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Practice and Determinants of Infection Prevention and Control Measures among Health Care Workers at Benjamin Mkapa Hospital, Dodoma-Tanzania

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Abstract

Introduction: Infection Prevention and Control are scientific approaches and practical solutions designed to prevent harm caused by infection to patients and health workers. The study aimed to assess Infection prevention and control practices and determinants. **Method:** The hospital-based analytical cross-sectional study design was employed through a convenience approach. The SPSS version 26 was used for data analysis. **Results:** 72.5% of healthcare workers at Benjamin Mkapa Hospital observed not performing hand hygiene before direct contact with the patient or before the procedure and 60.3% observed performing hand hygiene after direct contact with the patient or after removing gloves. Professionals (Doctors, Medical attendants, and Nurses) were significantly practiced more in infection prevention and control by 2.860, 2.923, and 3.237 units respectively compared to pharmacy personnel. **Conclusion:** The sustainable availability of Infection Prevention and Control resources is important to enhance a healthy working environment. The current study has shown that the availability of Equipment and Supplies was 100% for gloves, face masks, and sanitizer. The multivariate results showed a statistically significant relationship between those trained in IPC and those more likely to practice IPC than those not trained.

Keywords

Benjamin Mkapa Hospital, Dodoma, Health Care Workers, Infection Prevention Control, Practice Tanzania

1. Introduction

Infection Prevention and Control (IPC) is a scientific approach and practical solution designed to prevent harm caused by infection to patients and healthcare workers (HCW) [1]. HCWs and hospital clients including patients and their caregivers risk acquiring infectious diseases at the hospital premises during care provision or when seeking healthcare services [2]. This is because the hospital environment harbors various infectious agents by patients, HCWs, and the environment [3].

Infectious diseases contribute to significant morbidity and mortality worldwide. Many HCWs get infected in the working environment; for example, in the Kingdom of Saudi Arabia, around 3 million healthcare workers experience percutaneous exposure to blood-borne viruses each year [4] [5]. In Africa, infectious diseases produce as much as 2 to 20 times significantly higher morbidity and mortality than in developed countries mainly due to cross-infection [6]. In Tanzania 35.1% of HCWs experience needle stick injury due to poor adherence and lack of training on IPC measures [7]-[9]. IPCs primarily focus on preventing the spread of infectious diseases from one person to another [10]. IPC is a crucial component of quality care in any healthcare setting. It requires multidisciplinary compliance by all categories and levels of HCW [11]. Under the universal precautions principle; any blood and body fluids from internal and external clients are observed as potentially infectious [12]. Standard precautions include appropriate hand hygiene, the use of suitable personal protective equipment (PPE), decontamination and sterilization, the use of an aseptic technique to reduce patient exposure to microorganisms, and management of sharps, blood spills, linen, and waste to maintain a safe environment is simple and low cost, though require HCW accountability, behavioral change, improved health care, workers' education, reporting and supportive supervision system [13] [14].

To successfully implement IPC, hospital management teams should ensure the availability of IPC resources but also put policies and intervention strategies in place that motivate HCWs to adhere to IPC standards [15]-[17].

Factors affecting IPC include the inconvenient location of PPE, overcrowding, patient demand, time-consuming, reduced ability to work, and no need for protective gear when infections are not anticipated [18] [19].

To address the challenge of poor adherence to IPC standards, Tanzania has set some strategies that can improve and maintain practice. The first strategy was the introduction of IPC Guidelines and standards which help to provide direction on the performance of IPC and assess HCW on adherence to IPC. The government introduced the Star Rating Assessment (SRA) to motivate healthcare facilities to implement IPC guidelines. The SRA compares the health facility performance on

adherence to IPC principles using baseline and reassessment data to measure the change as an indicator of improvement [1]. Despite all these strategic measures, available data manifest inadequate IPC practices among HCWs across different health facilities and several levels prompting further studies to understand the determinants of IPC practices. Thus, the study comes into place to assess the practice and determinants of IPC among HCWs at the BMH.

