

Asian Journal of Research in Nursing and Health

3(1): 52-63, 2020; Article no.AJRNH.56767

Assessment of Bacterial Burden and Knowledge, Attitude and Practices of Health Workers on Nosocomial Infection in General Hospital Ilorin, Kwara State

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Authors' contributions

This work was carried out in collaboration among all authors. Author OOB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AAA and AO managed the analyses of the study. Author AO managed the literature searches. All authors read and approved the final manuscript.

Article Information

Editor(s):
(1) Dr. Carla Maria Ferreira Guerreiro da Silva Mendes, Centro Hospitalar De Setúbal E.P.E, Portugal.
Reviewers:
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(2) Thonda Oluwakemi, King's University, Nigeria.
Complete Peer review History: http://www.sdiarticle4.com/review-history/56767

Original Research Article

Received 03 March 2020
Accepted 09 May 2020
Published 18 June 2020

ABSTRACT

Background: Nosocomial infection constitute over 25% of infection rates in the hospital setting causing significant morbidity and mortality especially in developing countries [1]. Microorganisms are present in the hospital environment including surfaces of sinks, taps, bedpans, beds, floors, bedspreads, stethoscopes, chairs, cupboards, theatre rooms, on surgical instruments [2]. Microbes in hospital public spaces have been a concern driven subject of significant importance, most especially in developing countries where nosocomial infection is considered to be two to three folds higher than in the developed countries [3].
Methodology: A qualitative survey involved the administration of a structured questionnaire to elicit data on the human dimensions for assessing the knowledge attitude and practice of health worker in nosocomial infection from different Units and Departments of the General Hospital Ilorin. Also, laboratory analysis of samples collected from contact surfaces from different wards was done.

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Results: Showed the practices of health workers that influences nosocomial infection, it indicates a higher percentage (63.7) of the population do not use personal protective equipment(PPE), The waste disposal method open dumping takes the highest percentage (55%) also, once in a day hospital disinfection is indicated by highest percentage (43.3%). Highest percentage (40.8%) Indicated that Izal is used for disinfection A higher percentage (56.8%) indicated that there is no Steady water supply. Highest percentage (59.2%) of the population study indicated that the source of water supply is well.

Conclusion: The burden of HAIs is very high, knowledge of workers concerning HAIs is adequate yet the attitude and practice to prevent HAIs is poor, despite the more scientific knowledge on the roles of inanimate objects in the spread of hospital acquired infections, it is starling that only a minority of healthcare worker takes appropriate steps to counter this transmissibility.

Keywords: Nosocomial; infection; microorganisms; hospital.

1. BACKGROUND

Hospital-acquired infection (HAI) is a major safety issue affecting the quality of care of hundreds of millions of patients every year, in both developed and developing countries. Health-care associated infections (HAIs) are defined as infection developed within 48hours after hospital admission or within 30 days after discharged from a hospital [4]. Worldwide, the delivery of health care is challenged by a wide range of safety problems. The traditional medical oath, “First do no harm,” is seldom violated intentionally or unintentionally by any healthcare workers (HCWs). Accordingly, the World Alliance for Patient Safety selected hospital-associated infections (HAI) as the topic for its first Global Patient Safety Challenges in 2005. However, the fact remains that in spite of advances in the health care system, patients are harmed every day in every country around the globe in the course of receiving health care while patient’s safety in hospitals remains at risk from HAI . More than 1.4 million people around the world become seriously ill from HAI at any given time [5]. Knowledge, attitude and practices of health workers within the hospital and health facilities has a great influence on the rate of nosocomial infection, the behavior at workplace plays a significant role in either increasing or reducing the rate of nosocomial infection. Positive behavior and practices, including hand washing, personal disinfection, hospital disinfection, adequate waste disposal and infection surveillance are known to drastically reduce level of nosocomial infectious organisms [6]. The main cause of nosocomial infection is, presence of pathogenic microbe in the hospital environments containing several kind of pathogen as well as aerosol in hospital air i.e. basic cause of airborne microbial disease transmission. Previously it was reported that the main entrance of the hospital act as one of the major link of air exchange between indoor hospital and the external environment. Again by means of the homogenization of indoor air of buildings, open door and window of the hospitals are the major source of microbial air contamination [7]. Microorganisms are present in the hospital environment including surfaces of sinks, taps, bedpans, beds, floors, bedspreads, stethoscopes, chairs, cupboards, theatre rooms, on surgical instruments [2]. Microbes in hospital public spaces have been a concern driven subject of significant importance, most especially in developing countries where nosocomial infection is considered to be two to three folds higher than the developed countries [3]. Microbes are responsible for mostly all forms of contagious disease in the hospital environment they include the fungi, bacteria, viruses, protozoa, etc [8].

