



Research Article

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Preventive Practices and Occupational Hazards Among Healthcare Workers in Tertiary Health Institutions in Imo State, Nigeria

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Abstract

Healthcare professionals are constantly exposed to biological, chemical, physical, ergonomic and psychosocial occupational risks in the process of delivering patient care. Effective preventive approaches reduce workplace-related injuries and illnesses. However, compliance with these preventive measures is still poor in many health care facilities in Nigeria. The study investigated the association between preventative behaviours and the occurrence of occupational risks among health care workers in tertiary health institutions in Imo State, Nigeria. A cross sectional analytical study was undertaken among 350 health care personnel in the selected tertiary health institutions in Imo state, Nigeria. A standardised questionnaire was used to gather data on preventive behaviours and occupational hazards. The preventive measures evaluated were use and adequacy of personal protective equipment (PPE), regular safety training, hospital safety policies, waste disposal practices, vaccination status, environmental cleaning and disinfection, disinfection of reusable equipment, disposal of ward/theatre materials, use of emergency communication devices, needle recapping and disposal of solid waste into safety boxes. The association between preventive practices and occupational hazards was tested using chi-square and binary logistic regression. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated and statistical significance was considered as $p < 0.05$. The prevalence of occupational risks among health workers was 41.1%. The consistent use of PPE significantly reduced the risks of occupational hazards, while healthcare workers who wore PPE sometimes ($OR = 1.78$, 95% CI: 1.01–3.11, $p = 0.0315$) and infrequently ($OR = 3.88$, 95% CI: 2.17–6.95, $p < 0.001$) had considerably higher odds of occupational hazards. Inadequate provision of PPE ($OR = 2.32$, 95% CI: 1.40–3.86, $p = 0.0005$), lack of regular safety training ($OR = 2.43$, 95% CI: 1.39–3.38, $p = 0.0009$), absence of improved hospital safety policies ($OR = 1.82$, 95% CI: 1.04–3.26, $p = 0.0272$), improper waste disposal ($OR = 1.88$, 95% CI: 1.06–3.38, $p = 0.0228$), inadequate vaccination ($OR = 1.83$, 95% CI: 1.09–3.13, $p = 0.0162$), lack of routine environmental cleaning and disinfection ($OR = 1.79$, 95% CI: 1.12–2.90, $p = 0.0106$), inadequate disinfection of reusable equipment between patients ($OR = 6.73$, 95% CI: 4.04–11.23, $p < 0.001$), improper disposal of ward/theatre materials ($OR = 2.56$, 95% CI: 1.18–6.01, $p = 0.0109$), and failure to dispose solid waste into safety boxes ($OR = 1.72$, 95% CI: 1.02–2.92, $p = 0.0306$) were all significantly associated with increased occupational hazards. No statistically significant relationships were found for use of emergency communication devices ($p = 0.1512$) or for recapping of needles prior to disposal ($p = 0.4224$). Adherence to occupational safety and infection prevention strategies significantly reduces the incidence of occupational hazards among healthcare personnel. Significant protective factors were consistent use of PPE, adequate supply of PPE, frequent safety training, complete safety regulations in hospitals, vaccination, proper waste management, environmental hygiene, and appropriate disinfection of reusable equipment. Institutional occupational health programmes should be strengthened, suitable safety resources provided and compliance with standard infection prevention and control procedures promoted to improve workplace safety in tertiary health institutions.

Keywords: Occupational hazards, healthcare personnel, preventive measures, personal protective equipment, infection prevention and control, occupational safety, tertiary health institutions, Nigeria.

INTRODUCTION

Healthcare workers (HCWs) are the backbone of any healthcare system and play a vital role in prevention, diagnosis, treatment and management of diseases. In the exercise of their functions, individuals are frequently exposed to a host of occupational dangers which are detrimental to their health, safety and general welfare. Occupational hazards are any potential danger, risk or threat coming from activities, work environment or working conditions that may adversely affect the health, safety or comfort of workers[1]. The International Labour Organization and the World Health Organization have together defined occupational health hazards as those factors in the workplace that cause illness or put workers in contact with toxic chemicals or unsafe environments. These risks might be biological, chemical, physical, ergonomic, mechanical or psychosocial and can lead to accidents, impairment, occupational diseases, decreased productivity, absenteeism, economic losses and even death if proper preventive measures are not taken[2].

