Practice of Infection Prevention and Control among Health Workers in a Tertiary Referral Centre in Enugu, Nigeria

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Abstract

Background: Healthcare-associated infections (HCAIs) also known as hospital acquired infections (HAI) are a common global challenge mainly in low and middle-income countries.

Objectives: This study on practice of infection prevention and control among health workers in a tertiary referral centre in Enugu, Nigeria is aimed at investigating the latest trends in infection control measures in developing countries.

Methods: A total of 251 subjects comprising 115 Doctors, 51 Nurses/Midwives, 39 Medical Laboratory scientists, 14 Physiotherapists and 32 Hospital orderlies in the various duty posts of the hospital: clinics, wards, theatre and emergency room, who have worked for at least a year at Enugu State University Teaching Hospital (ESUTH). Data collection was via a well-structured questionnaire in subjective and objective format.

Results: Doctors and Nurses comprised a significant percentage of respondents at 45.8% and 20.3% respectively. Also, a majority of the respondents were workers who had worked at the institution for 5 years or less (64.9%). An overwhelming majority practiced proper hand hygiene (94.0%) and disinfection of surfaces and hospital equipment. However, the proportion of workers practicing barrier nursing was on the low side (47.0%). On assessment of disposal of needles and other sharps, 11.6% dispose them in waste bags and nylons, 56.2% put used needles in a puncture resistant container, while 22.3% recap and bend used needles to avoid unwanted exposure.

Conclusion: This study has shown that health care workers largely practice and observe infection control measures; however, there are certain deficiencies in the way sharps and other medical wastes are disposed. There also appears to be a scarcity of essential protective gear like goggles and alcoholic hand gels and this may predispose workers to infection. It is recommended that adequate funding for equipment, staff and patient education should be initiated to protect patients and health care workers.

Keywords: Health-care-associated-infections (HCAIs), Hospital-Acquired-Infection (HAI), Prevention-Control-Practice, Health-care-workers (HCWs)

Introduction

Healthcare-associated infections (HCAIs) also known as hospital acquired infections (HAI) are a common global challenge mainly in low and middle-income countries[1]. The need for infection control in healthcare facilities is borne out of the need to prevent HCAIs. Health care associated infections can be defined 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[2].

It also involves the myriad of blood and air borne diseases that health care workers are exposed to by virtue of their work[3]. Infection control on the other hand can be defined as measures practiced by healthcare workers in health care facilities to decrease transmission and acquisition of infectious agents[4]. Infection control measures are based on how an infectious agent is transmitted, and include standard, contact, droplet and airborne precautions[5].

HCAIs contribute to significant morbidity and mortality, longer duration of hospitalization, as well as increased cost of treatment in both developed and resource-poor countries. An estimated 10% of hospitalized patients in developed countries and 25% in developing countries, develop HCAIs with resultant

adverse healthcare outcomes[6]. Although health systems in resource-limited countries are the hardest hit, there's however a paucity of data on the health outcomes for the health workers faced with these risks at their various places of work[7].

In the past twenty years, the overall incidence of HAIs has increased by 36%[6]. HAIs occur worldwide and affect both developed and developing countries; about 5-10% of patients acquire one or more infections and 15-40% of patients admitted to critical care are thought to be affected[6]. Even with the paucity of data in sub-Saharan Africa, HCAIs remain a major cause of preventable morbidity and mortality in developing countries where infection rates are relatively higher due to poor infection control practices and overcrowding of hospitals[8].

According to Centre for Disease control and prevention in the U.S, nearly 1.7 million HAIS occur yearly leading to approximately ninety-nine thousand deaths each year[9]. Such infections were long accepted by clinicians as an inevitable hazard of hospitalization. However, recent efforts have demonstrated that some multi-targeted simple practical procedures that are part of the components of standard precautions against HCAIs have been found to be effective in reducing HAIs[10]. Simple hand hygiene when performed properly, can reduce the prevalence of HCAIs substantially[11]. Improved compliance in hand hygiene with standard alcohol-based rub can reduce the rate of nosocomial infections by as much as 40%[12].