2. Methods

The study was conducted at Benjamin Mkapa Hospital in Dodoma region. The Benjamin Mkapa Hospital is the first ultramodern hospital in East Africa. It has been computerized from the entry point (Reception) to the exit point (pharmacy) and discharge office for outpatients and inpatients respectively. It has high-tech diagnostic equipment, skilled staff, and advanced treatment such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Cardiac Catheterization Laboratory. On top of normal specialized services, BMH provides super specialized services in Orthopedics, and Neurosurgery, Laparoscopic and Endoscopic procedures, Renal transplants, Bone Marrow Transplant, Open-heart surgeries, and Cancer Treatment. The hospital is found inside the University of Dodoma (UDOM). The Hospital is about 15 km away from Dodoma town. It serves approximately 800 - 1000 outpatients with different conditions every day. The bed capacity is 400. The hospital had a total of 777 workers including 580 health care workers who actively were working in the clinical area. The study involved nurses, doctors, laboratory personnel, pharmacy personnel, radiology personnel, and medical attendants of BMH with at least 12 months of working experience.

The hospital-based analytical cross-sectional study design was employed through a convenience approach. In this approach, the subjects are included in the study because they happened to be in the right place at the right time and accepted to participate. The study was conducted between November 2022 and January 2023. Data analysis was steered by the use of the Statistical Package for Social Science (SPSS) version 26. The Excel file formatted data was entered in the SPSS and cleaned.

2.1. To Assess the Practice of Health Care Workers on Infection Prevention and Control Measures at Benjamin Mkapa Hospital

Descriptive analysis was performed based on a structured questionnaire to identify aspects such as several social demographic characteristics of participants at BMH, availability of IPC resources in 32 units in the hospital, and Practice of health care workers on infection prevention and control measures at Benjamin Mkapa Hospital. Findings are summarized using percentages and presented in tables.

2.2. To Identify Factors Associated with the Practice of Infection Prevention and Control among Healthcare Workers at Benjamin Mkapa Hospital

To address these objectives, a linear regression model with bivariate and multivariate

was used to control for confounder and multicollinearity, the factors that influence how well healthcare workers practice infection prevention and control can be obtained as follows:

The bivariate linear regression (simple linear regression) model was first run to find the demographic and socio-economic variables that have statistical significance in healthcare workers' practice infection prevention and control. The formula for a simple linear regression is:

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Y is the predicted value of the healthcare workers' practice infection prevention and control (dependent variable) for any given value of the Demographic and Socio-Economic variable (independent variable).

β_0 is the intercept, the predicted value of healthcare workers practicing infection prevention and control when the x is 0.

β_1 is the regression coefficient—how much we expect y to change as the Demographic and Socio-Economic variables increase.

X is the Demographic and Socio-Economic variable and (the variable we expect is influencing healthcare workers' practice infection prevention and control).

ϵ is the error of the estimate, or how much variation there is in our estimate of the regression coefficient.

Multivariate linear regression (multiple linear regression) models were run and took only factor which was statistically significant from bivariate linear regression to control for confounder variables and reduce multicollinearity. The formula for a multiple linear regression is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots \beta_n X_n + \epsilon$$

Y is the predicted value of the healthcare workers' practice infection prevention and control (dependent variable) for any given value of the Demographic and Socio-Economic variable (independent variable).

β_0 is the intercept, the predicted value of healthcare workers practicing infection prevention and control when the X is 0.

$\beta_1, \beta_2, \beta_n$ are the regression coefficient—how much we expect y to change as Demographic and Socio-Economic variable increases.

X_1, X_2, X_n are the Demographic and Socio-Economic variables and (the variable we expect is influencing healthcare workers' practice of infection prevention and control).

ϵ is the error of the estimate, or how much variation there is in our estimate of the regression coefficient.

