Assessment of Health Workers' Knowledge, Perception and Compliance Following a World Health Organisation Multimodal Hand Hygiene Intervention Campaign an a Nigerian Teaching Hospital

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ABSTRACT

Background: The transmission of health care-associated infections (HCAI) in hospital environment constitutes a significant major public health problem worldwide and health-care workers are potential source of these infections. This study assessed the knowledge and perception of health workers in a Nigeria Teaching Hospital following the implementation of the World Health Organization (WHO) hand hygiene intervention strategy.

Methods: The study participants were physicians, nurses and other health workers involved in direct patient care. The intervention included training/education; use of reminders in the workplace; and introduction of 70% isopropyl alcohol hand rub in strategic 'points of care' places. The WHO hand hygiene evaluation and feedback tool was used for the assessment of the health workers perception.

Results: A total of 71 (65.7 %) out of 110 respondents participated in the hand hygiene training conducted during the period of the study; however only 58 of the respondents (53.7 %) routinely use alcohol-based hand rub. In the assessment of the knowledge of the main route of cross contamination and the most frequent source of germs responsible for HCAI, 45.9% and 43.9 % of the respondents respectively answered correctly. The follow-up perception survey conducted among the participants indicates that 63.2% of them admitted that the training/educational activities they participated in were very important to improve their hand hygiene practices.

Conclusion: Hand hygiene campaigns using the WHO tools and methodology can improve hand hygiene knowledge, perception and compliance of the health workers.

Keywords: *knowledge, perception, compliance, health workers, hand hygiene*

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Introduction

The transmission of health care-associated infection (HCAI) in hospital environment constitutes a significant major public health problem worldwide and health-care workers are potential source of these infections.[1-3] The World Health Organization (WHO) defined HCAI as an infection occurring in a patient during the process of care in a hospital or other

health-care facility which was not present or incubating at the time of admission, this includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility.[3] HCAI affects hundreds of millions of people worldwide and is a major global issue for patient safety. In modern health-care facilities in the developed world, 5–10% of patients acquire one or more infections. In developing countries the risk of HCAI is 2–20 times higher than in developed countries and the proportion of patients affected by HCAI can exceed 25%. In intensive care units, HCAI affects about 30% of patients and the attributable mortality may reach 44%.[1-3]

There is sufficient evidence indicating that most HCAIs can be transmitted from patient to patient via the hands of health-care workers.[4,5] Hand hygiene therefore is the simplest proven method to reduce the incidence of health care-associated infections.[6]

Although hand hygiene is generally acclaimed to be a very important strategy in the prevention of HCAI, it is one of the most neglected HCAI control practices among health workers.[3] Therefore the identification of effective methods to improve the practice of hand hygiene among health worker would greatly enhance patient safety and result in a significant decrease in HCAIs. In recent times the WHO through its Patient Safety Initiative has been promoting and supporting efforts to improve hand hygiene compliance among health workers worldwide.[3,7] According to the World Health Organisation,[3] successful and sustained hand hygiene improvement is achieved by implementing multiple actions to tackle different obstacles and behavioural barriers. Based on the evidence and recommendations from the WHO Guidelines on Hand Hygiene in Health Care,[3,8] the following components make up an effective multimodal strategy for hand hygiene: System change; Training/Education; Evaluation and feedback; Reminders in the workplace; and Institutional safety climate.

There is no documented systematic study in Nigeria on the use of the WHO hand hygiene intervention strategy to improve hand hygiene compliance among health workers. There is also no study on the perception of the health workers following the implementation of the WHO hand hygiene intervention strategy in a tertiary health facility. This study therefore provides scientific information that can aid in the development of hand hygiene intervention programme implementation. It also provides a baseline measurement on which future interventions can be monitored and evaluated.

Materials and methods

Setting: The study took place from January 2010 to April 2011 at Ebonyi State University Teaching Hospital (EBSUTH) and its training extension facility the Federal Medical Centre, located in Abakaliki the capital of Ebonyi State, south-eastern Nigeria. The study targeted physicians, nurses and other health workers involved in direct patient care. The study was approved by the Ethics Committee of the Ebonyi State University Teaching Hospital and by the Ethical Review Committee of the World Health Organisation.