The practice of infection prevention and control entails concerted efforts involving both the healthcare workers and patients. In order to practice and execute proper precautionary measures, health care workers (HCWs) require the necessary equipment and education to ensure a reduction in disease burden in resource poor areas[13].

The dearth of information on the subject matter from south-eastern Nigeria and the country as a whole, has prompted an investigation for further discourse. Enugu State University Teaching Hospital (ESUTH), Park Lane, Enugu State, Nigeria is a foremost health and research institution serving an estimated population of 6 million comprising persons from the 17 local government areas of the state, more than six neighbouring states of the federation and the diaspora[14]. The admission policy of ESUTH is unrestricted, serving the dual purpose of both a general and teaching hospital.

This study therefore is aimed at assessing the practice of infection prevention and control among healthcare workers in a tertiary referral centre, with a view to improving healthcare delivery and overall welfare of patients and forms a basis for further research and intervention.

Methods

A total of 251 subjects comprising 115 Doctors, 51 Nurses/Midwives, 39 Medical Laboratory scientists, 14 Physiotherapists and 32 Hospital orderlies in the various duty posts of the hospital: clinics, wards, theatre and emergency room, who have worked for at least a year at Enugu State University Teaching Hospital (ESUTH). Data collection was via a well-structured questionnaire in subjective and objective format issued to the respondents to obtain adequate information.

Sample size determination

The sample size was calculated and determined using the following formula[15];

$$N = Z^2P\,(1-P)/D^2$$

Where;

N = sample size
Z = significant level usually set at 95% confidence level, Z = 1.96
P = Prevalence from a previous study in percentage. P = 18%, 0.18
D = margin of error tolerated = 0.05s
N = 1.96² X 0.18 (1 -0.18)t/0.05²
N = 3.8416 X 0.18 (0.82)/0.0025
N = 3.8416 X 0.147/0.0025
N = 226
Fraction of error = 10% of N
Fraction of error = 22. Hence N = 226 + 22 = 248
For the study, we worked with a sample size of 250

Sampling technique

Probability sampling, in particular multistage sampling technique was used for the study. And this was carried out in the following stages:
Stage 1: The choice of tertiary institution was by simple random sampling.
Stage 2: The choice of the duty posts in the hospital (which involves the clinics, wards, theatre and Emergency sections) was selected by simple random sampling.
Stage 3: The category of health care workers to be studied was determined by stratified sampling.
Stage 4: The number of respondents for each category was determined by proportionate random sampling

Inclusion Criteria

Included in this study were health workers involved in patient care and handling of sharps and wastes who gave their consent. Doctors, nurses and orderlies and medical lab scientist that attended work within the study period.

Exclusion Criteria

Workers who are not involved in patient care and in handling of sharps and wastes. Doctors, nurses, orderlies and medical lab scientists that didn't attend work within the study period. Those that didn't give their consent.

Data collection

The instrument of data collection was with a well-structured questionnaire in subjective and objective format which would come in various sections with the aim of fulfilling the general and specific objectives of the study.

Data analysis

The data collected from the study would be analysed using SPSS (version 23). The result would be presented using tables.

Ethical considerations

Informed consent was obtained from the respondents prior to the administration of the questionnaire and after a brief explanation of the purpose of the study to the respondent was given. Effort was made to ensure absolute confidentiality of the respondents' identity. Ethical clearance was taken from the Ethical Review Committee Enugu State University Teaching Hospital, Park lane before the commencement of data collection.

Results

Sociodemographic Characteristics of Respondents

There were more females (56.2%) than males (43.8%) amongst the 251 respondents that were assessed. Doctors constituted a large percentage of the respondents (45.8%) and about 2.4% of the 251 respondents were staff who had worked for more than 20 years in the hospital. Mean age was 32.91 (STD DEV = 9.37).

