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Knowledge and Compliance with Standard Precautions amongst Healthcare Workers in Selected Hospitals in Rivers State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author PNO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KD managed the research instrument of the study. Author BMM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Standard precautions (SPs) in the hospital are very important in the reduction of health care workers' exposure to occupational health hazards but most hospitals are used to reactive rather than proactive safety practices. The effect of reactive safety practices is overwhelming to health care workers, hospitals and the society. Thus, this study assessed health care workers' knowledge and compliance with standard precautions.
Materials and Methods: Descriptive cross-sectional design and proportionate stratified random sampling method was adopted and a sample size of 391was selected using Taro-Yamane formula. The study relied on a structured questionnaire to elicit information from respondents and a reliability of 0.87 was obtained. Descriptive and inferential statistics were used with the aid of statistical package for social science (SPSS) software version 21.

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Results: Healthcare workers' (HCWs) have fair knowledge of SPs and poor compliance with SPs. Also, there is significant association between HCWs' knowledge of SPs and gender, marital status, years of experience and job category in the hospitals ($p < 0.05$). Consequently, there is significant association between compliance with SPs and gender, years of experience and job categories in the hospitals ($p < 0.05$).
Conclusion: There is great need for strong advocacy on knowledge of SPs and compliance with SPs in the hospitals to curb increasing occupational health hazards. The Nigeria government and hospital managements should develop an all-encompassing integrated SPs policies, strategies and procedures consistent with global best practices.

Keywords: Knowledge; compliance; standard precautions; personal protective equipment; hospitals.

1. INTRODUCTION

There is absence of obligatory laws and regulations governing the labor environment and this makes a lot of workers susceptible to hazards which may be life threatening. In developing countries, occupational health and safety (OHS) regulations make up only 10% of the populace [1]. Therefore, abandoning quite a lot of key hazardous businesses and professions like the health sector is dangerous [2,3]. Even where the laws exist, workers are still at risk of being hired into situations that deprive them from practicing standard precautions and self-respect; these expose them to a great number of job-related events and accidents. This has led to worsening of workers health and welfare as some African studies opined that occupationally, health care workers (HCWs) obtained infections like tropical illnesses [2]. There is also the problem of lack of or incomplete vaccination against hepatitis B virus (HBV) infection, inadequate knowledge of standard precautions (SPs), reduced availability/insufficient use of personal protective equipment (PPE) and absence of preventive training in hospitals which amounts to high possibility for hazard exposure to HCWs [4-7]. Standard precautions (SPs) are guides or measures outlined to prevent and control the risk of occupational health hazards such as exposure to blood borne pathogens (BBPs), blood & body fluids (BBFs), viral infections (e.g. HIV, HBV, HCV etc.) from both familiar and unforeseen sources in the healthcare system [8,9].

Knowledge of SPs among HCWs is low. Only 37.0% of HCWs knew that SPs comprises hand washing before and after any contact with a patient. 39.0% of the HCWs recognized cough protocols and only 40.0% knew about sanitary procedures which comprise infection preventive approaches to curb the dangers of exposure to infection. Fifty percent of the HCWs continually protect themselves against blood and body fluids (BBFs) of patients, 25% do not recap needles after usage and 28.0% do not always wipe blood spills on time [10]. Sixty-three percent of HCWs opined that using PPEs such as aprons, gloves, gowns and goggles, might cause patients to fright occasionally and adhering to SPs sometimes obstructs the ability to offer care (38.0%).

This study adopts the Health Belief Model (HBM). It is a psychosocial model that tries to predict health behaviors portrayed by HCWs as they provide healthcare services. The HBM lays emphases on the attitudes, perception and knowledge of HCWs. It is centered on an understanding that a HCW will take a health-related action if he/she perceives that a health illness can be avoided, or has a rational anticipation that by carrying out a suggested action (compliance with SPs), he/she will avoid a hazard. Occupational exposure of HCWs and the susceptibility of diseases are on the rise. The continuous exposure to threats from infectious ailments has caused numerous HCWs to suffer from different illnesses contracted by handling of patients infected with various transmissible diseases (such as HIV, HBV, HCV, tuberculosis, chicken pox, mumps, flu, and other occasionally recurring infections like severe acute respiratory distress syndrome (SARS), EBOLA, Lassa fever and recently coronavirus (COVID-19). Likewise, lack of safety practices within the hospitals is a concern to HCWs, administrative bodies and the general public. This is unquestionably a crucial problem in the health sector. The long term effects comprise HCWs'/patients' susceptibility to infections, scarcity of health sector employees, HCWs' apathy and cost effects, even with the SPs scheme. Thus, there is plea for cautionary actions and reaction safety practices in hospitals. Therefore, the objectives of the study were to determine the level of knowledge of standard precautions and assess health careworkers' compliance with standard precautions.

