

# Knowledge of Healthcare Workers on Nosocomial Infection in Selected Secondary Health Institutions in Zaria, Nigeria

Samaila Ayuba Balarabe<sup>1,\*</sup>, Istifanus Anekoson Joshua<sup>2</sup>, Aliyu Danjuma<sup>1</sup>, Mohammed Usman Dauda<sup>3</sup>, Omoniyi Oluwafemi Sunday<sup>4</sup>, Haruna Danlami Yusuf<sup>3</sup>

<sup>1</sup>Department of Nursing Services, Ahmadu Bello University Teaching Hospital Shika-Zaria, Kaduna, Nigeria

<sup>2</sup>Department of Community Medicine, Kaduna State University, Kaduna, Nigeria

<sup>3</sup>University Health Services, Ahmadu Bello University Samaru Zaria, Kaduna, Nigeria

<sup>4</sup>Department of Nursing Services, Federal Medical Centre, Bida, Niger State, Nigeria

\*Corresponding author: balarabeayubas@gmail.com

Received January 22, 2015; Revised February 04, 2015; Accepted February 08, 2015

**Abstract Background:** Nosocomial infection is one of the leading causes of death and increased morbidity for hospitalized Patients. The study assessed the knowledge of healthcare workers on nosocomial infections in secondary health institutions in Zaria local government area of Kaduna State, Nigeria. **Materials and Methods:** This study was a cross-sectional descriptive survey carried out in October, 2010. One hundred and sixty (160) self-administered semi structured questionnaire was used for the study and data analyzed using SPSS window 16.0 version. **Results:** The findings showed most of the respondents were within the age bracket of 20–29 years, mean age of  $34 \pm 12$  years and age range of 20–60 years. 62.2% were female and 66.9% were nurses by profession followed by pharmacist with 13.1%. The respondents mean working experience was  $10 \pm 9$  years. Majority (57.5%) of the respondents were aware of nosocomial infections as an infection that manifests after 48 hours of hospital admission. 76.9% (123) of the respondents were of the opinion that bacteria are the common cause of nosocomial infections. 38.8% of the respondents were of the opinion that contact transmission, airborne transmission, vehicle transmission and vector transmission are the common routes of nosocomial infections. 46.9% of the respondents were of the opinion that the best ways to prevent nosocomial infections are strict aseptic technique, proper isolation and barrier nursing of infectious cases, regular nasal and throat swab investigations of health care workers and education of health workers on the prevention and control of the infection. **Conclusion:** The recommendations included emphasis on regular in-service training programme for staff, the practice of universal precaution and screening of hospital staff to identify those that are chronic nasal carriers of *Staphylococcus aureus* among others.

**Keywords:** knowledge, healthcare workers, nosocomial infections, Zaria

**Cite This Article:** Samaila Ayuba Balarabe, Istifanus Anekoson Joshua, Aliyu Danjuma, Mohammed Usman Dauda, Omoniyi Oluwafemi Sunday, and Haruna Danlami Yusuf, “Knowledge of Healthcare Workers on Nosocomial Infection in Selected Secondary Health Institutions in Zaria, Nigeria.” *World Journal of Preventive Medicine*, vol. 3, no. 1 (2015): 1-6. doi: 10.12691/jpm-3-1-1.

## 1. Introduction

A nosocomial (or healthcare-associated) infection is defined as an infection acquired in hospital or other health care facility by a patient in whom the infection was not present or incubating at the time of admission [1]. These include infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility [2,3]. These patients are usually admitted for a reason other than that of infection.

It has also been defined as infections which are as a result of treatment in a hospital or healthcare unit, but secondary to the patient's original condition [3]. These infections first appear 48 hours or more after hospital

admission or within 30 days after discharge from the hospital.

Studies have shown that 6 to 10% of patients admitted to a hospital in the United States acquired a nosocomial infection [3], and it has been estimated by the Centers for Disease Prevention and Control (CDC) that nearly two million patients each year become infected during their hospital stay. Nosocomial infection is one of the leading causes of death and increased morbidity for hospitalized patients [4,5].