Hand hygiene intervention:

This involved the implementation of strategies that promoted hand hygiene compliance as health care facility priority and included the following:

(i).Training/education sessions: The training/education sessions were conducted separately for nurses and doctors. The training was conducted by the Research Team at the Hospital's conference hall using Power Point presentation, and training handouts given to each participant. The training on hand hygiene focused on: background to WHO Patient Safety and the First Global Patient Safety Challenge; definition, impact and burden of HCAI; major patterns of transmission of health care-associated pathogens, with a particular focus on hand transmission; prevention of HCAI and the critical role of hand hygiene. The tools for the training sessions were downloaded from the WHO URL (http://www.who.int/gpsc/5may/tools/training_education/en/index.html). A total of 202 health workers (39 doctors and 163 nurses) were trained in a series of workshops.

(ii). Use of reminders in the workplace*:* After the completion of all training activities, materials used as reminders were downloaded from WHO Patient Safety website (http://www.who.int/gpsc/5may/tools/workplace_reminders/en/index.html) and were reproduced in the forms of posters, prescription notebooks, and computer screen savers. The hand hygiene posters were then pasted in all the hospital wards at strategic locations such as: near wash hand sink, beside beds, consultation rooms, etc.

*(*iii). Introduction of alcohol hand rub: A 250ml 70% isopropyl alcohol hand rub was placed at strategic 'points of care' places within the hospital and were constantly replaced throughout the project period.

Assessment of health workers' perception

The tools used for the assessment of health workers perception were the WHO hand hygiene evaluation and feedback tools downloaded from the WHO URL

(http://www.who.int/gpsc/5may/tools/evaluation_feedback/en/index.html). The tools used included: Hand Hygiene Knowledge Questionnaire for Health-Care Workers, Follow-Up Perception Survey Questionnaire for Health-Care Workers and Ward Infrastructure Survey Questionnaire

Data analysis

Data obtained from the study was analyzed using the Epi Info software, version 3.5.3. The analysis was performed according to the recommendations of WHO.

Results

Outcome of Hand Hygiene Knowledge Survey for Health-Care Workers:

The summary of the characteristics of the surveyed health care workers is presented in Table 1. A total of 65.7% of the respondents participated in the hand hygiene training conducted during this research period; however only 53.7% of the respondents routinely use alcohol-based hand rub.

The summary of hand hygiene knowledge survey for health workers is presented in Table 2. In the assessment of the main route of cross contamination, 45.9% of the respondents answered correctly while in the assessment of the most frequent source of germs responsible

Table 1: Post-intervention characteristics of the Health workers surveyed

Parameter assessed	Frequency	Percent (%)
{ŝŝ		
Male	30	27.3
Female	80	72.7
Total	**110**	
Profession		
Doctor	26	26.6
Nurse	63	57.3
Midwife	19	17.3
Others	2	1.8
Total	**110**	
Department		
Internal medicine	11	10.0
Surgery	20	18.2
Intensive care unit	6	5.5
Emergency unit	19	17.3
Obstetric	23	20.9
Paediatrics	11	10.0
Outpatient clinic	11	10.0
Others	7	6.4
Total	**110**	
Participated in hand hygiene training		
Yes	71	64.5
No	37	33.6
Indifferent	2	1.9
Total	**110**	
Use alcohol based hand rub		
Yes	58	52.7
No	50	45.5
Indifferent	2	1.8
Total	**110**	

for HCAI, 43.9% of the respondents answered correctly.

Outcome of Follow-Up Perception Survey for Health-Care Workers:

The summary of hand hygiene follow-up perception survey for health workers is presented in Table 3. Of the 109 health workers who participated in the survey, majority of the respondents (53.2 %) noted that the impact of a health care-associated infection on a patient's clinical outcome is high. Similarly about half the proportion of the respondents (50.5 %) also noted the high effectiveness of hand hygiene in preventing health care-associated infections. Up to 67.0 % of respondents noted that leaders at the institution strongly support hand hygiene;

Table 2: **Post-intervention health workers' hand hygiene knowledge survey outcome**