Table 1: Sociodemographic Characteristics of Respondents

Sociodemographic Factors	Frequency (n=251)	Percentage (%)
AGE		
20-29	114	45.4
30-39	82	32.7
40-49	36	14.3
>50	19	7.6
Sex		
Male	110	43.8
Female	141	56.2
Educational Status		
Primary	6	2.4
Secondary	12	4.8
Tertiary	230	91.6
None	3	1.2
Marital Status		
Married	123	49.0
Single	121	48.2
Widowed	7	2.8
Religion		
Christianity	251	100.0
Category of healthworker		
Doctor	115	45.8
Nurse/ Midwife	51	20.3
Lab Scientist	39	15.5
Physiotherapist	14	5.6
Orderly	32	12.7
Work Experience/Years of Service in the Institution		
0-5 years	163	64.9
6-10 years	55	21.9
11-15 years	19	7.6
16-20 years	8	3.2
>20 years	6	2.4

Practice of Precautionary Measures Among Respondents

Out of the 251 respondents, a large percentage of respondents practice standard precautionary measures like hand hygiene (94%). The most common regular precautionary measures practiced include: Hand washing after attending to patients (84.9%), Use of gloves for handling soiled matter (76.5%) and proper waste disposal (68.5%). Education of patients on proper cough etiquette is the most popular precautionary measure against respiratory infections (81.3%).

Table 2: Practice of Precautionary Measures among Respondents

Precautionary measure	Frequency (n=251)	Percentage (100%)
Standard precautionary methods practiced by respondents		
Hand hygiene	236	94.0
Use of personal protective gear	172	68.5
Cleaning and disinfection of objects	194	77.3
Regular precautionary method practiced by respondents		
Proper hand washing after attending to patients	213	84.9
Regular use of alcoholic hand gels	144	57.4
Use of gloves when handling soiled matter	192	76.5
Proper waste disposal	172	68.5
Barrier nursing	118	47.0
Precautionary measures to prevent respiratory infections		
Spacing seats in waiting areas	141	56.5
Education of patients on use of handkerchief when coughing	204	81.3
Provision of non-touch receptacle for tissue disposal	139	55.4

Use of Hand Gloves and Practice of Hand Hygiene among Respondents

Out of the total sampled (251), 235 (93.6%) practiced hand washing after removal of gloves. 242 used hand gloves before attending to any patient and 225 respondents, change gloves before attending to the next patient. About 74.1% wash hands immediately after an encounter with a patient and 2.8% noted inaccessible hand washing facilities.

Table 3: Use of Hand Gloves and Practice of Hand Hygiene Among Respondents

Factors	Frequency	Percentage
Use of hand gloves before handling patient	242	96.4
Washing of hands after removing gloves	235	93.6
Change gloves after each patient	225	89.6
Respondents washing of hands after encountering patients		
Immediately	186	74.1
An hour later	3	1.2
Forget to wash at times	27	10.8
Inaccessible hand washing facilities	7	2.8
None	28	11.2

Usage and Disposal of Sharp Needles by Respondents

Majority (56.2%) of the respondent's place needles and other sharps in a puncture resistant container, with 80.5% disposing used sharps in specially designated sharps boxes. Other means of sharps disposal include open container, which 38.6% use to discard sharps.

Table 4: Usage and Disposal of Sharp Needles by Respondents

Factors	Frequency	Percentage
Handling of sharps/needles		
Recapping and bending used needles	56	22.3
Removing needle from tube holder	38	15.1
Placing needle and sharps in puncture resistant container	141	56.2
Means of disposing used sharps and needles		
Open container	97	38.6
Sharp box	202	80.5
Others (waste baskets and nylons)	29	11.6

Relationship between the practice of cleaning and disinfection of objects and the category and working experiences of respondents

A reasonable number of the nurses, medical laboratory scientists and orderlies that were assessed practiced infection control measures at 86.3%, 84.6% and 87.5% respectively, with only half of the physiotherapists practicing infection control actively. Of the 163 respondents that have worked in the institution for less than 5 years, 120 (73.6%) practice infection control measures. About 95% of workers with 11-15 years' work experience, practice infection control.