The World Health Organization (WHO) established that the rate of nosocomial infections will continue to rise as a result of four factors which include: Crowded hospital conditions, increasing number of people with compromised immune system, new microorganisms and increasing bacterial resistance [6]. Similarly, Toni and Lee identified the following risk factors as the causes of

nosocomial infections: prolonged hospital stay, severity of underlying illness, compromised nutritional or immune status, use of indwelling catheters, failure of health care workers to wash hand between handling of patients or before any procedure and prevalence of antibiotic resistance bacteria from a prolonged use or misuse of antibiotics [7].

Nosocomial infections are commonly caused by bacteria, it can also be caused by viruses, fungi and parasites, but these types of infection occur less frequently, especially those caused by parasites, for example scabies and often do not carry the same morbidity and mortality as bacterial infections.

Viral nosocomial infections are more common in children than in adults and carry a high epidemic risk [8] and fungal nosocomial infections frequently occur during prolonged treatment with antibiotics and in patients who have compromised immune systems [6].

Nosocomial infections occur worldwide and it affects both developed and developing countries. Over 1.4 million people worldwide suffer from infection complications acquired in the hospital [6]. Nosocomial infections contribute to 80,000 deaths annually and carry an estimated yearly cost of nearly \$2 billion [9]. Nosocomial infections have socio-economic impact on the society [10]; it affects more than 2 million patients each year or about 5- 10% of hospitalized patients leading to approximately 90,000 deaths per year. Average cost of \$ 14,000 to \$38,000 per infection, adding more than \$4.5 billion to the total national health care costs [11].

A similar study listed the following measures in preventing and controlling nosocomial infections which includes: mounting surveillance on nosocomial infections, development of policies regarding prevention and control such as hand hygiene and practice of universal precaution, adherence to healthy environmental practices and regular training of hospital staff on nosocomial infections and its control [12]. This study assessed the knowledge of healthcare workers on nosocomial infections in secondary health institutions of Zaria Local Government Area, Nigeria.

## 2. Materials and Methods

### 2.1. Study Area

The study area is Zaria local Government where the two selected secondary health institutions were located. Zaria is one of the ancient cities in the northern Nigeria. The total estimated population is 406,990 according to the 2006 census [13]. The two secondary health institutions selected for the study were St. Luke's Hospital Wusasa Zaria and Hajiya Gambo Sawaba General Hospital, Kofan Gayan.

Wusasa hospital is one of the oldest missionary hospitals in the Northern Nigeria and it is a secondary Health care facility. It was founded in 1929 by the missionary people from England under the denomination of Anglican Church. At the time of the study the hospital had the following categories of health personnel: nurses, doctors, pharmacists, laboratory scientists among others.

Hajiya Gambo Sawaba General Hospital was founded and opened on 3<sup>rd</sup> March 1975 as a health center Zaria. It

is a secondary Health care facility with Nurses, Doctors, Pharmacists and Laboratory scientists among others.

### 2.2. Study Design

It was a cross sectional descriptive study carried out in October, 2010 to assess the knowledge of healthcare workers on nosocomial infections in the 2 selected secondary health institutions in Zaria Local Government Area.

### 2.3. Sampling technique, sample size and study population

It was a whole population based study which comprised of 160 healthcare workers: 18 doctors, 107 nurses, 21 pharmacists and 14 laboratory scientists in the selected hospitals.

### 2.4. Data collection Tools

A self-administered semi-structured questionnaire on knowledge of healthcare workers on nosocomial infections in secondary health institutions of Zaria Local Government was administered to the 160 healthcare workers. The questionnaire was divided into two sections, A and B. section A contains the socio-demographic characteristics of the participants while section B which contained questions on knowledge of nosocomial infections.

### 2.5. Data Analysis

Data analysis was done using SPSS 16.0 version and the results presented in charts and statistical significance was at p value of < 0.05.

