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Epidemiological Study on Hand Hygiene Practices Among Health Care Workers at Infectious Diseases Hospital Kano, Nigeria

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Abstract

Background: *Effective hand hygiene is essential for reducing healthcare associated infections. However, compliance of healthcare workers to hand hygiene guidelines are reportedly poor. It is important therefore to instill adequate knowledge and good attitudes and practices at the time of primary training of the healthcare workers. The aim of the study was to assess hand hygiene practices among healthcare workers in Infectious Diseases Hospital Kano, Nigeria. It was hoped that the study would benefit all health care workers through making recommendations aimed at improving hand hygiene compliance.*

Methods: *Quantitative, Cross-sectional study, using a self-administered Questionnaire to collect data on 260 participants. The results were analyzed using SPSS version 24.0.*

Results: *The result shows that 260 participants responded to the questionnaire. The majority of participants had good knowledge of hand hygiene and younger participants practiced hand hygiene more than older ones ($p<.05$).*

Conclusion: *The study highlighted the practices of hand hygiene among health care workers and the status of hand hygiene resources in the hospital which have a negative impact on hand hygiene practices demonstrated that compliance with hand hygiene compliance among health care workers remains unacceptably low, despite the irrefutable scientific evidence that hands are the most common vehicle for transmission of pathogens. 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*: Hand hygiene, Health care workers, Hand hygiene practices, Health care associated infection, Resource.*

Background of the study

Prevention and management of infection is the responsibility of all staff working in health care services, and an integral element of patient safety programmes [36]. This is applicable to all healthcare services, regardless of the patient setting or care provider. Infection prevention and control (IPC) is a process of developing and implementing safe, evidence-based practices towards improving quality healthcare and is usually part of quality assurance [17, 18]. This is achieved by monitoring infection and implementing IPC measures through education of patients, employees and visitors on the principles and practices of IPC [17]. Appropriate hand hygiene is singled out as the most important measure in preventing these infections. However, hand hygiene compliance among healthcare professionals remains low despite the well-known effect on infection reduction. Hand hygiene is paramount in preventing transmission of pathogen [17]. Since the publications of the first IPC manuals significant progress has been made globally in understanding the basic principles of infection prevention as well as acceptance and use of evidence-based infection prevention practices [36]. It is now recognized that IPC does not only reduce the risk of disease transmission to patients and visitors but also protects healthcare workers including doctors, nurses, laboratory workers, cleaning and housekeeping staff [7]. Comprehensive infection prevention and control practices are

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therefore required to effectively prevent, identify, monitor, and control the spread of infections in all health care facilities [9].

Transmission of health-care-associated infections (HAIs) most often occurs via the contaminated hands of health care workers [12]. HAIs also impact on the health service in terms of extended lengths of stay of affected patients, the costs of diagnosis and treatment of the infections and their complications, and the costs of specific infection control measures [27]. Healthcare workers' hands are the most common vehicle for the transmission of healthcare-associated pathogens from patient to patient and within the healthcare environment. Hand hygiene is the leading measure for preventing the spread of antimicrobial resistance and reducing healthcare-associated infections (HCAIs), but healthcare worker compliance with optimal practices remains low in most settings. According to Mehtar, [17] adherence rates of hand washing is up to 67% at best and most of the studies reveal that health care workers do not wash hands willingly.

Hands play a major role in the transmission of infection in healthcare setting and the importance of hand hygiene in the control of infection cannot be overemphasized [8]. Appropriate hand hygiene can minimize micro-organisms acquired on the hands during daily duties [5]. Hand hygiene, defined as the act of washing one's hands with soap and water, or disinfecting them with an antiseptic agent, has been recognized as the single most effective and cost-effective means of preventing hospital acquired infection, as well as an effective means of preventing illness in the community that may lead to hospitalization [2]. Despite this, many studies have documented that compliance with hand hygiene recommendations in healthcare settings is consistently less than 50% [28]. Intensive education programs have been associated with modest improvements in hand hygiene and dramatic reductions in rates of hospital-acquired infections [1]. However, few programs have documented continuing success.

Infectious Diseases Hospital which is a centre of excellence, and an academic hospital have the basic need for studies on infection control practices. Though infection prevention and control training are carried out there are still gaps which need to be identified on the practices of infection control. To date no hand hygiene study has been carried out in the hospital hence there is need to conduct research on such issues. There have been outbreaks of Gastro- enteritis on several occasions but no effort has been made to establish it so rig in. However, the a for ementioned condition is associated with hand hygiene. Health care workers had suffered from communicable disease after caring for patients with such communicable diseases like Tuberculosis and chicken pox. According to Pittet, et al, [28], in the mid- 1800s, studies by Ignaz Semmelweis in Vienna and Oliver Wendell Holmes in Boston established that hospital-acquired diseases, now known to be caused by infectious agents, were transmitted via the hands of HCWs. In the community, hand hygiene has been acknowledged as an important measure to prevent and control infectious diseases and can significantly reduce the burden of disease, in particular among children in developing countries [3].