2. MATERIALS AND METHODS

2.1 Study Design

The study employed the descriptive cross-sectional design.

2.2 Study Location

The study was conducted in the two major Tertiary Hospitals in Rivers State, Southern Nigeria, namely Rivers State University Teaching Hospital (RSUTH) and University of Port Harcourt Teaching Hospital (UPTH) and the Zonal Hospitals (secondary health care facilities) including Okrika, Degema, Bonny, Isiokpo, Ahaoda and Bori hospitals respectively.

2.3 Study Duration

April, 2019-October, 2019.

2.4 Sampling Method

Proportionate stratified random sampling method and the use of table of random numbers was adopted for the category selection.

2.5 Sample Size/Calculation

391 HCWs was used for this study. A population of 3876 staffs was considered and a sample size of 391 was computed, which includes 8% non-response rate (29.0) by applying Taro-Yamane formula [11] given as:

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

where n is the sample size, e is tolerance error (0.05) and N is the study population. Thus,

$$n = \frac{3876}{1 + 3876(0.05)^2} = 362.58$$

Primary data were gathered using closed ended questionnaire which were self- and interviewer-administered, while secondary data was obtained via hospital records.

2.6 Inclusion Criteria

The research was limited to direct staffs who have worked in the hospital facility for at least 6 months and above. This includes doctors, nurses, pharmacists, clinical laboratory attendants, mortuary attendants, cleaners / porters, administrative workers and radiographers. All participants were aged 20 to 66 years. Their typical work day starts from 8 am to 4 pm after which the call duty starts till 8 am the following day.

2.7 Exclusion Criteria

HCWs who are on contract, brief internship training, students, those in maternity leave, as well as those who have worked for less than 6 months were excluded from the study.

2.8 Procedure Methodology

The questionnaire was administered with the help of a research assistant. The instrument contains respondents' knowledge regarding SPs in a dichotomous pattern, where the respondents answered "true" or "false". The correct answers was presented in a rating scale of 1 to 10, where response score of 1-4 is rated poor, 4-7 is rated fair and 8-10 is rated good. Questions on compliance were structured using a 4-point likert scale [always (4), often (3), sometimes (2) and rarely (1). (See APPENDIX).

2.9 Statistical Analysis

The data obtained were subjected to statistical analyses such as descriptive (mean, percentages and charts) and inferential (Chi-Square) statistics using statistical package for social sciences (SPSS) version 21. A test retest using Pearson Product Moment of Correlation Coefficient was carried out and a value of 0.87 was obtained. Content validation was done by experts in occupational health and safety.

3. RESULTS

3.1 Knowledge of Standard Precautions (SPs)

The association between knowledge of SPs and social-demographic variables is presented in Table 1. Result revealed that 41.7% of respondents have good knowledge of SPs, while 34.3% and 24.0% have fair and poor knowledge of SPs respectively. The Chi-Square results showed that knowledge of SPs is associated with gender, marital status, years of experience and job categories of respondents ($p < 0.05$).But knowledge of SPs is not associated with educational level and age of respondents ($p > 0.05$).