### 2.6. Ethical Considerations

Ethical approval was obtained from the Directors of the Secondary Health Institutions and also only the staff that gave consent to participate in the study were given the questionnaire.

## 3. Results

Table showed that majority of the respondents 124 (77.2 %) fall within the age range of 20-39 years, 106 (66.2%) were female, 107 (66.9%) were nurses, 107(66.9%) were in nurses department, 55(34.4%) were from other wards while 116(72.5%) had 1-10 years of experience.

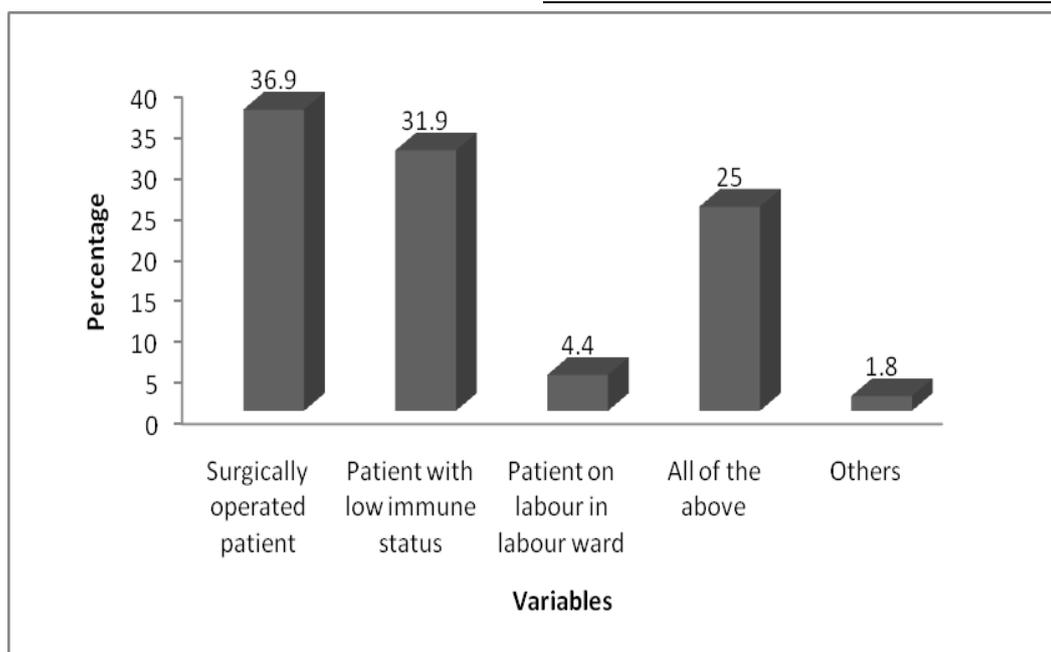
Majority of the respondents 92(57.5%) gave fully correct definition of nosocomial infection, 123 (75.9%) were of the opinion that bacteria is the most common cause of nosocomial infection. 72(45.0%) were of the opinion that improper aseptic technique and contamination of healthcare workers is one of the common risk factors of nosocomial infection, 80 (50.0%) were of the opinion that the sources of nosocomial infection can be as a result of environmental factors, patient-related factors and iatrogenic factors. 61(38.1%) were of the opinion that surgical wound infection is the commonest type of nosocomial infection (Table 2).