The nature of healthcare delivery exposes healthcare workers all around the world to occupational dangers than many other occupational groups. Millions of healthcare workers every day are exposed to infectious patients, dangerous chemicals, ionising radiation, sharp instruments, heavy equipment and mentally stressful situations[3]. The COVID-19 pandemic has underscored the susceptibility of healthcare workers, showing that frontline workers are exposed to biological dangers of a kind never seen before and highlighting the urgent need for strong occupational health and safety measures. In addition to new infectious diseases such as COVID-19, health professionals are at risk of tuberculosis, hepatitis B and C, human immunodeficiency virus (HIV), severe acute respiratory syndrome (SARS) and other communicable diseases acquired by occupational exposure. These hazards are further increased in low- and middle-income countries, where occupational safety infrastructure and adherence to infection control measures continue to be inadequate [4].

Healthcare facilities themselves are complicated work environments with many dangers in the same place. Biological dangers result from exposure to blood, body fluids, contaminated tools, infectious waste and airborne infections. Needlestick injuries and exposure to blood-borne pathogens are still one of the most common occupational hazards faced by health care workers, notably by nurses, physicians, laboratory scientists and other people that are directly involved in patient care [5]. These exposures raise the risk of serious infections, including hepatitis B virus, hepatitis C virus, and human immunodeficiency virus. Poor infection prevention and control policies, weak waste management systems, inadequate sterilisation procedures and limited availability of personal protective equipment (PPE) further complicate these hazards in many underdeveloped countries like Nigeria [6].

Besides biological hazards, healthcare professionals are exposed to many chemical hazards from the normal use of disinfectants, sterilising agents, laboratory reagents, dangerous medications, anaesthetic gases, and cleaning chemicals. Long-term exposure to these compounds has been linked to lung diseases, skin diseases, allergic reactions, reproductive health concerns, and carcinogenic consequences. Laboratory staff, chemists, cancer nurses, operating theatre staff and environmental health workers are particularly vulnerable because of the regularity with which they handle dangerous chemicals. Therefore, effective control measures such as engineering controls, adequate ventilation, good storage, safe handling procedures, personnel training and appropriate use of PPE are necessary to minimize chemical exposure[7]. Physical risks are also a major concern for occupational health in health care settings. Healthcare personnel usually need to carry out physically intensive activities such as lifting, repositioning and moving patients which put them at risk of musculoskeletal illnesses, especially lower back discomfort. Occupational morbidity is caused by long working hours, repetitive actions, awkward postures, protracted standing, exposure to radiation, excessive noise, heat, slick floors, and unintentional injuries from sharp devices. The high prevalence of work-related musculoskeletal diseases has been found among healthcare workers especially among nurses, physiotherapists and laboratory staff in several studies highlighting the necessity of ergonomic design of the workplace and proper ways of lifting[8].

The occupational dangers are contributed to by the psychosocial work environment of health care institutions. Healthcare professionals regularly suffer high workloads, long working hours, shift assignments, emotional weariness, workplace violence, poor staffing levels, and difficult contacts with patients and their relatives[9]. These psychosocial stressors are a major contributor to burnout, anxiety, depression, low job satisfaction, absenteeism, decreased productivity, medical errors, and poor quality of patient care. There is growing evidence that occupational stress among healthcare workers has emerged as a serious public health concern worldwide, particularly in resource-constrained health systems where shortages of healthcare personnel exacerbate workload and emotional demands[10].