In the health-care setting, a prospective controlled trial conducted in a hospital nursery and investigations conducted during the past 40 years have confirmed the important role that contaminated hands of HCWs play in the transmission of health care-associated pathogens [37]. Currently, hand hygiene is considered the most important measure for preventing the spread of pathogens in health-care settings [24]. HCWs carry high levels of bacteria on their dominant hand, even without direct patient contact, hence the practice of hand hygiene needs to be studied. According to Mehtar, [17] eighty per cent of pathogen transmission both inside and outside healthcare facilities occurs via hands.

Hand-hygiene should be practiced at Infectious Diseases Hospital in accordance with WHO Guidelines on Hand Hygiene in Health Care [41]. The 2009 *WHO Guidelines* provide a comprehensive review of scientific data on hand hygiene rationale and practices in health care. However, compliance by health care workers with recommended hand hygiene procedures has remained unsatisfactory, with compliance rates generally below 50% of hand hygiene opportunities [22]. Some of the factors that have contributed to poor hand washing compliance among health care workers, include lack of knowledge among personnel about the importance of hand hygiene in reducing the spread of infection and how hands become contaminated, lack of understanding of correct hand hygiene technique, understaffing and overcrowding, poor access to hand washing

facilities, irritant contact dermatitis associated with frequent exposure to soap and water, and lack of institutional commitment to good hand hygiene [30].

Hand hygiene practices remain a major challenge among Health Care Workers at Infectious Diseases Hospital. There are still some gaps in the implementation of hand hygiene activities and health care workers attitudes towards hand hygiene strategies. Hand hygiene practices are required to effectively prevent and control the spread of infections in Infectious Diseases Hospital. The most important scope of such practices is: monitoring of health care practices, surveillance of infection in health care facilities, reporting process, adequate infrastructure, e.g. sinks, availability of appropriate supplies and equipment, education or training of staff and periodic evaluation of the hand hygiene policies and guidelines [23]. It is important for all health care Workers to adhere to the infection control guidelines strictly. It is also imperative for health care administrators to ensure implementation of the hand hygiene programme in health care facilities, according to World Health Organization guidelines of 2003[41].

Methodology

Study design

In this study a quantitative study approach was utilized, in order to provide more insight about the practices of HCWs in hand hygiene.

A cross sectional descriptive study design was implemented and data collected using a questionnaire. The study examined data collected at one point in time from the different categories of HCW. The data collected from each category of HCWs was compared using statistical measures.

Study site and population

The research was conducted at Infectious Diseases Hospital (IDH) Kano, Nigeria. Infectious Diseases Hospital (IDH), Kano is a government owned specialized secondary health facility serving a population of about 1.5 million and having a patronage of about 300/day. It is a referral centre located along France road in Kano metropolis. The hospital caters for all infectious diseases' cases such as HIV, TB, gastroenteritis, cholera, etc.

This study was involved HCWs from Infectious Diseases Hospital (IDH), Kano for the period of **December, 2018** through **January, 2019** hence making a total study population of 800 HCWs from which the sample was drawn.

Sample size determination

In this study, manual calculation of the sample size using Morgan and Krejcie [19] formula was used for sample size determination as stated below:

$$S = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P)$$

Where:

S = Required sample size

X^2 = The table value of the chi-square at desired confidence **(3.841)**

N = Study Population size (**800)**

P = Population proportion assumed to be **0.50** since this would provide maximum sample size

d^2= Degree of accuracy of the result expressed as proportion **0.050**

$$\frac{3.841\times800\times0.5\times0.5}{0.0025\times799+3.841\times0.5\times0.5} = \frac{768.2}{2.95775} = 259.7 = 260$$

Hence 260 respondents

Inclusion criteria and exclusion criteria

Inclusion criteria

The inclusion criteria were all health care workers working at the hospital and willing to participate in thestudy.

Exclusion criteria

Hospital workers who do not deal directly with touching patients, and those whose mandate is not patient care.

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Data collection

Data collection procedure

Data collection was subject to strict controls and procedures were followed precisely, to ensure that the data was valid, reliable and useful [17]. Data was obtained on the Hand Hygiene practices among HCW at Infectious Diseases Hospital. The healthcare workers were informed about the purpose of the study. And consent was obtained prior completion of the questionnaire. The questionnaire was delivered by the researcher personally to the participants.