**Table 1. Socio-demographic characteristics of the respondents (n=160)**

Variables	Frequency	Percentage
Age (in years)		
20-29	81	50.6
30-39	43	26.6
40-49	16	10.0
50-59	10	6.3
≥60	10	6.3
Sex		
Male	54	33.8
Female	106	66.2
Profession		
Physician	18	11.2
Nurse	107	66.9
Laboratory scientist	14	8.8
Pharmacist	21	13.1
Department		
Medicine	7	4.4
Surgery	11	6.9
Nursing	107	66.9
Laboratory science	14	8.7
Pharmacy	21	13.1
Ward/unit		
Surgical ward	40	25.0
Medical ward	46	28.8
Laboratory unit	14	8.7
Theatre	5	3.1
Others	55	34.4
Years of experience (in years)		
1-10	116	72.5
11-20	21	13.1
21-30	13	8.1
≥31	10	6.5

**Table 2. Respondents' knowledge on nosocomial infection (n=160)**

Variables	Frequency	Percentage
Knowledge of Definition of nosocomial infection	92	57.5
Fully correct response	52	32.5
Partially correct response	16	10.0
Incorrect response		
Knowledge of causes of nosocomial infections	123	76.9
Bacteria	13	8.0
Viruses	9	5.6
Protozoa	10	6.3
Fungi	5	3.1
Others (poor personal hygiene, malnutrition)		
Knowledge on risk factors associated with nosocomial infections		
Prolonged hospital stay	28	17.5
Severity of underlying illness	12	7.5
Compromised nutritional or immune status	30	18.8
Improper aseptic technique and contamination of healthcare workers	72	45.0
Others	18	11.2
Knowledge on Sources of infections		
Environmental factors	47	29.4
Patient-related factors	20	12.5
Iatrogenic factors	13	8.1
All of the above	80	50.0
Knowledge on types of infections		
Respiratory tract infection	57	35.6
Surgical site infection	61	38.1
Urinary tract infection	17	10.6
Blood stream infection	11	6.9
Others	14	8.8



**Figure 1.** Respondents' opinion on the most vulnerable patients in the hospital that easily contact Nosocomial infection (n=160)

Figure 1 showed that majority of the respondents 59 (36.9%) were of the opinion that surgical operated patients are the most vulnerable to nosocomial infection just like patient with low immune status, patients on labour ward and others (patients on steroid or cancer therapy, HIV/AIDS).

Majority of the respondents 75 (46.9) were of the opinion that: increase length of hospital stay, increase cost of laboratory investigation, increase cost of drugs, surgical intervention and supportive needs and increase personnel work hour were 16.9%, 5.0%, 23.7%, 7.5% and 46.9% respectively (Table 3).

**Table 3. Respondents' opinion on economic implication of nosocomial infection (n=160)**

Economic implication	Frequency	Percentage
Increase length of hospital stay	27	16.9
Increase cost of laboratory investigation	8	5.0
Increase cost of drugs, surgical intervention and supportive needs	38	23.7
Increase personnel work hour	12	7.5
All of the above	75	46.9