Ergonomic hazards are prevalent among healthcare personnel due to repetitive manual duties, long standing periods, awkward body positions and high volumes of patient handling activities. Musculoskeletal injuries are neck, shoulder, wrist, and lower back injuries caused by poor workstation design, repetitive laboratory procedures, prolonged computer use, and inadequate lifting equipment. Healthcare professionals engaged in manual patient handling have been found to have substantially higher rates of work-related musculoskeletal problems compared to those involved in less physically demanding duties, underlining the importance of ergonomic interventions and workplace redesign[10]. Healthcare professionals are exposed to occupational dangers due to a variety of interconnected circumstances at the individual, institutional and governmental levels. Individual factors include lack of knowledge regarding occupational safety practices, poor compliance with standard precautions, inconsistent use of PPE, negligence, fatigue, excessive

workload, prolonged working hours, inadequate vaccination, and failure to use post-exposure prophylaxis when indicated. Institutional factors include poor infrastructure, poor supply of PPE, poor staffing, poor implementation of infection prevention and control measures, lack of regular safety training, inadequate supervision, poor waste management practices and poor occupational health programmes[11]. Weak legislation, poor enforcement of occupational health rules and inadequate investment in workplace safety at the policy level continue to hinder the effectiveness of occupational health interventions in many developing countries[12].

In response to these difficulties, the Nigerian government and the healthcare sector have initiated many measures to avoid and control occupational hazards among healthcare professionals. These include development of occupational health and safety policies, implementation of infection prevention and control guidelines, provision of PPE during disease outbreaks, occupational health surveillance, safety training programmes, vaccination initiatives and strengthening of health care waste management systems. Agencies such as the Nigeria Centre for Disease Control have been instrumental in producing infection prevention recommendations, capacity-building programmes and coordinating emergency response during outbreaks of infectious diseases. Despite these efforts, low finance, uneven enforcement of safety policies, poor infrastructure and lack of vital safety equipment continue to jeopardise occupational safety in many Nigerian health care facilities[12].

Prevention of occupational hazards requires a multipronged approach including engineering controls, administrative controls, environmental modifications, ongoing staff education, regular safety training, vaccination, proper waste management, environmental cleaning and disinfection, provision and consistent use of PPE, surveillance systems and strict adherence to standard infection prevention and control practices. Evidence repeatedly shows that healthcare facilities with good occupational safety programmes have reduced rates of occupational injuries and healthcare-associated infections and work-related illnesses among healthcare workers[13].

Although, occupational risks among health care workers have been well reported globally, there is limited information on the effectiveness of preventive approaches in lowering occupational hazards in tertiary health institutions in Imo State, Nigeria. It is important to understand the relationship between preventative measures and the occurrence of occupational hazards in order to develop evidence-based treatments that will protect healthcare workers and enhance healthcare delivery. Therefore, this study was carried out to assess preventive practices against occupational hazards among health workers in tertiary health institutions in Imo State, Nigeria, with the intention of generating evidence for strengthening occupational health policies, improving compliance with safety measures and enhancing the protection of health workers[14]. Healthcare workers are inevitably exposed to many occupational hazards such as biological, chemical, physical, ergonomic and psychosocial dangers as a result of healthcare services. These dangers can lead to needlestick injuries, infectious disease exposure, chemical poisoning, musculoskeletal disorders, stress-related illnesses, disability, absenteeism, diminished productivity, increased healthcare expenses, and poor quality of patient care. Occupational hazards are still common among health care workers particularly in developing countries[15] despite the availability of internationally recommended preventive measures like engineering controls, administrative controls, personal protective equipment, vaccination, environmental sanitation and infection prevention protocols.

Poor infrastructure, irregular availability of PPE, no safety training, poor enforcement of occupational health policies, poor waste management systems, understaffing, and lack of funding of healthcare institutions are some of the factors that often hinder occupational health and safety practices in Nigeria. Such shortcomings expose healthcare professionals to occupational injuries and illnesses, therefore jeopardising both workforce sustainability and patient safety[16]. Some research have studied occupational hazards among health care workers. However, there is inadequate data on the effectiveness of preventive interventions in tertiary health facilities in Imo State. This knowledge gap hampers the development of specific treatments that can improve occupational safety and reduce workplace-related dangers. Hence, the present study was carried out to assess preventive practices against occupational hazards among healthcare workers in tertiary health institutions in Imo State of Nigeria with the ultimate goal of providing evidence that can drive policy formulation, strengthen occupational health programmes and improve workplace safety for health professionals.

