9)	18	
Obstetrics	5 (33.3)	6 (40.0)	4 (26.7)	15	
Others	1 (7.7)	10 (76.9)	2 (15.4)	13	
Surgery	3 (25.0)	8 (66.7)	1 (8.3)	12	
Laboratory	0 (0.0)	6 (54.5)	5 (45.5)	11	
Mixed Medical/Surgical	2 (20.0)	4 (40.0)	4 (40.0)	10	
ICU	2 (40.0)	3 (60.0)	0 (0.0)	5	
Internal medicine	1 (33.3)	2 (66.7)	0 (0.0)	3	

4. Discussion

With the aim to reduce healthcare associated infections and the spread of antimicrobial resistance, the WHO launched Global Patient Safety Challenge in October 2005 Under the Slogan of 'Clean Care is Safer Care'. Our study aim to fulfill the aforementioned statement by providing useful insights into the prevailing practices of hand hygiene and major barriers to proper hand hygiene practices.

A total of 130 healthcare workers participated in the study with majority of them as nurses (41.9%) and house-officers 21 (16.3%), and majority were females (62.3%). Though majority of the respondents' (77.3%) have had training in hand hygiene, more than half of them (51.2%) had fair knowledge in hand hygiene practices. This finding is consistent with other studies which shows low level knowledge in hand hygiene among healthcare workers (Pittet et al., 2000; Danchaivijitr et al., 2005; Harris et al., 2000). But majority of the respondents' knew that hand hygiene should be performed before touching a patient (87.7%) and after touching a patient (89.4%) which is consistent to findings in other studies (Pittet et al., 2004).

Also majority (86.6%) knew that hand rubbing is not more effective against germs than handwashing. Less than half of the respondents' were aware of the hand hygiene method needed before giving an injection (39.4%) and after making a patient's bed (20.5%). Majority (>80%) were aware that the following should be avoided as is associated with increased likelihood of colonisation of hands with harmful germs: wearing jewellery, damaged skin and artificial fingernails.

In our study, less than half (31.1%) does not believe that infection prevention notices reminds them of hand hygiene. Also about 32.2% believes that wearing gloves sometimes reduces the need for hand hygiene. Majority of the respondents (>70%) always washes hands after defecating, before and after meals. The top four (4) factors influencing hand hygiene practices included: inadequate water (21.9%); lack of clean towels (15.1%); lack of air dryer (14.0%) and absence of detergent (13.0%) and the top three (3) reasons for not practicing hand hygiene included: heavy patient load (33.5%); forgetfulness (23.6%) and lack of time (17.9%). This findings explaining the low compliance in

proper hand hygiene practices is consistent with other studies performed in Nigeria and Ghana (Omuemu et al., 2013; Yawson&Hesse.,2013; Alex-Hart &Opara,2011).

In this study, techniques commonly used by respondents' for hand hygiene are the use of cold running water (27.3%), use of alcohol-based hand rub (22.9%). Only 18 (5.3%) were using warm running water. Hand drying techniques used included: use of common towels (30.3%);use of personnel handkerchiefs (21.5%); allowing hands to dry on their own (19.3%), use of disposable towels (10.9%). From the above, it could be seen that alcohol-based hand rubs are not much patronised by healthcare workers,maybe because of its availability or because of heavy patient load/insufficient time preventing its use or because of lack of awareness for its use in preventing transmission of germs.

Our study demonstrates that the professional status of the healthcare worker was significantly associated with hand hygiene knowledge score ($P= 0.005$), but not correlated to their departments ($P=0.390$), which is inconsistent with other studies that have noticed better hand hygiene compliance among healthcare workers working in Paediatrics and Medicine departments as compared to those involved in surgical and intensive care units (Larson EA,2004;Pessosa-silva et al.,2005)).

5. Conclusions

Knowledge in hand hygiene practices was found to be fair, with heavy patient load, forgetfulness and unavailability of water and detergent being the major contributing factors hampering proper hand hygiene practices. Also there was low patronage for alcohol-based hand rubs and only 5.3% had access to warm running water. A hospital-wide program aiming at healthcare workers and adoption of alcohol-based hand rubs at the point of care can help improve compliance to hand hygiene. Senior practitioners should be sensitized to act as role models of excellent hand hygiene practice to junior practitioners.

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Author Contributions

I.A. was the principal author and contributed to the study concept, design, interpretation and discussion of the data. S.S. contributed to the data collection and J.C. contributed towards analysis of the data. All authors read and approved the final manuscript.