Studies in the 1970s and 1980s suggested that environmental surface contamination played a negligible role in the endemic transmission of healthcare-associated infections. However, recent studies have demonstrated that several major nosocomial pathogens are shed by patients and contaminate hospital surfaces at concentrations sufficient for transmission, survive for extended periods, persist despite attempts to disinfect or remove them, and can be transferred to the hands of healthcare workers. Evidence is accumulating that contaminated surfaces make an important contribution to the epidemic and endemic transmission of Clostridium difficile, vancomycin-resistant enterococci, methicillin-resistant Staphylococcus aureus, Acinetobacter baumannii, Pseudomonas aeruginosa, and norovirus and that improved environmental decontamination contributes to the control of outbreaks [9]. There were an estimated 722,000 hospital-acquired infections in the US in 2011

(CDC, 2014) 3.4 -10.9% of hospital-associated infections often result to mortality in most developed countries though these figures are suspected to be higher in developing countries of sub-Saharan Africa including Nigeria [3]. Nosocomial infection constitute over 25% of infection rates in the hospital setting causing significant morbidity and mortality especially in developing countries [1].

Objects which become contaminated with pathogenic bacteria and then spread infection to others are often referred to as fomites and most outbreaks of infection associated with inanimate objects are caused by items that should be sterile but have been contaminated [10]. The hypothesis that environmental microorganism cause human diseases arises from two facts, firstly, our interaction with the inanimate environment is constant and close, secondly environmental objects are usually contaminated often with important human pathogens.

Some studies ignore the incidence of parasitic causes of nosocomial infection because the low number of parasite diseases compared to viral, bacterial, and fungal infection, reduce the hazard of nosocomial parasite to relatively trivial level but certain parasitic microorganism may at times cause significant morbidity and even mortality in both normal and immunocompromised patients [11].

In developing countries, the magnitude of the problem remains underestimated or even unknown largely because HAI diagnosis is complex and surveillance activities to guide interventions require expertise and resources. Surveillance systems exist in some developed countries and provide regular reports on national trends of endemic HAI. such as the National Healthcare Safety Network of the United States of America or the German hospital infection surveillance system. This is not the case in most developing countries because of social and health-care system deficiencies that are aggravated by economic problems. Additionally, overcrowding and understaffing in hospitals result in inadequate infection control practices, and a lack of infection control policies, guidelines and trained professionals also adds to the extent of the problem therefore, the knowledge of the persistence of pathogens will support ensuring the bio-safety in microbiological and biomedical laboratories, food-handling settings, and for hygienic attitude and practices in the everyday life to prevent transmission of infectious diseases.

1.1 Objective

To identify nosocomial bacterial and to assess bacteria burden, knowledge, attitude and practices of hospital workers in nosocomial infection.

2. METHODOLOGY

2.1 Study Areas

The study was conducted in General Hospital Ilorin situated along Surulere adjacent Queens College, Ilorin West Local Government Area of Kwara State Nigeria. The General Hospital is a secondary health facility with various departments including GOPD, Accident and emergency, female surgical wards, rehabilitation unit, children emergency, with all cadres of health practitioner in the health facility.

2.2 Research Design

2.2.1 Sampling protocol

A proportionate sampling technique was used following Daramola (2006) to select 40% of the target population of 400, which is 60 respondents since the population is less than 5,000 from each unit. Each respondent was then voluntarily engaged using an accidental sampling technique.

2.2.2 Qualitative research instrument

A structured interviewer administered questionnaire was developed from earlier studies related to causes of nosocomial infection and attitudes of hospital users that triggers multiplication of nosocomial infectious organisms sorted to gain insight from respondent's attitude, knowledge and practices on nosocomial infections and attitudes of hospital workers that triggers multiplication of bacteria. It also covered demographic characteristics of respondents. The questionnaire was constructed in the formal language (English language) for easy administration to the respondents.

2.2.3 Quantitative research instrument

Samples were collected with the use swabs in peptone water, contact surfaces and instruments such as walls, door handles, door knob, fans-witch, shelves, window frames, sphygmomano-meter, microscope were sampled.