MATERIALS AND METHODS

Study Design

This study employed a descriptive cross-sectional analytical survey design to assess occupational hazards among healthcare workers, their effects on health and productivity, and the preventive practices adopted in tertiary health institutions in Imo State, Nigeria. The descriptive cross-sectional design was considered appropriate because it enabled the collection of data from a representative sample of healthcare workers at a single point in time, thereby allowing the determination of the prevalence of occupational hazards and the assessment of associations between preventive practices and occupational hazard occurrence. The design also facilitated the use of both descriptive and inferential statistical analyses to achieve the study objectives.

Study Area

The study was conducted in selected tertiary health institutions located within the three geopolitical (senatorial) zones of Imo State, southeastern Nigeria. Imo State is bounded by Anambra State to the north, Rivers State to the south, Abia State to the east, and Delta State to the west. The state has three senatorial zones namely Owerri, Orlu, and Okigwe, each hosting major referral healthcare facilities that provide secondary and tertiary healthcare services.

The selected health institutions included:

- Federal University Teaching Hospital (FUTH), Owerri (formerly Federal Medical Centre, Owerri), located along Orlu Road, Owerri Municipal Council (Latitude: 5.50197°N; Longitude: 7.02246°E).
- Imo State University Teaching Hospital (IMSUTH), Orlu, located in Orlu Senatorial Zone.
- General Hospital, Okigwe, located in Okigwe Senatorial Zone (Latitude: 5.8296°N; Longitude: 7.3559°E).

These institutions were selected because they serve as major referral centres with a broad spectrum of healthcare professionals who are routinely exposed to occupational hazards in the course of patient care.

Study Population

The target population comprised all healthcare workers employed in the selected tertiary health institutions in Imo State. Healthcare workers included physicians, nurses, medical laboratory scientists, pharmacists, radiographers, physiotherapists, environmental health officers, and other allied health professionals directly involved in patient care.

The estimated staff population across the selected institutions was **3,520 healthcare workers**, distributed as follows:

Health Institution	Estimated Staff Population
Federal University Teaching Hospital, Owerri	2,500
Imo State University Teaching Hospital, Orlu	870
General Hospital, Okigwe	150
Total	3,520

Sample Size Determination

A sample size of 350 healthcare workers was selected for the study. The selected sample was considered sufficiently representative of the study population and adequate for statistical analysis.

Ethical Considerations

Ethical approval for the study was obtained from the Imo State University Research Ethics Committee before commencement of data collection. Administrative permission was also obtained from the management of the participating healthcare institutions.

Participation in the study was entirely voluntary. Written informed consent was obtained from all respondents after explaining the objectives, procedures, benefits, and possible risks associated with the study. Participants were assured of confidentiality and anonymity, and no identifying information was included in the questionnaires. Respondents were informed of their right to decline participation or withdraw from the study at any stage without any adverse consequences. All information obtained during the study was treated with strict confidentiality and used solely for research purposes.

Sampling Technique

A multistage sampling technique was employed.

In the first stage, the three healthcare institutions were purposively selected to ensure representation from the three senatorial zones of Imo State.

In the second stage, proportionate allocation of the sample size was made based on the staff strength of each institution.

Finally, eligible healthcare workers who met the inclusion criteria and consented to participate were selected using simple random sampling until the required sample size was achieved.

Inclusion Criteria

Healthcare workers who:

- were employed in the selected healthcare institutions;
- had worked for at least six months before the commencement of the study;
- were directly involved in patient care or laboratory services; and
- voluntarily provided informed consent.

