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## Infection control: nurses' knowledge and practice of universal precaution in Delta State, Nigeria

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### Abstract

**Background:** Health personnel especially nurses are at high risk of various occupational acquisition of infections such as blood-borne infections, body fluids and contaminated medical equipment. Health personnel may transmit the acquired infections to clients, colleagues and other people they come in contact with. Infection control reduces the risk of transmission of infections among clients, clients to nurses or other health personnel and vice versa. Literature reveals that nurses' knowledge and attention to infection control in Primary Health Centres (PHC) in Nigeria is very limited. This study was therefore designed to assess the nurses' knowledge and practice of infection control in PHC in Delta State, Nigeria.

**Method:** Cross-sectional design was utilised and target population were the nurses working in PHC in Delta State. Using Slovan's sampling formula; a sample size of 231 nurses was obtained from the randomly selected 17 out of the 25 local government areas in Delta State. A self-administered structured questionnaire was used for data collection. Items on knowledge have Yes/No responses while items on practice have Always, Sometimes, Not at all and not applicable responses. Data were analysed and hypothesis tested with Chi square test at significant level of  $p < 0.05$ .

**Results:** Findings revealed that nurses in the study setting had good knowledge of infection control, but not fully reflected in the level of their practice of infection control. Majority of them knew that the following precautions could prevent infection: cleaning/covering of sores with waterproof plaster (96.1%), washing of hands with soap and water (97.8%), wearing of gloves (99.1) and disinfecting re-usable instruments (95.2%). In practice, the percentage was below average in the use of hand gloves (47.6%), disinfection of re-usable instrument (45.9%), use of face mask (17.7%), use of eyeshield (7.0%). There was relationship between

the years of working experience and practice of infection control ( $p < 0.05$ ).

**Conclusion:** This study reveals that the practice of universal precaution is not given much attention in the PHC and this may constitute health risk to the nurses and the patients in the study setting. It is essential that activities that will encourage the practice of infection control should be put in place in PHC to prevent transmission of infection.

**Keywords:** Health personnel, Primary Health Centres, infection control, practice of universal precaution, Nurses' knowledge, Years of experience.

### Résumé

**Introduction :** Les agents de santé, spécialement les infirmier(e)s, sont à divers grand risque d'acquisition occupationnelle des infections telle que les infections à voie sanguine, fluides corporelle et équipement médical contaminé. Les agents de santé peuvent transmettre les infections acquises aux clients, collègues et autre personnes ils viennent en contact avec. Le control d'infection réduit le haut risque de transmission des infections parmi les clients, clients aux infirmier(e)s ou autre agents de santé et vice versa. La littérature révèle le savoir et attention des infirmier(e)s vis-à-vis du control d'infection dans les Centres Primaire de Santé (CPS) au Nigeria est très limité. Cette étude était par conséquent désignée pour répartir le savoir et pratique du control d'infection dans les CPS de l'état de Delta, Nigéria.

**Méthode :** Un dessin de cross-section était utilisé et la population de cible était les infirmier(e)s travaillant dans les CPS de l'état de Delta. En utilisant la formule d'échantillonnage de Slovan ; un échantillon de 231 infirmier(e)s était obtenu par une sélection au hasard de 17 parmi 25 gouvernement locaux (communes) de l'état de Delta. Un questionnaire structuré administré par soi-même était utilisé pour la collection des données. Les items sur le savoir ont des réponses Oui/Non tandis que les items sur les pratiques ont des réponses telles que Toujours, Souvent, Pas du tout et Pas applicable. Les données étaient analysées et les hypothèses testées avec le test de Chi square a un niveau significatif de  $p < 0,05$ .

**Résultat :** Les découvertes révélaient que les infirmier(e)s dans l'établissement d'étude avaient bon savoir du control d'infection, mais ne reflète

pas complètement dans le niveau de leurs pratiques du control d'infection. La majorité d'eux savait que les précautions suivantes pouvaient prévenir une infection : nettoyage/couvrement des blessures avec des emplâtres imperméables (96,1%), lavage des mains avec l'eau et du savon (97,8%), l'usage des gants (99,1%), la désinfection d'instrument a utilisation nouvelle (45,9%), l'usage de masque de visage (17,7%), l'usage de bouclier des yeux (7,0%). Il y avait une relation entre les années d'expérience de travaille et la pratique du control d'infection ( $p < 0,05$ ).