3. Results

3.1. Social Demographics Characteristics of Participants at BMH

The study involved 302 participants from 32 different units (16 specialized clinics, Cardiac Catheterization Laboratory (Cath lab) Emergency Medical Department (EMD), Laboratory, Pharmacy, Radiology, Operating Theatre, and 10 wards).

Among 302 participants, 5 (1.7%) were from Cath Lab, 101 (33.4%) from different Clinics, 18 (6.0%) from EMD, 22 (7.3%) from Laboratory, 20 (6.6%) from Pharmacy, 12 (4.0%) from Radiology, 12 (4.0%) from Operating Theatre and 112 (37.1%) from Wards.

Participants Mean age (±SD) was 31.6 ± 6.1 with Mean age in clinical practice (±SD) of 6.0 ± 5.2 and most of the participants 152 (50.3%) were female. IPC Mean Knowledge; (±SD) was 72.62 ± 14.6. Professionally, the majority of them 126 (41.7%) were nurses. 109 (36.1%) participants were diploma-level education. 162 (53.6%) participants reported that they had never received any training regarding IPC. Among 140 (46.4%) participants who received training on IPC, 77 (25.5%) got it when they were at BMH. A large number (25.5%) of participants were capacitated in IPC training at BMH because there is a Quality Assurance (QA) unit that is responsible for IPC training and 63 (20.9%) got it before enrolling at BMH (Table 1).

Table 1. Social demographics characteristics of participants at BMH (N = 302).

Variable	Frequency (%)
Working Unit	
Cardiac Catheterization Laboratory (Cath lab)	5 (1.7)
Clinics	101 (33.4)
EMD	18 (6.0)
Lab	22 (7.3)
Pharmacy	20 (6.6)
Radiology	12 (4.0)
Theatre	12 (4.0)
Wards	112 (37.1)
Sex of respondent	
Female	152 (50.3)
Male	150 (49.7)
Age of respondent; Mean (±SD)	31.6 (±6.1)
Years in clinical practice; Mean (SD)	6.0 (5.2)
Percent of IPC Knowledge; Mean (SD)	72.62 (14.6)
Profession of respondents	
Doctor	81 (26.8)
Laboratory personnel	21 (7.0)
Medical Attendant	49 (16.2)
Nurse	126 (41.7)
Pharm personnel	19 (6.3)
Radiology personnel	6 (2.0)

Continued

Educational status of the respondents	
Pre-certificate/Non-professional level	34 (11.3)
Certificate level	33 (10.9)
Diploma level	109 (36.1)
Bachelor level	89 (29.5)
Masters	37 (12.3)
Ever received specific training regarding IPC	
Yes	140 (46.4)
No	162 (53.6)
Place of obtained training regarding IPC	
Within BMH Hospital	77 (25.5)
Outside BMH Hospital	63 (20.9)
Never obtain IPC training	162 (53.6)

3.2. Availability of IPC Resources in 32 Units of the Hospital

The availability of different IPC resources at BMH was assessed in 32 units during the study. Gloves, Face masks, hand sanitizer, and black bins/bin liners were available for 32 (100%). 31 units (96.9%) apologized that, there is IPC personally at the hospital and availability of hand washing facilities with liquid soap. Chlorine solution, powder, tablets, or any other disinfectants and hand washing facilities with running water were available at all times for 30 (93.8%). Guidelines or Standards for IPC, Standard Operating Procedure (SOPs) for Hand hygiene, red bins/bin liners, and yellow bins/bin liners, were available for 29 (90.6%). Plastic Apron and SOPs for processing instruments including cleaning and decontamination were available for 27 (84.4%) meanwhile the availability of SOPs for Dilution of Disinfectants was 26 (81.3%). SOPs for Post Exposure Prophylaxis (PEP) were available for 22 (68.8%), SOPs for safety practice for handling and passing sharps for 16 (50.0%), hand washing facilities at the right place were available only for 13 (40.6%) and also hand washing facilities with disposable towel or hand towel dispenser was only for 3 (9.4%). See Table 2.