Exclusion Criteria

Healthcare workers who:

- were on leave or absent during the period of data collection;
- had less than six months of work experience in the institution; or
- declined to participate.

Study Variables

Dependent Variable

- Occurrence of occupational hazards.

Independent Variables

- Use of personal protective equipment (PPE)
- Adequacy of PPE supply
- Regular safety training
- Hospital occupational safety policies
- Waste disposal practices
- Vaccination status
- Environmental cleaning and disinfection
- Disinfection of reusable equipment
- Disposal of ward/theatre materials
- Use of emergency communication devices
- Needle disposal practices
- Other occupational safety practices

Instrument for Data Collection

Data were collected using a structured, pre-tested, interviewer-administered questionnaire and an observational checklist. The questionnaire was developed following an extensive review of relevant literature and consisted of four sections:

- **Section A:** Occupational hazards experienced by healthcare workers.
- **Section B:** Preventive practices against occupational hazards.

The observational checklist was used to assess workplace safety practices, availability of PPE, waste disposal facilities, environmental cleanliness, and compliance with infection prevention and control measures within the healthcare institutions.

Validity of the Instrument

The questionnaire underwent face and content validity.

Face validity was established by ensuring that the instrument appeared suitable for measuring occupational hazards and preventive practices among healthcare workers.

Content validity was established through expert review by the research supervisor and specialists in Public Health, Occupational Health, and Medical Laboratory Science. Their observations and recommendations were incorporated into the final version of the instrument to ensure that all study objectives were adequately addressed.

Reliability of the Instrument

The reliability of the questionnaire was assessed using the test-retest method.

Ten copies of the questionnaire were administered to healthcare workers in a health facility outside the study area. The same respondents completed the questionnaire again after an interval of three days.

Responses obtained from both administrations were analyzed using Pearson's Product Moment Correlation Coefficient, yielding a reliability coefficient (r) of 0.71, indicating acceptable reliability for the study.

Data Collection Procedure

Ethical approval and official permission were obtained from the relevant authorities before commencement of the study.

A letter introducing the researcher was presented to the management of the selected healthcare institutions.

Eligible healthcare workers were approached during duty hours and informed about the purpose of the study. Written informed consent was obtained before questionnaire administration.

The questionnaires were administered directly to respondents and retrieved immediately after completion whenever possible to minimize non-response. Personal observations using the checklist were simultaneously conducted to verify workplace safety conditions and preventive practices.

Data Management and Statistical Analysis

Completed questionnaires were checked for completeness, coded, and entered into the Statistical Package for the Social Sciences (SPSS) software (IBM SPSS Statistics version 25.0) for analysis.

Descriptive statistics including frequencies, percentages, means, and standard deviations were used to summarize respondents' characteristics and study variables. Results were presented using tables, charts, and graphs where appropriate.

Inferential statistical analyses were performed to determine associations between preventive practices and occupational hazards. Pearson's Chi-square test was used to assess associations between categorical variables.

Binary logistic regression analysis was conducted to determine predictors of occupational hazards, and results were expressed as Odds Ratios (ORs) with 95% Confidence Intervals (CIs). Statistical significance was established at $p < 0.05$.

RESULTS

The effects of practicing preventive measures on occupational hazard in this study are represented in Table 1. The table showed that clear majority of the PPE showed significant association with occupational hazard. The odds of having OH were significantly higher among those that use PPE sometimes and rarely at 1.78 times ($p=0.0315$, OR = 1.78, 95%CI = 1.01 – 3.11) and 3.88 times ($p=0.0001$, OR = 3.88, 95%CI = 2.17 – 6.95) respectively.

For the non-adequacy of the PPEs, the odds for hazard was 2.3 times significantly higher ($p=0.0005$, OR = 2.32, 95%CI = 1.40 – 3.86). Similarly, non-regular safety training is accompanied by higher odds of 2.34 folds ($p=0.0005$, OR = 2.32, 95%CI = 1.39 – 3.38).