**Conclusion :** Cette étude révèle que la pratique de précaution universelle n'est pas donnée beaucoup d'attention dans les CPS et ceci peu constitué risque de santé aux infirmier(e)s et patients dans l'établissement d'étude. Il est essentiel que les activités qui encouragerons la pratique du control d'infection soient mise en place dans les CPS pour prévenir la transmission d'infection.

**Mots clés :** *Agent de santé, Centres Primaire de Santé, control d'infection, pratique universelle de précaution, savoir des infirmier(e)s, années d'expérience.*

## Introduction

Health personnel including physicians, nurses, laboratory scientists, dental surgeons, autopsy personnel and students in training have potential for exposure to infectious materials such as contaminated medical/surgical equipment, blood and body substances. Nurses are more prone to infections and injuries from sharp needle pricks [1]. Literature reveals that there is association between unwashed hands by health personnel and the spread of hospital acquired infections [2-4]. Health professional can transmit infections to clients or to other colleagues through either direct or indirect contact, e.g. during certain procedures like colostomy care, passing of urethra catheter, wound dressing and oral care. It may be by handling contaminated instruments already used for an infected patient [2].

Hospital acquired infections otherwise known as nosocomial infection occurs worldwide [5]. Nosocomial transmission of hepatitis B virus has been documented among health care personnel [6-10]. Literature reveals many case reports of transmission of hepatitis C virus infection from seropositive patients to health care personnel due to accidental needle pricks and cuts from sharp instruments [11-12]. Cases of nosocomial infection of conjunctivitis have been reported in eye clinics and neonatal intensive care units [13-17]. There are several reported cases of nosocomial transmission of tuberculosis from clients to health personnel [18-

19] and transmission of scabies from patients to health personnel while performing procedures like sponge bathing and application of body lotions [20-23].

Infection control addresses factors related to the spread of infections within the health care settings. Studies have confirmed the effectiveness of infection control programmes in various health care settings [24-25]. The use of standard precautions including appropriate handwashing and barrier precautions can reduce contact with blood and body fluids [26-29]. Adherence to personal hygiene after every procedure and after contacts with patients will reduce risk of contacting or transmitting infections [30-31].

In Nigeria, poor knowledge of WHO's recommended universal precautions has been noted among health care workers especially for prevention of HIV/AIDS transmission [32]. Attention to infection control in Primary Health Centres (PHC) in Nigeria is very limited compared to the attention given to hospital acquired infections in tertiary health institutions. On this premise, this study was designed to assess the nurses' knowledge of infection control and the extent to which they practice infection control in some selected PHC in Delta State.

**Objective:** The main objective of the study was to assess the nurses' knowledge and practice of infection control in the study setting.

### Research questions

1. What is the level of nurses' knowledge of infection control in the study setting?
2. What is the extent of nurses' practice of infection control in the study setting?

**Hypothesis:** There will be no significant relationship between the nurses' years of experience and practice of infection control.

## Materials and method

### The study setting

The study was conducted in 17 Local Government Areas (LGA) randomly selected out of the 25 LGAs of Delta State, using the Primary Health Centres (PHC) in the LGAs. The study design was cross sectional survey, nurses working in the PHC in the selected LGAs were the target population. The sample size consisted of 231 nurses selected out of 564 nurses in PHC in Delta State, using Slovin's formula cited by Araoye [33].

**Inclusion criteria:** All the available nurses in the PHC at the time of the study had equal chances of being selected.

*Exclusion criteria:* The nurses who were on annual, maternity and study leave were not selected.

*The formula for sample size:*

$$n = N/1+N(e)^2 \text{ where}$$

n is the required sample size

N is the total population

e is error of tolerance (0.05)

$$n = 564/1+564(0.05)^2$$

$$= 564/1+1.41$$

$564/2.41 = 234$  out of which 231 consented.

#### *Ethical consideration*

A written approval for this study was obtained from the Ethical Research Committee of the Ministry of Health, Delta State. Voluntary consent was obtained from the respondents and they had the freedom to withdraw their consent to participate in the study at any point of the study continuum.

#### *Instrument for data collection*

A self-administered structured questionnaire was used for data collection. To ensure reliability, the questionnaire was adapted from peer-reviewed related articles and a test-re-test was done with a reliability coefficient of 0.75.