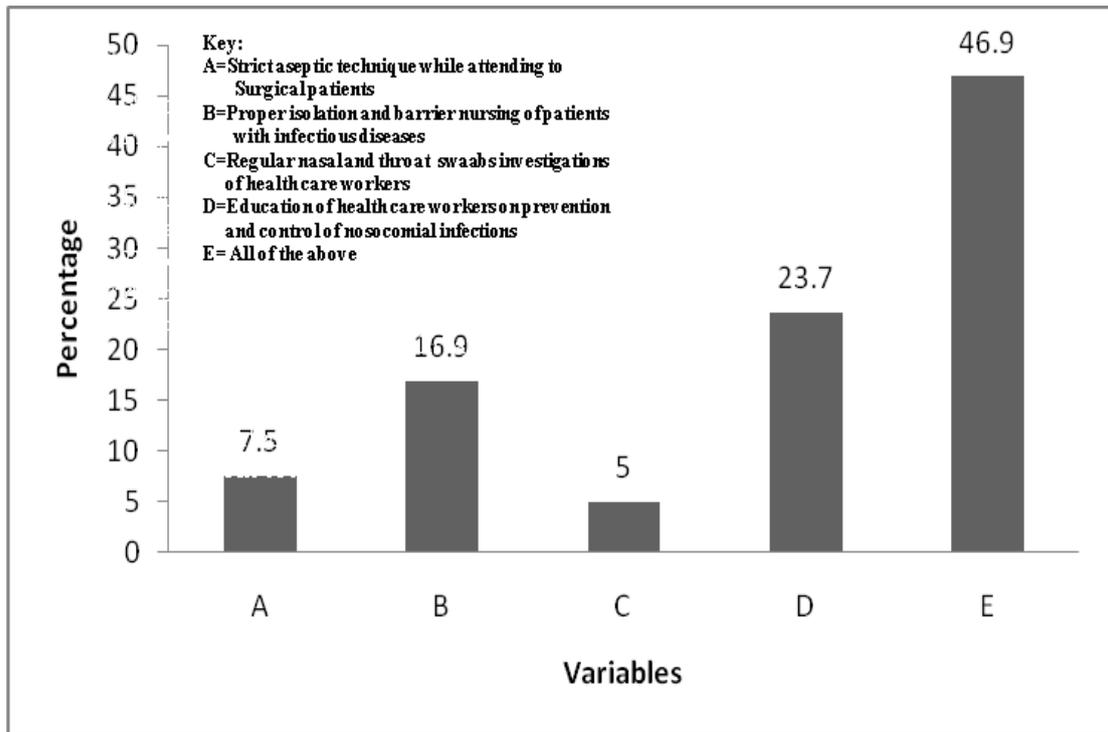


Figure 2. Respondents' opinion on the best way to prevent Nosocomial infection (n=160)

About 46.9% of the respondents were of the opinion that: strict aseptic technique while attending to surgical patients, proper isolation and barrier nursing of infectious diseases. Regular nasal and throat swab investigation of

the health workers and education of the healthcare workers or preventions and control of nosocomial infections are the best ways of preventing nosocomial infections (Figure 2).