Hazards were lower at improved hospital policies (30.4%), of which the odds for hazard was found to be 1.82 folds more at the absence of non-improved hospital policies folds ($p=0.0272$, OR = 1.82, 95%CI = 1.04 – 3.26). For improper waste disposal, the risk for OH was 1.88 significantly higher against the risk at proper waste disposal ($p=0.0228$, OR = 1.88, 95%CI = 1.06 – 3.38).

Healthcare workers that had adequate vaccination recorded lower occupational hazard (30.9% against 45.1%), at a significant odds of more than 1.8 times higher among those without adequate vaccination ($p=0.0012$, OR = 1.83, 95%CI = 1.09 – 3.13).

Also significant was routine cleaning and disinfecting of environmental surfaces ($p=0.0106$), and among those that do not practice routine cleaning and disinfectant of environmental surfaces, occupational hazard was more by almost 1.9 times (OR = 1.79, 95% CI = 1.12 – 2.90).

Similarly, non-adequate disinfection of reusable equipment in between patients showed greater occurrence of OH (68.3%), with odds of up to 6.7 times more ($p=0.0001$, OR = 6.73, 95% CI = 4.04 – 11.23).

Non-proper disposal of materials used in in the ward / theater showed association with occupational hazard and those that practice non-proper disposal of such materials recorded higher OH rate (43.6%) with an odd of more than t and half times more ($p=0.0109$, OR = 2.56, 95% CI = 1.18 – 6.01).

Disposing solid waste into safety box significantly showed lower occupational hazard (OH: 32%; $p=0.0306$). The odds ratio indicates that higher odds for OH was found among the group that do not practice solid waste disposal into safety box with 1.7 folds more odd (OR= 1.72, 95% CI = 1.02 – 2.92).

No significant association was found on Use of emergency communication device for rescue/intervention ($p= 0.1512$) and recapping needles before disposals before disposal ($p=9.4224$) but they both showed greater odds for occupational hazard among those that were not practicing them.

Table 1: Preventive measures and occurrence of Occupational Hazard among the study group

Preventive measures	Total	OH: Yes	%	OH: No	%	P	OR	95%CI	
Use of PPE									
Always	147	41	27.9	106	72.1				
Sometimes	108	44	40.7	64	59.3	0.0315	1.78	1.01	3.11
Rarely	95	57	60	38	40	0.0001	3.88	2.17	6.95
Total	350	144	41.1	206	58.9				
Adequate PPE is provided									
Yes	117	33	28.2	84	71.8				
No	233	111	47.6	122	52.4	0.0005	2.32	1.4	3.86
Total	350	144	41.1	206	58.9				
Regular safety Training									
Yes	88	23	26.1	65	73.9				
No	262	121	46.2	141	53.8	0.0009	2.43	1.39	3.38
Total	350	144	41.1	206	58.9				
Improved hospital policies									
Yes	79	24	30.4	55	69.6				
No	271	120	44.3	151	55.7	0.0272	1.82	1.04	3.26
Total	350	144	41.1	206	58.9				
Proper Waste disposal									
Yes	77	23	29.9	54	70.1				
No	273	121	44.3	152	55.7	0.0228	1.88	1.06	3.38
Total	350		0	350	100				
Adequate Vaccination									
Yes	97	30	30.9	67	69.1				
No	253	114	45.1	139	54.9	0.0162	1.83	1.09	3.13
Total	350	144	41.1	206	58.9				
Use of emergency communication device for rescure/intervention									
Yes	31	9	29	22	71				
No	319	135	42.3	184	57.7	0.1512	1.79	0.76	4.56
Total	350	144	41.1	206	58.9				

Table 1: (continued)