#### *Process of data collection*

Data were collected within four weeks by the researchers with the assistance of four trained female community health nurses. The purpose of the study was stated in the questionnaire which contained information on the demographic characteristics of the respondents, their knowledge and practice of infection control. All the respondents returned the completed questionnaire.

#### *Analysis of data*

The data were coded and the statistical software package SPSS17 was used for analysis. Items on knowledge of infection control were categorized as Yes/No, while items on practice of infection control were categorized as Always, Sometimes, Not at all, Not applicable. Frequency distribution and percentages were used to present the outcome. Chi-square test was used to test the hypothesis.

#### **Results**

Table 1 shows that higher percentage (78.3%) of the respondents were in the age range of 35 years and above, while the rest 21.7% were between 20 and 34 years. Females were more (93.9%) than the

**Table 1:** Demographic Characteristics of Respondents n=231

Variables	Level	Frequency	Percentage (%)
Age (Years)	20 – 24	3	1.3
	25 – 29	8	3.5
	30 – 34	39	16.9
	35 – 39	55	23.8
	40 – above	126	54.5
Gender	Male	14	6.1
	Female	217	93.9
Marital Status	Single	23	10.0
	Married	205	88.7
	Widowed	3	1.3
Religion	Christianity	226	97.8
	Islam	2	0.9
	Not specified	3	1.3
Professional qualification	RN	18	7.8
	RN + RM	157	68.0
	RN + RM + any other	21	9.1
	First Degree	23	10.0
	Postgraduate	12	5.2
Years of experience	1 – 4	9	3.9
	5 – 9	57	24.7
	10 – 14	68	29.4
	15 – 19	31	13.4
	20 – above	66	28.6
Professional Status	Staff Nurse/Midwife	27	11.7
	Nursing Officer I (NO)	36	15.6
	Senior Nursing Officer (SNO)	60	26.6
	Principal Nursing Officer (PNO)	45	19.5
	Chief Nursing Officer (CNO)	63	27.3

**Table 2:** Frequency distribution of respondents' knowledge of infection control and prevention n = 231

Variables	Responses	Frequency	Percentage (%)
Cleaning and covering of any sore/cuts on your hands with waterproof plaster can prevent infection.	Yes:	222	96.1
	No:	9	3.9
Washing of hands with soap and water after attending to patients may prevent infection to some extent.	Yes:	2	97.8
	No:	5	2.2
Wearing gloves anytime you are in contact with blood and other fluids is a common routine that does not prevent any infection.	Yes:	222	0.9
	No:	269	99.1
Disinfecting all re-usable instruments after cleaning is not effective enough to prevent any infection.	Yes:	11	4.8
	No:	220	95.2
Cleaning up any spills of blood or body fluids using 0.5% chlorine bleach solution cannot prevent infection because it is superficial .	Yes:	26	11.3
	No:	205	88.7
Disposing contaminated materials in a container that has a tight cover is a bad way of controlling infection.	Yes:	30	13.0
	No:	201	87.0
Using face masks when attending to patients cannot in any way protect the nurse from being infected.	Yes:	71	30.8
	No:	160	69.2

**Table 3:** Frequency distribution of respondents' practice of infection control n = 231

How often do you practice the following?		Frequency	Percentage(%)
Washing of hands before and after attending to each patient.	Always	186	80.5
	Sometimes	29	12.6
	Not at all	12	5.2
	Not applicable	4	1.8
Using a new needle for each patient	Always	225	97.4
	Sometimes	6	2.6
	Not at all	-	-
Sterilising instrument after use	Not applicable	-	-
	Always	182	78.8
	Sometimes	41	17.7
	Not at all	8	3.5
Using hand gloves anytime in contact with blood and body fluid or when handling hospital equipment	Not applicable	-	-
	Always	106	45.9
	Sometimes	58	25.1
	Not at all	59	25.5
Putting on facemask when attending to or assisting with a patient	Not applicable	8	3.5
	Always	41	17.7
	Sometimes	151	65.4
	Not at all	36	15.6
Disposing contaminated materials in the appropriate container	Not applicable	3	1.3
	Always	117	50.6
	Sometimes	81	35.0
	Not at all	29	12.6
Disinfecting all re-usable instruments after cleaning.	Not applicable	4	1.8
	Always	110	47.6
	Sometimes	95	41.1
	Not at all	23	10.0
Putting on protective eye shield when treating or assisting with a patient.	Not applicable	3	1.3
	Always	16	7.0
	Sometimes	69	29.9
	Not at all	119	51.5
	Not applicable	27	11.6