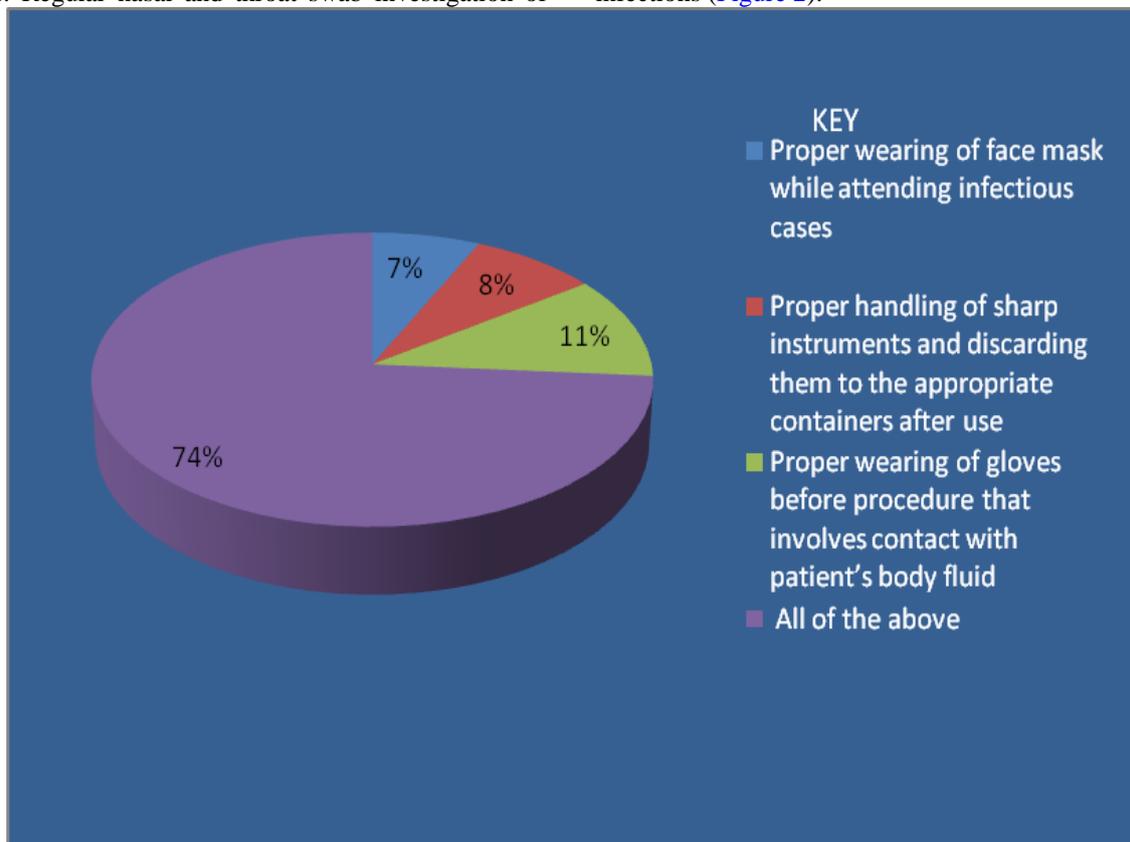
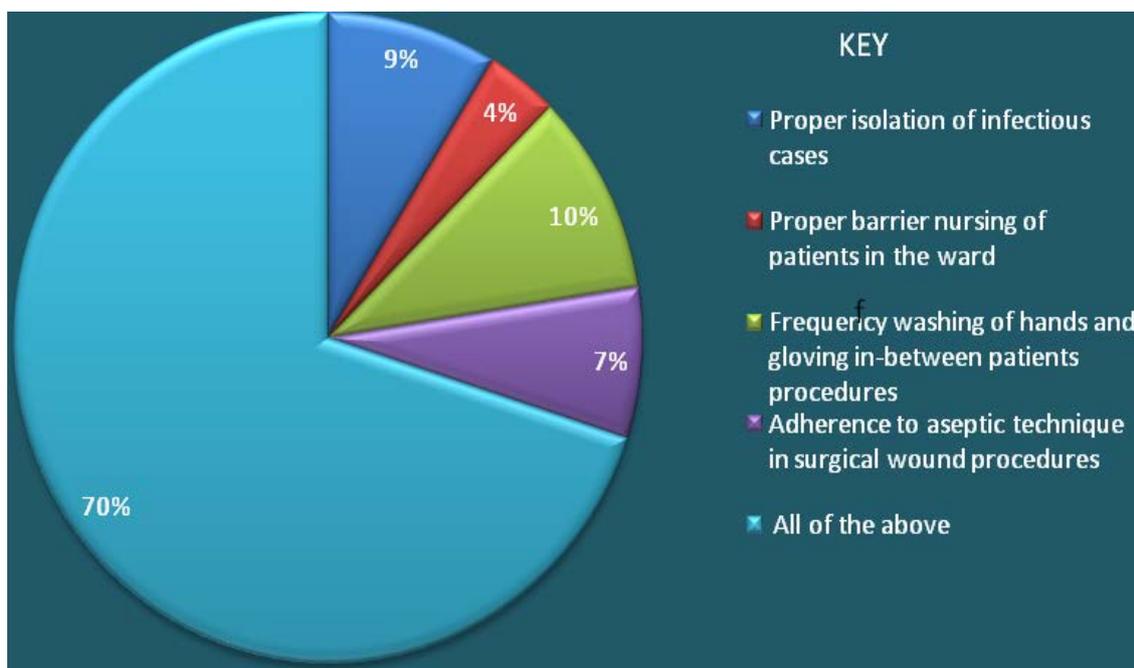


Figure 3. Respondents' opinion on the way which personnel can adopt to protect themselves (n=160)

Figure 3 showed that majority of the respondents 118 (73.8%) were of the opinion that proper wearing of face mask while attending infectious cases, proper handling of sharp instruments and discarding them to the appropriate

containers after used and proper wearing of gloves before procedure that involves contact with patients body fluid are good way which the personnel can adopt to protect themselves against infection.