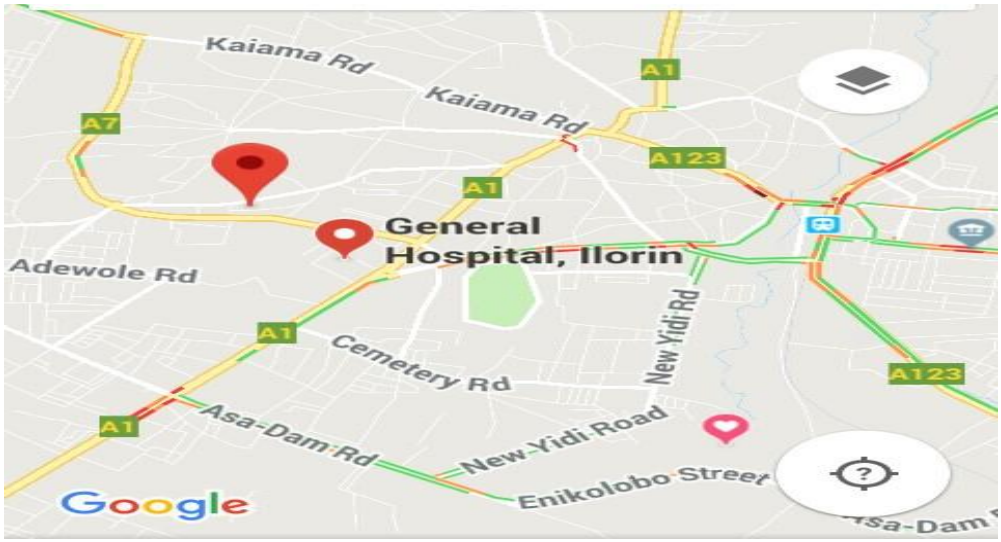


Image 1. Map showing general hospital Ilorin

2.3 Data Analysis

Once the data have been collected, the instruments were thoroughly checked for completeness and consistency. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 and descriptive statistics (frequencies, and bar charts) was used to tabulate and describe the data. The chi-square test always tests the null hypothesis which states that there is no significant difference between the expected and observed result.

3. RESULTS

3.1 Socio-demographic Data

Fig. 1 showed the sex of the respondent with highest percentage 66.7% being female and 33.3% male.

Fig. 2 showed the age of the respondents of which age 39-48 is having the highest percentage (48.3%) while age 18-29 has the lowest percentage (17%) of the population.

Fig. 3 showed the ethnicity of the respondents with Yoruba having the highest percentage (48.3%)and others having lowest percentage of (5.8%).

Fig. 4 showed the religion of the respondents where Islam has highest percentage (46.7%) and others has lowest percentage (5%) of the population size.

Fig. 5 showed the educational status of the respondents with the tertiary level having highest percentage (58.3%) while respondents with lowest percentage (4.2%) are with primary education.

Fig. 6 showed the position of the respondents where nurses has highest percentage (45.0%) and students with lowest frequency of (4.2%).

3.2 Section B: Knowledge of Hospital Users about Nosocomial Infections

Of the total respondents ,Respondents that agreed that hospital infections are from patients has the highest percentage (28.3%) while those that strongly agreed has the lowest percentage (10.8%) . Most of the respondents (29.2%) disagreed that hospital acquired infections can be from care giver and few (15.8%) are yet to decide. Respondents that agreed that hospital acquired infections are from patients to workers and vice versa are having the highest percentage (33.3%) of the population, while undecided has lowest percentage of (4.2%). A higher percentage (38.3%) of the respondents that agreed that hospital acquired infection can be contacted through contaminated surfaces and instruments, while persons that strongly agreed has lowest percentage (10.0%) Also, highest percentage (33.3%) of the respondents disagreed that hospital acquired infections can result in death while undecided has lowest percentage (10.8%).

Knowledge of health workers about nosocomial infection.