Parameter assessed	Number examined	Frequency	Percent (%)
L `lmqnt sd ne bqnrr			
Contamination			
Colonised surface	109	21	19.3
Health care worker's hand*	109	50	45.9
Hospital air	109	19	17.4
Sharing objects	109	19	17.4
Most frequent source of HCAI			
Gnrohs`k`hq	107	1	0.9
Germs already present on or within the patient*	107	47	43.9
Hospital environment (surfaces)	107	52	48.6
Hospital's water system	107	7	6.5
Minimal time for hand rub to kill most germs on hands			
1 minute	105	20	19.0
20 seconds*	105	49	46.7
10 seconds	105	20	19.0
3 seconds	105	16	15.3
To prevent HCAI transmission to the patient Use hand rub			
Before touching a patient*	104	100	96.2
Immediately after body fluid exposure*	79	29	36.7
After exposure to patient surroundings*	77	28	36.4
Before clean/aseptic procedure*	81	62	76.5
To prevents HCAI transmission to the health worker, use hand rub			
Before touching a patient*	98	92	93.9
Immediately after body fluid exposure*	87	82	94.3
After exposure to patient surroundings*	75	29	38.7
Before clean/aseptic procedure*	84	77	91.7
Correct statements on hand hygiene			
Hand rub more rapid than hand washing*	88	12	13.6
Hand rub dries the skin more than hand Washing*	81	57	70.4
Hand rub is more effective than hand washing*	80	28	35.0
Hand washing & hand rub recommended in sequence *	88	64	72.7
Hand rub and not hand washing is the most ideal method required			
Before palpation of abdomen*	105	72	68.6
Before giving an injection *	104	51	58.7
After emptying bedpan *	106	22	20.8
After removing gloves *	105	22	21.0
After making a patient's bed*	106	43	40.6
After exposure to blood *	107	27	25.2

52.8 % noted that alcohol based hand rub is available at each point of patient care; but only 21.9 % noted that patients were invited to remind HCW to perform hand hygiene. Up to 49.0 % of the respondents noted that the fact they were being observed made them pay more attention to their hand hygiene practices, while 63.2 % admitted that the

Table 3: Post-intervention health workers' follow up perception survey outcome

Parameter assessed	Outcome/findings								
Gender (N= 109)	Male 37(33.9)					Female 72(66.1)			
Profession (N=110)	Doctor 22(20.2)			Nurse 74(67.9)		Midwife 9(8.3)		Others 3(2.8)	
Department (N=109)	Internal medicine	Surgery	Intensive care unit	Medical/ surgical	Emergency unit	Obstetric	Pediatrics	Outpatient clinic	Others
	8(7.3)	22(20.2)	13(11.9)	13(11.9)	12(11.0)	22(20.2)	13(11.9)	14(12.8)	3(2.8)
Hand hygiene training (N=108)	Yes 73(68.2)					No 34(31.8)			
Use of handrub (N=105)	Yes 57(54.3)					No 48(45.7)			
Percentage of patients who will develop HCAI (N=63)	?20% 13(20.6)		21-40% 22(12.2)		41-60% 10(15.9)		61-80% 15(23.8)		81-100% 3(4.8)
Impact of HCAI patient's clinical outcome (N=109)	High 58(53.2)		Low 26(23.9)		Very high 17(15.6)			Very low 8(7.3)	
Effectiveness of hand hygiene (N=107)	High 54(50.5)		Low 10(9.3)		Very high 42(39.3)			Very low 1(0.9)	
Priority of hand hygiene at your institution(N=108)	High priority 40(37.0)		Low priority 4(3.7)		Moderate priority 26(24.1)			Very high priority 38(35.2)	
Situations hand hygiene performed by HCW(N=86)	?20% 3(3.5)		21-40% 10(11.6)		41-60% 24(27.9)		61-80% 35(40.7)		81-100% 16(18.6)
	1	2	3	4	5	6	7		
Leaders support hand hygiene (N=106)	Not effective 2(1.9)	6(5.7)	1(0.9)	2(1.9)	11(10.4)	13(12.3)	Very effective 71(67.0)		
Handrub available at each point of patient care (N=106)	19(17.9)	4(3.8)	6(5.7)	2(1.9)	8(7.5)	11(10.4)	56(52.8)		
Hand hygiene posters are displayed at point of care (N=106)	8(7.4)	4(3.7)	4(3.7)	5(4.6)	9(8.3)	14(13.0)	64(59.3)		
You perform hand hygiene perfectly (N=106)	6(5.7)	0(0)	5(4.8)	8(7.6)	7(6.7)	19(18.1)	60(57.1)		
Patients invited to remind HCW to perform hand hygiene (N=106)	50(47.6)	6(5.7)	6(5.7)	4(3.8)	4(3.8)	12(11.4)	23(21.9)		
Being observed made you pay more attention to hand hygiene (N=100)	**1 Not at all** 11(11.0)	**2** 2(2.0)	**3** 1(1.0)	**4** 4(4.0)	**5** 10(10.0)	**6** 23(23.0)	**7 Very much** 49(49.0)		