3.3. The Practice of Health Care Workers on IPC Measures at BMH (N = 302)

On descriptive result of IPC practice measures, 219 (72.5%) of health care workers observed not performing hand hygiene before direct contact with the patient or before performing procedure, 182 (60.3%) observed performing hand hygiene after direct contact with the patient or after removing gloves, 283 (93.7%) were observed wearing PPE, 220 (72.8%), were observed safely disposing infectious waste material; highly infectious waste in red bucket, infectious waste in yellow bucket, non-infectious waste in blue or black and sharps in safety box, 189 (62.6%) were not performing hand hygiene by wet hand, apply soap, rub palm to palm, wash the back of the hand, wash finger by finger, wash nails, wash between the fingers,

wash wrist, rinse with water and dry with dry towel, 169 (56.0%) were correctly telling the first aid procedure in an event of exposure to the blood or body fluids—first step; do not squeeze or rub injury site, 183 (60.6%) were correctly telling the first aid procedure in an event of exposure to the blood or body fluids—second step; wash site immediately using soap or mild disinfectant solution that would not irritate the skin, 197 (65.2%) were incorrectly telling the first aid procedure in an event of exposure to the blood or body fluids—third step; if running water is not available, cleaning the site with the gel or any other hand cleaning solution available, 215 (71.2%) were incorrectly telling the first aid procedure in an event of exposure to the blood or body fluids—fourth step; do not use strong solution such as bleach or iodine to clean the site as these may irritate the wound and make the injury worse, 248 (82.1%) were correctly telling the reporting procedure following in an event of exposure to the blood and body fluids (Table 3).

Table 2. Availability of IPC resources in the 32 units of the hospital (N = 32).

Variable	availability status N (%)	
	Available	**not available**
Equipment and supplies and IPC Personnel		
Gloves	32 (100)	0 (0)
Face Mask	32 (100)	0 (0)
Plastic Apron	27 (84.4)	5 (15.6)
Sanitizer	32 (100)	0 (0)
Chlorine solution, powder tablets, or any other disinfectants as per MoH guideline	30 (93.8)	2 (6.3)
Yellow bins/bin liners	29 (90.6)	3 (9.4)
Red bins/bin liners	29 (90.6)	3 (9.4)
Black bins/bin liners	32 (100)	0 (0)
IPC personnel at the hospital	31 (96.9)	1 (3.1)
Guidelines and SOPS		
Guideline or Standards for IPC	29 (90.6)	3 (9.4)
SOPs for Hand hygiene	29 (90.6)	3 (9.4)
SOPs for processing instruments including cleaning and decontamination	27 (84.4)	5 (15.6)
SOPs for Post Exposure Prophylaxis (PEP)	22 (68.8)	10 (31.3)
SOPs for Dilution of Disinfectants	26 (81.3)	6 (18.8)
SOPs for safety practice for handling and passing sharps	16 (50.0)	16 (50.0)
Institutional infrastructure (hand washing facility in the working area)		
Hand washing facilities at the right place	13 (40.6)	19 (59.4)
Hand washing facilities with running water available at all times	30 (93.8)	2 (6.3)
Hand washing facilities with liquid soap	31 (96.9)	1 (3.1)
Hand-washing facilities with disposable towels or hand towel dispensers	3 (9.4)	29 (90.6)

Table 3. Practice of healthcare workers on IPC measures at BMH.