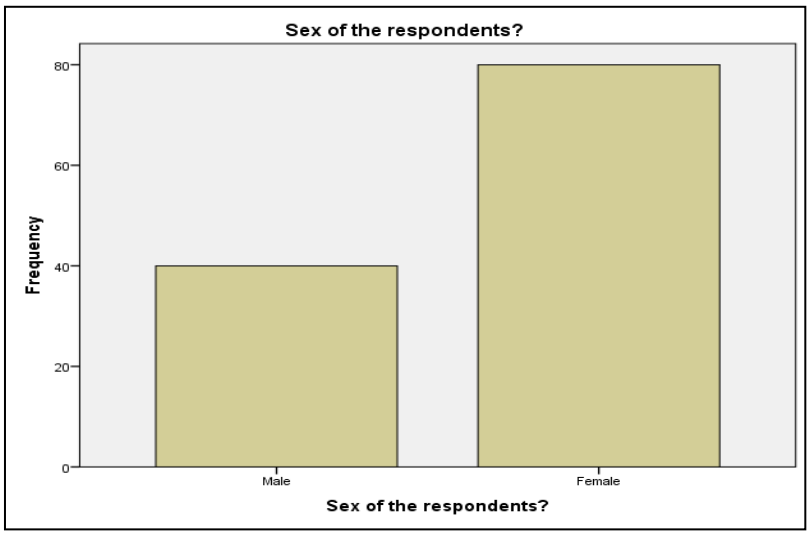


Fig. 1. Showed sex of the respondents

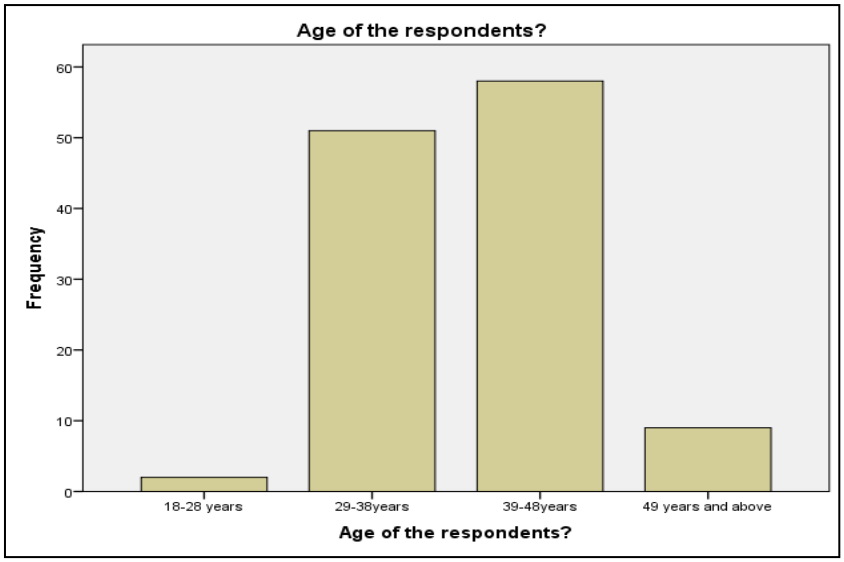


Fig. 2. Showed age of the respondents

Fig. 7 shows the means adopted by hospital workers to protect themselves from HAIs with the highest percentage (52.2%) being hand washing and the lowest percentage (21.7) beign through hospital rules.

Fig. 8 shows the rate of handwashing among hospital workers of which highest percentage (37%) indicated that they wash their hands before and after eating while the persons that washes their hand before attending to patients has the lowest percentage (5.8%).

Fig. 9 shows the use of gloves of which highest percentage (42.5%) of the study population changes gloves when it is stained, while the lowest percentage (11.7%) changes gloves before and after attending to patients.

Fig. 10 shows the rate of personal disinfection in which the highest percentage (55.8) do not observe it at all, while the lowest percentage (21.7%).

Table 2 showed the practices of health workers that influences nosocomial infection, it indicates a higher percentage (63.7) of the population do not use personal protective equipment (PPE) while a lower percentage (36.6%) uses PPE. Also highest percentage (55.8%) indicates that

they rarely use PPE, while persons that never used PPE have the lowest percentage (17.5%). The waste disposal method open dumping takes the highest percentage (55%) while others take the lowest percentage (16.7%) also, once in a day hospital disinfection is indicated by highest percentage (43.3%) the population while lowest percentage (2.5%) indicated that disinfection rarely takes place. Highest percentage (40.8%) Indicated that Izal is used for disinfection while others is indicated by the lowest percentage (6.7%).A higher percentage (56.8%) Indicated that there was no Steady water supply while lower percentage indicated that there was steady water supply. Highest percentage (59.2%) of the population study indicated that the source of water supply is well while the lowest percentage (16.7) indicated other source of water supply.