The participants were given clear instructions of filling the questionnaire. It took roughly about 20-25 minutes to fill in the questionnaire. Data was collected in fifteen days. The participants were followed in their respective departments (work place) during morning and afternoon shifts.

Instrument

A self-administered questionnaire was applied; the questionnaire consisted of three

(3) Sections: socio-demographic profile; attitudes of HCWs and practice of healthcare on hand hygiene. For attitude questions Three (3) point Likert scale was used.

Data collection procedure

The questionnaires were written in English since all participants were able to read and write the English language well and the medium of instruction in the hospital is English.

Data analysis

Data were analyzed using SPSS software version 24.0 at that time with the help of the Statistician. The descriptive statistical method was used to analyze frequencies and percentages.

Reliability and validity

Reliability

Reliability is the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure [32].

The questionnaire was pre-tested at another health care facility (Area W clinic) to ensure that it was reliable. Twenty health care workers at Area W clinic were given the questionnaire.

Validity

Validity is the degree to which an instrument measures what it is intended to measure sampling [32]. Validity was addressed by submitting the questionnaire to peers and experts (supervisor), to ensure that the questionnaire covered all areas stated in the objectives of the study.

Content Validity is the degree to which the items in an instrument adequately represent the universe of content for the concept being measured [32]. The questionnaire was submitted to supervisor and also to colleagues who work on researchers within the hospital to ensure that the instrument covered all areas hence content validity was addressed.

Face validity

Face Validity is the extent to which a measuring instrument looks as though it is measuring what it purports to measure [32]. Face validity was addressed through a series of consultations with the supervisor to ensure that the questionnaire did not mimic what it was intended to do.

Bias

Bias is any influence that produces a distortion in the results of a study [32]. Sampling bias was minimized by using stratified random sampling thereby giving all categories of HCWs an equal chance of being included for the study.

Ethical considerations

This study was conducted only after obtaining approval from infectious diseases hospital (IDH) Kano, Research Ethics Committee

Results

A total of 260 Health Care Workers (HCWs) were interviewed, giving 100% response rate. Of the study subjects, 166(63.8%) and 94(36.2%) were males and females respectively. Among all, 98(37.7%) of HCWs were 30-39 years of age. 115 (44.2%) of HCWs were never married, 125(48.1%) currently married. 12(4.6%) divorced and 8(3.1%) HCWs were widowed **(Table 1)**.

The socio-economic characteristics of the study showed that, among all HCWs, 8(3.1%) of HCWs were Doctors 36(13.8%) of HCWs were Medical Lab Scientist, 38(14.6%) of HCWs were Nurses, 18(6.9%) of HCWs were Pharmacist, 48(18.5%) of HCWs were Primary Health Care, 24(9.2%) of HCWs were X-ray, 35(13.5%) of HCWs were health Assistance. Among all, 87(33.5%) of HCWs were 11-15 years of working experience **(Table 1**

Table 1. Socio demographic characteristics of the study population N=260

VARIABLE	FREQUANCIES	PERCENTAGES %
Gender N=260		
Males	166	63.8
Females	94	36.2
Ages N= 260		
20-29	75	28.8
30-39	98	37.7
40-49	82	31.5
50+	5	2
Marital Status N=260		
Married	125	48.1
Single	115	44.2
Divorce	12	4.6
Widowed	8	3.1
Professional N=260		
Medical Doctors	8	3.1
Medical Lab Scientist	36	13.8
Nurses	38	14.6
Pharmacist	18	6.9
Primary Health Care	48	18.5
Med Lab Technician	25	9.6
Pharmacy Technician	28	10.8
x-ray	24	9.2
Health Assistance	35	13.5
Work Experience N=260		
1-5yrs	49	18.8
6-10yrs	65	25
11-15yrs	87	33.5
16yrs+	59	22.7

Table 2: shows that the majority of the respondents have Knowledge of Hand Hygiene; About 50% of HCWs reported that Performing hand hygiene slows down building immunity to disease

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Table 2. Knowledge of hand hygiene as reported by respondents, n=260