Preventive measures	Total	OH: Yes	%	OH: No	%	P	OR	95%CI	
Routine cleaning and disinfecting of environmental surfaces									
Yes	135	37	27.4	98	72.6				
No	265	107	40.4	158	59.6	0.0106	1.79	1.12	2.9
Total	350	144	41.1	206	58.9				
adequate Disinfection of reusable equipment in between patients									
Yes	223	56	25.1	167	74.9				
No	127	88	69.3	39	30.7	0.0001	6.73	4.04	11.23
Total	350	144	41.1	206	58.9				
Proper disposal of materials used in in the ward / theater									
Yes	43	10	23.3	33	76.7				
No	307	134	43.6	173	56.4	0.0109	2.56	1.18	6.01
Total	350	144	41.1	206	58.9				
Recapping needles before disposals									
Yes	32	11	34.4	21	65.6				
No	319	133	41.7	186	58.3	0.4224	1.36	0.6	3.24
Total	350	144	41.1	206	58.9				
Disposing solid waste into safety box									
Yes	97	31	32	66	68				
No	253	113	44.7	140	55.3	0.0306	1.72	1.02	2.92
Total	350	144	41.1	206	58.9				

DISCUSSION

The present study evaluated the influence of preventative strategies on the prevalence of occupational hazards among health care workers in tertiary health institutions in Imo State, Nigeria. The findings indicate that compliance with occupational safety is a vital determinant in reducing the frequency of occupational hazards. This highlights the importance of institutional policies, availability of personal protective equipment (PPE), environmental hygiene, vaccination, and infection prevention practices for the protection of healthcare workers[17]. Consistent usage of personal protective equipment was significantly associated with less occurrence of occupational hazards. Healthcare workers who sometimes used PPE and those who rarely used PPE were 1.78 and 3.88 times more likely to experience occupational hazards respectively compared to those who always used PPE. This finding is in keeping with the World Health Organization recommendations that identify PPE as the first line of defence against occupational exposure to infectious pathogens and hazardous materials in healthcare settings. Similar findings have been reported by [18] who found that regular use of gloves, gowns, masks and eye protection greatly reduced occupational injuries and exposure to blood and body fluids among health care professionals. The high risk seen among workers who wore PPE inconsistently could be explained by poor compliance, poor supervision, discomfort in using PPE, or restricted availability of protective equipment[19].

Provision of adequate PPE was also revealed to be a key driver of occupational hazard occurrence. Healthcare personnel who reported poor provision of PPE were more than twice at risk of occupational hazards (OR = 2.32). This finding is in line with earlier research in Nigeria and other low- and middle-income countries that have highlighted lack of PPE as a major factor to occupational injuries and healthcare-associated illnesses. The inadequate supply of PPE creates risks to workers from biological, chemical and physical dangers during periods of increasing demand for healthcare, highlighting the necessity of institutional commitment to provide an uninterrupted supply of PPE[20]. Another important protective

factor revealed in this study was regular safety instruction. Not receiving regular safety training was associated with more than double the risk of occupational hazards (OR 2.4, 95% CI 1.4–4.1) compared with receiving regular safety training. The finding is consistent with studies by International Labour Organization and other occupational health researchers who have shown that continuing education improves compliance with infection prevention and control measures, increases awareness of workplace risks and promotes safer work practices. The regular training strengthens the workers' capacity to handle hazardous products, respond to emergencies, and properly utilise protective equipment, which reduces workplace injuries[21].

The study also revealed that updated hospital policies greatly cut down on occupational dangers. Healthcare personnel who worked in facilities without better occupational safety policies had 1.8 times odds of having occupational risks. Institutional safety policies establish the basis for executing occupational health programs, monitoring compliance, enforcing required measures, and assuring accountability. Previous research has indicated that healthcare organisations with complete occupational health policies experienced fewer workplace injuries and were more likely to follow infection prevention practices than those without formal safety programs[21].