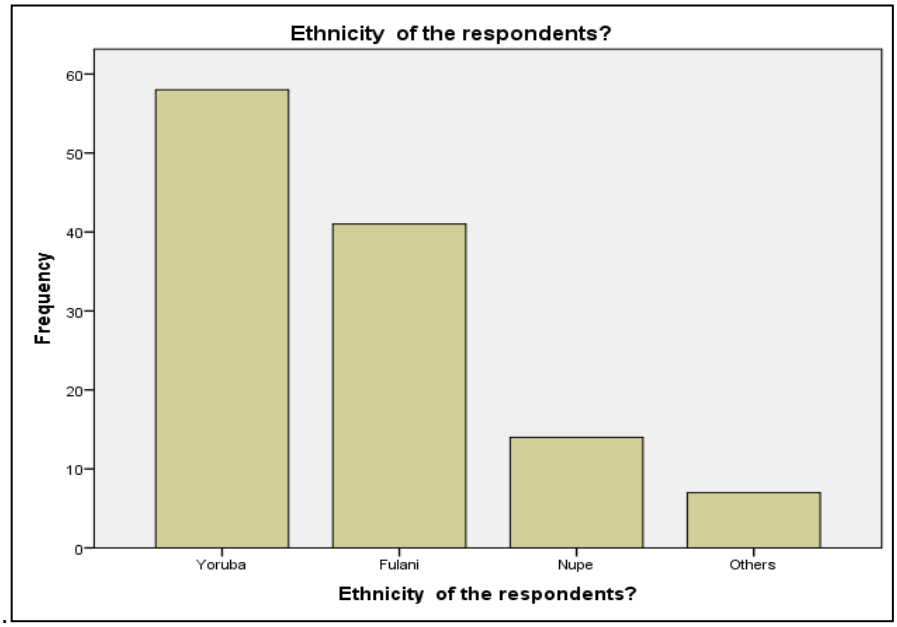


Fig. 3. Showed ethnicity of the respondents

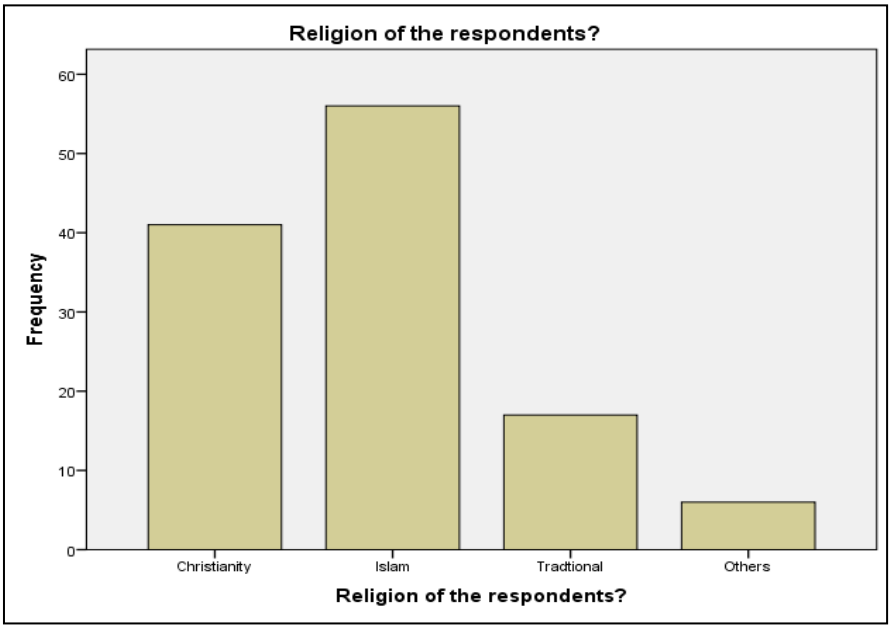


Fig. 4. Showed religion of the respondents

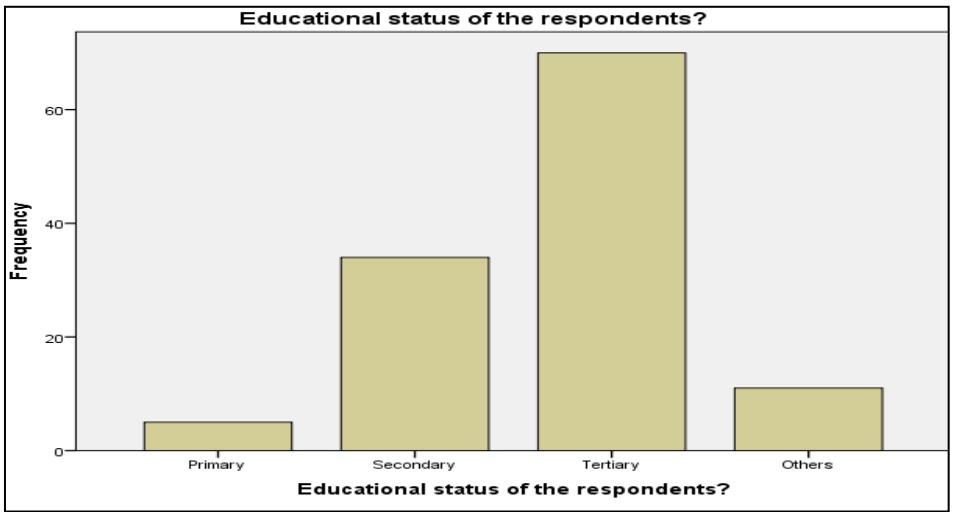


Fig. 5. Showed educational status of the respondents

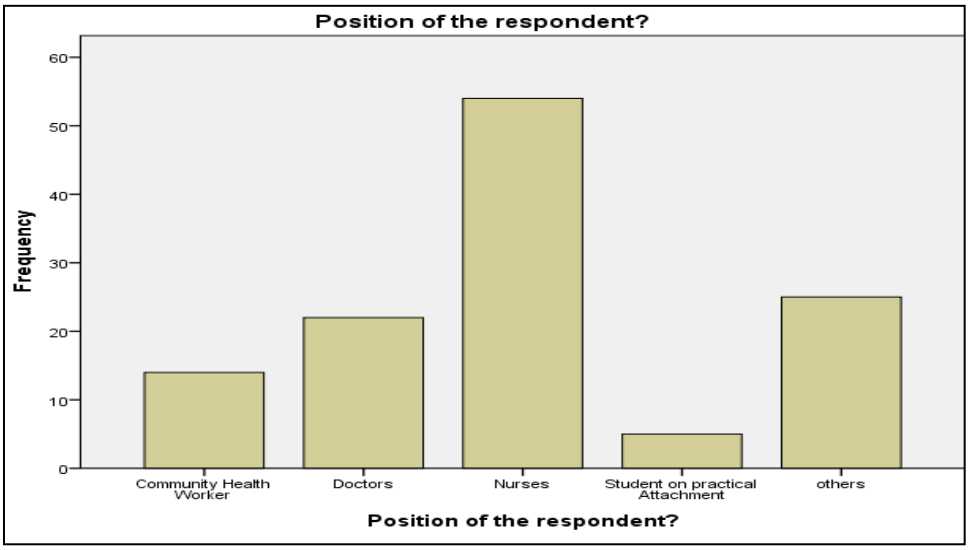


Fig. 6. Showed position of the respondents

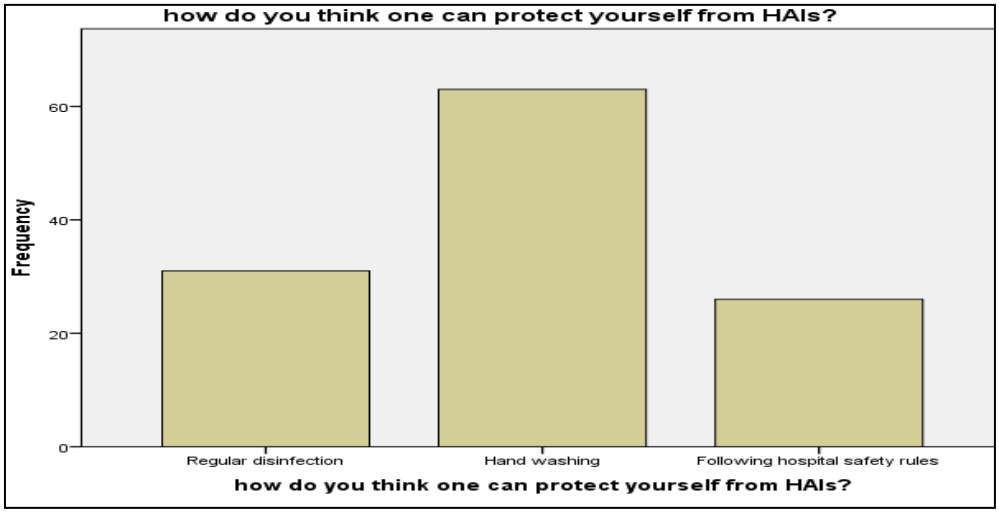


Fig. 7. Showed protection from HAIs

Table 1. Knowledge of hospital users about nosocomial infections

Variables		Frequency	Percent
Hospital infection are from patients?	Strongly Agree	13	10.8
	Agree	34	28.3
	Disagree	32	26.7
	Strongly disagree	27	22.5
	Undecided	14	11.7
	Total	120	100.0
Hospital acquired infections are from care providers?	Strongly Agree	6	5.0
	Agree	28	23.3
	Disagree	35	29.2
	Strongly disagree	32	26.7
	Undecided	19	15.8
	Total	120	100.0
Hospital acquired are from patient to workers or vice versa	Strongly Agree	24	20.0
	Agree	40	33.3
	Disagree	28	23.3
	Strongly disagree	23	19.2
	Undecided	5	4.2
	Total	120	100.0
Hospital acquired infection can be contacted through contaminated surface like wall, instruments, chairs etc.	Strongly Agree	12	10.0
