

## Knowledge of Infection, Prevention and Control Strategies Among Nurses in National Orthopaedic Hospital Enugu

Obeagu Getrude Uzoma<sup>1</sup> & Obeagu Emmanuel Ifeanyi<sup>2,3\*</sup>

<sup>1</sup>*Department of Nursing Science, Ebonyi State University, Abakaliki, Nigeria*

<sup>2</sup>*Medical Laboratory Science, University Health Services, Michael Okpara University of Agriculture, Umudike, Nigeria*

<sup>3</sup>*Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria*

**\*Correspondence to:** Dr. Obeagu Emmanuel Ifeanyi, Department of Medical Laboratory Science, Imo State University, Owerri and University Health Services, Michael Okpara University of Agriculture, Umudike, Nigeria.

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### Abstract

This study was carried out to determine the knowledge of infection prevention and control strategies among nurses in four wards of National orthopaedic Hospital Enugu. The objectives of the study were aimed at assessing the level of knowledge of nurses about infection prevention and control strategies, their practice of infection prevention and control strategies, factors affecting infection prevention and control strategies and ways of improving infection prevention and control strategies. The related literature was reviewed. The benefit of the study is to reduce the incidence of nosocomial infection. Descriptive survey was used. The population for the study was 87 nurses and sample size was 71 nurses. The instrument for data collection was questionnaire. The data presentation and analysis were done using frequency tables, percentages and pie chart. The major findings of the study revealed that nurses in four wards of National Orthopaedic hospital Enugu had an above

average knowledge of infection prevention and control strategies while their practice of infection prevention and control strategies was not satisfactory especially on the area of aseptic technique and disinfection. Inadequate resources like manpower, materials etc were identified as major factor affecting infection prevention and control strategies. Organization of infection prevention and control programme in the hospital ranked highest in ways of improving infection prevention and control strategies. Hence, the researcher recommended that ministry of health should conduct seminars on infection prevention and control strategies for health workers.

## Introduction

From time immemorial, the existence of micro-organism or microbe is as old as man. Longman dictionary (2008) defined microbe as an extremely small living thing or creature which one can only see with microscope and some of them can cause disease or infection. Micro-organisms include bacteria, virus, fungi etc. Infection can be defined as the process by which pathogenic micro-organism enter the body of a person, overcome his body defense mechanism and cause disease [1]. However, from orthopaedic point of view in 18th century of the historical background of orthopedics, the knowledge of infection prevention and control strategies was totally lacking. The treatment of orthopedic conditions were based on the assumption rather than scientific fact and there was nothing like antibiotic neither has the work of Lister and Pasteur begun even in developed countries of the world.

Knowledge on the other hand refers to the information, skill and understanding that you have gained through learning or experience (Longman 2005). Zontman (2010) states that one third of health care associated infections in the hospital setting could be prevented if hospital instituted the essential components required for infection prevention and control programme. He further stated that recent data regarding infection prevention and control programme in developed countries like Canada, United Kingdom, Italy, Australia etc have reported deficits in the essential resources (trained staff etc) and components of infection prevention and control programme. Infection prevention and control is a critical component of patient safety, as health care associated infections are by far the most common complication affecting hospitalized patients. Infection prevention and control strategies refer to medical interventions used to minimize and/or avoid transmission of infection. The human and economic burdens that health care associated infections place on countries and their health care system speak to the importance of an effective infection prevention and control strategies.

The goal of infection prevention and control strategies is to contribute to patient safety through protecting patients from infections, protecting health care workers and visitors to health care facilities from infections. Also, accomplishing these goals in the most cost effective manner when ever possible, thus reducing the economic impacts of health care associated infections on individual health facilities, health systems and the national health care industry. Health care associated infections occur in relation to health care interventions including invasive, diagnostic, surgical and medical procedures. Examples of health care infections include blood stream, surgical site, urinary tract, pulmonary and skin and soft tissue infections.