Variable	Observed status N (%)	
	Observed	**Not Observed**
Healthcare workers perform hand hygiene before direct contact with the patient or before performing the procedure	83 (27.5)	219 (72.5)
Healthcare workers perform hand hygiene after direct contact with the patient or after removing gloves	182 (60.3)	120 (39.7)
Healthcare workers wear personal protective equipment (PPE) accordingly	283 (93.7)	19 (6.3)
Healthcare workers safely dispose of infectious waste material according to the Ministry of Health guideline (MoH)	220 (72.8)	82 (27.2)
Healthcare workers perform hand hygiene at MoH	113 (37.4)	189 (62.6)
Healthcare workers perform the first step of first aid correctly in an event of exposure to blood or body fluids according to MoH	169 (56.0)	133 (44.0)
Healthcare workers perform the second step of the first aid procedure in an event of exposure to blood or body fluids according to MoH	183 (60.6)	119 (39.4)
Healthcare workers perform the third step of the first aid procedure in an event of exposure to blood or body fluids according to MoH	105 (34.8)	197 (65.2)
Healthcare workers perform the fourth step of the first aid procedure in an event of exposure to blood or body fluids according to MoH	87 (28.8)	215 (71.2)
Health care workers report procedures to be followed in an event of exposure to the blood and body fluids according to MoH	248 (82.1)	54 (17.9)

3.4. Factors Associated with the Practice of IPC among Health Care Workers at BMH

Using a linear regression model, the factors that influence how well HCW practice infection prevention and control are summarized in Table 4 below. Bivariate linear regression was used to fit the model, and multivariate linear regression was also employed as an adjustment to remove the effect of the third variable (confounding).

The result of multivariate linear regression was significant since as the age of HCW increases in years in clinical practice, leads to a decrease in the standard of practice in IPC by 0.113 units. To avoid practicing in substandard following aging, the institution established the Quality Assurance (QA) Unit which has the responsibility of performing mentorship and supportive supervision to the BMH healthcare workers.

Healthcare workers who Received training regarding IPC, significantly practiced more in IPC by 0.566 units compared to those who did not receive training.

Professionals (Doctors, Medical attendants, and Nurses) were significantly practiced more in infection prevention and control by 2.860, 2.923, and 3.237 units respectively compared to pharmacy personnel (Table 4).

Table 4. Factors associated with the practice of IPC.

Variable	Bivariate linear regression			multivariate linear regression		
	β	Sig.	95% CI	β	Sig.	95% CI
Age of respondent	−0.063	**0.001**	(−0.094, −0.031)	−0.113	**0.002**	**(−0.186, −0.041)**
Total years in clinical practice	−0.053	**0.006**	(−0.090, −0.015)	0.042	0.300	(−0.038, 0.122)
Sex [Female]	0.145	0.469	(−0.248, 0.538)			
Received training regarding IPC [Yes]	0.515	**0.010**	(0.125, 0.905)	0.566	**0.006**	**(0.168, 0.965)**
Percent of IPC knowledge	0.011	0.107	(−0.002, 0.024)	0.012	0.089	(−0.002, 0.026)
Working Unit						
Pharmacy	Ref					
Cath Lab	−0.15	0.862	(−1.851, 1.551)	−3.096	**0.015**	**(−5.597, −0.595)**
Clinic	0.206	0.626	(−0.626, 1.039)	−2.679	**0.010**	**(−4.724, −0.633)**
EMD	0.739	0.189	(−0.366, 1.844)	−2.35	**0.035**	**(−4.534, −0.166)**
Lab	0.714	0.182	(−0.337, 1.765)	−1.455	0.252	(−3.948, 1.039)
Radiology	−0.317	0.616	(−1.559, 0.925)	−2.317	0.057	(−4.700, 0.066)
Theatre	0.85	0.179	(−0.392, 2.092)	−2.219	0.053	(−4.467, 0.030)
ward	0.609	0.148	(−0.217, 1.435)	−2.435	**0.020**	**(−4.482, −0.387)**
Profession of respondents						
Pharmacy personnel	Ref					
doctor	0.454	0.298	(−0.402, 1.311)	2.86	**0.009**	**(0.719, 5.001)**
Laboratory Personnel	0.729	0.178	(−0.335, 1.793)	2.056	0.110	(−0.472, 4.584)
Medical Attendant	0.893	0.054	(−0.016, 1.801)	2.923	**0.007**	**(0.792, 5.054)**
Nurse	0.999	**0.018**	(0.172, 1.826)	3.237	**0.002**	**(1.177, 5.298)**
Radiology personnel	−0.842	0.293	(−2.416, 0.731)	1.79	0.204	(−0.978, 4.559)
Educational status						
Bachelor level	Ref					
Certificate level	0.361	0.310	(−0.337, 1.059)	0.192	0.684	(−0.735, 1.119)
Diploma	0.206	0.408	(−0.283, 0.696)	0.029	0.922	(−0.553, 0.611)
Masters	−0.076	0.824	(−0.746, 0.595)	0.725	0.053	(−0.010, 1.460)
Pre-certificate/non-professional level	0.198	0.581	(−0.508, 0.904)	0.012	0.986	(−1.303, 1.326)
Professional level	1.073	0.389	(−1.377, 3.523)	0.291	0.814	(−2.147, 2.730)