S/N	Knowledge of hand hygiene	Yes N (%)	No N (%)	Not sure N (%)
1	I was educated on the use of the hand Hygiene	253(97.3)	5(1.9)	2(0.8)
2	I know what is hand hygiene	257(98.8)	2(0.8)	1(0.4)
3	Performing hand hygiene in the recommended situations can reduce patient Mortality	235(90.4)	23(8.8)	2(0.8)
4	Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital acquired infections	230(88.5)	20(7.7)	10(3.8)
5	Prevention of hospital acquired infection is a valuable part of a health care worker's role	251(96.5)	7(2.7)	2(0.8)
6	Failure to perform hand hygiene in the recommended situations can be considered negligence	226(86.9)	29(11.2)	5(1.9)
7	Performing hand hygiene slows down building immunity to disease	130(50)	120(46.2)	10(3.8)
8	Performing hand hygiene after caring for a wound can protect from infections	258(99.2)	2(0.8)	0(0)
9	Cleansing hands after going to the toilet can reduce transmission of infectious disease	259(99.6)	1(0.4)	0(0)

Table 3 below shows that 57.7% of HCW sometimes forget to perform hand hygiene; 61.2% HCW wash my hands every-time after they handle patient.52.7% HCW reported that When busy it is more important for the respondent to complete their, tasks than to perform hand hygiene.36.9% HCWs reported that they can't always perform hand hygiene in recommended situations because their patient's needs come first.

90.8% of health care workers can effectively apply their knowledge of hand hygiene to their clinical practice.84.6% HCW take Hand hygiene as a habit for them in their personal life. 85.4% of HCW believe have the power to change poor Practices in the workplace.65.4% HCWs reported It was an effort to remember to perform hand hygiene in the recommended situation.

Table 3. Practice of Hand hygiene as reported by respondents N=260

S/N	Practice	Yes N (%)	No N (%)	Not sure N (%)
1	I sometimes forget to perform hand hygiene	150(57.7)	106(40.8)	4(1.5)
2	I wash my hands every-time after I handle Patient	159(61.2)	95(36.5)	6(2.3)
3	When busy it is more important to complete my tasks than to perform hand hygiene	137(52.7)	112(43.1)	11(4.2)
4	I can't always perform hand hygiene in recommended situations because my patient's needs come first	96(36.9)	159(61.2)	5(1.9)
5	I follow the example of senior health care workers when deciding whether or not to perform	85(32.7)	163(62.7)	12(4.6)

	hand hygiene			
6	I believe I have the power to change poor practices in the work place	222(85.4)	30(11.5)	8(3.1)
7	Hand hygiene is a habit for me in my personal Life	220(84.6)	27(10.4)	13(5)
8	I can effectively apply my knowledge of hand hygiene to my clinical practice	236(90.8)	20(7.7)	4(1.5)
9	It is an effort to remember to perform hand hygiene in the recommended situations	170(65.4)	88(33.8)	2(0.8)
10	I would feel uncomfortable reminding a health professional to do hand wash	97(37.3)	159(61.2)	4(1.5)
11	Performing hand hygiene slows down building immunity to disease	128(49.2)	123(47.3)	7(2.7)
12	Dirty sinks can be a reason for not washing Hands	175(67.3)	81(31.2)	4(1.5)
13	Lack of an acceptable soap product can be a reason for not cleansing hands	160(61.5)	97(37.3)	3(1.2)
14	Staff do hand hygiene in between patient	70(27.3)	83(31.5)	107(41.2)

Table 4 below shows that the majority of HCWS do practice had hygiene, with only a few who did not.

Table 4. Hand hygiene Actions for Germ Transmission Prevention to the Patient, as reported by respondents, N= 260

S/N	Hand hygiene Actions	Yes N (%)	No N (%)	Not sure N (%)
1	Hand hygiene Before touching a patient	256(98.4)	1(0.4)	3(1.2)
2	Hand hygiene in Between patients	257(98.8)	2(0.8)	1(0.4)
3	Hand hygiene after physical contact with patient	259(99.6)	0(0)	1 (0.4)
4	Hand hygiene Immediately after a risk of body fluid exposure	256(98.4)	4(1.5)	0(0)
5	Hand hygiene After exposure to the immediate surroundings of a patient	255(98.1)	5(1.9)	0(0)
6	Hand hygiene Immediately before a clean/aseptic procedure	257(98.8)	3(1.2)	0(0)
7	Hand hygiene After inserting an invasive device	257(98.8)	3(1.2)	0(0)

Table 5 shows that HCWs generally had access to hand hygiene tools, but 43.5% reported that their wards did not have elbow taps and 72.3% reported that had wash basins were not easily accessible and alcohol had rubs were not functional (72.7%).