Zautman (2010) estimated 2.1 million nosocomial infections with 80,000 attributable deaths in the US. Health care associated infections were the fourth most common cause of death. He also estimated that

220,000 nosocomial infections, which result in more than 8,000 deaths occur in Canadian hospital each year. The bulletin of world Health Organization by Benjamin (2011) [2] on systematic review of associated infection in Africa-Health care reported 95% in the cumulative incidence and density of health care associated infection due to understating. The researcher also observed that in National Orthopaedic hospital Enugu, the practice of infection prevention and control strategies was not efficient due to inadequate resources.

Consequently, society as a whole suffers negative impacts from health care associated infections. These infections including their investigation and treatment, have both immediate and future implications for the individual, the health care system and the local, national and global communities, many factors increase a patients risk of developing health care associated infections including advanced age, prematurity and increasingly complex treatment modalities in both hospital and out-of-hospital setting.

However, routing practices which is the term used by public Health Agency of Canada to describe the system of infection prevention and control strategies is recommended in the hospital to prevent and control transmission of micro-organisms in health care setting. Dutchman (2007) [3] states that consistent use of routine practices with all clients/patients/residents is critical to preventing transmission of infection. The control strategies to be used with all clients/patients/residents during all care include hand hygiene with an alcohol-based rub or with soap and water before and after physical contact with a client/patient or contaminated environment.

Also, additional barrier precautions to prevent health care workers contact with blood, body fluids, secretions, excretions, non- intact skin or mucous membranes. This include wearing of gloves, long-sleeved gown, mask, and eye protection or face shield where appropriate (contact precaution), preventing injuries from needles, scalpels and other sharp devices. Careful handling of soiled linen and waste to prevent personal contamination and transfer to other clients/patients/residents. Isolation for patients with infections disease. Cleaning and disinfecting all equipment that is being used by more than one client/patient between uses etc are some of the strategies to control and prevent infection in health care system [3].

Generally, universal precautions, disinfection, sterilization etc remain the most effective ways of improving infection prevention and control strategies in the hospital. The overall benefits of infection prevention and control strategies include reduced cost and rates of health care associated infections, quick patient recovery and less work on the part of hospital staff.

## Research Questions

The research questions for this study are as follows.

- What is the level of knowledge of nurses towards infection prevention and control strategies?
- How do nurses practice infection prevention and control strategies?
- What are the factors affecting infection prevention and control strategies?
- What are the ways of improving infection prevention and control strategies?

## Research Methodology

### Research Design

The design for this study is descriptive survey design. Descriptive design is employed in understanding the health problem through orderly collection, analysis and interpretation of data of current situation of event to arrive at a solution for the problem use in this study which focuses on determining the knowledge of infection prevention and control strategies among nurses working in four wards of National Orthopaedic hospital Enugu.

### Area of the Study

The area of the study is National Orthopaedic Hospital Enugu in Enugu East Local Government Area of Enugu State of Nigeria. Four wards in the hospital are used which include trauma unit, female ward one, male ward three and septic ward.

### Population of the Study

The population of nurses used for this study consists of 87 nurses of four wards in National Orthopaedic Hospital Enugu. That is 26 nurses from trauma unit, 21 nurses from female ward one, 25 nurses from male ward three and 15 nurses from septic ward of the hospital.

### Sample and Sampling Technique

Using Yaro Yamane's Formula, the sample size for this study consists of 71 nurses of the four wards of National Orthopaedic Hospital Enugu.

Yaro Yamane's Formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where e = constant = 0.05.

$$N = \frac{87}{1 + 87(0.05)^2}$$

$$\begin{aligned} N &= \frac{87}{1+0.2175} \\ &= \frac{87}{1.2175} \\ &= 71.457906 = 71 \text{ nurses} \end{aligned}$$

The sample size is 71 nurses out of 87.