4. Discussion

The study aimed to know IPC and its associated factors. The next sub-sections discuss the key findings of the research objectives.

4.1. Availability of IPC Resources

Some IPC resources such as Gloves, Face Mask, Sanitizer, Black Bins, Yellow bins/bin liners, red bins/bin liners, Black bins/bin liners, hand washing facilities with liquid

soap, chlorine solution/powder/tablets or any other disinfectants, and hand washing facilities with running water were available at all times in all 32 units for more than three quarter; this is possibly due to the HCW are very mindful with the use of these items for IPC to avoid contamination and made them in daily significant usable items. This information goes hand in hand with the technical report of the HCW on the importance of PPE which states that; the appropriate use of effective PPE, reduces the HCW's likelihood of becoming infected while minimizing exposure to other patients they care for. This may reduce demands placed on the healthcare system and help to preserve the workforce [20] The availability of IPC resources was high in the current study compared to the study conducted in 51 districts of Tanzania mainland in which most of the facilities had less than two quarters [1]. This difference might be attributed to the level and location of the health facilities since the BMH is one of the tertiary hospitals in Tanzania and is allocated in the headquarters of Tanzania and well equipped with medical infrastructures.

4.2. The Guidelines and SOPS

Guidelines or Standards for IPC, and SOPs for Hand Hygiene were available in 29 units out of 32 for 90.6%; this might be because they were supplied in the respective unit and regularly supervised to ensure their existence. This finding is similar to the WHO guideline which explains that one of the minimum requirements for IPC programs is to supply and ensure the presence of IPC policies, procedures, and protocols through supervision [21].

In more than 90% of the hand washing facilities in the working area, hand washing facilities with running water were available at all times in 30 units out of 32. This might be due to the facility's reliable water supply, which influences the construction of hand-washing facilities to provide quality care and reduce the spread of diseases. This is similar to the information from the Global Water, Sanitation and Hand Hygiene which states that to provide quality care, healthcare facilities need to have a safe and accessible water supply; clean and safe sanitation facilities; hand hygiene facilities at points of care, and toilets; and appropriate waste disposal systems; Infrastructure that supports water, sanitation, hygiene (WASH) and healthcare waste management practices helps prevent the spread of diseases within the healthcare facility and to the surrounding community [20] [22].

Moreover, HCWs with inadequate knowledge were less likely to practice IPC than those with adequate knowledge, possibly due to a lack of familiarity with IPC issues. The information is supported by the research conducted in Ghana and Rwanda which manifested that, high compliance and good practice in IPC were influenced by the knowledge acquired through education of IPC [23] [24].

4.3. Practice of Health Care Workers on IPC Measures at BMH

The study showed that more than three-quarters of participants were wearing PPE according to Tanzania Ministry of Health guidelines. This is possibly due to most

of the respondents being knowledgeable about IPC, so they needed to protect themself against infection. This is supported by the findings from the Chicago School of Psychology and Egypt which said that doctors, nurses, and other professionals used protective gear to prevent the risk of exposure to infectious diseases [25] [26]. These similarities may be the facilities have enough IPC resources but this is not in line with the study done in Bir Hospital which is in the heart of the capital city of Nepal, Kathmandu in which more than two-quarters of participants had poor practice on infection prevention through wearing of personal protective equipment, decontamination, cleaning of instruments, sterilization, and use of antiseptics [27].