Table 5. Access to hand hygiene tools as reported by respondents, N=260

S/N	Tools	Yes N (%)	No N (%)	Not sure N (%)
1	Is Hand Soap available	228(87.7)	25(9.6)	7(2.7)
2	Are there easy to access hand wash basin	188(72.3)	69(26.5)	3(1.2)
3	Are taps elbow taps	113(43.5)	145(55.8)	2(0.8)
4	Soap dispenser available and functional	221(85)	30(11.3)	9(3.5)

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5	Disposable Hand towel available and is accessible	210(80.8)	40(15.4)	10(3.8)
6	Hand hygiene posters demonstrating good hand washing techniques available	216(83.1)	41(15.8)	3(1.2)
7	Alcohol hand rubs available and functional	189(72.7)	61(23.5)	10(3.8)
8	Is there hand washing basins in each treatment room	150(57.7)	87(33.5)	23(8.8)

Table 6 below shows that 88.5% of HCW reported that they avoid wearing jewellery while working; and 86.9% HCWs avoid artificial fingernails.

Table 6. Protection against germs as reported by respondents

S/N	Items to be avoided	Yes	No
1	Wearing jewellery	230(88.5)	30(11.5)
2	Damaged skin	240(92.3)	20(7.7)
3	Artificial fingernails	226(86.9)	34(13.1)
4	Regular use of a hand cream	60(23.1)	200(76.9)

Table 7 shows that 61.5% of HCWs reported that they are too busy to perform regular hand hygiene while 57.7 % of HCWs reported that they forget to perform hand hygiene. About 74.2% of HCWs reported that hand hygiene equipment's were not in convenient location. 78.5% HCWs reported that they do not perform hand hygiene because of lack of hand hygiene products. 22.3% HCWs reported that they were unsure of the need of hand hygiene.41.2% of HCWs reported that they do not wash hands because they always wear gloves and 43% said they do not always wear gloves.

Table 7. Reasons for not practicing regular hand hygiene as reported by respondents; N=260

S/N	Reasons	Yes N (%)	No N (%)	Not sure N (%)
1	Too busy	160(61.5)	92(35.4)	8(3.1)
2	Forget	150(57.7)	101(38.9)	9(3.4)
3	Not in convenient location	193(74.2)	55(21.2)	12(4.6)
4	Damages skin	98(37.7)	152(58.5)	10(3.8)
5	Out of product	204(78.5)	51(19.6)	5(1.9)
6	Unsure of need	58(22.3)	127(48.9)	75(28.8)
7	Always wear gloves	107(41.2)	111(42.7)	42(16.1)

Discussion

Adequate hand hygiene of healthcare workers is the single most effective means of preventing nosocomial infections. Hand hygiene compliance is based on disinfecting hands appropriately [17]. According to Erasmus et al, [6] patients in hospital are at high risk of developing infections that they did not have before admission. Erasmus et al, [6] further argue that most health care-associated infection is spread by direct contact, especially via the hands of health workers. Traditionally hand hygiene, such as washing hands before and after seeing patients, has been considered the single most important way of reducing such infections, but compliance with hand hygiene protocols in health workers is poor [4].

The results of the study revealed that most of respondents sometimes forgot to perform hand hygiene and did not wash hands every-time after they handle a patient. According to Lau Chun Ling

[13], approximately 27% - 50.8% HCWs reported that they failed to remember that they have to perform hand hygiene. Yildirim et al, [44], similarly reported that adherence to recommended hand-washing practices remains unacceptably low, rarely exceeding of situations in which hand hygiene is indicated. The current results further revealed that HCWs reported that when they are busy as reasons for non-compliance to hand hygiene. It looks like, what becomes more important to them was to complete their tasks than to perform hand hygiene. The fact that some HCWs did not regularly perform hand hygiene means that HCWs are putting the very patients that they are trying to protect at risk of cross infection, and putting themselves at risk of being infected as well. Liz et al, [14] reported that there are about 5 million cases of healthcare associated infections annually, contributing to 135,000 deaths in Europe alone. This, according to WHO [41]. has an impact on Healthcare cost to billions of dollars, and according to Chenetal, (2005) can significantly increase length of hospitalization of patients.

Mathai, George and Abraham, [15]. reported that the most common reason for the hand hygiene non-compliance was that HCWs were too busy; when the workload is heavy or the activity index is higher (>20), there is higher demand for hand hygiene and that leads to lower hand hygiene compliance, hence lower compliance rate results. According to Pittet et al [25], there is a direct relation between increased workload and reduced hand hygiene compliance.

The results of the current study revealed that there was no significant difference in practices of hand hygiene between the respondents according to different years of services. Although hand hygiene is a very simple procedure and has long been deemed one of the most important infection control measures, the compliance rates by health care workers are generally reported to be low and do not depend on the years of services.