### **The Sampling Technique**

The researcher decided to use systematic random sampling technique with the *n*th element of three without replacement using the population size. In systematic random sampling technique, every members of the population has equal chance of being selected as a member of the sample. The sample size for each of four wards are 22 nurses from trauma unit, 17 nurses from female ward one, 21 nurses from male ward three and 11 nurses from septic ward, constituting 71 nurses which is the sample size for the study.

### **Instrument for Data Collections**

The instrument for data collection was questionnaire. The researcher constructed it based on the research objectives. It contains close ended questions to elicit opinion of the respondents. It is made up of 5 sections (A, B, C, D and E) comprising of demographic data, knowledge of infection prevention and control strategies, practice of infection prevention and control strategies, factors affecting infection prevention and control strategies and ways of improving infection prevention and control strategies.

### **Validity/Reliability of the Instrument**

Validity - the researcher constructed the questionnaire based on research objectives and presented it to the project supervisor, who read it, made proper corrections and approved it for typing and distribution.

Reliability - for the reliability of the instrument for data collection, a pilot study was conducted in poly sub-district hospital Enugu using the questionnaire with effective result. The instrument was reliable to be used as data collection instrument for the study.

### **Method of Data Collection**

The researcher approached the chief-nursing officers' in-charge of the four wards in National Orthopaedic Hospital Enugu to obtain permission. The questionnaires were distributed to 71 nurses randomly selected at different duty shifts comprising of only nurses in trauma unit, female ward one male ward three and septic ward of the hospital. The filled questionnaires were collected immediately.

## Method of Data Analysis

The method of data analysis for this study is based on the set research objectives. The collected data were analyzed using frequencies and percentages.

## Ethical Considerations

The ethical consideration of the study includes confidentiality, respect for human dignity and justice.

Confidentiality - the respondents were assured that the information provided will not be used against them merely for academic purpose.

Respects for human dignity - the subject were assured of the right to self determination that is the right of the subjects to voluntarily decide whether or not to participate in the study.

## Data Presentation and Analysis

This chapter deals with the presentation and analysis of data for this study. The data are presented using frequency tables and percentages as well as pie chart.

### Section A: Demographic Data

*Table 1: Age distribution*

S/n	Items	Frequency	Percentages
A	20-30 years	24	33.8%
B	31-40 years	28	39.44%
C	41-50 years	12	16.9%
D	51-59 years	7	9.86%
	Total	71	100%

The table one above showed that majority of the respondents 28(39.44%) aged 31-40 years, 24 (33.8%) were 20-30 years, 12 (16.9%) were between 41-50 years and 7 (9.86%) aged 51-59 years.

*Table 2: Units/ward*

S/n	Items	Frequency	Percentages
A	Trauma unit	22	30.99%
B	Female ward one	17	23.94%
C	Male ward three	21	29.58%
D	Septic ward	11	15.49%
	Total	71	100%

Table 2 revealed that trauma unit nurses had highest percentage 22 (30.99%) followed by male ward three 21 (29.58%), female ward one got 17 (23.94%) and septic ward was 11 (15.49%).

**Table 3: Professional Qualification**

S/n	Items	Frequency	Percentages
A	Diploma Holder	39	54.93%
B	B.N.Sc Holder	28	39.44%
C	Master/Doctorate degree holder	4	5.63%
	Total	71	100%

Diploma Holder assumed the highest frequency 39 (54.93%) in professional qualifications of the respondents, B.NSc Holder had 28 (39.44%) and master/doctorate degree holder had 4 (5.63%).

**Table 4: Ranks of Respondents**

S/n	Items	Frequency	Percentages
A	NOII/NOI	54	76.06%
B	SNO/PNO	6	8.45%
C	ACNO/CNO	11	15.49%
D	DDNS/DNS	-	-
	TOTAL	71	100%

For ranks of the respondents, NOII/NOI scored the highest frequency 54 (76.06%) followed by ACNO/CNO 11 (15.49%), SNO/PNO had 6 (8.45%) and DDNS/DNS scored non.