Still, more than two-thirds of participants were performing hand hygiene after direct contact with the patient or after removing gloves and also were safely disposing of infectious waste material accordingly; *i.e.* highly infectious waste in the red bucket, infectious waste in the yellow bucket, non-infectious waste in blue or black and sharps in the safety box. This is possibly due to BMH being a tertiary hospital, and IPC infrastructures have been well established. This study is similar to the survey conducted in Egypt and Northwest Ethiopia where participants showed good compliance in IPC and the facility had good infrastructure of IPC in items such as sharp bins and liquid soap [3] [26] but was not in line with the study done in Southeast Nigeria where participants had poor levels of IPC compliance [28].

More than two-thirds of participants were incorrectly telling the first aid procedure in the event of exposure to the blood or body fluids in case of not using a strong solution such as bleach or iodine to clean the site as these may irritate the wound and make the injury worse. The results of the current study were slightly higher than the study done in Cameroon [29] but were not in line with the study conducted in Ghana where more than three-quarters of participants used to wash injured sites thoroughly with soap under running water [30].

4.4. Factors Associated with the Practice of IPC among Health Care Workers at BMH

A linear regression model was used to determine factors associated with the practice of IPC measures among healthcare workers at BMH. Bivariate linear regression was used to fit the model, and multivariate linear regression was also employed as an adjustment to remove the effect of the third variable (confounding).

There was a statistically significant relationship and those who are trained in IPC were more likely to practice IPC in comparison to those who were not trained. This might be due to inadequate mentorship and monitoring because analysis of knowledge in this study showed, that more than a quarter of respondents were knowledgeable including even those who were not trained to understand IPC issues through their study curriculum at College/University. That was similar to the study conducted at Songwe, Tanzania stated that those who had two or more training sessions on IPC in the previous year were more likely to comply at a high

level compared to those with no training [9]. This contradicts the study done at Wolaitta Sodo Otona Teaching and Referral Hospital, Ethiopia in which healthcare workers not receive training on infection prevention were more likely to practice IPC [3].

5. Study Limitation

The study population was recruited from a limited geographical area. Therefore the results cannot be generalized to other regions in Tanzania. However, these findings may represent other contexts with similar socio-economic characteristics.

6. Conclusion

The sustainable availability of IPC resources is important to enhance a healthy working environment. The current study has shown that the availability of Equipment and Supplies was 100% for gloves, face masks, and sanitizer. The multivariate results showed a statistically significant relationship between those trained in IPC and those more likely to practice than those not trained.

Ethics Approval and Consent to Participate

The ethical approval for this study was obtained from the University of Dodoma Research Ethics Committee with reference number MA.84/261/02/. Each participant who participated in this study signed the informed consent form after the full description of the purpose of the study. Participants were free to withdraw from the research and no penalty was imposed. To enhance anonymity and confidentiality of participant's information each questionnaire and checklists used were coded with numbers; no names of the participants were used. After entry into SPSS, the dataset was kept in the principal investigators' computer and secured by password. Data was only accessed by researchers and used solely for research purposes.

Availability of Data and Material

The dataset used and analyzed during the study is available from the corresponding author on reasonable request.

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and data analysis together with Mr.Heri Masuka for participating in steering the exercise of data collection and analysis.

Authors' Contributions

BSK, HIH, ABC, GMM, FJN, and BLN, conceptualized and designed the survey. HIH and BSK supervised the data collection, analyzed the data, interpreted the results, and drafted up the manuscript as well as involved in data collection. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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List of Abbreviations

BMH: Benjamin Mkapa Hospital; DNMS: Director of Nursing and Midwifery Services; HCW: Health Care Worker; IPC: Infection Prevention and Control; MoH: Ministry of Health; QI: Quality Improvement; QIT: Quality Improvement Team; PI: Principal Investigator; PPE: Personal Protective Equipment; RA: Research Assistance.