training/educational activities they participated in were very important to improve their hand hygiene practices.

Outcome of Ward Infrastructure Survey: The summary of the outcome of ward infrastructure survey is presented in Table 3. Of the 17 health workers who participated in the survey, 13 of the respondents noted that water is regularly available in the ward. A total of nine of the respondents noted that an

Table 4: Post-intervention ward infrastructure survey outcome

Parameter assessed	Outcome/findings								
Department (N=17)	Internal medicine	Surgery	Intensive care unit	Medical/ surgical	Emergency unit	Obstetric	Pediatrics	Outpatient clinic	Others
	2(11.8)	3(17.6)	1(5.9)	1(5.9)	1(5.9)	3(17.6)	3(17.6)	1(5.9)	1(5.9)
Position of respondent (N=17)	Head nurse		Hand hygiene programme co-ordinator			Other infection control team member		Others	
	4(23.5)		6(35.3)			5(29.4)		3(17.6)	
Availability of water (N=17)	Always		Intermittently			Rarely		Never	
	4(23.5)		6(35.3)			5(29.4)		3(17.6)	
kind of taps available (N=17)	Hand-operated		Elbow/wrist-operated			Automatic		Foot-operated	
	17(100)		0(0)			0(0)		0(0)	
Disposable towels available at all sinks (N=17)	Always		Intermittently			Rarely		Never	
	2(11.8)		1(5.9)			1(5.9)		13(76.5)	
Available of soap at all sinks (N=17)	Always		Intermittently			Rarely		Never	
	2(11.8)		1(5.9)			1(5.9)		13(76.5)	
Alcohol-based handrub available (N=17)	Always		Intermittently			Rarely		Never	
	4(23.5)		9(52.9)			4(23.5)		0(0)	
Type of handrub dispensers available (N=17)	Pocket bottle		Bottle affixed to trolley/tray		Bottle affixed to bed	Wall dispenser		Dispenser located on bedside table/trolley	
	6(35.3)		7(41.2)		0(0)	1(5.9)		2(11.8)	
Handrub dispensers replaced when empty (N=17)	Always		Intermittently			Rarely		Never	
	6(35.3)		6(35.3)			4(23.5)		1(5.9)	
Posters illustrating indications for hand hygiene displayed (N=17)			Yes 15(88.2)				No 2(11.8)		
Audits on hand hygiene compliance periodically performed (N=17)			Yes 12(75.0)				No 4(25.0)		

alcohol-based hand rub is intermittently available, while 14 of the respondents admitted that there is an assigned person responsible for the refilling or replacement of empty dispensers. Nearly all the respondents (15) noted that posters illustrating hand wash technique are displayed beside each sink.

Discussion

The outcome of the hand hygiene knowledge survey conducted among the health workers in this study showed a poor level of knowledge related to the main route of cross contamination with germs and the most frequent source of HCAIs among them. This may not be unconnected with the fact that a sizeable proportion of them did not participate in the hand hygiene training intervention conducted during the research period. However, majority of the respondents studied had a good level of knowledge related to some aspects of hand hygiene actions that prevent transmission of HCAI to the patient and health-care worker. What can be inferred from this observation is that there is need for a

more intensive hand hygiene training programme for these health-care workers. Recent studies have provided evidence to support the improvement of health workers knowledge on hand hygiene and compliance through interventional training programmes.[9,10] Compliance is a multifactorial problem that involves knowledge, behaviour and educational awareness; and frequent reminders are critical to maintain high rates of hand hygiene compliance.[10]