**Table 5: Years of Service**

S/N	Items	Frequency	Percentages
A	1-10years	52	73.24%
B	11-20years	10	14.08%
C	21-30years	9	12.68%
D	31-35years	-	-
	Total	71	100%

In years of services, 1-10 years was the highest 52 (73.24%), 11- 20 years ranked 10 (14.08%) while 9(12.68%) was the score for respondents under 21-30 years of service and 31-35 years had noscore.

## Research Question One

### *What Is the Level of Knowledge of Nurse on Infection Prevention and Control Strategies?*

Questions 6,7,8,9 and 10 of the questionnaire help to answer this question.

**Table 6:** Number of respondents that have heard of infection prevention and control strategies

S/n	Items	Frequency	Percentage
A	Yes	71	100%
B	No	-	-
	Total	71	100%

Table 6 above showed that all the respondents 71 (100%) have heard of infection prevention and control strategies.

**Table 7:** Shows the source of information of the respondents

S/n	Items	Frequency	Percentage
A	Health workers	39	54.93%
B	Medical journal	18	25.35%
C	Mass media	12	16.9%
D	Friends/church	2	2.82%
	Total	71	100%

Majority of the nurses 39 (54.93%) heard of infection prevention and control strategies from health workers, 18 (25.35%) from medical journals, 12 (16.9%) from mass media and 2 (2.82%) heard it from friends/church.

**Table 8:** Respondents understanding of infection prevention and control strategies

S/n	Responses	Frequency	Percentage
A	Services provided in the hospital for cleanliness	6	8.45%
B	Services provided by health workers and CSSD	6	8.45%
C	Medical interventions used to minimize and/or avoid transmission of infection	59	83.1%
	Total	71	100%

Majority of the nurses 59 (83.1%) from table 8 above knew the meaning of infection prevention and control strategies while 8.45% respectively did not know the meaning.

**Table 9:** Number of respondents that have been trained on Infection prevention and control programme

S/n	Items	Frequency	Percentage
A	Yes	55	77.46%
B	No	16	22.54%
	Total	71	100%

The table 9 above revealed that majority of the respondents 55 (77.46%) have been trained on infection prevention and control programmed while 16 (22.54) have not been trained.

**Table 10:** Examples of services used to control health care associated infections

S/n	Items	Frequency	Percentage
A	Isolation precaution	29	23.97%
B	Transmission based precautions	34	28.1%
C	Environmental health	16	13.22%
D	Contact tracing	9	7.43%
E	Health education	33	27.27%

Majority of the respondents 34 (28.1%) reported that the services used to control health care associated infections is transmission based precautions, 33(27.27%) said health education, 29 (23.97%) claimed isolation precaution, 16(13.32%) revealed environmental health and 9 (7.43%) identified contract tracing.

## Research Question Two

### *How Do Nurses Practice Infection Prevention and Control Strategies?*

Questions 1, 12 and 13 of the questionnaire help to answer this question.

**Table 11:** Respondents ideas on services of infection prevention and control strategies

S/n	Items	Frequency	Percentage
A	standard/universal precaution	63	56.76%
B	Disinfection	21	18.92%
C	Sterilization	27	24.32%

From table 11 above, 63 (56.76%) of respondents identified the services of infection prevention and control strategies as standard/universal precautions, 27 (24.32%) recommended sterilization and 21 (18.92%) identified disinfection.

**Table 12:** Responses of the nurses on questions applied to practice of aseptic techniques

S/n	Items	Frequency	Percentage
A	I wash many hands always before and after each nursing care with soap and water.	69	79.31%
B	I wash my hands immediately I entered the ward	10	11.49%
C	I always forget to wash my hands because of scarce resources.	4	4.6%
D	I have shared one dressing pack ; into two in favour of patients and for hospital economy	4	4.6%

Table 12 above showed that majority of the respondents 69 (79.31%) always wash their hands before and after each nursing care with soap and water in their practice of aseptic technique. 10 (11.49%) of them claimed to wash their hands immediately they entered the ward while 4 (4.6%) revealed that they forget to wash their hands because of scarce resources and they have shared onedressing pack into two in favour of patients and for hospitals economy respectively.