Table 1. Association between knowledge of SPs and social-demographic variables

Variables	Good (%)	Fair (%)	Poor (%)	Total (%)	df.	Chi-square (p-value)	Decision
Gender							
Male	98(48)	70(34.3)	36(17.6)	204(100)	2	11.381	Significant
Female	65(34.8)	64(34.2)	58(31)	187(100)		(0.003)	($p < 0.05$)
Marital Status							
Single	76(47.8)	56(35.2)	27(17)	159(100)	8	15.758	Significant
Married	84(38.4)	74(33.8)	61(27.9)	219(100)		(0.046)	($p < 0.05$)
Divorced	3(60)	1(20)	1(20)	5(100)			
Co-habiting	0(0)	2(40)	3(60)	5(100)			
Widow/Widower	0(0)	1(33.3)	2(66.7)	3(100)			
Years of Experience							
0-5	5(14.7)	18(52.9)	11(32.4)	34(100)	10	20.855	Significant
6-10	66(47.8)	46(33.3)	26(18.8)	138(100)		(0.022)	($p < 0.05$)
11-15	46(37.1)	46(37.1)	32(25.8)	124(100)			
16-20	30(50.8)	16(27.1)	13(22)	59(100)			
21-25	9(45)	3(15)	8(40)	20(100)			
26+	7(43.8)	5(31.2)	4(25)	16(100)			
Job Categories							
Doctors	26(35.6)	31(42.5)	16(21.9)	73(100)	16	35.709	Significant
Nurses	29(31.9)	34(37.4)	28(30.8)	91(100)		(0.003)	($p < 0.05$)
Pharmacists	23(50)	16(34.8)	7(15.2)	46(100)			
Radiographers	19(61.3)	9(29)	3(9.7)	31(100)			
Administrators	30(45.5)	22(33.3)	14(21.2)	66(100)			
Cleaners/Porters	4(19)	7(33.3)	10(47.6)	21(100)			
Technicians	12(38.7)	7(22.6)	12(38.7)	31(100)			
Attendants	9(60)	2(13.3)	4(26.7)	15(100)			
Educational Status							
Post Graduate	50(40.3)	45(36.3)	29(23.4)	124(100)	6	4.989	Not
Tertiary	85(43.6)	66(33.8)	44(22.6)	195(100)		(0.545)	Significant
Secondary	27(42.9)	19(30.2)	17(27)	63(100)			($p > 0.05$)
Primary	1(11.1)	4(44.4)	4(44.4)	9(100)			

Variables	Good (%)	Fair (%)	Poor (%)	Total (%)	df.	Chi-square (p-value)	Decision
Age (Years)							
≤25	10(43.5)	8(34.8)	5(21.7)	23(100)	10	7.100	Not
26-35	82(46.9)	56(32)	37(21.1)	175(100)		(0.716)	Significant
36-45	49(38.6)	44(34.6)	34(26.8)	127(100)			(p > 0.05)
46-55	20(36.4)	20(36.4)	15(27.3)	55(100)			
56-65	1(12.5)	5(62.5)	2(25)	8(100)			
66+	1(33.3)	1(33.3)	1(33.3)	3(100)			
Total	163(41.7)	134(34.3)	94(24)	391(100)			

Table 2. Association between compliance with SPs and social-demographic variables

Variables	Always (%)	Often (%)	Sometimes (%)	Rarely (%)	Total (%)	df.	Chi-Square (p-value)	Decision
Gender								
Male	35(17.2)	50(24.5)	89(43.6)	30(14.7)	204(100)	3	10.494	Significant
Female	23(12.3)	32(17.1)	83(44.4)	49(26.2)	187(100)		(0.015)	(p < 0.05)
Marital Status								
Single	28(17.6)	38(23.9)	72(45.3)	21(13.2)	159(100)	12	17.521	Not
Married	29(13.2)	43(19.6)	95(43.4)	52(23.7)	219(100)		(0.131)	Significant
Divorced	1(20)	1(20)	2(40)	1(20)	5(100)			(p > 0.05)
Co-habiting	0(0)	0(0)	2(40)	3(60)	5(100)			
Widow/ Widower	0(0)	0(0)	1(33.3)	2(66.7)	3(100)			
Years of Experience								
0-5	2(5.9)	9(26.5)	13(38.2)	10(29.4)	34(100)	15	26.811	Significant
6-10	26(18.8)	25(18.1)	64(46.4)	23(16.7)	138(100)		(0.030)	(p < 0.05)
11-15	12(9.7)	35(28.2)	53(42.7)	24(19.4)	124(100)			
16-20	13(22)	8(13.6)	26(44.1)	12(20.3)	59(100)			
21-25	5(25)	3(15)	5(25)	7(35)	20(100)			
26+	0(0)	2(12.5)	11(68.8)	3(18.8)	16(100)			