The outcome of follow-up perception survey of health workers provided some insight on factors that contributed to the positive impact of the hand hygiene training programme conducted during the research period. The success factors as perceived by the health workers included: high priority importance of hand hygiene at the hospital; the performance of hand hygiene in 61-80% of situations requiring hand hygiene by health-care workers in the hospital; the very strong support of leaders in the hospital to hand hygiene; the display of hand hygiene posters at point of care and the clear instructions for hand hygiene made visible in the hospital. These factors have been reported in many previous studies to be responsible for the improvement in hand hygiene compliance rate in health care facilities in various parts of the world.[9,11]

Interestingly, only about 22 % of the health workers in this study noted that patients were invited to remind them to perform hand hygiene. This is an indication that this is not a common practice in the health facility. There are only a few studies that have evaluated the role of patients in health workers motivation to perform hand hygiene. In a study conducted in Switzerland on Patients' beliefs and perceptions of their participation to increase healthcare worker compliance with hand hygiene, [12] the authors noted that most patients who participated responded that they would not feel comfortable asking a nurse (76 %) or a physician (77 %) to perform hand hygiene. It may be needful for patients to be educated to remind their health care providers to perform hand hygiene as this might help to improve hand hygiene compliance.

In the present study, up to 49 % of the health workers admitted that the fact that they were being observed made them pay more attention to their hand hygiene practices. A number of previous studies have indicated that the effect on the health worker of being observed or monitored (i.e., the Hawthorne effect) tends to significantly increase hand hygiene compliance rate.[13-15] Studies have shown that when health workers are aware they are being observed by recognized observers, the outcome is usually higher rates of hand hygiene compliance, even in a healthcare setting where such observations have become routine.[13]

In another study conducted in Germany, the authors noted that the Hawthorne effect had a marked influence on compliance with antiseptic hand rub use; with a 55% increase in compliance with overt observation.[14] There has been the argument that Hawthorne effect as an unintended consequence of observational studies contributes to altered behaviour that may not be sustained when the period of observation elapses.[16] This is clearly demonstrated by Harbarth et al. who noted in their report that baseline hand hygiene compliance decreased after the first 2 weeks of observation from 42.5% to 28.2% (presumably

because of waning of a Hawthorne effect). These findings therefore suggest that maintaining the Hawthorne effect in health care facilities can sustain the high rate of hand hygiene compliance among health workers. Although many health workers may not be comfortable with this, however it is the view of some researchers that Hawthorne effect should be an integral component of the hand hygiene campaign since obtaining a sustained and never-ending Hawthorne effect is associated with improved compliance with hand hygiene and decreased infection and cross-transmission rates.[14,15]

The outcome of ward infrastructure survey conducted in this study indicates that basic facilities and amenities that can encourage hand hygiene practice were to a large extent available in the wards, though not very optimal. A total of 76% to 94% of the respondents admitted that facilities which enhance hand hygiene performance were always available in the wards. Such facilities included regular visibly clean running water; hand operated taps with sink; soap in all sinks; examination gloves in all wards; and posters illustrating hand wash technique displayed beside each sink. A considerable proportion of the respondents (52.9%) noted that an alcohol-based hand rub is intermittently available, and up to 75% noted that audits on hand hygiene compliance are periodically performed on their ward. The availability of these infrastructures was a major boost to the hand hygiene campaign conducted in the hospital and it is believed to have enhanced the hand hygiene compliance rate recorded in the study. There are numerous reports from developed and developing countries which indicate that the provision of hand hygiene infrastructure and facilities within the reach of health workers in wards can greatly enhance hand hygiene compliance by the health workers.[9,18-21]

The outcomes of this study have shown that hand hygiene campaigns using the WHO tools and methodology can be successfully executed in tertiary health facilities in low income setting with far reaching improvement in the knowledge and compliance of the health workers. Apart from educational intervention and the use of reminders in the work place, findings from this study also indicate that there is need to improve hand hygiene facilities especially the use of alcohol-based hand rubs to encourage compliance.

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