According to Pittet, [26], five moment of hand hygiene should be performed before touching a patient, before aseptic / clean procedure, after body fluid exposure risk, after touching a patient and after touching patient surroundings. The WHO [39] Guidelines on Hand Hygiene in Health Care provider healthcare workers states that, with a thorough review of evidence on hand hygiene in health care and specific recommendations to improve practices and reduce the transmission of pathogenic microorganisms to patients and HCWs. The WHO "SAVE LIVES: Clean Your Hands" programme reinforces the "*My 5 Moments for Hand Hygiene*" approach as key to protect the patients; HCWs and the health-care environment against the spread of pathogens and thus reduce Healthcare- associated infections (HAIs). This approach encourages HCWs to clean their hands: before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient and after touching patient surroundings [38,40]. Katowa et al, [10] reported that multimodal strategies have been shown to be more successful in improving rates of adherence with hand hygiene in HCWs than single interventions, e.g. Multi-faceted approaches focusing on system change, administrative support, motivation, availability of alcohol-based hand rubs, training and intensive education of HCWs and reminders in the workplace have been recommended for improvement in hand hygiene. There should also be adequate supply of hand hygiene products, lotions and creams, disposable towels and facilities for hand washing, where necessary Alcohol hand rubs should be available at the point of care in sufficient quantities [29].

The results of this study revealed that the majority of HCWs viewed proper hand hygiene as important, however, due to insufficient hand hygiene equipment and the improper proximity of hand hygiene facilities at point of care had as reported by some HCWs, led to poor hand hygiene practices, As HCWs continue not practicing good hand hygiene, HCWs' hands become progressively colonized with germs as well as with potential pathogens during patient care. According to McGuckin et al, [16], "*the longer the duration of care, the higher the degree of hand contamination*". Hence proper hand hygiene needs to be practiced to prevent cross contamination.

The results of this study further revealed a significant association between age, gender, HCW category and hand hygiene practices. The findings further revealed that the older the HCWs the less the hand hygiene compliance. These findings are similar to Scheithauer et al., [35] who reported that younger HCWs were more compliant than older ones.

The results of this study found that HCWs generally had good knowledge about recommended hand hygiene practices. According to the results, the majority of the respondents had good knowledge

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on hand hygiene. Pittet [31] further emphasized the fact that training builds the capacity of HCWs, which has a significant association with hand hygiene compliance. Indeed, training can becrucial in terms of hand hygiene compliance; and by extension, post-training follow-up may contribute to better hand hygiene, according to Allengranzi et al [2].

According to the previous studies on hand hygiene, knowledge about hand hygiene was found to be significantly better among the obstetrics and gynecology medical residents when compared to the others [34]. The low level of knowledge of hand hygiene among the emergency medical residents in the current study was attributed to their workload and nature of their work, where they are required to work under severe pressure, and often missing the opportunity to comply to hand hygiene. Also, observational studies have found that nurses tend to have better hand hygiene practices than doctors [13]. In this study there was no significance difference between nurses and doctors according to hand hygiene practices.

Increased awareness of the importance hand hygiene is the key to prevention of HAIs. Educational interventions for HCWs should provide clear evidence that HCWs hands become grossly contaminated with pathogens upon patient contact and that hand hygiene is the easiest and most effective means of decontaminating hands and thereby reducing the rates of HAIs [34]. The results of the current study further revealed that HCWs believed that they have the power to change practice in the workplace. Yuan et al [45]. Further suggest that hand hygiene is more of a behavioral practice and the will to change bad practice to good one relies heavily on the willingness to practice proper and consistent hand hygiene.

The finding from the study showed that their respondents affirmed that Hand hygiene posters demonstrating good hand washing techniques were available. Meaning that the poster would constantly remind HCWs on performing hand hygiene. According to Sax et al [34] study on compliance with hand hygiene, improved significantly following a hospital wide education programme and coinciding with a reduction of nosocomial infections and the posters campaigns also improved adherence which was sustained and observed across the hospital.

Resource gaps can limit improvements in hand hygiene practices whereas healthcare workers both appreciated and understood the importance of hand hygiene and the recommended practices [45]. The results of this study found that the majority of HCW reported that proper practices often did not occur due to limited equipment placement to support hand hygiene efforts.

In this current study, some of the respondents reported that alcohol hand rubs are available and dispensers are functional and the majority of the respondents reported that there were functional hand washing basins in each treatment room. According to Pittet et al [28] hand hygiene was significantly improved when HCWs used alcohol-based product rather than using antiseptic detergent to clean their hands.