Variables	Always (%)	Often (%)	Sometimes (%)	Rarely (%)	Total (%)	df.	Chi-Square (p-value)	Decision
Job Categories								
Doctors	6(8.2)	23(31.5)	29(39.7)	15(20.5)	73(100)	24	65.631	Significant
Nurses	13(14.3)	14(15.4)	41(45.1)	23(25.3)	91(100)		(0.000)	($p < 0.05$)
Pharmacists	17(37)	1(2.2)	21(45.7)	7(15.2)	46(100)			
Radiographers	6(19.4)	5(16.1)	17(54.8)	3(9.7)	31(100)			
Administrators	10(15.2)	15(22.7)	27(40.9)	14(21.2)	66(100)			
Cleaners/Porters	1(4.8)	2(9.5)	9(42.9)	9(42.9)	21(100)			
Technicians	0(0)	12(38.7)	12(38.7)	7(22.6)	31(100)			
Attendants	0(0)	5(33.3)	9(60)	1(6.7)	15(100)			
Educational Status								
Post Graduate	23(18.5)	20(16.1)	55(44.4)	26(21)	124(100)	9	9.787	Not Significant
Tertiary	29(14.9)	44(22.6)	86(44.1)	36(18.5)	195(100)		(0.368)	($p > 0.05$)
Secondary	6(9.5)	17(27)	27(42.9)	13(20.6)	63(100)			
Primary	0(0)	1(11.1)	4(44.4)	4(44.4)	9(100)			
Age (Years)								
≤25	4(17.4)	5(21.7)	10(43.5)	4(17.4)	23(100)	15	12.234	Not
26-35	27(15.4)	46(26.3)	73(41.7)	29(16.6)	175(100)		(0.661)	Significant
36-45	19(15)	21(16.5)	56(44.1)	31(24.4)	127(100)			($p > 0.05$)
46-55	8(14.5)	8(14.5)	26(47.3)	13(23.6)	55(100)			
56-65	0(0)	1(12.5)	6(75)	1(12.5)	8(100)			
66+	0(0)	1(33.3)	1(33.3)	1(33.3)	3(100)			
Total	58(14.8)	82(21)	172(44)	79(20.2)	391(100)			

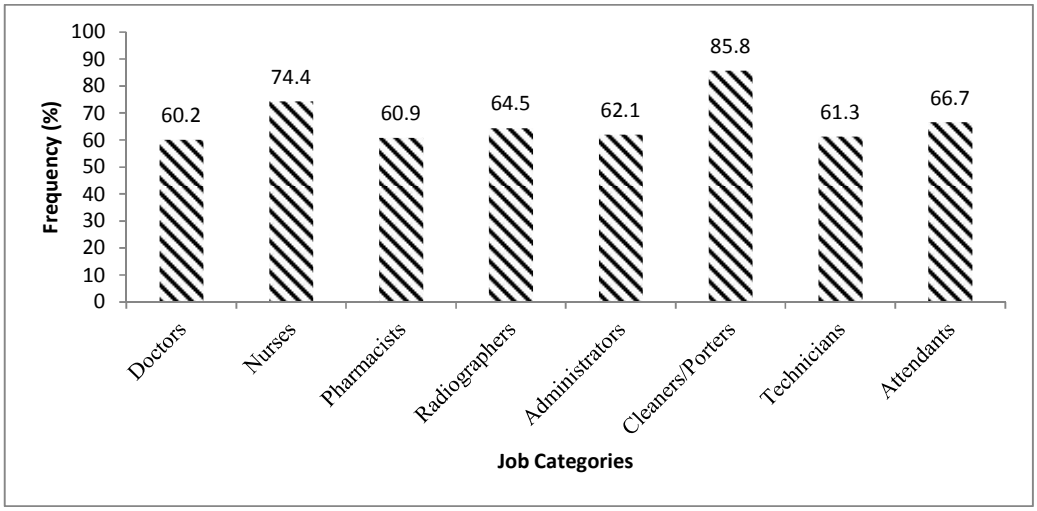

Fig. 1. Bar chart of HCWs non-compliance with SPs

3.2 Compliance with Standard Precautions (SPs)

The association between compliance with SPs and social-demographic variables is presented in Table 2. Results revealed that 14.85 of respondents always comply with SPs, while 21.0%, 44.0% and 20.2% of respondents often, sometimes and rarely comply with SPs in that order respectively. The Chi-Square results showed that compliance with SPs is associated with gender, years of experience and job categories of respondents ($p < 0.05$). But compliance with SPs is not associated with marital status, educational level and age of respondents ($p > 0.05$).

Consequently, Fig. 1 revealed HCW's non-compliance with SPs for various job categories; the bar chart revealed that 85.8% of cleaners/porters do not comply with SPs followed by nurses (70.4%), attendants (66.7%), radiographers (64.5%) and administrators (62.1%) respectively. Also, technicians (61.3%) followed by pharmacists (60.9%) and lastly doctors (60.2%).