**Figure 4.** respondents' opinion on the way which personnel can adopt to protect their patients (n=160)

Majority of the respondents 112 (70.0%) were of the opinion that proper isolation of infectious cases proper barrier nursing of patients in the ward, frequent washing of hands and gloving in-between patients procedures and adherence to aseptic technique in surgical wound procedures are the effective ways which the personnel can adopt to protect their patients against any infection (Figure 4).

#### 4. Discussion

Majority of the respondents (77.2%) are within the productive age group of 20 -39 years, with mean age of  $34 \pm 12$  years and age range of 20-60 years. Majority of the respondents (62.2%) were female and 66.9% were nurses by profession distantly followed by pharmacist with 13.1%. The respondents' working experience mean is  $10 \pm 9$  years.

About 57.5% of the respondents gave fully correct definition of nosocomial infection. This tallied with the result of a similar study by McBryde *et al* [13].

A significant percentage (76.9%) of the respondents had knowledge that nosocomial infections can be caused by bacteria, and also bacteria is the most common cause of nosocomial infection. This is inline with the study carried out by some researchers [18].

In addition, 45% of the respondents are aware that improper aseptic technique and contamination by healthcare workers are risk factors associated with the infection which is consistent with the findings of the study by Toni and Lee-Culvert who stated that risk factors that increase the opportunity for hospital adult and children to acquire infection are improper aseptic techniques and contamination by healthcare workers [7].

Half of the respondents had knowledge that the main sources of nosocomial infections are environments factors, patient-related factors and iatrogenic factors, similar to result by WHO [16]. Also the study showed that 38.1% of the respondents were aware that surgical site infection is

the commonest type of nosocomial infection in the hospital which is inline with the study by Zhan and Miller which showed that surgical site infections account for approximately 40% of infections acquired in a healthcare setting and are costly in terms of length of stay, morbidity, mortality and actual cost [14]. About 38.8% of the respondents stated that contact transmission, airborne transmissions, vehicle transmission and vector transmission are the commonest route of acquiring nosocomial infections similar to the result of study by Prescott *et al* that stated that transmission is the link in the infectious disease cycle and occur by four main routes: airborne, contact vehicle and vector [15]. Likewise, the study showed that, 36.9% of the respondents had knowledge that surgically operated patients are the most vulnerable patients in the hospital.

This study also revealed that increase cost of drugs, surgical intervention and supportive needs are the economic implications of nosocomial infection. This is in agreement with the study by Zhan and Miller who stated that post-operative sepsis, post-operative wound dehiscence and infection due to medical care were the three indicators associated with highest cost in term of length of stay charges and mortality [14].

The suggested ways of prevention of nosocomial infections by 46.9% of the respondents are: strictly adherence to aseptic technique while attending to surgical patients, proper isolation and barrier nursing of infectious cases, regular nasal and throat swab investigation of the healthcare workers and education of the healthcare workers on prevention and control of nosocomial infections which are in line with the study carried out by WHO [6] which established that nosocomial infections are better prevented through strict adherence to aseptic techniques, proper isolation and barrier nursing of infectious cases, regular nasal and throat swab investigation of healthcare workers and education of healthcare workers on the causes and control of nosocomial infections.

A good percentage of the respondents (73.8%) had knowledge of the various ways which personnel can adopt to protect themselves from nosocomial infections which include: proper wearing of face mask while attending to infectious cases, proper handling of sharp instruments and discarding to their appropriate containers after use and proper wearing of gloves before procedure that involves contact with the patient's body fluid.

Furthermore, it showed that 70% of the respondents were aware that proper isolation of infectious cases, proper barrier nursing of patients in the ward, frequent washing of hands and gloving in between patients' procedures and adherence to aseptic technique in surgical wound procedures are the ways health personnel can adopt in protecting their patient. These are in line with the study carried out by who stated that the healthcare workers can adequately prevent themselves and their patients against nosocomial infections when they ensure wearing of protective equipment, handling of sharp objects with care and avoiding contact with patients' body fluids and droplet infectious cases while performing their procedures [16].