**Table 13:** Respondents interpretation of disinfection, sterilization and universal precautions

S/n	Items/Respondents	Frequency	
		Agreed	Disagreed
A	Universal precautions apply to body fluids and non-intact skin	51	20
B	Sterilization refers to the destruction of microbes and spores	65	6
C	Dry heat method of sterilization is used to dispose infected dressing	36	35
D	Chemical agents like halogens are used for hand and skin disinfection	37	34
E	Diaguanide (hebitane) is used for hand washing, preoperative skin preparation and trolley disinfection.	61	10
F	Phenolics are used fordecontamination of infected linen and floor.	49	22

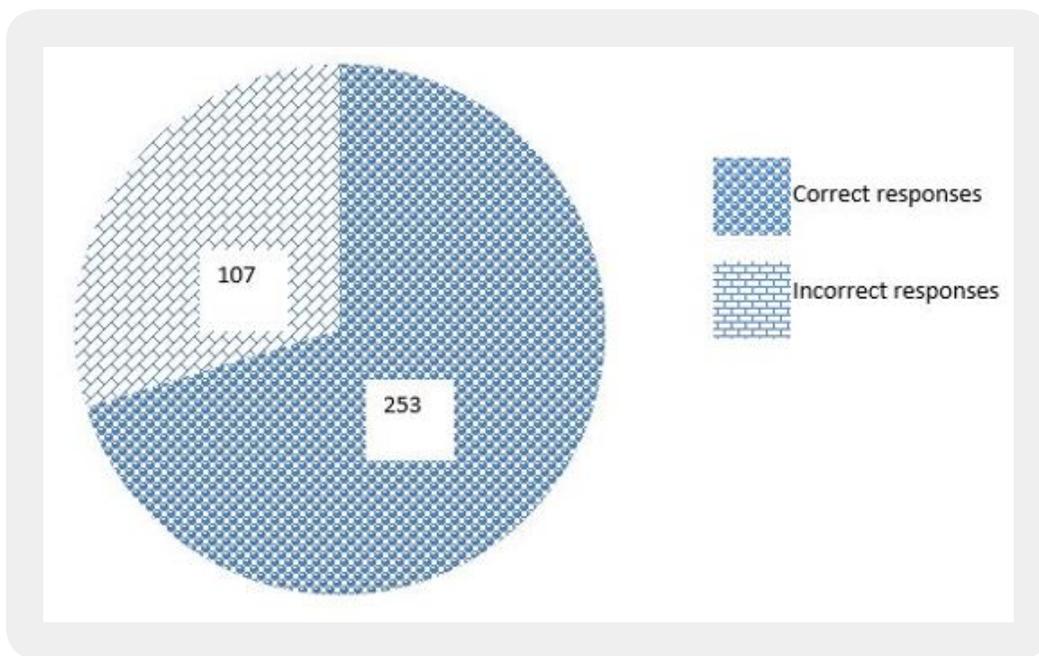
total correct responses = 51 + 65 + 36 + 37 + 61 + 49 = 299

total incorrect responses = 20 + 6 + 35 + 34 + 10 + 22 = 127

$$\text{Average for correct response} = \frac{\text{total}}{\text{no of items}} = \frac{299}{6} = 49.83 (70.18\%)$$

$$\begin{aligned}
 \text{Average for incorrect responses} &= \frac{127}{6(\text{no of items})} = 21.17 (29.82\%) \\
 &= \frac{\text{Average}}{71(\text{sample size})} \times \frac{360}{1}
 \end{aligned}$$

Correct responses = 253°  
 Incorrect responses = 107°



**Figure 1:** Pie Chart showing Respondents Interpretation of Disinfection Sterilization and Universal Precautions

Table 13 above highlighted respondents' interpretation of disinfection, sterilization and universal precaution. Majority of the nurses 49.83 (70.18%) can interpret correctly the practice of disinfection, sterilization and universal precaution while only 21.17 (29.82%) cannot interpret them correctly.