	Agree	46	38.3
	Disagree	36	30.0
	Strongly disagree	13	10.8
	Undecided	13	10.8
	Total	120	100.0
Hospital acquired infections can result to death	Strongly Agree	13	10.8
	Agree	31	25.8
	Disagree	40	33.3
	Strongly disagree	23	19.2
	Undecided	13	10.8
	Total	120	100.0

Attitude of health workers that influence nosocomial infection



Fig. 8. Showed rate of hand washing

Table 2. Practices of health workers in controlling nosocomial infection

Variables		Frequency	Percent (%)
Do you use personal protective equipment?	Yes	44	36.7
	No	76	63.3
	Total	**120**	**100.0**
How often do you use PPE?	Regularly	32	26.7
	Rarely	67	55.8
	never	21	17.5
	Total	**120**	**100.0**
How do you dispose your waste?	Incineration	10	8.3
	Open dumping	66	55.0
	Burying	24	20.0
	others	20	16.7
	Total	**120**	**100.0**
How often is hospital disinfected	Once a day	52	43.3
	Twice a day	46	38.3
	Once on two days	19	15.8
	Rearly	3	2.5
	Total	**120**	**100.0**
With what is the hospital disinfected?	Detergents	32	26.7
	Izal	49	40.8
	liquid soap	31	25.8
	Others	8	6.7
	Total	**120**	**100.0**