males(6.1%) and majority of them were married(88.7%) compared with the single (10.0%) and widowed(1.3%) respectively. Christians were 97.8%, Moslem 0.9% and not specified 1.3%. Only few of them had M.Sc. (5.2%) and first degree (10.0%), while many of them had RN + RM certificate (68.0%), RN + RM + RNT (9.1%) and RN only (7.8%). Those with 10-14 years of experience were more (29.4%), followed by 20 years and above (28.6%), then 5-9 years (24.7%), 15-19years (13.4%) and the least, 1-4 years (3.9%). By status, Chief Nursing Officers (CNO) were more (27.3%), followed by Senior Nursing Officers (SNO) (26.0%), Principal Nursing Officers (PNO) (19.5%), Nursing Officers (NO) (15.6%) and Staff nurse/ Midwife (11.7%).

Table 2 indicates that many of the respondents had good knowledge of infection

control, considering their responses to the questions. Majority of them knew that the following could prevent or control infection: cleaning and covering of sores/cuts with waterproof plaster (96.1%), washing of hands with soap and water after procedure (97.8%), wearing of gloves (99.1%), disinfecting re-usable instrument (95.2%), cleaning up spills of blood or body fluids with 0.5% chlorine (88.7%), disposing contaminated materials in covered container (87.0%), using face masks (69.2%).

Table 3 indicates the extent to which respondents practiced infection control. The use of new needle for each patient has the highest percentage (97.4%), followed by washing of hands before and after attending to each patient (80.5%) and sterilization of instrument after use (78.8%), Disposing contaminated materials was on the

**Table 4:** Relationship between the respondents' years of experience and practice of infection control

Years of experience	Putting on facemask				Chi-square	p-values
	Always Freq. (%)	Sometimes Freq. (%)	Not at all Freq. (%)	Not applicable Freq. (%)		
1-4	2(0.9)	5(2.2)	2(0.9)	-	22.59	0.031
5-9	11(4.9)	35(15.6)	9(3.9)	2(0.9)		
10-14	18(8.0)	37(16.5)	9(4.0)	4(1.7)		
15-19	2(0.9)	20(8.9)	8(3.5)	-		
20-above	8(3.5)	54(24.1)	3(1.3)	1(0.4)		
Putting on protective eye shield						
1-4	2(0.9)	3(1.4)	(0.9)	2(0.9)	23.04	0.027
5-9	2(0.9)	24(11.1)	25(10.8)	6(2.8)		
10-14	8(3.5)	23(10.6)	29(12.6)	8(3.7)		
15-19	2(0.9)	10(4.6)	14(6.1)	5(2.3)		
20-above	8(3.5)	9(4.1)	43(19.8)	6(2.8)		
Using gloves when in contact with blood/fluid/equipment						
1-4	2(0.9)	4(1.8)	3(1.3)	-	34.11	0.001
5-9	30(13.5)	19(8.2)	5(2.2)	3(1.3)		
10-14	24(10.8)	16(6.9)	27(12.1)	1(0.5)		
15-19	10(4.5)	7(3.0)	12(5.4)	2(0.9)		
20-above	40(17.9)	12(5.4)	11(4.9)	3(1.3)		
Use of new needle for each patient						
1-4	4(1.8)	5(2.3)	-	-	24.22	0.000
5-9	25(10.9)	32(13.9)	-	-		
10-14	66(29.2)	2(0.9)	-	-		
15-19	30(3.3)	1(0.4)	-	-		
20-above	66(29.2)	-	-	-		
Hand washing after each patients						
1-4	4(1.8)	5(2.3)	-	-	43.74	0.000
5-9	12(5.2)	41(18.8)	3(1.3)	1(0.5)		
10-14	53(24.3)	5(2.3)	4(1.8)	6(2.7)		
15-19	29(13.3)	1(0.4)	1(0.5)	-		
20-above	58(26.6)	2(0.9)	4(1.8)	2(0.9)		
Sterilising instrument after use						
1-4	2(0.9)	6(2.7)	1(0.4)	-	20.68	0.008
5-9	17(7.4)	37(16.4)	3(1.3)	-		
10-14	57(25.2)	10(4.3)	1(0.4)	-		
15-19	23(10.2)	8(3.5)	-	-		
20-above	59(26.1)	7(3.1)	-	-		

average (50.6%) while disinfecting re-usable instrument and using of hand gloves were below average – 47.6% and 45.9% respectively. The least practiced precaution was the use of protective eye shield (7.0%) followed by the use of face mask (17.7%).