4. DISCUSSION

This study revealed that HCWs have fair (76.0%) knowledge of standard precautions (SPs) in the hospitals. This buttress HCWs do not understand the importance of taking health- related actions when providing services. This is in agreement with Zhang et al. [12] who opined that HCWs lack knowledge about blood borne pathogens (BBPs) transmission and SPs in China. Also HCWs was reported to have low level of knowledge of SPs in Ghana [10]. HCWs are not continually informed on SPs principles, insufficiencies or lack of knowledge and practice of SPs [13-15]. This study is at variance with Aluko et al. [15] who stated that 89% of HCWs (89%) had good knowledge about SPs in health care facilities (HCFs). Also HCWs demonstrated good knowledge of SPs at 86.9% and 81.8% respectively [16-17]. The knowledge of SPs is vital to avert and regulate the susceptibility to hospital acquired infections [8-9]. Also, access to information about to SPs will bring about enhancement of knowledge and better adherence to SPs [18]. Apparently, Chi-Square result showed that gender, marital status, years of experience and job category is significantly associated with knowledge of SPs ($p < 0.05$).

Furthermore, this study showed that there is non-compliance with SPs in hospitals. This implies that HCWs do not have rational anticipation that taking unhealthy related actions will result to hazard as postulated by Health Belief Model (HBM). This study reinforces that only few HCWs (35.8%) complied with SPs. The non-compliance with SPs is as a result of poor safety culture in the hospitals, insufficient delivery of PPEs, absence of supervision, absence of incident reporting, irregular trainings on SPs, nonexistence of monitoring, too much workloads, poor time management, nonexistence of punitive actions on non-compliance, prompt handling in emergency situations, assumptions that patient lacks infection, general self-efficacy, nonexistence of checks by hospital management.

This finding agrees with report that only 12% of HCWs significantly practice SPs [19]. Also reported median scores for compliance with SPs, HCWs complained of insufficient resources to practice SPs [20]. In developing countries like Nigeria, SPs are either absent, not adhered to, or not enforced [21,22] studies affirmation of insufficient compliance with SPs by HCWs and they stated that observance of SPs is internationally suboptimal. In Rwanda, there was a fall in adherence to 32.1% between 2015 and & 2016 [23]. More previous researchers reported poor compliance with SPs by HCWs [9,12,24-26]. Much lower results (12% and 16.1%) on HCWs adherence to SPs have been reported [23,27]. Findings do not differ from report that 77.9% of HCWs currently describe standard precautions and infection control while 98.6% reported non-compliance to standard precautions and disease control in northern Nigeria. This is due to non-availability of PPEs and other equipment and utilities required for ensuring safety of HCWs [28].

Also 70.1% of HCWs was reported to have good adherence to SPs [15]. Other studies also opined that hand washing; use of PPEs and safer devices (like retractable lancets) reduces the risk of occupational health hazards [9,29,30]. These measures also help to reduce the spread of infectious agents in the HCFs [31]. Also there is advocacy that adherence to SPs is the most effective way of preventing transmission of BBPs [32]. Yet, even with published procedures on disease control and adverse health concerns following noncompliance, major issues still exists around HCWs' adherence to SPs. More so, the Chi-Square result showed that gender, years of experience and job categories is significantly associated with compliance with SPs ($p < 0.05$). Female HCWs are more likely not to comply with standard precaution than male HCWs and HCWs with job experience less than 10 years are more likely not to comply with SPs HCWs with job experience 11 year and above. This finding concurs with the opinion that the level of awareness of SPs rises with increased years of experience at work Mcgrowder et al. [33]. Also, HCWs' gender and years of work experience is significantly associated with compliance with SPs [15].

5. CONCLUSION

This study revealed that the Health Belief Model (HBM) is not obtainable or practiced in hospitals in River State. Even with high perception of susceptibility to infection, or high perception of the seriousness of the problem, HCWs still did not comply with SPs. The non-compliance with SPs reported in this study poses devastating consequences in the hospitals, such as increase in OHHs, decline in sustainable development and growth in the health sector in Nigeria. Hence this study recommends regular training for HCWs on SPs and enlightenment that HCWs are obligated to comply with SPs as this will reduce their exposure to OHHs. More so, Healthcare system in Nigeria should enforce a system of surveillance for OHHs, to improve HCWs' knowledge of SPs, as well as encourages adherence with SPs. There should be regular provision of PPEs, maintenance (for those that are not disposable) and timely replacement when worn out. The Federal Government of Nigeria through her legislation should formulate laws and policies that promotes and enforces SPs in healthcare facilities.