Do you have a steady water supply	Yes	35	43.2
	No	85	56.8
	Total	**120**	**100.0**
What source water do you have?	Tap	29	24.2
	Well	71	59.2
	Others	20	16.7
	Total	**120**	**100.0**



Fig. 9. Showed frequency of changing gloves

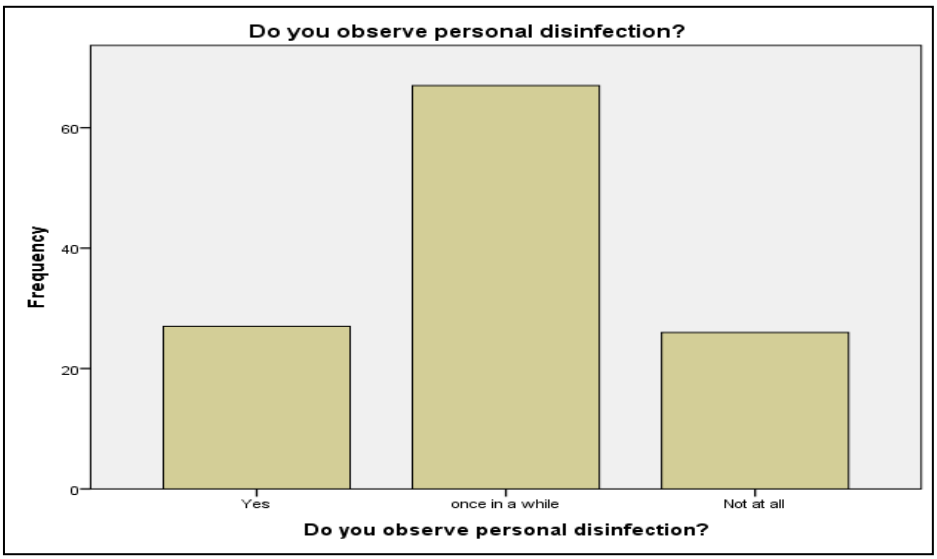


Fig. 10. Showed personal disinfection

4. DISCUSSION

4.1 Knowledge of Hospital Workers about Nosocomial Infection

The findings of the study shows that majority of hospital workers are aware of hospital acquired infections and that it can be contacted from patients and contaminated surfaces while it was not believed by some workers that HAIs can be contacted from care providers. this is in line with the findings of (Fisher et al. 1995) Also majority are with low knowledge about hospital acquired infections capable of resulting to death. It is believed that HAIs can be reduced through hand washing, disinfection and observing hospital rules. Also majority of hospital users do not see improper handling of specimen and disease corpse to play a significant role in the increase in spread of nosocomial infectious organisms.