According to the current results HCWs indicated that it was easy to access hand hygiene tools, which is therefore a good contributing factor to good hand hygiene practices. Sax et al [34] affirmed that lack of products of hand hygiene does hamper HCWs from practicing hand hygiene. Hand hygiene resources have many barriers to proper hand hygiene (HH). There is therefore evidence that the resources/ hand hygiene commodities were available however, hand hygiene practices remained poor due to other factors like attitudes, priorities, type of taps and the proximity of hand basins to point of care. Equipment gaps included absence of elbow taps and unavailability of hand soap, hand towels, and improper proximity hand basins to the point of care. The issue of inadequate equipment and resources can limit compliance of hand hygiene practices. Even if healthcare workers' sense to do hand hygiene is strong, facilities and equipment need to improve, like accessible hand basin for instance. It was interesting to note that although hand rub was satisfactorily available the respondents were not practicing good hand hygiene.

The current study revealed that the majority of the respondents had moderate knowledge; while approximately half of the respondents had good attitudes while majority had poor hand hygiene practices. This study shows the need for further improvement of the existing hand hygiene training programs to address the gaps in knowledge, attitudes and practices.

Hand hygiene is a simple procedure which is instrumental in reducing hospital acquired infections and cross transmission of pathogens in the hospitals and especially among patients. ln addition almost

half of the respondents felt that the facilities available for hand hygiene was not adequate. Despite the fact that hand hygiene is considered as the single best measure for infection control, compliance of health care workers regarding hand hygiene remains consistently poor. The study also revealed that there were factors that hindered HCWs from Practicing Hand Hygiene; Respondents reported that they were too busy to perform hand hygiene. Others indicated that they forget to perform hand hygiene. The majority of respondents reported that hand hygiene equipment was not in convenient location. Some of HCWs reported that they do not wash hand because they always wear gloves /and lastly some reported that damage skin does not hinder them to practice hand hygiene. According to Pittet et al [25] HCW's reasons for not washing hands included skin irritation, in accessible hand washing supplies, wearing gloves, being too busy or not thinking about it. There are a lot of challenges as far as hand hygiene practices is concerned, according to Yuan et al [45] findings from the study suggested that the primary challenges in improving hand hygiene were limited to the lack of resources and knowledge and attitudes Similar to studies reported from other developing countries, the health care workers in the hospitals were not satisfied with the facilities available for hand hygiene. Therefore, we need to address this issue and improve facilities such as improving the availability of soap/antiseptics, paper/cloth for drying hands and gloves. Furthermore, it is essential to conduct hand hygiene training programmes for the hospital staff members, [11]. The results revealed that HCWs reported that the location of hand hygiene equipment hinders them from practicing hand hygiene; this proves that the proximity of the hand hygiene equipment is crucial in good hand hygiene practices. According to Owusu-Ofori [20], sinks need to be convenient and accessible and, where possible, follow established criteria regarding placement and design. It is also crucial to install alcohol-based hand rub dispensers at the point-of-care so as to improve adherence to hand hygiene [33]. There must be sufficient hand hygiene sinks to encourage and assist staff to readily conform to hand hygiene practices. Hand washing sinks must be cleaned on a regular basis. Hand washing sinks should be regularly inspected to ensure they are maintained in good condition [21]. Hand washing sinks must be dedicated to this purpose and not be used for any other purpose. Improper sink placement and design can add to the environmental reservoir of contaminants and can lead to outbreaks, particularly with gram-negative bacilli (e.g., Pseudomonas species). Hand hygiene products must be always at point of care. So as to enhance good hand hygiene practice.

It is evident that providing a conveniently located hand hygiene sink in each patient room reduces HAIs rates [2]. Also, hand washing sink indications and placement criteria are of fundamental importance [42, 43]. Hand hygiene facilities must be readily available in all clinical areas. Hand washing facilities which are not immediately accessible are one of the main reasons that health care providers do not comply with good hand hygiene practices [1]. This Study offer convincing and important evidence that providing conveniently located hand hygiene sink in each patient care room reduces HAIs rates. HCWs encounter difficulties in complying with hand hygiene indications at different levels. Insufficient or poor hand hygiene practices have been reported from all HCW [3]. The reasons which explain the suboptimal practices are multiple for example, the lack of appropriate infrastructure and equipment to enable hand hygiene performance, the perception on hand hygiene practices. The most frequently observed factors determining poor hand hygiene compliance are: understaffing and workload; and wearing gloves. Unfortunately, hand hygiene indications at higher risk of being neglected are the ones that prevent pathogen transmission to the patient (i.e. before patient contact and clean/aseptic procedures) [2].