CONSENT AND ETHICAL APPROVAL

This study was approved by River State Hospital Management Board (RSHMB) and University of Port Harcourt Research Ethical Committee, Port Harcourt, Nigeria. Informed consent was obtained from respondents before they participated in the study. In the process, respondents were educated in a nut shell on hazards they may face as healthcare workers and how to mitigate them. Respondents were informed of their right to opt out of the study if necessary.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Research Instrument (Questionnaire)

Knowledge and Compliance with Standard Precautions in Healthcare Facilities

Section A: Socio-dermographic Data

1. AGE: ☐
2. SEX: Male ☐ Female ☐
3. MARITAL STATUS: Single ☐ Married ☐ Divorced ☐
   Separated ☐ Cohabiting ☐ Widow/Widower ☐
4. YEARS OF WORK EXPERIENCE: 0-5 yrs ☐ 6-10 yrs ☐ 11-15 yrs ☐
   16-20 yrs ☐ 20-25 yrs ☐ >26 yrs ☐
5. JOB CATEGORY: Doctor ☐ Nurse ☐ Pharmacist ☐ Radiographer ☐
   Administration ☐ Cleaners/Porters ☐ Technologist ☐ Attendant ☐
6. HOSPITAL FACILITY: RSUTH ☐ UPTH ☐ Degema ☐ Bonny ☐
   Ahoada ☐ Isiokpo ☐ Bori ☐ Okrika ☐
7. EDUCATIONAL LEVEL: Post graduate ☐ tertiary ☐ secondary ☐
   Primary ☐ no education ☐

Section B: Knowledge Regarding Standard Precautions

True (T) and False (F)

1) Standard precautions are applied to patients with HIV & Viral Hepatitis only T☐ F☐
2) Used needles can be recapped after giving injections T☐ F☐
3) Standard precautions are not necessary in situations that might lead to contact with saliva T☐ F☐
4) Healthcare workers with non-intact skin (open bruises) should not be involved in direct patient care until the condition resolves. T☐ F☐
5) Hands washing is not necessary before wearing gloves to attend to patients T☐ F☐
6) Hands must be washed after removal of gloves before attending to another patient T☐F☐
7) Gloves must be changed in between patient handling T☐ F☐
8) Masks, gowns, goggles etc. are necessary if procedures and patient-care activities are likely to cause splashing of blood or exposure to body fluid. T☐ F☐
9) Covering mouth and nose when coughing or sneezing is not necessary T☐ F☐

10) Vaccination in healthcare workers is key to preventing some hospital acquired infections
T ☐ F ☐

Section C: Compliance with Standard Precautions

S/No	Questions	Always	Often	Sometimes	Rarely
1.	Wear glove, facemasks, goggles, aprons/gowns where necessary before handling patients.				
2.	Wash hands before putting on gloves.				
3.	Change gloves after each patient.				
4.	Remember not to recap used needles				
5.	Disinfect work area surfaces prior to settling down to work.				
6.	Dispose of all disposable items after each use.				
7.	Sterilize lying equipment/ tools before use.				
8.	Put used needles into sharp disposal bins provided in work area.				
9.	Use functional sterilizing machine in work area				

10. Do you always use facemasks, goggles, aprons/gowns where necessary? Yes ☐ No ☐

If NO, is it due to any of these reasons?

They are not readily available ☐ not enough for everyone on duty ☐ Torn/destroyed ☐

Dirty & not maintained ☐ person in charge is not always around to dispense it ☐

It is given only to nurses and doctors ☐

11. Have you been immunized against viral hepatitis B since start of work? Yes ☐ No ☐

If NO, is it due to any of these reasons?

a. You don't think you are at risk of the infection ☐ b. fear of needles ☐
c. Vaccine not being recommended/enforced for healthcare workers in this facility ☐
d. Fear of side effects of the vaccine ☐ e. I have to pay a sum for the vaccine ☐
f. The day I went the vaccine was unavailable ☐
g. Don't know where to obtain vaccine ☐

If YES, did you complete the three doses required of Hepatitis B Virus vaccine? Yes ☐ No ☐

If NO, was it dues to any of these reasons?

a. Too much workload & no time to return back as scheduled ☐
b. laziness/negligence ☐
c. I just forgot about my next date as scheduled ☐
d. Vaccine not available when my next dose was due ☐
e. We were not educated that it requires three dose ☐

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