Table 5: Relationship between the practice of cleaning and disinfection of objects and the category and working experiences of respondents

Factors	Practiced	(p-value)
Category		0.008
Doctor	82 (71.3%)	
Nurse/ midwife	44 (86.3%)	
Lab scientist	33 (84.6%)	
Physiotherapist	7 (50.0%)	
Orderly	28 (87.5%)	
Number of years worked		0.195*
0-5 years	120 (73.6%)	
6-10 years	45 (81.8%)	
11-15 years	18 (94.7%)	
16-20 years	7 (87.5%)	
>20 years	4 (66.7%)	

*statistically significant

Discussion

Our research on the practice of infection prevention and control among health workers studied Doctors, Nurses/Midwives, Laboratory scientists, Physiotherapists and Hospital orderlies working in Enugu State University of Technology (ESUT) Teaching Hospital, Park lane. The rising incidence of health care associated infections and outbreak of infectious diseases in the hospital setting makes this study an important public health exercise[16]. Of the 251 respondents assessed, Doctors comprised a significant percentage (45.8%) and physiotherapists in the minority (5.6%) with majority of the respondents falling between the ages of 20-29 (45.4%). The high percentage of respondents being doctors and nurses is due to the fact that they form the bulk of the health workers in the institution[14].

The respondents' practice of routine precautionary measures was also assessed, and an overwhelming majority (94.0%) indicated proper hand hygiene. This is a commendable outcome considering the fact that faeco-oral transmission is an important route of transmission of infectious diseases[6]. In a previous study by Johnson et al, adherence to hand hygiene was poor in developing countries[17]. This also contrasts with another study which stated that workers had adequate knowledge about the importance of hand hygiene, but were not implementing the practice effectively[18]. A significant number practice disinfection of surfaces and hospital equipment. However the proportion of health workers practicing barrier nursing and regular use of alcoholic gel (47.0% and 57.4% respectively) is on the low side, considering the fact that these two practices help to limit the spread of nosocomial infections. This is in keeping with the study by Sethi et al, who noted lack of infrastructure, training and infection control models as the reason for the above findings[4].

On further assessment of the use of gloves, 96.4% stated they use gloves before attending to any patient while about 89.6% attested to the fact that they change gloves before attending to the next patient. This is a good practice which should be encouraged. Possible reasons for this could be as a result of availability of gloves in the wards and clinics which are mostly provided by the patients before they receive any form of care from the health workers[19]. Changing of gloves before attending to patients is an important factor in curtailing spread of infection especially when handling high risk patients[20].

Questions were also asked on the prevention of respiratory infections which includes spacing of seats in waiting areas, patient education on use of handkerchief while coughing and provision of non-touch receptacle for tissue disposal. Only about half of the respondents practice the first and third principles with a significant number properly educating the patients. This calls for proper organization of the hospital reception areas to limit the spread of air borne pathogens[21].

Proper disposal of needles and other sharps is also very important, however quite a number of respondents do not dispose of them properly with about 11.6% disposing them in waste bags and nylons. This practice should be frowned upon as it could expose hospital orderlies and porters to unwarranted infection[19]. To prevent needle stick injury, 56.2% place used needles in a puncture resistant container, while 22.3% recap and bend used needles to avoid unwanted exposures. This is comparable to a previous study[22] which noted a prevalence of 27.8%. Recapping of needles is a practice that should be stopped and health workers should be educated on proper ways to dispose sharp objects[19].

The relationship between the practice of cleaning and disinfection of objects and category of health worker was significant as evidenced by a p-value of 0.008, however the relationship between cleaning and disinfection and working experience of respondents (number of years worked in the institution) showed no significance (p value of 0.195). This could be explained by the fact that Doctors and Nurses are more likely to be conscious of infection control measures than physiotherapists or medical laboratory scientists as they are the first point of contact for patients coming into the hospital and are more susceptible to HAIs[6].

Conclusion and recommendation

From this study, several deductions were made on the practice of infection prevention and control among health workers and it was noted that health care workers engage in some precautionary measures such as proper hand hygiene using water or alcoholic gel more than others. It was also observed that there are also disparities in the way sharps and other medical wastes are disposed. Also worthy of note is that a significant portion of the health workers practice hand washing, gloving in patient attendance, use of face masks etc. which is very commendable. However there seems to be a paucity of use of other protective equipment like goggles, needle proof bins for sharps disposal and alcoholic gel which is mostly due to deficient funding.

The result of this study is a reflection of the inadequacies in the health sector in Nigeria which promote the spread of HAIs and it is recommended that adequate funding for equipment, staff and patient education; and policy formulation on infection control should be initiated to protect both patients and HCWs.

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