### Research Question Three

#### *What Are the Factors Affecting Infection Prevention and Control Strategies?*

Question number 14 of the questionnaire was used to answer this questions.

**Table 14:** Respondents ideas on the factors affecting infection. Prevention and control strategies

S/n	Items	Frequency	Percentage
A	Age	21	8.7%
B	Nutrition	41	17.01%
C	Exposure to radiation	19	7.88%
D	Patient factors like anaemia, diabetes mellitus	29	12.03%
E	Quality of health care delivery	45	18.67%
F	Inadequate resources	49	20.33%
G	Understaffing of trained infection control personnel	37	15.35%

From table 14, majority of the respondents 49(20.33%) reported inadequate resources as a factor affecting infection prevention and control strategies. Quality of health care delivery was identified by 45(18.67%) respondents, 41 (17.01%) respondents claimed nutrition, understaffing of trained infection control personnel was pinpointed by 37 (15.35%) of nurses. 29 (12.03%) of respondents revealed patient factors like anaemia etc, 21 (8.71%) of nurses said age and 19 (7.88%) indicated exposure to radiation as factors affecting infection prevention and control strategies.

#### Research Question Four

##### *What Are the Ways of Improving Infection Prevention and Control Strategies?*

Question 15 from the questionnaire helps to answer this question.

**Table 15:** Answers of the respondents on ways of improving infection prevention and control strategies

S/n	Items/response	Frequency	Percentage
A	Implements control measures to prevent spread of nosocomial infection like hand hygiene	53	27.32%
B	Organize infection prevention and control programme in hospitals	55	28.35%
C	Establish/strengthen active surveillance systems for nosocomial infections	33	17.01%
D	Foster education training research and information exchange on prevention and control of nosocomial infection	53	27.32%
E	Others specify	-	-

Table 15 above showed that majority of the respondents 55 (28.35%) recommended organization of infection prevention and control programme in the hospital as a way of improving infection prevention and control strategies. 53 (27.32%) nurses answered implementation of control measures to prevent spread of nosocomial infection and fostering education, training, research etc on prevention and control of nosocomial infections respectively, only 33 (17.01%) identified strengthening active surveillance system for nosocomial infection.

## Discussion of Findings

The major findings of this study are discussed in accordance with research questions and in relations to the findings from the related studies

### Research Question One

#### *What is the Level of Knowledge of Nurses on Infection Prevention and Control Strategies?*

Table 6 of the previous chapter revealed that 71 (100%) nurses have heard of infection prevention and control strategies and table 8 showed that 59 (83.1%) nurses knew the meaning of infection prevention and control strategies while 12 (16.9%) did not know the meaning. Also table 9 of chapter four showed that 55 (77.46%) respondents have been trained on infection prevention and control programme while 16 (22.54%) have not undergone such training.

These showed that nurses in the four wards of national Orthopaedic hospital Enugu have above average knowledge of infection prevention and control strategies. This findings correspond to the study undertaken by Keah (2010) on evaluation of knowledge and awareness of disinfection and sterilization among health care workers in south east Asia which reported that nurses were more aware of the policy of disinfection and sterilization than other groups of medical personnel. The study further revealed that a significant increase in awareness from 56.2% before training to 73.3% was observed after in- service training. He also stated that knowledge on method of decontamination, disinfection and sterilization of equipment varies widely from 28.8% to 90.1%. In addition, the study reported that with continuous in-service training, the average knowledge of health care workers improved from 44.4% to 57.3%.

Also, table 10 of chapter four showed that 34 (28.1%) nurses identified transmission based precautions, 29 (23.97) nurses claimed isolation precaution and 9 (7.43%) nurses reported contact tracing as services used to control health care associate infection. These findings were supported by Smelter S.C (2008) [4] who recommended that isolation precautions and transmission based precautions are guidelines or services used for infection prevention and control in the hospital. Famakinwa (2006) suggested that contact tracing should be used in infection prevention and control strategies supporting the above findings from table 10.