As indicated in Table 4, the respondents with 20 years of experience claimed that they practiced the following precautions always: sterilizing instruments after use (59 out of 66 of them), washing of hands before and after attending to patients (58 out of 66), using new needle for each patient (all the 66) and using of gloves (40 out of 66). Similar result was observed in those with 15-19 years of experience, 23 out of 31 in sterilization, 29 out of 31, in hand washing, 30 out of 31 in the use of new needle, only 10 out of 31 in the use of gloves.

For those with 10-14 years experience, in the same other as above, 57 out of 68 in sterilizing instruments, 53 out of 68 in washing of hands, 66 out of 68 in using new needle and 24 out of 68 in using gloves. It is not the same for those with 5-9 years and 1-4 years experience. In the area of putting on face mask and protective eye shield, the practice was quite low for all the respondents. The result shows that there is significant relationship between the years of experience and practice of infection control.

## Discussion

As expected, female respondents were considerably more than the males, all of them were in their productive age and majority of them were married. The dominance of females may be attributed to the fact that nursing profession is regarded as female profession. Similar observation was reported by John and Ndifon *et al* [34-35]. The residents in the study setting are predominantly Christians, this accounts for the high percentage of Christians compared with other religions. Almost all of them had additional qualification apart from RN certificate and many of them had more than ten years of experience. This is expected because professionally, additional certificate is required for nurses working in PHC. The additional certificates accounts for their higher professional status, hence, many of them are in the NO, SNO, PNO and CNO cadre.

Greater percentage of the respondents demonstrated good knowledge of infection control, especially in cleaning and covering of sores with waterproof plaster, wearing gloves when in contact with blood/body fluid, disinfecting re-usable instruments, cleaning up spill of blood/body fluid with 0.5% chlorine bleach and disposing

contaminated materials and washing of hand with soap and water before and after attending to patient. Esan, *et al.* [36] and Wendel and Edmond [37] also emphasized the importance of hand washing before and after attending to a patient, before performing invasive procedures or after contact with blood and body secretions. It is said that in the United States, hand washing is mandatory in most health care settings [38]. As shown in this study, one would have expected the high level of knowledge to reflect in the extent of practice of infection control, but it was not so. The level of knowledge did not correspond with practice of infection control. Despite the fact that personal protective equipment like eye shields and face mask prevents contact with potentially pathogenic microorganisms, many of the respondents either sometimes used or did not use face mask and eye shield. Disinfecting re-usable instruments and use of hand gloves was below average.

Many factors could be responsible for the little attention given to the practice of infection control in the study setting, which may include under recognition or non-perception of the risk involved in not using the protective equipment, non-availability of the equipment and pressure of caring for a large number of patients. Similar result was reported in a study by David and Famurewa [39]. Also, Ige, *et al.* [40], reported that in Nigeria, inadequate knowledge of risks of hospital acquired infection and the measures of risk reduction have limited infection control activities.

## Implication for community health nursing:

Infection control is essential for the safety of all health practitioners, especially nurses who by the nature of their professional practice, are prone to infection and injuries. It is necessary for nurses to be exposed to specialised training in infection control. In some health care institutions, nurses are trained as infection control nurse specialists and they have special responsibility for maintaining good infection control practices. It will also help the nurses to see the need to protect themselves in the course of their professional practice. As stated in the health belief and health promotion models [41], some people may not have the insight to protect themselves from danger until they are motivated to do so. The health belief model provides a framework for understanding why some people fail to protect themselves or feel reluctant to take preventive measures, while the health promotion model says that individuals, when motivated, are likely to change their

perception and adopt healthy lifestyle or take necessary precaution to protect themselves [41].

### Conclusion

Infection control should be seen as fundamental to quality health care. If infection control is given the recognition it deserves, it will go a long way to reduce the rate of transmission of infection from patients to health workers and vice versa.

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