Infection control practices are of critical importance to overall quality of care and safety of healthcare workers and their patients and the community at large. Despite international engagement in improving hand hygiene, all countries struggle to sustain proper hand hygiene practices in healthcare.

The findings from this study suggest that the primary challenges in improving hand hygiene at Infectious Diseases Hospital are the limited resources and the lack of essential resources. These insights are important as previous studies have attributed poor hand hygiene practices to individuals' knowledge and attitudes, and typical strategies to improve hand hygiene involve staff training [45]. Based on my study, the reasons for inadequate hand hygiene are more complicated, and strategies to address this behavior require greater understanding of the organizational culture and systems of accountability that exist in hospital. In this study though the hospital, infection control staff often

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reported within departments and to senior administration about hand hygiene resources. There are still some problems on hand hygiene commodities procurement. The infection control has no budget hence depend on domestic vote. Also, hand hygiene practices depend on the infrastructure, hand hygiene resources and HCW good practices (behavior change). The infrastructure renovation and maintenance lie with a national outsourced company. As for the hand hygiene supplies lies with outsourced cleaning company. although health care workers can be trained and have the zeal to change the behavior on hand hygiene practices, if the infrastructure is improper and there are no hand hygiene supplies and hand compliance remain compromised and can lead to HAIs.

Therefore, more funds should be directed at improving hand hygiene practices. Building management should support infection control measures, and involve infection control on Hospital infrastructure, especially placement of hand basins and Provision of elbow taps. More modern methods of hand hygiene surveillance are also needed.

Limitations of the study

The study has several drawbacks which need to be considered when interpreting this data. Data was collected by using a self-administered questionnaire, which allows the respondent to check others responses or discuss the answers as well as document the expected response rather than the health care workers own practice or attitudes. This can be overcome by incorporating an observational study which will enable the investigator to observe the actual hand hygiene practices among these health care workers. However, it is not easy to conduct such a study currently due to the high work load and time restrains.

The Study was also a quantitative, cross sectional study in which there was no sought to understand in depth the reasons for inadequate hand hygiene practices at Infectious Diseases Hospital. Questionnaires were administered at infectious diseases hospitals, although were ensured about anonymity, some participants declined due to the length of the questionnaire and some left other questionnaire unattended or not completed the results of the study may not be representative of all the Health care workers at infectious diseases Hospital. Questionnaire though self-administered they are bias unlike unannounced observation which can be ethical not correct also.

The sample was relatively big which is common with quantitative studies. Theoretical saturation was achieved, and this was a hypothesis-generated study about the possible causes of inadequate hand hygiene in hospitals. Future research should test whether changes in these factors result in significant improvements in hand hygiene practices. As we strive to improve quality of infectious diseases hospital care, resource- poor settings present particular challenges finances and infrastructure.

Conclusion

In conclusion, the study highlights the urgent need for introducing measures to increase good practices on hand hygiene and improve facilities available for hand hygiene in Infectious Diseases Hospital, which may play very important role in increasing hand hygiene compliance among the Infectious Diseases Hospital staff and reducing cross transmission of infections among the patients. Hand hygiene is an effective strategy to prevent health care-associated infections and limit the transmission of microorganisms, including antibiotic-resistant organisms (ARO). It is a required practice for all health care providers and it is recommended in all national and international infection control guidelines and is a basic expectation of patients and their families (Provincial Infectious Diseases Advisory Committee.2014). There are many issues concerning all aspects of hand hygiene which remain unresolved. While hand hygiene practices are simple, compliance with hand hygiene falls in the domain of human behaviour, and altering human behaviour is complex and constitutes an enormous challenge.

Recommendations

There is a need for regular trainings among health care workers with regard to hand hygiene.

There is need to Periodically monitor and record adherence as the number of hand- hygiene episodes performed by personnel and or number of hand-hygiene opportunities, by ward or by service. Provide feedback to personnel regarding their performance.

Attitude can be improved by increasing one's knowledge via education program while self-efficacy can be enhanced by social learning from role models or providing positive performance feedback and rewards.

More studies are needed to explore the relationship between availability of resources and facility design, product dispenser placement and designated hand washing sinks play a pivotal role in hand hygiene hence they are essential at any point of care.

Hand hygiene education should be a mandatory component of all clinical course curricula and should be delivered to HCWs prior to clinical placement. Adherence to appropriate hand hygiene should be assessed periodically. Hand hygiene programs and continuous quality improvement are necessary: continuous quality improvement process and hand hygiene program. Hand hygiene campaigns should be conducted more often is essential. Hand hygiene Posters to be changed frequently to attract health care workers attention.

Data availability

The data used to support the findings of this study are available from the corresponding author upon request.

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