### Research Question Two

#### *How do Nurse Practice Infection Prevention and Control strategies?*

Table 11 of the previous chapter revealed that 63 (56.76%) nurses reported universal precautions, 27 (24.32%) nurses said sterilization and 21 (18.92%) nurses claimed disinfection are services of infection prevention and control strategies. These are in line with the work of parker and Stucke (2006) which identified the services of infection prevention and control strategies as universal precautions, disinfections and sterilization.

Also table 12 of chapter four showed that 69 (79.31%) of respondents always wash their hands before and after each nursing care with soap and water. The study carried out to assess the observance of universal

precaution by health care workers in Abeokuta Ogun State in 2008 from an internet source was not in support of this findings. The study reported that 94.6% of health care workers observed hand washing after handling patient.

In addition, table 12 of chapter four further revealed that 4 (4.6%) nurses claimed that they have shared one dressing pack into two in favour of patients and for hospital economy. This finding was rejected by the finding of Rajinder, Walia and Kaur (2008) [5] on knowledge and practice regarding universal precautions among nursing personnel using 150 respondents reported that 93.3% of the subjects claimed they always use aseptic technique during handling of open wounds

Also, table 13 of chapter four revealed that a good number of respondents 49.83 (70.18%) can interpret ideas of disinfection, sterilization and universal precaution correctly while 21.17 (29.82%) nurses cannot interpret them correctly. This findings is in partial support with the findings of the study conduct by Rajinder *et al* (2008) [5] on knowledge and practice regarding universal precautions among nursing personnel with 150 respondents. The study reported that 70% of subject said that disinfectant solution should be used in diluted strength than the recommended strength due to cost factor while 18% subjects claimed they will never compromise on recommended strength.

### **Research Question Three**

#### ***What are the Factors Affecting Infection Prevention and Control Strategies?***

Table 14 of the previous chapter showed that 49 (20.33%) respondents identified inadequate resources, 45 (18.67%) nurses reported quality of health care delivery and 21 (8.7%) nurses identified age as factors affecting infection prevention and control strategies. This finding is in accordance with the work of Zoutman (2010) which revealed that patient over 65 years of age accounted for 52% of the hospital patient day. He further stated that for infection prevention and control programme to be effective there should be quality and quantity knowledgeable infection control health workers.

Also, from table 14 of the previous chapter showed that 41 (17.01%) nurses identified nutrition, 29 (12.03%) nurses reported patients factors like anemia and 19 (7.88%) claimed exposure to radiation are factors affecting infection prevention and control strategies. This finding was supported by Famakinwa (2006) who identified nutrition, patients factors like anaemia and exposure to radiation as factors affecting infection prevention and control strategies.

### **Research Question Four**

#### ***What are the Ways of Improving Infection Prevention and Control Strategies?***

Table 15 of chapter four showed that 55 (28.35%) respondents identified organization of infection prevention and control programme in the hospital, 53 (27.32%) identified fostering education, training, research and information exchange on prevention and control of nosocomial infection and 3 (17.01%) reported establishment/strengthening active surveillance systems for nosocomial infections as ways of improving

infection prevention and control strategies. This finding was supported by the work of European commission (2011) [6] that identified the above mentioned strategies as ways of improving infection prevention and control strategies [7,8].

## Conclusion

From the study, the following conclusion was made based on the findings. The nurses in National Orthopaedic Hospital Enugu had an above average knowledge of infection prevention and control strategies. Their practice of infection prevention and control strategies was not satisfactory especially on areas of aseptic technique and disinfection. Also, inadequate resources was identified by 49 (20.33%) respondents as major factors affecting infection prevention and control strategies. The findings of the study further revealed organization of infection prevention and control programme in the hospital as the major way of improving infection prevention and control strategies as claimed by 55 (28.35%) respondents.

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