The occurrence of occupational hazards was substantially associated with proper waste disposal techniques. Participants who reported inappropriate waste disposal procedures had almost twice the likelihood of occupational hazards compared with those practicing suitable waste management. Healthcare trash comprises infectious, toxic and sharp elements that might cause injury and transmissibility of diseases. Proper segregation, processing, transportation and disposal of healthcare waste will reduce exposure to these hazards. Similar findings have been observed in studies from sub-Saharan Africa where poor waste management systems were major contributors to occupational injuries among health-care workers[22]. Another key protective factor revealed in this investigation was adequate immunisation status. The probabilities of occupational hazards were considerably higher among unvaccinated healthcare professionals than their vaccinated counterparts. Vaccination remains one of the most effective preventive measures against occupational infections, including hepatitis B and other vaccine-preventable diseases that are frequently seen in healthcare settings. This conclusion is consistent with earlier research suggesting that vaccinated healthcare personnel have lower occupational infection rates and greater workplace safety compared to unvaccinated individuals[23].

The regular cleaning and disinfecting of environmental surfaces also greatly lowered workplace risks. Workers who did not regularly clean and disinfect environmental surfaces were 1.8 times more likely to have occupational hazards. Environmental contamination is a major factor in the spread of healthcare-associated diseases and routine environmental cleansing disrupts the chain of infection. This conclusion is in keeping with the current infection control recommendations for routine cleaning and disinfection of commonly touched surfaces within health-care settings[24]. Another important relationship found in this study was the proper cleaning of reusable equipment between patients. The probabilities of occupational hazards were about 7 times greater among healthcare personnel who did not disinfect reusable equipment properly as compared to those who always disinfected equipment. This was the strongest predictor revealed among the preventive behaviours studied. Properly cleansed reusable medical equipment can be an important reservoir for harmful bacteria. Previous studies have repeatedly established that non-compliance with equipment cleaning procedures significantly increases the risk of occupational exposure and healthcare-associated infections[25]. Likewise, proper disposal of items used in wards and operating theatres was strongly associated with lower occupational hazards. Healthcare professionals with inappropriate disposal practices were more than two times likely to face occupational dangers. Safe disposal of hazardous materials reduces exposure to infectious waste, sharps injuries and environmental contamination. These findings are in agreement with published infection prevention recommendations highlighting effective segregation and disposal of clinical waste at the time of generation[26].

The practice of putting solid garbage into designated safety bins also greatly decreased occupational dangers. Health care personnel who did not properly dispose of solid waste had 1.72 times the risks of occupational hazards. Safety boxes are intended to reduce unintentional exposure to contaminated waste and sharps, and consequently reduce injuries and transmission of blood-borne infections. This study further highlights the need for strict compliance with conventional waste management standards in healthcare facilities[27].

However, healthcare personnel who did not employ emergency communication devices for rescue or intervention had increased probabilities of occupational hazards, but the association was not significant statistically. The absence of any statistical significance may be explained by the very small number of individuals reporting the availability and use of such devices, leading to inadequate statistical power. However, emergency communication systems are crucial components of occupational safety since they facilitate rapid reaction to workplace emergencies and reduce the severity of occupational incidents[28].

In addition, recapping needles before disposal was not statistically significantly connected with occupational hazards in this study. Participants who practiced needle recapping had slightly increased probabilities of occupational hazards but the association was not statistically significant. This finding is in disagreement with several prior research that have linked needle recapping to a significant contribution to needlestick injuries. This variation may be due to changes in local practice

patterns, reporting behaviour, sample size, or the increased use of safer needle disposal techniques within the participating institutions [29]. Although statistical significance was not observed in the current investigation, international guidelines for infection prevention continue to warn against needle recapping based on the recognised relationship with needlestick injuries.

CONCLUSION:

This study's results show that the comprehensive execution of occupational safety measures like correct use of PPE, adequate provision of PPE, ongoing safety training, effective hospital safety policies, proper waste management, vaccination, environmental cleaning, disinfection of equipment, and safe disposal practices greatly reduces occupational hazards in health care workers. The strengthening of these preventive measures through sustained institutional commitment, continuous staff education, adequate resource allocation and effective monitoring systems will be essential for improving occupational health and a safer working environment for healthcare workers in tertiary health institutions in Imo State, Nigeria.

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