## 5. Conclusion

This study showed that 66.9% of the respondents were nurses who are mostly female. The study revealed that, 57.5% of the respondents were aware of nosocomial infection as infection that manifests after 48 hours of hospital admission and bacteria is the most common cause of nosocomial infection in relation to other causes. The routes of transmission are contact transmission, airborne transmission, vehicle transmission and vector transmission and the most vulnerable patients are the surgically operated patients. The preventive measures to be adopted can be through protection of personnel themselves and through protecting their patient.

1. There should be regular training for healthcare workers on topical public health issues such as nosocomial infection and its control by the management of the hospitals and the various professional bodies.

2. Healthcare workers should be regularly screened by their employers to identify carriers of pathogen organism for subsequent treatment.

3. The practice of universal precaution should be intensified.

## References

- [1] World Health Organization. WHO Global Strategy for Containment of Antimicrobial Resistance. WHO/CDS/CSR/DRS/2001.2.
- [2] Struelens MJ. The epidemiology of antimicrobial resistance in hospital-acquired infections: problems and possible solutions. *BMJ* 1998; 317:652-654.
- [3] Mc Brydes ES, Bradley L.G, Whithy, M, Mc Elwain D.L An investigation of contact transmission of methicillin-resistance staphylococcus aureus. *J. Hospital Infection*, 2004; 58(2): 104-8, <http://www.ncbi.nlm.gov> (assessed on 17/07/2009).
- [4] Greenwood D, Richard SCB, John PF. Strategy of antimicrobial chemotherapy. *Medical Microbiology*; London, church Livingstone, 15<sup>th</sup> edition, 1998: 644-645.
- [5] Richard S. Infection control today. *Journal of hospital infection*, 2000; 32(4): 159-165.
- [6] World Health Organization (WHO). Prevention of Hospital-acquired infections. A Practical Guide, General WHO press, 2<sup>nd</sup> edition, 2002: 1-3.
- [7] Toni R. Lee-Culvert L. Hospital-Acquired infection, 2004 [http://www.surgeryencylopedia.com / FL-la/Hospital-Acquired infection.htm](http://www.surgeryencylopedia.com/FL-la/Hospital-Acquired%20infection.htm) (assessed on 20/08/2009).
- [8] Weinstein R., Kasper D.L, Braudiwald E, Hauser S.L. Hospital-acquired Infections. *Harrison's principles of internal Medicine*, 16<sup>th</sup> edition, 2004.
- [9] Wesley A. W, Margaret F.W. Basic microbiology, New York, Harper and Row Publishers, 6<sup>th</sup> edition, 1988: 171-172.
- [10] Chen, Y.Y, Chou, Y.G, Chou, P. Impact of Nosocomial Infection on cost of illness and Length of stay in intensive care unit. *Infection control hospital epidemiology* 2005, 26(3): 281-287.
- [11] Stone P.W, Braccia D, Larson E. Systematic review of economic analyses of healthcare associated infections. *AMJ Infections control*, 2005; 33(9): 501-509.
- [12] Farr, B. Prevention and Control of Nosocomial infection WMA Business Briefing: *Global healthcare* 2002; 3:37-41.
- [13] National Population Commission of Nigeria: Zaria Local Government Area, 2006 [www.citypopulation.de/references.html](http://www.citypopulation.de/references.html) (assessed on 20/11/2013).
- [14] Zhan C, Miller M.R. Excess length of stay, charges and mortality attributable to medical injuries during hospitalization *JAMA* 2003; (290): 1868-1874.
- [15] Prescott L.M., Harsley J, Klein O. *Microbiology*, New York, Mc Graw-Hall publishers, 5<sup>th</sup> edition, 2002: 855-867.
- [16] Garner J.S Hospital Infection Control Practice Advisory Committee. Guidelines For isolation and precaution in hospitals *infection control epidemiology* 1996: 17:53-80.