4.2 Attitude of Hospital Workers and Nosocomial Infection

Despite the high knowledge of HAIs and means of preventing it, the attitudes of health workers in the prevention and control of HAIs is poor, the level of hand-washing was low; also the misuse of gloves was rampant among health workers, using same gloves for two or more patients. rate of changing gloves before attending to each patients was low , this was majorly seen among workers who have short duration of contact with patients e.g for injection, pulse check, blood pressure check, immunization and sample collection probably they assumed changing of gloves to be stressful. Also, the rate of personal disinfection was low among workers; majority depends on the general disinfection done in the hospital.

4.3 Practice of Hospital Workers and Nosocomial Infection

The general disinfection of hospital in frequently done, using disinfectant that are strong enough to eradicate the higher percentage of the microorganisms responsible for HAIs, but there are lapses in the use of personal protective equipment's as some workers only use PPE when they feel it is necessary. Also, the infrequent supply of water was big problem, water from Well was the major means of water supply, which is not the best option in combating HAIs, the waste management means adopted was a poor type, waste segregation from source was not observed and biomedical waste are to be dumped on dump sites. These can result to increased in pathogens that are resistant to antibiotics and airborne infections as these pathogens may be brought back to the hospital by air.

The chi square test indicates There is no relationship between position and the level of hand washing that is irrespective of an health worker; a doctor, nurse, community extension worker, students and other, the level of hand washing remains the same and it is not influenced by either being in a higher position or not.

Also, it was indicated that there is no significant relationship between the educational status or level attained being primary, secondary or tertiary to the attitude of hand washing. Frequent hand washing is personal discipline and activity that can only be instilled and made continuous by frequent reminder through training and re-training from time to time irrespective of educational level.

5. CONCLUSION

The burden of HAIs is very high, knowledge of workers concerning HAIs is adequate but the attitude and practice to prevent HAIs is poor, despite the more scientific knowledge on the roles of inanimate objects in the spread of hospital acquired infections, and the increase incidence of resistance of microorganism to drugs, it is starling that only a minority of healthcare worker takes appropriate steps to counter this transmissibility, it is important to lay emphasis on training, retraining and seminal on hand washing and other means of preventing HAIs among health workers. Poor Disposal of waste in hospital facilities will increase the spread of pathogenic organisms as it is known that what we give to the environment, it will definitely give back to us, and this will definitely help to counter any effort put in place to combat HAIs this will also complicate issues by increasing multidrug resistant pathogens considering the fact that in hospitals antibiotics are administered frequently. Also, frequent surveillance to know the level of bacteria in hospital settings have to be put in place so that adequate measures to de populate them will be implemented. This will pose a great burden on economic development in terms of increase in spending on HAI and reduce in productivity level due to death as a result of HAIs therefore the need to segregate waste right from source and to manage waste in manners which prevent the spread of diseases must be adopted. Hospital administrators should strive to create an organizational atmosphere in which adherence to recommended hand hygiene practices is considered an integral part of providing high-quality care. For such an approach to be successful, hospitals must provide visible support and sufficient resources in the form of continuous education programs. These programs should be innovative, educational and motivational and tailored to specific health care personnel. The strategies should be designed to suit the specific needs and the expected outcome for that particular category of HCW.

6. RECOMMENDATIONS

- Training and retraining has a positive impact on the attitude and practices in all categories of health workers, there is need to incorporate a system of continuous education for all categories of staffs.
- There is need for Government to employment environmental health officers in all health sectors and facilities so that waste will be appropriately managed to reduce level of HAIs
- Standard surveillance of nosocomial infection has to be urgently addressed in Nigeria.
- There is need for Infection prevention programs and protocol, adoption of rules and regulations in all level of health facilities.
- Improvement and modification of available equipment's, supply of personal protective equipment's, with emphasis on hand washing should be done in health facilities.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
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